### DRAFT ENVIRONMENTAL IMPACT REPORT

# 751 GATEWAY BOULEVARD PROJECT

CITY OF SOUTH SAN FRANCISCO, CALIFORNIA STATE CLEARINGHOUSE No. 2020010281

DRAFT EIR PUBLICATION DATE: SEPTEMBER 22, 2020
DRAFT EIR PUBLIC HEARING DATE: OCTOBER 15, 2020
DRAFT EIR PUBLIC COMMENT PERIOD: SEPTEMBER 22—
NOVEMBER 8, 2020

### **WRITTEN COMMENTS SHOULD BE SENT:**

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City of South San Francisco Acronyms and Abbreviations

# **Acronyms and Abbreviations**

 $\mu g/m^3$ micrograms per cubic meter

ΑB Assembly Bill

Association of Bay Area Governments ABAG

ADA Americans with Disabilities Act

AIA Airport Influence Area

ALUC San Mateo County Airport Land Use Commission

**ALUCP** Airport Land Use Compatibility Plan **ALUCs** Airport Land Use Commissions

**AMS** alternate mode share amsl above mean sea level

**APNs** Assessor's Parcel Numbers

**BAAQMD** Bay Area Air Quality Management District

**BART Bay Area Rapid Transit** BC **Business Commercial** 

**BCDC** San Francisco Bay Conservation and Development Commission

below ground surface bgs

**BMPs** best management practices

**BTU** British thermal unit

C/CAG City/County Association of Governments

CAA Clean Air Act

CAAOS California Ambient Air Quality Standards CAFÉ standards Corporate Average Fuel Economy Standards

cal BP calibrated years before present

CAL FIRE California Department of Forestry and Fire Protection

CalEEMod California Emissions Estimator Model

CalEPA California Environmental Protection Agency

CalRecycle California Department of Resources Recycling and Recovery

Caltrans California Department of Transportation

**CAMUTCD** California Manual on Uniform Traffic Control Devices

CAP Climate Action Plan

California Air Resources Board **CARB** CCAs **Community Choice Aggregators** California Code of Regulations **CCR** 

CCR Code of Regulations

**CDFW** California Department of Fish and Wildlife

CEC California Energy Commission **CEQA** California Environmental Quality Act **CESA** California Endangered Species Act

CFR Code of Federal Regulations

 $CH_4$ methane

CMA **Congestion Management Agency** CMP **Congestion Management Program CNDDB** California Natural Diversity Database CNEL Community Noise Equivalent Level

**CNPPA** California Native Plant Protection Act of 1977

CO carbon monoxide carbon dioxide  $CO_2$ 

carbon dioxide equivalent CO<sub>2</sub>e

**CPUC** California Public Utilities Commission CRHR California Register of Historical Resources

**CWA** Clean Water Act

decibel dB

dBA A-weighted decibel dBC C-weighted decibel

DPM diesel particulate matter

**DTSC** Department of Toxic Substances Control

**EIR Environmental Impact Report** 

EO **Executive Order** 

**EPA Environmental Protection Agency** 

**ESPs** energy service providers

FAA Federal Aviation Administration

FAR floor area ratio

**FEMA** Federal Emergency Management Agency

**FESA** Federal Endangered Species Act **FHWA** Federal Highway Administration FTA **Federal Transit Administration** 

**GHG** greenhouse gas

**GSAs Groundwater Sustainability Agencies** 

**GSPD** Gateway Specific Plan District **GSPs Groundwater Sustainability Plans** 

**GWP** global warming potential

**HBW** home-based work **HFCs** hydroflourocarbons

hazard index ΗΙ

HRA health risk assessment **HVAC** heating, ventilation, and air conditioning

Hz hertz

**IOUs** investor-owned utilities

**IPaC** Information for Planning and Consultation **IPCC** Intergovernmental Panel on Climate Change

**IRP** 2018 Integrated Resource Plan

ITE Institute of Transportation Engineers

kBTU thousand BTU

kilowatt kW

kWh kilowatt hour  $L_{dn}$ day-night level

**LEED** Leadership in Energy and Environmental Design

 $\mathsf{L}_{\mathsf{eq}}$ equivalent sound level LID Low-Impact Development maximum sound level  $L_{max}$ minimum sound level  $L_{min}$ 

Level of Service LOS

LRA Local Responsibility Area **MBTA** Migratory Bird Treaty Act  $mg/m^3$ milligrams per cubic meter

**MPOs** Metropolitan Planning Organizations

**MRP** Municipal Regional Permit

 $N_2O$ nitrous oxide

**NAAQS** National Ambient Air Quality Standards

NCP National Contingency Plan

**NDCs Nationally Determined Contributions** 

**NHTSA** National Highway Traffic Safety Administration

NO nitric oxide  $NO_2$ nitrogen dioxide NOC **Notice of Completion** NOD Notice of Determination

non-VHFHSZ Non-Very High Fire Hazard Severity Zone

NOP **Notice of Preparation** 

nitrogen oxides  $NO_{x}$ 

**NPDES** National Pollutant Discharge Elimination System

**NWPR** Navigable Waters Protection Rule

 $O_3$ ozone

**OEHHA** Office of Environmental Health Hazard Assessment

OPR Office of Planning and Research **OSHA** Occupational Safety and Health Administration

**PCBs** polychlorinated biphenyls **PCE** Peninsula Clean Energy

**PCWQCA** Porter-Cologne Water Quality Control Act

PPV peak particle velocity **PFCs** perfluorocarbons

PG&E Pacific Gas and Electric PM particulate matter parts per billion ppb parts per million ppm

R&D research and development

**Recognized Environmental Conditions** RECs RHNA **Regional Housing Needs Allocation** 

**RMS** root mean square **ROGs** reactive organic gases

**RPS** Renewables Portfolio Standard **RTPs Regional Transportation Plans** 

**RWQCB** Regional Water Quality Control Board

SAFF Safer Affordable Fuel-Efficient SamTrans San Mateo County Transit District

SB Senate Bill

SCS Sustainable Communities Strategy

 $SF_6$ sulfur hexafluoride

**SFBAAB** San Francisco Bay Area Air Basin **SFO** San Francisco International Airport

**SFPUC** San Francisco Public Utilities Commission SGMA Sustainable Groundwater Management Act

**SLCP** short-lived climate pollutant

**SMCEHD** San Mateo County Environmental Health Department

**SMCWPPP** San Mateo Countywide Water Pollution Prevention Program

State Water Resources Control Board

SO<sub>2</sub> sulfur dioxide

**SWRCB** 

SRAs State Responsibility Areas

**SSFFD** South San Francisco Fire Department **SSFPD** South San Francisco Police Department South San Francisco Unified School District **SSFUSD SWPPP** Stormwater Pollution Prevention Plan

**TACs Toxic Air Contaminants** 

TAZ Transportation Analysis Zone City of South San Francisco Acronyms and Abbreviations

TDM Transportation Demand Management

TPAs Transit Priority Areas

U.S. 101 U.S. Route 101

USACE U.S. Army Corps of Engineers

USC United States Code

USEPA U.S. Environmental Protection Agency

USFWS U.S. Fish and Wildlife Service

USGS U.S. Geological Survey

UWMP Urban Water Management Plan

VHFHSZs Very High Fire Hazard Severity Zones

VMT vehicle miles traveled

WDRs Waste Discharge Requirements

WEAP Worker Environmental Awareness Program
WETA Water Emergency Transportation Authority

WSA Water Supply Assessment

This chapter summarizes the 751 Gateway Boulevard Project (proposed project), outlines the purpose of this Environmental Impact Report (EIR), summarizes the environmental review process, and describes the organization of the draft EIR.

## 1.1 Project Summary

The project sponsor, 701 Gateway Center LLC, proposes to redevelop a 7.4-acre, irregularly shaped site within the City of South San Francisco's (City's) Gateway Specific Plan planning area with a research and development (R&D) facility and office building. The project site is in an area referred to as the Gateway Campus (consisting of eight buildings at 601, 611, and 651 Gateway Boulevard; 681 to 685 Gateway Boulevard; 701 Gateway Boulevard; 801 Gateway Boulevard; and 901 to 951 Gateway Boulevard). The project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west. The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) currently consists of an existing six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and a surface parking lot with approximately 558 parking spaces.

The proposed project involves construction of a 148-foot-tall, seven-story building with approximately 208,800 square feet of space (60 percent R&D uses and 40 percent office uses). The new building would be constructed on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would remain. The ground floor of the proposed building would include a "through lobby" with access from the north and south; the lobby would include an amenity space for tenants. An entry plaza and landscaped visitor lot would be constructed north of the proposed building. An entrance and screened service yard would be constructed south of the proposed building. The proposed project would improve pedestrian connections between the nearby Gateway Campus buildings at 701, 901, 951, and 801 Gateway Boulevard by creating a pedestrian hub central to the campus. The proposed project would also include surface parking lots with a total of 418 parking spaces on-site (including approximately 42 parking spaces in a lot north of the proposed building) for use of the tenants on-site and within the Gateway Campus. Construction of the proposed project, if the related entitlements are approved by the City, would begin in 2020 and occur over approximately 18 months, with an anticipated completion date in 2021.

# 1.2 Purpose of This Draft EIR

This EIR has been prepared by the South San Francisco Planning Division in the City of South San Francisco, the Lead Agency for the proposed project, in compliance with the provisions of CEQA and the CEQA Guidelines (California Public Resources Code Section 21000 et seq., and California Code of Regulations Title 14, Section 15000 et seq., "CEQA Guidelines"). The lead agency is the public agency that has the principal responsibility for carrying out or approving a project.

As stated in CEQA Guidelines Section 15121(a), an EIR is an informational document intended to inform public agency decision-makers and the public of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project. This EIR assesses potentially significant impacts as defined in CEQA Guidelines Section 15382 as substantial, or potentially substantial, adverse changes 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.

The degree of specificity required in an EIR should "correspond to the degree of specificity involved in the underlying activity which is described in the EIR" (CEQA Guidelines Section 15146). Pursuant to CEQA Guidelines Section 15161, this is a project-level EIR, defined as an EIR that examines the environmental impacts of a specific development project. As stated above, the EIR analyzes a specific project site development plan.

Before any discretionary project approvals may be granted for a proposed project, the official or decision-making body responsible for taking action on that project must take action on the required environmental documents, including (if applicable) certifying that the EIR was completed in compliance with CEQA, that the decision-making body reviewed and considered the information in the final EIR, and that the EIR reflects the City's independent judgment and analysis. EIR adequacy is defined in CEQA Guidelines Section 15151, which states "[a]n EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences."

CEQA requires that public agencies approve projects only after all feasible means available have been employed to substantially lessen the significant environmental effects of such projects. City decision-makers will use the certified EIR, along with other information and public processes, to determine whether to approve, modify, or disapprove the proposed project, and to require any feasible mitigation measures as conditions of project approval.

### 1.3 Environmental Review Process

The environmental review process for the proposed project includes a number of steps: publication and circulation of a Notice of Preparation (NOP) for public comment, publication of a draft EIR for public review and comment, preparation and publication of responses to public and agency comments on the draft EIR, and certification of the final EIR. These steps are described below.

### 1.3.1 Notice of Preparation

The City of South San Francisco Planning Division of the Economic and Community Development Department (Planning Division), issued an NOP of an EIR for the proposed 751 Gateway Project on January 21, 2020, in compliance with Title 14, Sections 15082(a), 15103, and 15375 of the California Code of Regulations (CCR). The NOP review period commenced on January 21, 2020, and concluded on February 20, 2020, and a scoping meeting was held on January 30, 2020. Two commenters spoke at the meeting. The Planning Division received three comment letters from interested parties during the public review and comment period and one letter from the State Clearinghouse providing the NOP to responsible agencies. The Planning Division has considered the comments made by the public in preparation of the draft EIR for the proposed project. The NOP comments letters are provided in Appendix A of this draft EIR.

Comments on the NOP raised the following issues:

#### **Aesthetics**

 Confirmation that landscaping on a Caltrans-owned parcel near the project site will be maintained.

#### **Cultural and Tribal Cultural Resources**

• Compliance with Assembly Bill 52.

#### Noise

- Noise impacts on sensitive receptors and associated mitigation measures.
- Consistency with Airport Land Use Compatibility Plan noise policies.

#### Land Use

• Consistency with the Airport Land Use Compatibility Plan policies concerning noise, safety, height restrictions/airspace protection, and overflight notification, as well as project consistency with land use criteria within the end safety zones described in the Plan.

#### **Hydrology and Water Quality**

 Project-related discharge rates and proposed drainage features to address location within the Colma Creek Flood Control Zone.

### **Project Description**

- Confirmation of the project construction schedule.
- Confirmation of the proposed building foundation type.

#### **Transportation**

- Traffic impacts to the project site and surrounding area because many existing employees commute via vehicle to the area already.
- Pedestrian circulation through the project site and surrounding area.
- Site access and ensuring that access to the northern driveway on the project site is maintained.
- Confirmation that the parking garage behind the 801 Gateway Boulevard building would remain as is.
- Proposed onsite bus or shuttle services.

### 1.3.2 Draft Environmental Impact Report

This draft EIR has been prepared on behalf of the City of South San Francisco, the Lead Agency, in accordance with CEQA. It provides an analysis of the physical environmental impacts of construction and operation of the proposed project, and the project's contribution to the

environmental impacts from foreseeable cumulative development in the project site vicinity and the City as a whole. It considers all environmental topic areas in Appendix G of the CEQA Guidelines and takes into consideration NOP comments.

Hard copies of the draft EIR, all documents referenced in this draft EIR, and the distribution list for the draft EIR are available at the Planning Counter, South San Francisco Planning Division, 315 Maple Avenue, South San Francisco, CA 94080. Due to the COVID-19 Pandemic, the Planning Division is not open to members of the public. If you would like to review a physical copy of the draft EIR, please call the Planning Division at (650) 877-8535 to make arrangements to review the document. The draft EIR is also available for viewing or downloading at http://www.ssf.net/ceqadocuments under 751 Gateway Boulevard.

#### **How to Comment on the Draft Environmental Impact Report**

The City, on September 22, 2020, filed a Notice of Completion (NOC) with the State Clearinghouse, indicating that this draft EIR has been completed and is available for review and comment. This draft EIR will be available for review by the public and interested parties, agencies, and organizations for a review period of at least 45 days, as required by California law. Reviewers should focus on the document's adequacy in identifying and analyzing the proposed project's significant effects on the environment and ways in which the significant effects of the proposed project might be avoided or mitigated (California Code of Regulations Section 15204(a)).

The 45-day review period for the draft EIR is from September 22, 2020, to November 8, 2020. Comments should be submitted in writing during this review period to:

Adena Friedman, Senior Planner Department of Economic and Community Development City of South San Francisco 315 Maple Avenue South San Francisco, California 94080 Comments may also be sent via email to: adena.friedman@ssf.net

For comments sent via email, please include "EIR Comments: 751 Gateway Project" in the subject line and the name and physical address of the commenter in the body of the email. All comments on environmental issues received during the public comment period will be considered and addressed in the Final EIR.

There will be a public hearing before the Planning Commission during the 45-day public review and comment period for this draft EIR to solicit oral comments on the adequacy and accuracy of information presented in this draft EIR. The public hearing on this draft EIR has been scheduled before the Planning Commission for October 15, 2020, via teleconference beginning at 7:00 p.m. or later.

Join Zoom Meeting:

https://us02web.zoom.us/j/88231380027?pwd=Z3NGeVdTMFB0Uk5hTWFKWmtodFhhQT09

Meeting ID: 882 3138 0027

Password: 365780

#### One tap mobile:

- +16699006833,,88231380027#,,,,0#,,365780# US (San Jose)
- +13462487799,,88231380027#,,,,0#,,365780# US (Houston)

#### Dial by your location:

- +1 669 900 6833 US (San Jose)
- +1 346 248 7799 US (Houston)
- +1 253 215 8782 US (Tacoma)
- +1 301 715 8592 US (Germantown)
- +1 312 626 6799 US (Chicago)
- +1 929 205 6099 US (New York)
- 833 548 0282 US Toll-free
- 877 853 5257 US Toll-free
- 888 475 4499 US Toll-free
- 833 548 0276 US Toll-free

### 1.3.3 Final Environmental Impact Report

Following the close of the draft EIR public review and comment period, the City will prepare responses to comments, which will contain a summary of comments submitted during the public hearing and a copy of all written comments received on this draft EIR as well as the City's responses to significant environmental points raised in the review and consultation process and any necessary changes to the text. Responses to comments will be prepared and published in a final EIR. The final EIR will be available to all commenting agencies at least 10 days prior to the certification hearing, in accordance with CEQA requirements. The South San Francisco Planning Commission, as the decision-making body for this project, will review the final EIR documents and will determine whether or not the final EIR provides a full and adequate appraisal of the project and its alternatives.

The Planning Commission will review the final EIR for adequacy and certify that the EIR has been completed in compliance with CEQA and that it reflects the City's independent judgment pursuant to the requirements of CEQA Guidelines Section 15090. The City will consider certification of the final EIR and then consider the project separately for approval or denial. Findings on the feasibility of avoiding or reducing the project's significant environmental effects will be made and, if necessary, a Statement of Overriding Considerations will be prepared, balancing the benefits achieved by the proposed project against unavoidable environmental impacts, should the City choose to approve the project with remaining significant impacts that cannot be avoided.

A Notice of Determination (NOD) will be prepared and filed with the State Clearinghouse if the City approves the proposed project. The NOD will include a description of the project, the date of approval, and an indication of whether Findings and Statements of Overriding Considerations were prepared. The NOD will also provide the address where the EIR and record of project approval are available for review.

### 1.4 Report Organization

This draft EIR is organized into the following chapters.

• Chapter 1, *Introduction*, summarizes the purpose and organization of the draft EIR and the environmental review process.

- Chapter 2, *Executive Summary*, summarizes the proposed project and environmental consequences that would result from the implementation of the project (including significant and unavoidable impacts that cannot be mitigated to a level of less than significant, impacts reduced to a level of less than significant through mitigation, and impacts determined not to be significant), the alternatives to the proposed project that were analyzed, and a summary table of project impacts and mitigation measures.
- Chapter 3, *Project Description*, describes the existing setting, the project sponsor's objectives, the proposed project, and required approvals and actions including the agencies involved in the actions.
- Chapter 4, Environmental Setting, Impacts, and Mitigation, begins with Section 4.1, Approach to Environmental Analysis, which presents the methodology for environmental analysis, including a list of baseline projects and cumulative projects. Sections 4.2 through 4.9 are each devoted to a particular environmental topic. Each section describes the environmental setting and regulatory framework, provides an analysis of the potential environmental impacts of the project and cumulative impacts, and identifies mitigation measures (if necessary) to reduce significant impacts. The following topics are analyzed:
  - o Air Quality (Section 4.2)
  - Biological Resources (Section 4.3)
  - o Cultural Resources and Tribal Cultural Resources (Section 4.4)
  - o Energy (Section 4.5)
  - o Geology and Soils (Section 4.6)
  - Greenhouse Gas Emissions (Section 4.7)
  - Noise and Vibration (Section 4.8)
  - Transportation and Circulation (Section 4.9)

Section 4.10, *Less-than-Significant Impacts*, summarizes the environmental effects found not to be significant. The following topics are analyzed:

- Aesthetics
- o Agricultural and Forest Resources
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use
- Mineral Resources
- Population and Housing

- Public Services
- Recreation
- Utilities
- Wildfire
- Chapter 5, Alternatives, summarizes three alternatives to the proposed project as well as the
  comparative environmental consequences and benefits of each alternative. The No Project
  Alternative and two additional alternatives are analyzed (the Reduced Surface Parking Lot
  Demolition Alternative and the Reduced Building Footprint Alternative). This chapter also
  identifies the environmentally superior alternative and discusses any alternatives that were
  considered for analysis in the EIR but rejected, then gives the reasons for their rejection.
- Chapter 6, Other CEQA Considerations, contains the discussion of mandatory findings of significance (including cumulative impacts), growth-inducing impacts, significant impacts that cannot be avoided, significant irreversible environmental changes, and areas of known controversy and project-related issues that have not been resolved.
- Chapter 7, *Report Preparers*, identifies the Lead Agency, organizations, and individuals consulted during preparation of this draft EIR. In addition, the project sponsor team and the consultants working on the EIR are identified.

Appendices to this draft EIR are as follows:

- Appendix A Notice of Preparation and Comments
- Appendix B Air Quality and Greenhouse Gas Materials
- Appendix C Assembly Bill 52 Consultation Materials
- Appendix D Transportation Impact Analysis

# **Executive Summary**

This Draft Environmental Impact Report (EIR) has been prepared in accordance with the provision of the California Environmental Quality Act (CEQA) to evaluate the potential impacts of the proposed 751 Gateway Boulevard Project (proposed project) in the City of South San Francisco, San Mateo County, California (City). As required by Section 15123 of the CEQA Guidelines, this summary chapter is intended to highlight major areas of importance in the environmental analysis. Following the summary description of the proposed project, a summary table presents the environmental impacts of the proposed project, and mitigation measures identified to reduce significant impacts. Following the summary table is a description of the alternatives to the proposed project that are addressed in this EIR, including a description of the environmentally superior alternative. The final subsection in this chapter is a summary of environmental issues to be resolved and areas of known controversy.

# 2.1 Summary Description

This draft EIR analyzes the potential for environmental impacts resulting from implementation of the proposed 751 Gateway Boulevard Project. The proposed project would involve the redevelopment of an approximately 7.4-acre, irregularly shaped site within the City of South San Francisco's Gateway Specific Plan planning area with a research and development (R&D) facility and office building. The project site is in an area referred to as the Gateway Campus (consisting of eight buildings at 601, 611, and 651 Gateway Boulevard; 681 to 685 Gateway Boulevard; 701 Gateway Boulevard; 801 Gateway Boulevard; and 901 to 951 Gateway Boulevard). The project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west. The 7.4-acre project site consists of two parcels (Assessor's Parcel Numbers [APNs] 015-024-290 and 015-024-360). The project site is currently occupied by an existing 6-story, approximately 176,235-square foot (sf) office building at 701 Gateway Boulevard and a surface parking lot containing approximately 558 parking spaces. The project sponsor is 701 Gateway Center LLC. The Lead Agency is the City of South San Francisco. The proposed project would require entitlements to enable development of the project site, including, but not limited to, design review, precise plan approval, Transportation Demand Management (TDM) Plan approval, and a Conditional Use Permit required for a parking reduction.

The proposed project would maintain the existing zoning designation of Zone IV under the Gateway Specific Plan District. The existing zoning allows for development at a maximum floor area ratio (FAR) of 1.25, or a maximum of 402,930 sf, within the project site. The building at 701 Gateway Boulevard is approximately 170,235 sf. Based on the zoning, 232,695 sf of unrealized FAR remains available for the project site, and the proposed project would utilize a portion of that unrealized FAR. The total proposed FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18.

The proposed building would be constructed on the site of an existing surface parking lot. The proposed project involves the construction of a 148-foot-tall, seven-story building with approximately 208,800 sf of usable space (60 percent R&D uses, and 40 percent office uses). The existing building at 701 Gateway Boulevard would remain. The ground floor of the proposed building would include amenity space and a "through lobby" with access from the north and south. In addition, an entry plaza and landscaped visitor lot would be constructed north of the proposed building. An entrance and screened service yard would be constructed south of the proposed building. Furthermore, the proposed project would also improve pedestrian connections between the nearby Gateway Campus buildings at 701, 901, 951, and 801 Gateway Boulevard, and would provide a total of 418 surface parking spaces on-site (including 42 parking spaces in a lot north of the proposed building) for use of the tenants on-site and within the Gateway Campus. Vehicular access to the project site would be via two existing driveways from Gateway Boulevard. Construction of the proposed project, if the related entitlements are approved by the City, would begin in 2020 over the course of 18 months, with an anticipated completion date in 2021. Construction activities would include the demolition of the existing surface parking lots and removal of trees and vegetation, which would be replaced in accordance with the project's landscape plan and consistent with the City's Tree Preservation Ordinance. Refer to Chapter 3, Project Description, for a detailed description of the project's components.

# 2.2 751 Gateway Boulevard Project Impacts and Mitigation Measures

Table 2-1 provides an overview of the following:

- Environmental impacts with the potential to occur as a result of the proposed project;
- Level of significance of the environmental impacts before implementation of any applicable mitigation measures;
  - o NI: No Impact
  - o LTS: Less than Significant
  - o LTSM: Less than Significant with Mitigation
  - S: Significant
  - o SUM: Significant and Unavoidable with Mitigation
- Mitigation measures that would avoid or reduce significant environmental impacts; and
- The level of significance for each impact after the mitigation measures are implemented.

A detailed description of project impacts and mitigation measures are discussed in Chapter 4, *Setting, Impacts, and Mitigation Measures*, of this document.

Table 2-1. Summary of Project Impacts and Mitigation Measures

| Potential Environmental Impacts  | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures | Level of<br>Significance<br>after<br>Mitigation |
|--|--|---------------------------------|---|
| Aesthetics (refer to Section 4.10, Less-than-Sign  |  |                                 |   |
| <b>Impact AES-1</b> : The proposed project would not have a substantial adverse effect on a scenic vista.  | LTS  | None required.                  | LTS   |
| <b>Impact AES-2</b> : 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.   | NI   | None required.                  | NI  |
| <b>Impact AES-3</b> : The proposed project would not conflict with applicable zoning and other regulations governing scenic quality.   | LTS  | None required.                  | LTS   |
| <b>Impact AES-4</b> : The proposed project would not create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.   | LTS  | None required.                  | LTS   |
| Impact C-AES-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on aesthetics.  | LTS  | None required.                  | LTS   |
| Agriculture and Forest Resources (refer to Secti   | ion 4.10, <i>Less-tho</i>                        | nn-Significant Impacts)         |   |
| Impact AG-1: The proposed project would not convert designated Farmland under the Farmland Mapping and Monitoring Program, nor would it conflict with any existing agricultural zoning or a Williamson Act contract, nor would it involve any changes to the environment that would result in the conversion of designated farmland. | NI   | None required.                  | NI  |

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures   | Level of<br>Significance<br>after<br>Mitigation |
|---|--|---|---|
| Impact AG-2: The proposed project would not conflict with existing zoning for, or cause rezoning of, forestland, timberland, or timberland zoned Timberland Production, nor would it result in the loss or conversion of forestland to nonforest uses.  | NI   | None required.  | NI  |
| <b>Impact C-AG-1</b> : The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on agricultural or forest resources.                                    | NI   | None required.  | NI  |
| Air Quality   |  |   |   |
| <b>Impact AQ-1</b> : The proposed project would not conflict with or obstruct implementation of the applicable air quality plan.  | LTS  | None required.  | LTS   |
| Impact AQ-2: The proposed project would not result in a cumulatively considerable net increase in any criteria pollutant for which the project region is classified as nonattainment under an applicable federal or state ambient air quality standard. | Construction: S Operation: LTS                   | Construction: Mitigation Measure AQ-1: Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related NO <sub>X</sub> Emissions  The project sponsor shall ensure that all off-road diesel-powered equipment used during construction is equipped with EPA-approved Tier 4 Final engines. The construction contractor shall submit evidence of the use of EPA-approved Tier 4 Final engines or cleaner for project construction to the City prior to the commencement of construction activities.  Mitigation Measure AQ-2: Implement BAAQMD Basic Construction Mitigation Measures  The project sponsor shall require all construction contractors to implement the basic construction mitigation measures recommended by BAAQMD. The emissions reduction measures shall include, at a minimum, the following: | Construction:<br>LTSM<br>Operation: LTS         |

| Potential Environmental Impacts | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
|---------------------------------|--|--|---|
|                                 |  | <ul> <li>All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, unpaved access roads) shall be watered two times a day.</li> <li>All haul trucks shall be covered when transporting soil, sand, or other loose material offsite.</li> <li>All visible mud or dirt track-out material on adjacent public roads shall be removed using wet-power vacuum-type street sweepers at least once a day. The use of dry-power sweeping is prohibited.</li> <li>All vehicle speeds shall be limited to 15 miles per hour on unpaved roads.</li> <li>All roadways, driveways, and sidewalks that are to be paved shall be paved as soon as possible. Building pads shall be laid as soon as possible after grading, unless seeding or a soil binder is used.</li> <li>All construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications. All equipment shall be checked by a certified visible-emissions evaluator.</li> <li>Idling times shall be minimized, either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California Airborne Toxics Control Measure).</li> <li>Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.</li> </ul> |   |
|                                 |  | Operation: None required.  |   |

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
|---|--|--|---|
| <b>Impact AQ-3</b> : The proposed project would not expose sensitive receptors to substantial pollutant concentrations.   | Construction: S<br>Operation: LTS                | Construction: Implement <b>Mitigation Measures AQ-1 and AQ-2</b> , above.  Operation: None required. | Construction:<br>LTSM<br>Operation:<br>LTS      |
| <b>Impact AQ-4</b> : The proposed project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.  | LTS  | None required.   | LTS   |
| <b>Impact C-AQ-1</b> : The proposed project in combination with past, present, and reasonably foreseeable future projects would not result in a cumulatively considerable impact on air quality plan consistency.   | LTS  | None required.   | LTS   |
| <b>Impact C-AQ-2</b> : The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts related to a net increase in criteria pollutants for which the region is in nonattainment for an applicable federal or state ambient air quality standard. | S  | Implement <b>Mitigation Measures AQ-1 and AQ-2</b> , above.  | LTSM  |
| <b>Impact C-AQ-3</b> : The proposed project in combination with past, present, and reasonably foreseeable future projects would not contribute to cumulative health risks for sensitive receptors.  | S  | Implement Mitigation Measures AQ-1 and AQ-2, above.  | LTSM  |
| Impact C-AQ-4: The proposed project in combination with past, present, and reasonably foreseeable future projects would not contribute to emissions (such as those leading to odors) adversely affecting a substantial number of people.  | LTS  | None required.   | LTS   |

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures   | Level of<br>Significance<br>after<br>Mitigation |
|---|--|---|---|
| Biological Resources  |  |   |   |
| Impact BIO-1: The proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. | S  | Mitigation Measure BI-1: Preconstuction Nesting Bird Surveys and Buffer Areas  The project sponsor shall protect nesting birds and their nests during construction by implementation of the following measures:  a. To the extent feasible, conduct initial activities, including, but not limited to, vegetation removal, tree trimming or removal, ground disturbance, building or parking lot demolition, site grading, and other construction activities which may compromise breeding birds or the success of their nests outside the nesting season (February 15–September 15).  b. If construction occurs during the bird nesting season, a qualified wildlife biologist* shall conduct a nesting bird preconstruction survey within 14 days prior to the start of construction or demolition at areas that have not been previously disturbed by project activities or after any construction breaks of 14 days or more. The survey shall be performed within 100 feet of the applicable construction phase area in order to locate any active nests of passerine species and within 300 feet of the applicable construction phase area to locate any active raptor (birds of prey) nests, and this survey shall be of those areas that constitute suitable habitat for these species.  c. If active nests are located during the preconstruction nesting bird survey, a qualified biologist shall determine if the schedule of construction activities could affect the active nests; if so, the following measures would apply:  1. If the qualified biologist determines that construction is not likely to affect an active nest, construction may proceed without restriction; | LTSM  |

|                                 | Level of<br>Significance |                                 | Level of<br>Significance |
|---------------------------------|--------------------------|---------------------------------|--------------------------|
|                                 | before                   |                                 | after                    |
| Potential Environmental Impacts | Mitigation               | Recommended Mitigation Measures | Mitigation               |
|                                 |                          | 1 1.0 11 1 1 1 1 1              |                          |

however, a qualified biologist shall regularly monitor the nest at a frequency determined appropriate for the surrounding construction activity to confirm there is no adverse effect. Spotcheck monitoring frequency would be determined on a nest-by-nest basis, considering the particular construction activity, duration, proximity to the nest, and physical barriers that may screen activity from the nest.

- 2. If it is determined that construction may cause abandonment of an active nest, the qualified biologist shall establish a no-disturbance buffer around the nest(s), and all project work shall halt within the buffer to avoid disturbance or destruction until a qualified biologist determines that the nest is no longer active. Typically, buffer distances are 100 feet for passerines and 300 feet for raptors; however the buffers may be shortened if an obstruction, such as a building, is within line-of-sight between the nest and construction.
- 3. Modifying nest buffer distances, allowing certain construction activities within the buffer, and/or modifying construction methods in proximity to active nests shall be approved by the qualified biologist and in coordination with the Planning Division. To the extent necessary to remove or relocate an active nest, such removal or relocation shall be coordinated with the Planning Division, and the removal or relocation shall be in compliance with the California Fish and Game Code and other applicable laws.
- 4. Any work that must occur within established nodisturbance buffers around active nests shall be monitored by a qualified biologist. If adverse

| Detectial Environmental Income   | Level of<br>Significance<br>before | Decommonded Mitigation Managemen   | Level of<br>Significance<br>after |
|--|------------------------------------|--|-----------------------------------|
| Potential Environmental Impacts  | Mitigation                         | effects in response to project work within the buffer are observed and could compromise the nest, work within the no-disturbance buffer(s) shall halt until the nest occupants have fledged.  5. Any birds that begin nesting within the project area and survey buffers amid construction activities are assumed to be habituated to construction-related or similar noise and disturbance levels. Work may proceed around these active nests subject to Measure c.2 above.  * The experience requirements for a "qualified biologist" shall include a minimum of 4 years of academic training and professional experience in biological sciences and related resource management activities, and a minimum of 2 years of experience conducting surveys for each species that may be present within the project area. | Mitigation                        |
| <b>Impact BIO-2</b> : The proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. | NI                                 | None required.   | NI                                |
| Impact BIO-3: The proposed project would not have a substantial adverse effect on state or federally protected wetlands, including, but not limited to, marsh, vernal pools, coastal areas, etc., through direct removal, filling, hydrological interruption, or other means.                            | NI                                 | None required.   | NI                                |
| <b>Impact BIO-4:</b> The proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.                     | S                                  | Implement Mitigation Measure BI-1, above.  Mitigation Measure BI-2: Lighting Measures to Reduce Impacts on Birds  During design, the project sponsor shall ensure that a qualified biologist experienced with bird strikes and building/lighting design issues shall identify lighting-  | LTSM                              |

|                                 | Level of<br>Significance<br>before |   | Level of<br>Significance<br>after |
|---------------------------------|------------------------------------|---|-----------------------------------|
| Potential Environmental Impacts | Mitigation                         | Recommended Mitigation Measures   | Mitigation                        |
|                                 |                                    | related measures to minimize the effects of the building's lighting on birds. The project sponsor shall incorporate such measures, which may include the following and/or other measures, into the building's design and operation.   |                                   |
|                                 |                                    | a. Use strobe or flashing lights in place of continuously burning lights for obstruction lighting. Use flashing white lights rather than continuous light, red light, or rotating beams.  |                                   |
|                                 |                                    | b. Install shields onto light sources not necessary for air traffic to direct light towards the ground.   |                                   |
|                                 |                                    | <ul> <li>c. Extinguish all exterior lighting (i.e., rooftop floods,<br/>perimeter spots) not required for public safety.</li> </ul>   |                                   |
|                                 |                                    | d. When interior or exterior lights must be left on at night,<br>the operator of the buildings shall examine and adopt<br>alternatives to bright, all-night, floor-wide lighting,<br>which may include installing motion-sensitive lighting,<br>using desk lamps and task lighting, reprogramming<br>timers, or using lower-intensity lighting. |                                   |
|                                 |                                    | <ul> <li>e. Windows or window treatments that reduce<br/>transmission of light out of the building shall be<br/>implemented to the extent feasible.</li> </ul>  |                                   |
|                                 |                                    | Mitigation Measure BI-3: Building Design Measures to<br>Minimize Bird Strike Risk   |                                   |
|                                 |                                    | During design, the project sponsor shall ensure that a qualified biologist experienced with bird strikes and building/lighting design issues shall identify measures  |                                   |
|                                 |                                    | related to the external appearance of the building to minimize the risk of bird strikes. The project sponsor shall incorporate such measures, which may include the   |                                   |
|                                 |                                    | following and/or other measures, into the building's design.  |                                   |
|                                 |                                    | <ul><li>a. Minimize the extent of glazing.</li><li>b. Use low-reflective glass and/or patterned or fritted glass.</li></ul>   |                                   |

|  | Level of<br>Significance<br>before |   | Level of<br>Significance<br>after |
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| Potential Environmental Impacts  | Mitigation                         | c. Use window films, mullions, blinds, or other internal or external features to "break up" reflective surfaces rather than having large, uninterrupted areas of surfaces that reflect, and thus to a bird may not appear noticeably different from, vegetation or the sky.   | Mitigation                        |
| Impact BIO-5: The proposed project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.  | LTS                                | None required.  | LTS                               |
| Impact BIO-6: The proposed project would not conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan. | NI                                 | None required.  | NI                                |
| <b>Impact C-BIO-1:</b> The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on biological resources.  | S                                  | Implement <b>Mitigation Measures BI-1, BI-2</b> , <b>and BI-3</b> , above.  | LTSM                              |
| Cultural Resources   |                                    |   |                                   |
| <b>Impact CR-1</b> : The proposed project would not cause a substantial adverse change in the significance of a historical resource, pursuant to Section 15064.5.  | NI                                 | None required.  | NI                                |
| Impact CR-2: The proposed project would not cause a substantial adverse change in the significance of an archaeological resource, pursuant to Section 15064.5.   | S                                  | Mitigation Measure CR-1: Cultural Resources Worker Environmental Awareness Program (WEAP)  The project applicant shall ensure that a qualified archaeologist shall conduct a WEAP training for all construction personnel on the project site prior to construction and ground-disturbing activities. The training shall include basic information about the types of artifacts that might be encountered during construction activities, and procedures to follow in the event of a discovery. This training shall be provided for any additional personnel added to the project even after the initiation of construction and ground-disturbing activities. | LTSM                              |

|   | Level of<br>Significance<br>before |  | Level of<br>Significance<br>after |
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| Potential Environmental Impacts   | Mitigation                         | Mitigation Measure CR-2: Halt Construction Activity, Evaluate Find, and Implement Mitigation for Archaeological, Historical, and Tribal Resources In the event that previously unidentified archaeological, historical, or tribal resources are uncovered during site preparation, excavation, or other construction activity, the project applicant shall cease or ensure the ceasing of all such activity within 25 feet of the discovery until the resources have been evaluated by a qualified professional, and specific measures can be implemented to protect these resources in accordance with sections 21083.2 and 21084.1 of the California Public Resources Code. If the find is significant, the project applicant shall ensure that a qualified archaeologist excavate the find in compliance with state law, keeping project delays to a minimum. If the qualified archaeologist determines the find is not significant then proper recordation and identification will ensue and the project shall continue without delay. | Mitigation                        |
| Impact CR-3: The proposed project would not disturb any human remains, including those interred outside of formal cemeteries. | S                                  | Mitigation Measure CR-3: Halt Construction Activity, Evaluate Remains, and Take Appropriate Action in Coordination with Native American Heritage Commission  In the event that human remains are uncovered during site preparation, excavation, or other construction activity, the project applicant shall cease or ensure the ceasing of all such activity within 25 feet of the discovery until the remains have been evaluated by the County Coroner, and appropriate action taken in coordination with the NAHC, in accordance with section 7050.5 of the CHSC or, if the remains are Native American, section 5097.98 of the California Public Resources Code.   | LTSM                              |

| Potential Environmental Impacts  | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
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| <b>Impact CR-4:</b> The proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resource Code Section 21074.   | S  | Implement Mitigation Measures CR-1 and CR-2, above.  | LTSM  |
| <b>Impact C-CR-1:</b> The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on archeological resources, human remains, and tribal cultural resources.                        | S  | Implement <b>Mitigation Measures CR-1, CR-2</b> , <b>and CR-3</b> , above.                 | LTSM  |
| Energy   |  |  |   |
| <b>Impact EN-1:</b> The proposed project would not result in a potentially significant environmental impact due to the wasteful, inefficient, or unnecessary consumption of energy resources   | Construction: S<br>Operation: LTS                | Construction: <b>Implement Mitigation Measure GHG-1</b> , below. Operation: None required. | Construction:<br>LTSM<br>Operation: LTS         |
| during project construction or operation.  |  |  |   |
| <b>Impact EN-2:</b> The proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.  | LTS  | None required.   | LTS   |
| Impact C-EN-1: The proposed project in combination with past, present, and reasonably foreseeable projects would not result in the wasteful, inefficient, or unnecessary consumption of energy resources during construction or operation. | LTS  | None required.   | LTS   |
| <b>Impact C-EN-2:</b> The proposed project in combination with past, present, and reasonably foreseeable projects would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.                     | LTS  | None required.   | LTS   |

|  | Level of<br>Significance<br>before | D  | Level of<br>Significance<br>after |
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| Potential Environmental Impacts Geology and Soils  | Mitigation                         | Recommended Mitigation Measures  | Mitigation                        |
| Impact GEO-1: The proposed project would not directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismically related ground failure, including liquefaction, or landslides. | LTS                                | None required.   | LTS                               |
| <b>Impact GEO-2:</b> The proposed project would not result in substantial soil erosion or the loss of topsoil.   | LTS                                | None required.   | LTS                               |
| <b>Impact GEO-3:</b> The proposed project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project.  | LTS                                | None required.   | LTS                               |
| <b>Impact GEO-4:</b> The proposed project would not be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.   | LTS                                | None required.   | LTS                               |
| <b>Impact GEO-5:</b> The proposed project would not have soils that would be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.  | NI                                 | None required.   | NI                                |
| <b>Impact GEO-6:</b> The proposed project could directly or indirectly destroy a unique paleontological resource on site or unique geologic feature.   | S                                  | Mitigation Measure GEO-1: Halt Construction Activity, Evaluate Find, and Implement Mitigation for Paleontological Resources In the event that previously unidentified paleontological resources are uncovered during site preparation, excavation, or other construction activity, the project sponsor shall cease or ensure that all such activity within 25 feet of the discovery cease until the resources have | LTSM                              |

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
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|   |  | been evaluated by a qualified professional, and specific measures can be implemented to protect these resources in accordance with sections 21083.2 and 21084.1 of the California Public Resources Code. If the find is significant, a qualified paleontologist shall excavate the find in compliance with state law, keeping project delays to a minimum. If the qualified paleontologist determines the find is not significant then proper recordation and identification shall ensue and the project will continue without delay.              |   |
| Impact C-GEO-1: The project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on geology and soils. | LTS  | None required.   | LTS   |
| Impact C-GEO-2: The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on paleontological resources.                     | S  | Implement Mitigation Measure GEO-1, above.   | LTSM  |
| Greenhouse Gas Emissions  |  |  |   |
| Impact GHG-1a: The proposed project would not generate GHG emissions, either directly or indirectly, that may have significant impact on the environment during construction.         | S  | Mitigation Measure GHG-1: Require Implementation of BAAQMD-recommended Construction BMPs  The project sponsor shall require its contractors, as a condition in contracts (e.g., standard specifications), to reduce construction-related GHG emissions by implementing BAAQMD's recommended BMPs as set forth in BAAQMD's 2017 CEQA Guidelines, including (but not limited to) the following measures. <sup>1</sup> • Ensure alternative-fuel (e.g. biodiesel, electric) construction vehicles/equipment make up at least 15 percent of the fleet; | LTSM  |

<sup>&</sup>lt;sup>1</sup> Ibid.

|  | Level of<br>Significance<br>before |  | Level of<br>Significance<br>after |
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| Potential Environmental Impacts  | Mitigation                         | Recommended Mitigation Measures  | Mitigation                        |
|  |                                    | <ul> <li>Use local building materials (at least 10 percent) sourced<br/>from within 100 miles of the planning area; and</li> </ul> |                                   |
|  |                                    | <ul> <li>Recycle and reuse at least 50 percent of construction</li> </ul>  |                                   |
|  |                                    | waste or demolition materials.   |                                   |
|  |                                    | The project sponsor shall submit evidence of compliance to the city prior to the start of construction.                            |                                   |
| Impact GHG-1b: The proposed project would  | S                                  | Implement Mitigation Measure TR-1, below.  | SUM                               |
| generate GHG emissions, either directly or indirectly, that may have a significant impact on   |                                    | Mitigation Measure GHG-2: Operational GHG Reduction<br>Measures  |                                   |
| the environment during operation.  |                                    | The project sponsor shall:   |                                   |
|  |                                    | <ul> <li>Plant 44 additional trees on existing surface parking lots; and</li> </ul>  |                                   |
|  |                                    | • Install 28 more electric vehicle (EV) charging spots than  |                                   |
|  |                                    | required by the 2019 Building Code.  |                                   |
| <b>Impact GHG-2</b> : The proposed project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.  | S                                  | Implement Mitigation Measure TR-1, below.  | SUM                               |
| Hazards and Hazardous Materials (refer to Sec  | tion 4.10, <i>Less-th</i>          | nan-Significant Impacts)   |                                   |
| <b>Impact HAZ-1</b> : The proposed project would not create a significant hazard for the public or the environment through the routine transport, use, or disposal of hazardous materials.   | LTS                                | None required.   | LTS                               |
| Impact HAZ-2: The proposed project would not create a significant hazard for the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. | LTS                                | None required.   | LTS                               |
| Impact HAZ-3: The proposed project would not emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.                               | LTS                                | None required.   | LTS                               |

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures | Level of<br>Significance<br>after<br>Mitigation |
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| Impact HAZ-4: The proposed project would not be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, create a significant hazard for the public or the environment. | LTS  | None required.                  | LTS   |
| Impact HAZ-5: The proposed project would not result in a safety hazard or excessive noise for people residing or working in the project area.   | LTS  | None required.                  | LTS   |
| Impact HAZ-6: The proposed project would not impair implementation of, or physical interfere with, an adopted emergency response plan or emergency evacuation plan.   | LTS  | None required.                  | LTS   |
| Impact HAZ-7: The proposed project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.  | NI   | None required.                  | NI  |
| Impact C-HAZ-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on hazards and hazardous materials.  | LTS  | None required                   | LTS   |
| Hydrology and Water Quality (refer to Section 4   | 4.10, Less-than-S                                | ignificant Impacts)             |   |
| Impact HY-1: The proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water or groundwater quality.  | LTS  | None required.                  | LTS   |
| Impact HY-2: The proposed project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project would impede sustainable groundwater management of the basin.                                | LTS  | None required.                  | LTS   |

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures | Level of<br>Significance<br>after<br>Mitigation |
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| Impact HY-3: The proposed project would not substantially alter the existing drainage pattern of the site or area in a manner that would result in substantial erosion or siltation onsite or offsite; substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite; create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect floodflows. | LTS  | None required.                  | LTS   |
| <b>Impact HY-4:</b> In flood hazard, tsunami, or seiche zones, the proposed project would not risk release of pollutants due to project inundation.   | LTS  | None required.                  | LTS   |
| Impact HY-5: The proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.  | LTS  | None required.                  | LTS   |
| Impact C-HY-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on hydrology and water quality.   | LTS  | None required.                  | LTS   |
| Land Use (refer to Section 4.10, Less-than-Signij   | ficant Impacts)                                  |                                 |   |
| <b>Impact LU-1</b> : The proposed project would not physically divide an established community.   | LTS  | None required.                  | LTS   |
| <b>Impact LU-2:</b> The proposed project would not result in a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.  | LTS  | None required.                  | LTS   |

| Potential Environmental Impacts  | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures   | Level of<br>Significance<br>after<br>Mitigation |
|--|--|---|---|
| <b>Impact C-LU-1:</b> The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on land use.  | LTS  | None required.  | LTS   |
| Mineral Resources (refer to Section 4.10, Less-ta  | han-Significant I                                | mpacts)   |   |
| Impact MIN-1: The proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state and/or a locally important mineral resource recovery site delineated in a local general plan, specific plan, or other land use plan. | NI   | None required.  | NI  |
| Noise and Vibration  |  |   |   |
| Impact NOI-1: The proposed project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.                               | S  | Mitigation Measure NOI-1: Construction Noise Control Plan to Reduce Noise Outside of the Standard Construction Hours in the City of South San Francisco. The project sponsor and/or the contractor(s) for the proposed project shall obtain a permit to complete work outside of the standard construction hours outlined in the City Municipal Code. In addition, the project sponsor and/or the contractor(s) for the proposed project shall develop a construction noise control plan to reduce noise levels to within the City's daytime and nighttime noise standards. Specifically, the plan shall demonstrate that noise from construction activities that occur daily between 7:00 and 8:00 a.m. weekdays and Saturday will comply with the applicable City noise limit of 65 dBA at the nearest existing land use, and construction activities that occur between 10:00 p.m. and 7:00 a.m. will comply with the applicable City noise limit of 60 dBA at the nearest existing land use. Measures to help reduce noise from construction activity during non-standard construction hours to these levels shall be incorporated into this plan and may include, but are not limited to, the following. | LTSM  |

| Potential Environmental Impacts | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures   | Level of<br>Significance<br>after<br>Mitigation |
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| Total Environmental impacts     | Pittigation                                      | <ul> <li>Require all construction equipment be equipped with mufflers and sound control devices (e.g., intake silencers and noise shrouds) that are in good condition (at least as effective as those originally provided by the manufacturer) and appropriate for the equipment.</li> <li>Maintain all construction equipment to minimize noise emissions.</li> <li>Locate construction equipment as far as feasible from adjacent or nearby noise-sensitive receptors.</li> <li>Require all stationary equipment be located to maintain the greatest possible distance to the nearby existing buildings, where feasible.</li> <li>Require stationary noise sources associated with construction (e.g., generators and compressors) in proximity to noise-sensitive land uses to be muffled and/or enclosed within temporary enclosures and shielded by barriers, which can reduce construction noise by as much as 5 dB.</li> <li>Use noise-reducing enclosures around noise-generating equipment during nighttime/nonstandard daytime hours. Prohibit the use of impact tools (e.g., jack hammers) during these hours.</li> <li>Prohibit idling of inactive construction equipment for prolonged periods during nighttime hours (i.e., more than 2 minutes).</li> <li>Advance notification shall be provided to surrounding land uses disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period.</li> <li>The construction contractor shall provide the name and telephone number an on-site construction noise is found</li> </ul> | migation  |

| Potential Environmental Impacts | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
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| rotentiai Environmentai impacts | ·······gutton                                    | to be intrusive to the community (complaints are received), the construction liaison shall investigate the source of the noise and require that reasonable measures be implemented to correct the problem.  • Use electric motors rather than gasoline- or diesel-powered engines to avoid noise associated with compressed air exhaust from pneumatically powered tools during nighttime hours. Where the use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust could be used; this muffler can lower noise levels from the exhaust by about 10 dB. External jackets on the tools themselves could be used, which could achieve a reduction of 5 dB.  Mitigation Measure NOI-2: Operational Noise Study to                        |   |
|                                 |  | Determine Attenuation Measures to Reduce Noise from  |   |
|                                 |  | Project Mechanical Equipment   |   |
|                                 |  | Once equipment models and design features to attenuate noise have been selected, the project sponsor shall conduct a noise analysis to estimate actual noise levels of project-specific mechanical equipment, including heating and cooling equipment (such as boilers, chillers, cooling towers, and exhaust fans), to reduce potential noise impacts resulting from project mechanical equipment. Feasible methods to reduce noise below the significant threshold include, but are not limited to, selecting quieter equipment, siting equipment further from the roofline, and/or enclosing all equipment in a mechanical equipment room designed to reduce noise. This analysis shall be conducted, and its results and reduction methods provided to the City, |   |
|                                 |  | prior to the issuance of building permits.  The analysis shall be prepared by persons qualified in acoustical analysis and/or engineering and shall  |   |

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demonstrate with reasonable certainty that the mechanical equipment selected for the project and the attenuation

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
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|   |  | features incorporated into project design would ensure noise from these equipment do not result in noise at the nearest existing land use of 65 dBA $L_{eq}$ during the daytime and 60 dBA $L_{eq}$ during the nighttime. The project sponsor shall incorporate all recommendations from the acoustical analysis necessary to ensure that noise sources would meet applicable requirements of the noise ordinance into the building design and operations. |   |
| <b>Impact NOI-2</b> : The proposed project would not generate excessive ground-borne vibration or ground-borne noise levels.  | LTS  | None required.   | LTS   |
| <b>Impact NOI-3:</b> The proposed project would not expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an airport land use plan or, where such plan has not been adopted, within two miles of a public airport or public use airport.                     | NI   | None required.   | NI  |
| Impact C-NOI-1: The proposed project would not result in a cumulatively considerable contribution to the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project site in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. | S  | Implement <b>Mitigation Measure NOI-2</b> , above.   | LTSM  |
| Impact C-NOI-2: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not expose persons to or generate excessive ground-borne vibration or ground-borne noise levels.   | LTS  | None required.   | LTS   |

| Potential Environmental Impacts   | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures | Level of<br>Significance<br>after<br>Mitigation |
|---|--|---------------------------------|---|
| Population and Housing (refer to Section 4.10,  |  |                                 | - Intigution                                    |
| Impact PH-1: The proposed project would not induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes or businesses) or indirectly (for example, through extension of roads or other infrastructure). | LTS  | None required.                  | LTS   |
| <b>Impact PH-2</b> : The proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.  | NI   | None required.                  | NI  |
| <b>Impact C-PH-1:</b> The proposed project would not result in a cumulatively considerable contribution to a significant impact on population and housing.  | LTS  | None required.                  | LTS   |
| Public Services (refer to Section 4.10, Less-than   | -Significant Impo                                | acts)                           |   |
| <b>Impact PS-1</b> : The proposed project would not require the provision of new or physically altered fire and emergency medical services in order to maintain acceptable service ratios, response times, or other performance objectives.                 | LTS  | None required.                  | LTS   |
| <b>Impact PS-2</b> : The proposed project would not require the provision of new or physically altered police protection services in order to maintain acceptable service ratios, response times, or other performance objectives.                          | LTS  | None required.                  | LTS   |
| <b>Impact PS-3:</b> The proposed project would not require the provision of new or physically altered schools or other public facilities in order to maintain acceptable service ratios or other performance objectives.                                    | LTS  | None required.                  | LTS   |

| Potential Environmental Impacts  | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
|--|--|--|---|
| <b>Impact C-PS-1</b> : The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on public services.  | LTS  | None required.   | LTS   |
| Recreation (refer to Section 4.10, Less-than-Sign  | nificant Impacts)                                |  |   |
| <b>Impact REC-1</b> : The proposed project would not require the provision of new or physically altered park facilities in order to maintain acceptable service ratios or other performance objectives.  | LTS  | None required.   | LTS   |
| <b>Impact REC-2</b> : 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 facilities would occur or be accelerated.   | LTS  | None required.   | LTS   |
| <b>Impact REC-3:</b> The proposed project would not include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.   | LTS  | None required.   | LTS   |
| <b>Impact C-REC-1:</b> The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on recreation.   | NI   | None required.   | NI  |
| Transportation and Circulation   |  |  |   |
| Impact TR-1: Existing home-based work (HBW) vehicle miles traveled (VMT) per employee in the travel demand model transportation analysis zone (TAZ) that encompasses the project result in greater than 16.8 percent below the regional average HBW VMT per employee under Existing Plus Project and Cumulative Plus Project conditions. | S  | <ul> <li>Mitigation Measure TR-1: First- and Last-mile Strategies</li> <li>The project sponsor shall fund the design and construction of the following off-site improvements to support the project's first- and last-mile strategies necessary to support auto trip reduction measures.</li> <li>The project shall provide a fair-share contribution towards the City's cost of facilities and improvements identified below for the purposes of upgrading Poletti</li> </ul> | SUM   |

|                                 | Level of     |  | Level of     |
|---------------------------------|--------------|--|--------------|
|                                 | Significance |  | Significance |
|                                 | before       |  | after        |
| Potential Environmental Impacts | Mitigation   | <b>Recommended Mitigation Measures</b> | Mitigation   |

Way sidewalk to a Class I shared-use bicycle and pedestrian pathway between the Caltrain Station at East Grand Avenue, and the street's northern terminus as identified in the Active South City: Bicycle and Pedestrian Master Plan (currently in draft form), or if said Master Plan is in the process of being amended or updated at the time of the first building permit for the project, then the project shall instead provide a fairshare contribution in an equivalent amount towards improvements and upgrades of equivalent design and purpose, as determined by the City's Chief Planner in his reasonable discretion. The Gateway Property Owners Association is currently in the process of dedicating the Poletti Way right-of-way to the City and the dedication is expected to be completed by the end of 2020. The improvement will include curb ramps, curb and gutter, signage, markings, and other changes necessary to meet Caltrans and City of South San Francisco Class I bikeway standards. Specific improvements will include upgrades at vehicular crossings (such as driveways and minor streets) to provide 10-foot minimum wide barrier-free accessible ramps that permit direct, two-way bicycle and pedestrian travel. Adequate warning and regulatory signage and markings will be provided to alert road users of potential conflicts per the California Manual on *Uniform Traffic Control Devices* (CAMUTCD). Existing pavement conditions will be assessed and reconstructed if necessary, per City of South San Francisco standards. The project's obligation to pay a fair share contribution toward this improvement is contingent upon the City (i) adopting a final Active South City Bicycle and Pedestrian Master Plan that includes the improvement, or City approval of a plan for improvements of equivalent design and purpose;

| Potential Environmental Impacts | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of Significance after Mitigation |
|---------------------------------|--|--|--|
|                                 |  | <ul> <li>(ii) acquiring any necessary right of way; and (iii) implementing a program that will require fair share contributions from other developments in the East of 101 area that will benefit from the improvement.</li> <li>The project shall provide a fair share contribution toward the City's cost of facilities and improvements identified below for the purposes of extending Class II bicycle lanes on Gateway Boulevard between East Grand Avenue and Oyster Point Boulevard, assuming 1,100 linear feet of frontage. This improvement will include striping new bicycle lanes and restriping existing lanes. Extending bicycle lanes will support enhanced bicycle access from south of the project site as identified in the <i>Active South City: Bicycle and Pedestrian Master Plan</i> (currently in draft form). If said Master Plan is in the process of being amended or updated at the time of the first building permit for the project, then the project shall instead provide a fair-share contribution in an equivalent amount towards improvements and upgrades of equivalent design and purpose, as determined by the City's Chief Planner in his reasonable discretion.</li> <li>The project shall participate in first-/last-mile shuttle program(s) to Caltrain, BART, and the ferry terminal. Shuttles may be operated by Commute.org and/or a</li> </ul> |  |

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future East of 101 transportation management agency. The project may provide an on-site loading zone for potential future private shuttles or pick-up/drop-off operations; however public shuttle shall utilize onstreet shuttle stops located adjacent to the project site in order to minimize additional travel time for shuttles. Southbound shuttles on Gateway Boulevard shall use the existing shuttle stop at the intersection of Gateway Boulevard and the Gateway Business Park driveway (approximately 500 feet south of the project site) or the project may choose to construct a new southbound

| Potential Environmental Impacts  | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures  | Level of<br>Significance<br>after<br>Mitigation |
|--|--|--|---|
|  |  | shuttle stop along the project frontage on Gateway Boulevard. A new shuttle stop shall accommodate small shuttles and larger buses and shall be designed in close coordination with the City and the shuttle operators taking into consideration planned roadway improvements, other new developments, and rider needs. Northbound shuttles on Gateway Boulevard shall use the future shuttle stop at the Gateway Business Park driveway (directly across the street from the project site) as proposed as part of the Gateway of Pacific project.  The project shall provide a more direct connection to on-street shuttle stops by adding directional curb ramps and high visibility crosswalks at the northern leg of the Gateway Boulevard/Gateway Business Park driveway/Project driveway intersection. Since no crosswalk currently existing across the northern leg of this intersection, the project shall review existing intersection signal timing and adjust if necessary, to accommodate the new pedestrian phase. Add high- visibility crosswalks on the south side of the Oyster Point Boulevard / Gateway Boulevard intersection (southern and eastern legs of the intersection) to improve access to shuttle stops on Oyster Point Boulevard. |   |
| Impact TR-2: The proposed project would not cause vehicle queues approaching a given movement downstream of Caltrans freeway facilities to exceed existing storage space for that movement or add vehicle trips to existing freeway off-ramp vehicle queues that exceed storage capacity resulting in a potentially hazardous condition. | LTS  | None required.   | LTS   |

| Potential Environmental Impacts  | Level of Significance before Mitigation | Recommended Mitigation Measures           | Level of<br>Significance<br>after<br>Mitigation |
|--|---|---|---|
| Impact TR-3: The proposed project would not produce a detrimental impact to existing bicycle or pedestrian facilities, or conflict with adopted plans and programs.  | LTS                                     | None required.                            | LTS   |
| <b>Impact TR-4:</b> The proposed project would not produce a detrimental impact to local transit or shuttle service, or conflict with adopted plans and programs.  | S                                       | Implement Mitigation Measure TR-1, above. | LTSM  |
| <b>Impact TR-5</b> : The proposed project would not substantially increase hazards due to a geometric design feature or incompatible uses.   | LTS                                     | None required.                            | LTS   |
| <b>Impact TR-6:</b> The proposed project would not result in inadequate emergency access.  | LTS                                     | None required.                            | LTS   |
| Utilities (refer to Section 4.10, Less-than-Signific   | cant Impacts)                           |   |   |
| Impact UT-1: The proposed project would not require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects. | LTS                                     | None required.                            | LTS   |
| <b>Impact UT-2:</b> The proposed project would have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.  | LTS                                     | None required.                            | LTS   |
| Impact UT-3: The proposed project would 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.  | LTS                                     | None required.                            | LTS   |

| Potential Environmental Impacts  | Level of<br>Significance<br>before<br>Mitigation | Recommended Mitigation Measures | Level of<br>Significance<br>after<br>Mitigation |
|--|--|---------------------------------|---|
| Impact UT-4: The proposed project would not generate solid waste in excess of state or local standards or in excess of the capacity of local infrastructure or otherwise impair the attainment of solid waste reduction goals. In addition, the proposed project would comply with federal, state, and local management and reduction statutes and regulations related to solid waste. | LTS  | None required.                  | LTS   |
| <b>Impact C-UT-1</b> : The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on utilities and service systems.  | LTS  | None required.                  | LTS   |
| Wildfire (refer to Section 4.10, Less-than-Signific  | icant Impacts)                                   |                                 |   |
| <b>Impact WF-1:</b> The proposed project would not substantially impair an adopted emergency response plan or emergency evacuation plan.   | LTS  | None required.                  | LTS   |
| Impact WF-2: The proposed project would not, because of slope, prevailing winds, or other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations form a wildfire or the uncontrolled spread of a wildfire.  | LTS  | None required.                  | LTS   |
| Impact WF-3: The proposed project would not require the installation or maintenance of associate infrastructure, such as roads, fuel breaks, emergency water sources, power lines, or other utilities, that may exacerbate the fire risk or that may result in temporary or ongoing impacts on the environment.  | NI   | None required.                  | NI  |

| NI  |
|-----|
|     |
| LTS |
|     |

# 2.2.1 Alternatives

CEQA Guidelines Section 15126.6 requires an EIR to evaluate the No Project Alternative and a reasonable range of alternatives to the project that would feasibly attain most of the project's basic objectives, but that would also avoid or substantially reduce any identified significant environmental impacts of the project. The proposed project would result in significant and unavoidable impacts to greenhouse gas emissions (related to vehicle miles traveled [VMT]) and transportation and circulation (related to VMT). In addition, the proposed project would result in impacts to air quality, biological resources, cultural resources and tribal cultural resources, energy, geology and soils, and noise that would be less than significant with mitigation. There are no project alternatives that would feasibly attain most of the proposed project's basic objectives but would avoid or substantially lessen any identified significant adverse environmental impacts of the proposed project. Accordingly, the range of project alternatives presents options that would avoid or reduce a less-than-significant impact with mitigation.

As described in Chapter 5, *Alternatives*, three alternatives are evaluated in this EIR:

- Alternative A—No Project Alternative
- Alternative B—Reduced Surface Parking Lot Demolition Alternative
- Alternative C—Reduced Building Footprint Alternative

As also described in Chapter 5, the EIR also evaluated, but ultimately rejected six alternatives that were considered by the City but rejected as infeasible during the scoping and environmental review process.

# 2.2.1.1 Alternative A: No Project Alternative

Under Alternative A—No Project Alternative, the existing land uses and site conditions at the project site would not change. The existing six-story, approximately 170,235-square-foot office building on the project site would remain, as would the existing surface parking, which has approximately 558 parking spaces. There would be no tree removal. Under the Alternative A, the FAR at the project site would remain at 0.53. Alternative A would not preclude potential future development of the project site with a range of land uses that are permitted at the project site.

# 2.2.1.2 Alternative B: Reduced Surface Parking Lot Demolition Alternative

Alternative B—Reduced Surface Parking Lot Demolition Alternative would demolish a smaller part of the existing surface parking lot at the project site, resulting in the same building as the proposed project but with a reduced area for parking, streetscape, and landscape improvements compared to the proposed project. Alternative B would redevelop approximately half of the proposed parking area in the northeast corner of the project site (shown in Figure 3-4 as a parking lot with 46 parking spaces in a lot north of the proposed building) with new parking, landscaping, trees, pedestrian entryway elements, and streetscape features. Most of the northeastern portion of the project site, which abuts an unnamed street to the north, Gateway Boulevard to the east, and the proposed entry plaza to the west, would remain in its current state as an existing surface parking lot with the exception of possible asphalt resurfacing and new striping for the parking spaces. This alternative would result in approximately 32 more parking spaces than the proposed project, for a total of

approximately 450 parking spaces. The 376 existing parking spaces in the rectangular parking lots in the southern portion of the project site would be included in this alternative, as is also proposed for the project.

Alternative B would retain approximately 32 existing trees in the northeastern part of the project site that are proposed for removal under the project, bringing the total number of trees to be removed to 143 compared to 175 under the proposed project. Additionally, existing shrubs and other landscaping in the northeastern part of the project site would remain and would not be renovated. The Gateway Campus site plan would be redesigned for the reduced development area under this alternative and would most likely result in a reimagined Gateway pedestrian connection with a potentially reduced art wall, biotreatment planting, and tree planting plan. It is anticipated that the landscaped square footage and permeable and impermeable surface areas of the project site would remain approximately the same as the proposed project. Site access and circulation would be otherwise similar to that proposed for the project.

The building design under Alternative B would be the same in height, square footage, bulk, architecture, and materials as the proposed project and would similarly be designed to meet LEED Gold certification and International WELL Building Institute WELL and Fitwel standards.

# 2.2.1.3 Alternative C: Reduced Building Footprint Alternative

Alternative C—Reduced Building Footprint Alternative would involve constructing a building that is the same height as the proposed project with the same ratio of office, R&D, and retail (i.e., café and fitness center) uses, but with a reduced building footprint and approximately 25 percent less square footage, with a total of 156,600 gsf. The site plan would be similar to the proposed project.

Similar to the proposed project, Alternative C would involve demolishing and removing an existing surface parking lot and the construction of a new building on the existing parking lot; however, the finished building would have a smaller footprint. Similar to the project, Alternative C would include surface parking lots with a total of 418 parking spaces on-site (including approximately 42 parking spaces in a lot north of the proposed building) for tenant use both onsite and within the Gateway Campus. Site access and circulation would be similar to that proposed for the project. Alternative C would include the same overall pedestrian and landscape improvements to the site as the proposed project, and would also improve pedestrian connections between the nearby Gateway Campus buildings at 701, 901, 951, and 801 Gateway Boulevard by creating a pedestrian hub central to the campus. Alternative C would result in project site coverage of similar proportions of pervious to impervious surfaces (or increased pervious surfaces compared to the project, as would be expected with a smaller building footprint), three biotreatment areas, and a similar number of overall and new street trees planted on site compared to the project. The design of the building under Alternative C would be similar in architecture and materials as the proposed project and would similarly be designed to meet LEED Gold certification and International WELL and Fitwel standards.

# **2.2.2** Environmentally Superior Alternative

CEQA Guidelines Section 15126.6(e)(2) requires identification of an environmentally superior alternative (the alternative that has the fewest significant environmental impacts) from among the other alternatives evaluated if the proposed project has significant impacts that cannot be mitigated

to a less-than-significant level. If Alternative A, the No Project Alternative, is found to be the environmentally superior alternative, the EIR must identify an environmentally superior alternative among the other alternatives.

Alternative B and Alternative C would result in the same significant and unavoidable impacts with mitigation related to transportation and circulation and GHG emissions because neither alternative would reduce the average HBW VMT per employee. Among the alternatives to the project, Alternative B would offer a lower level of impact by reducing the site-specific impacts that would be less than significant with mitigation. Specifically, Alternative B would require less ground disturbance and fewer tree removals, which would reduce impacts to biological resources, cultural resources and tribal resources, and geology and soils (paleontology) to a greater extent than Alternative C. Therefore, Alternative B is the environmentally superior alternative.

# 2.2.3 Areas of Known Controversy and Issues to be Resolved

The City of South San Francisco Planning Division of the Economic and Community Development Department (Planning Division), issued a Notice of Preparation (NOP) of an EIR for the proposed 751 Gateway Boulevard Project on January 21, 2020, in compliance with Title 14, Sections 15082(a), 15103, and 15375 of the California Code of Regulations. The NOP review period commenced on January 21, 2020, and concluded on February 20, 2020, and a scoping meeting was held on January 30, 2020. Two commenters spoke at the meeting. The Planning Division received three comment letters from interested parties during the public review and comment period, and one letter from the State Clearinghouse providing the NOP to responsible agencies. The Planning Division has considered the comments made by the public in preparation of the draft EIR for the proposed project. A copy of the NOP and all comments are provided in Appendix A. Based on the comments received during the scoping process, there are no known controversy or issues to be resolved.

# 3.1 Overview

The project sponsor, 701 Gateway Center LLC, proposes to redevelop a 7.4-acre, irregularly shaped site within the City of South San Francisco's (City's) Gateway Specific Plan planning area with a research and development (R&D) facility and office building. The project site is in an area referred to as the Gateway Campus (consisting of eight buildings at 601, 611, and 651 Gateway Boulevard; 681 to 685 Gateway Boulevard; 701 Gateway Boulevard; 801 Gateway Boulevard; and 901 to 951 Gateway Boulevard). The project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west. The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) currently consists of an existing six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and a surface parking lot with approximately 558 parking spaces. The project proposes to construct a new building, referred to as 751 Gateway Boulevard, on the site of an existing surface parking lot in the northern portion of the project site.

The proposed project would maintain the existing zoning designation of Zone IV under the Gateway Specific Plan District (GSPD). The existing zoning allows for development at a maximum floor area ratio (FAR) of 1.25, or a maximum of 402,930 square feet, within the project site. The building at 701 Gateway Boulevard is approximately 170,235 square feet. Based on the zoning, 232,695 square feet of unrealized FAR remains available for the project site, a portion of which the proposed project would utilize. The total proposed FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18.

The proposed project involves construction of a 148-foot-tall, seven-story building with approximately 208,800 square feet of space (60 percent R&D uses and 40 percent office uses). The new building would be constructed on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would remain. The ground floor of the proposed building would include a "through lobby" with access from the north and south; the lobby would include an amenity space for tenants. An entry plaza and landscaped visitor lot would be constructed north of the proposed building. An entrance and screened service yard would be constructed south of the proposed building. The proposed project would improve pedestrian connections between the nearby Gateway Campus buildings at 701, 901, 951, and 801 Gateway Boulevard by creating a pedestrian hub central to the campus. The proposed project would also include surface parking lots with a total of 418 parking spaces on-site (including approximately 42 parking spaces in a lot north of the proposed building) for use of the tenants on-site and within the

City of South San Francisco **Project Description** 

Gateway Campus. Construction of the proposed project, if the related entitlements are approved by the City, would begin in 2020 and occur over approximately 18 months, with an anticipated completion date in 2021.1

#### **Project Objectives** 3.1.1

The project sponsor identified the following objectives for the project:

- Create state-of-the-art R&D facilities consistent with the South San Francisco General Plan (General Plan) designation for the site as well as General Plan goals and policies.
- Develop a building that is aesthetically compatible with the surrounding vicinity, with height, massing and design treatment that is compatible with other recent development in the East of 101 Area.
- Promote the City's ongoing development of the "East of 101 Area" into a nationally recognized biotechnology and R&D center to attract other life science uses.
- Further the City's policies for developing the East of 101 Area with new opportunities for continued evolution from manufacturing and warehousing/distribution to biotechnology and R&D.
- Redevelop underutilized parcels within the project site at a higher density to build on the synergy of R&D development and to take advantage of opportunities offered in the East of 101 Area to create a vibrant, attractive and efficiently-designed R&D campus.
- Develop an R&D campus with a high level of design quality, as called for in the design policies and guidelines of the East of 101 Area Plan.
- Build a project that creates quality jobs for the City.
- Provide sufficient space for tenants to employ key scientific and business personnel in proximity to each other to foster efficient collaboration and productivity.
- Capitalize on the project's proximity to the new Caltrain station to provide transit-oriented employment opportunities, encourage employees to commute using public transit, and reduce VMT and air emissions by reducing single-occupancy vehicle trips.
- Enhance the visual quality of development around the existing Gateway Campus by providing a high-quality, modern building and functional and attractive landscape areas. The project will take advantage of and enhance access to the Caltrain station by upgrading the pedestrian and bicycle connections within and to the Gateway campus.

Subsequent to the preparation of this draft EIR, the project sponsor indicated that construction of the proposed project could begin in 2021 and end in 2022, which is a delay of approximately six months compared with the construction schedule analyzed in Chapter 4, Environmental Setting, Impacts, and Mitigation. The anticipated buildout year for the project assumed in the EIR analysis is 2021. Equipment and vehicle emission factors decline as a function of time due to increasingly stringent air emission standards. Therefore, if construction of the project were to extend to 2022, the air quality and greenhouse gas analyses in this draft EIR would likely be conservative, as actual emissions would likely be lower in 2022 than what was assumed for the project analysis. In addition, this potential change to the project schedule would not result in any changes to the environmental analysis for any of the environmental topic sections because the overall duration of construction and construction intensity would remain the same.

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Promote alternatives to automobile transportation to further the City's transportation objectives by emphasizing linkages, transportation demand management (TDM), pedestrian access, and ease of movement between buildings.

- Enhance vehicular, bicycle, and pedestrian circulation and access in the area surrounding the project site.
- Build a project that is viable in the East of 101 Area, based on market conditions and project service requirements for the area.
- Incorporate flexibility for office and R&D uses to ensure that the project is responsive to tenant demands, based on market conditions.
- Maximize positive fiscal impacts for the City through the creation of jobs, enhancement of property values, and generation of property taxes and development fees.

#### **Project Location** 3.1.2

The project site is located in the City of South San Francisco. The City is located south of the City of Brisbane and north of the City of San Bruno. The City is built on the bay plain and on the northern foothills of the Coastal Range. The City is located along major transportation routes, including U.S. 101, Interstate 380, Interstate 280, and the Union Pacific Railroad. Figure 3-1, shows the location of the project site and the regional vicinity.

The project site is within the City's Gateway Specific Plan area, within the East of 101 area. The Gateway Specific Plan area consists of approximately 23 acres of land and is bounded by Oyster Point Boulevard to the north, Eccles Avenue to the east, East Grand Avenue to the south, and the Caltrain right-of-way to the west.

#### 3.2 **Existing Setting**

The project site is located in the Gateway Campus, an area with primarily commercial and office uses. As shown in Figure 3-2, the project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west.

The project site is served by Gateway Boulevard as the primary arterial road, fed by Oyster Point Boulevard (running east to west) to the north and East Grand Avenue (running east to west) to the south. In addition, the project site is approximately 0.5 mile north of the South San Francisco Caltrain station and approximately 0.2 mile east of U.S. 101. San Francisco International Airport (SFO) is approximately 2 miles south of the project site.

#### 3.2.1 **Regional Setting**

The City of South San Francisco encompasses approximately 4,298 acres and is largely composed of single-use areas, with industry in the eastern and southeastern portions of the City and single-family homes to the north and west. Much of the City is already urbanized, and the amount of vacant land is limited. Growth in the City typically occurs mostly in the form of redevelopment and intensification.





Figure 3-1
Project Location
751 Gateway Boulevard Project

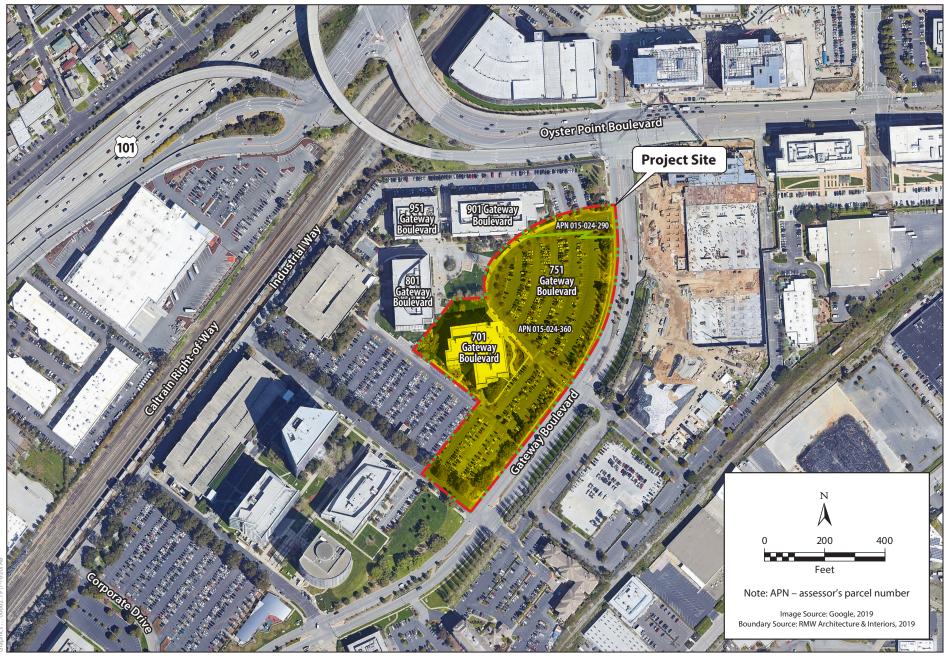




Figure 3-2
Existing Project Site
751 Gateway Boulevard Project

City of South San Francisco Project Description

# 3.2.2 Surrounding Land Uses

The project site is within an area comprised of numerous business parks near the intersection of Gateway Boulevard and Oyster Point Boulevard, as shown in Figure 3-2. The project site is within the Gateway Campus, which includes eight buildings at 601, 611, and 651 Gateway Boulevard; 681 to 685 Gateway Boulevard, 701 Gateway Boulevard, 801 Gateway Boulevard, and 901 to 951 Gateway Boulevard. The Gateway Campus is composed of three- to 16-story buildings, consisting of approximately 1.4 million square feet of office, R&D, childcare, and amenity uses and approximately 4,330 parking spaces. North of the project site across Oyster Point Boulevard is the Cove at Oyster Point, which is composed of four- to six-story buildings consisting of office and biotechnology uses. South of the project site across an unnamed street that connects Poletti Way to Gateway Boulevard is the Genentech Campus, which is composed of three- to six-story office and R&D buildings. The Genentech Campus also includes a five-story parking garage and amenities such as retail uses and childcare uses.

The Caltrain right-of-way is located along the western boundary of the Gateway Campus. Oyster Point Park is approximately 0.7 mile east of the project site and the Bay Trail is approximately 0.2 mile north of the project site.

# 3.2.3 Site Setting

The 7.4-acre project site (assessor's parcel numbers 015-024-290 and 015-024-360) consists of a six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and surface parking lots with approximately 558 parking spaces. The existing building at 701 Gateway Boulevard was constructed in 1998. Approximately 450 employees work at the existing office building at 701 Gateway Boulevard. Approximately 19 percent of the project site is covered with pervious surfaces, and 81 percent of the project site is covered with impervious surfaces. A summary of the existing characteristics of the project site is provided in Table 3-1.

Table 3-1. Summary of Existing Site Characteristics

| Feature                                | Existing Project Site                                   |
|--|---|
| Assessor's Parcel Numbers              | 015-024-290 and 015-024-360                             |
| Lot size                               | 7.4 acres (approximately 322,344 square feet)           |
| General Plan land use/zoning           | Business Commercial (BC)/Gateway Specific Plan District |
| Existing uses at 701 Gateway Boulevard | 170,235 square feet of office space                     |
| Building height                        | Approximately 97 feet                                   |
| Number of stories                      | 6   |
| Existing FAR <sup>1</sup>              | 0.53  |
| Vehicle parking                        | 558 spaces  |

Source: 701 Gateway Center LLC, 2019

Notes:

Floor area ratio (FAR) is the relationship between the total amount of usable floor area that a building has, or has been permitted for the building, and the total area of the lot on which the building stands. A higher FAR number is more likely to indicate a dense or urban construction. The South San Francisco Municipal Code Sections 20.040.008 and 20.40.009, allow certain areas to be excluded from the calculation of square feet of Floor Area and FAR.

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#### 3.2.3.1 **Existing Land Use and Zoning Designations**

The project site is identified in the 1999 General Plan as Business Commercial (BC). The BC land use designation allows for a mix of business and professional offices, visitor service establishments, and retail establishments. More specifically, the General Plan describes the permitted uses for the site as administrative, financial, business, and professional uses; medical and public offices; R&D facilities; and visitor-oriented and regional commercial uses. The land use designation was created to encourage the type of commercial and hotel growth that is currently occurring along South Airport, Gateway, and Oyster Point Boulevards as well as the South Spruce corridor within the City. The base maximum permitted FAR in the BC land use designation is 0.5, but increases may be permitted up to a total FAR of 1.0 for uses such as R&D facilities, or for development meeting specific TDM, off-site improvement, or specific design standards. A FAR of up to 1.25 is permitted in the Gateway Business Park Master Plan area and in certain portions of the Oyster Point Specific Plan area for projects that include a TDM program. In addition, the General Plan provides that the zoning ordinance can provide specific exceptions to FAR limitations for uses with low employment densities, such as research facilities, or low peak-hour traffic generation.

The City of South San Francisco is organized into several geographic areas, referred to as planning areas. The project site is in the Gateway Specific Plan Area, which includes a variety of commercial and R&D land uses, and is zoned GSPD. The GSPD is divided into five zones and the project site is located in Zone IV. The maximum number of buildings allowed within the GSPD is 50, with a maximum height of 250 feet.<sup>2</sup> The maximum surface area covered by structures (lot coverage) is limited to 50 percent, and development is permitted up to a maximum FAR of 1.25, or a maximum of 402,930 square feet, within the project site.

Figure 3-3 illustrates the existing General Plan land use and zoning designations of the project site and surrounding area.

### East of 101 Area Plan Designation

The project site is designated as Gateway Specific Plan Area in the East of 101 Area Plan.<sup>3</sup> The City interprets the East of 101 Area Plan as a design-level document. Per policy IM-5, the Gateway Specific Plan is not affected by the land use regulations of the East of 101 Area Plan. Development standards and density determinations, including FAR, are established in the General Plan, which was updated after the adoption of, and takes precedence over, the East of 101 Area Plan. Moreover, when East of 101 Area Plan policies are in conflict with or inconsistent with the General Plan, the General Plan policies supersede requirements outlined in the East of 101 Area Plan. Applicable design-level policies of the East of 101 Area Plan include all policies of the Design Element; Land Use Element policies LU-8a (Gateway Specific Plan uses), and LU-8b (Gateway Specific Plan FAR). Policy LU-8a provides that the uses allowed in the Gateway Specific Plan Area are those specified in the Gateway Specific Plan. Policy LU-8b provides that the maximum FAR in the Gateway Specific Plan Area is that specified in the Gateway Specific Plan.

Building heights east of U.S. 101 are allowed the maximum height limits permissible under Federal Aviation Regulations Part 77. General Plan Figure 2-2 establishes a 261-foot height limit for the project site, whereas Exhibit IV-13 of the 2012 SFO Comprehensive Airport Land Use Compatibility Plan establishes a 300-foot height limit for the project site.

The land use entitlements of the Gateway Specific Plan are not affected by the East of 101 Area Plan and supersede any standards or entitlements set forth in the East of 101 Area Plan. However, development within the project site would be required to conform with other policies of the *East of 101 Area Plan*, such as design guidelines.

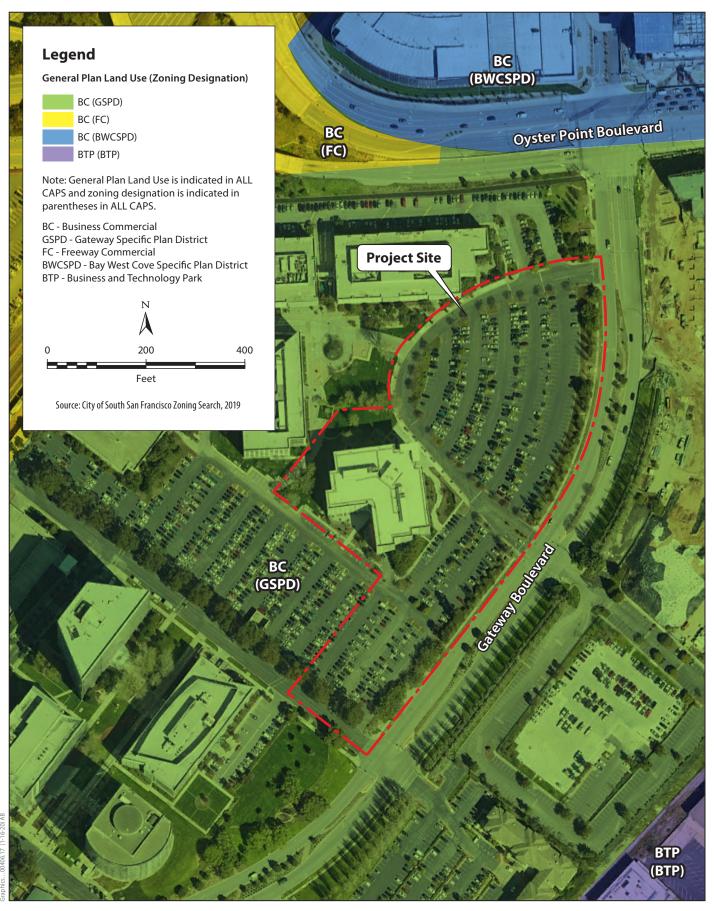




Figure 3-3
Existing General Plan Land Use and Zoning Designations
751 Gateway Boulevard Project

City of South San Francisco Project Description

### **Height Limits**

In general, height limitations or restrictions in the East of 101 Area are defined by the SFO sphere of influence.<sup>4</sup> Development on the project site is limited to 300 feet in height by elevation according to the *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport* prepared in 2012,<sup>5</sup> but may be restricted based on notification and consultation with the Federal Aviation Administration (FAA) under Part 77.9 of the Code of Federal Regulations (CFR). The Gateway Specific Plan and GSPD establish a 250-foot height limit within the GSPD.

# 3.2.3.2 Existing Parking, Circulation, and Access

The project site contains two driveways on Gateway Boulevard, one driveway from the existing internal access drive immediately south of the building at 951 Gateway Boulevard, and one driveway on an unnamed street that connects Poletti Way to Gateway Boulevard, as shown in Figure 3-2. Vehicles access the building at 701 Gateway Boulevard via the two driveways on Gateway Boulevard and travel to either the 376-space semi-circular parking lot in the northern portion of the project site, the rectangular parking lots in the southern portion of the project site that include a total of 170 spaces, or the 18 spaces immediately west of the building at 701 Gateway Boulevard. In total, there are approximately 558 surface parking spaces on the site. Onstreet parking is not permitted on the streets surrounding the project site. In addition, there is a loading dock on the southeast side of the existing building at 701 Gateway Boulevard.

The Gateway Campus, excluding 801 Gateway Boulevard and 901-951 Gateway Boulevard, currently has a total of 3,457 parking spaces, which provides a parking ratio of 3.19 spaces per 1,000 gross square feet. Of these spaces, in addition to the 558 spaces that serve the project site (office) (3.25 spaces/1,000 gross square feet), there are 369 spaces that serve 681-685 Gateway Boulevard (lab) (2.55 spaces/1,000 gross square feet), 711 spaces that serve 601 Gateway Boulevard (office) (3.29 spaces/1,000 gross square feet), 857 spaces that serve 611 Gateway Boulevard (office) (3.29 spaces/1,000 gross square feet), and 956 spaces that serve 651 Gateway Boulevard (office) (3.29 spaces/1,000 gross square feet).

The project site is served by a Class II bicycle lane along a segment of Oyster Point Boulevard north of the project site.<sup>6</sup> Pedestrian access is provided by a sidewalk along Gateway Boulevard adjacent to the project site.

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<sup>&</sup>lt;sup>4</sup> City of South San Francisco Zoning Ordinance, 2017.20.110.003(A).

<sup>&</sup>lt;sup>5</sup> City/County Association of Governments of San Mateo County. 2012. *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*. Exhibit IV-14, p. IV-45.

<sup>&</sup>lt;sup>6</sup> A Class II bicycle lane is a striped bicycle lane separated from traffic.

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### 3.2.3.3 Existing Landscaping and Site Conditions

Landscaping on the project site is limited to trees and ornamental landscaping features such as parking and building buffers. The project site contains approximately 227 trees, including 35 protected trees.<sup>7,8</sup> The project site, which is approximately 34 to 21 feet above mean sea level, slopes gently from west to east, toward Gateway Boulevard.<sup>9</sup>

### 3.2.3.4 Existing Utility Infrastructure

### Potable Water<sup>10</sup>

The project site is served by the California Water Service Company, which purchases most of its water from the San Francisco Public Utilities Commission. There is a 12-inch water main in Gateway Boulevard. There is a 12-inch lateral that serves the 701 Gateway Boulevard building and a 4-inch service line that connects to the lateral. In addition, there is an existing 8-inch fire water main that serves the 701 Gateway Boulevard building and connects to the 12-inch lateral and loops around the buildings located at 701, 801, and 901 Gateway Boulevard.

#### Stormwater<sup>11</sup>

There are several storm drains located around the perimeter of the northern surface parking lot. In addition, there is an 18-inch storm drain line in Gateway Boulevard that flows north and a 30-inch storm drainpipe in Gateway Boulevard that flows south.

# Sanitary Sewer System<sup>12</sup>

The project site is served by an existing sanitary sewer system. There is an existing pump station located immediately north of the project site at the intersection of Gateway Boulevard and Oyster Point Boulevard. There is a 10-inch sewer main in Gateway Boulevard that runs from the pump station and connects to an 8-inch lateral that serves the 701 Gateway Boulevard building. The 10-inch sewer main also has a 12-inch gravity pipe outfall that continues south in Gateway Boulevard.

#### **Natural Gas and Electric**

The project site is served by the existing natural gas and electric service provided by Pacific Gas and Electric (PG&E). There are underground electrical lines in the eastern portion of the northern surface parking lot. There is a 4-inch natural gas main in Gateway Boulevard.

<sup>&</sup>lt;sup>7</sup> Arborwell. 2020. 701 Gateway Boulevard Tree Inventory & Assessment, 701 Gateway Boulevard, South San Francisco, California. February 12.

The City of South San Francisco defines a protected tree as any tree of the following species with a circumference of 75 inches or more when measured 54 inches above natural grade: blue gum (*Eucalyptus globulus*), black acacia (*Acacia melanoxylon*), myoporum (*Myoporum laetum*), sweetgum (*Liquidambar styraciflua*), glossy privet (*Lingustrum lucidum*), lombardy poplar (*Populus nigra*).

<sup>&</sup>lt;sup>9</sup> Langan. 2019. Geotechnical Investigation, 751 Gateway Boulevard, South San Francisco, California. November 7.

<sup>&</sup>lt;sup>10</sup> BKF Engineers. 2020. 701 and 751 Gateway Boulevard, South San Francisco Wet Utilities. March 5, 2020.

<sup>&</sup>lt;sup>11</sup> Ibid.

<sup>&</sup>lt;sup>12</sup> Ibid.

City of South San Francisco **Project Description** 

#### **Telecommunications**

There are numerous telecommunication providers in the City for DSL, wireless, cable, and fiber optics. Various communication companies (e.g., AT&T, Comcast, CenturyLink/Level3 and Zayo) provide service via underground conduits located in the vicinity of the project site.

### **Refuse and Recycling**

The project site is served by South San Francisco Scavenger Company and Blue Line Transfer, Inc., which are located approximately 1 mile southeast of the project site. The building at 701 Gateway Boulevard has one off-street loading dock for trash and recycling pickup services.

#### **Description of the Proposed Project** 3.3

As discussed in detail below, the proposed project would include construction of a building, consisting of R&D and office uses and amenity uses supportive to the proposed uses on the project site and existing uses in the Gateway Campus. The proposed project would also include surface parking, streetscape improvements, and infrastructure for utilities.

#### 3.3.1 **Proposed Project Buildout**

The proposed project would maintain the existing zoning designation of Zone IV under the GSPD. Based on the zoning, 232,695 square feet of unrealized FAR is associated with the project site. The proposed project would use a portion of the unrealized FAR associated with the project site; the proposed total FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18.

#### 3.3.2 **Proposed Project Site Plan**

The proposed project involves construction of a 148-foot-tall, seven-story building with approximately 208,800 square feet of space (60 percent R&D uses and 40 percent office uses). The new building would be constructed on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would remain. The proposed building would be constructed on the site of an existing surface parking lot in the northern portion of the project site. The proposed project would also include two surface parking lots with a total of 418 parking spaces. Upon project completion, approximately 26 percent of the project site would be covered with pervious surfaces, and 74 percent of the project site would be covered with impervious surfaces. A summary of the proposed project features is provided in Table 3-2. Figure 3-4 illustrates the proposed project site plan.

City of South San Francisco Project Description

**Table 3-2. Proposed Project Features** 

| Feature  | Proposed Project   |
|--|--|
| Existing uses at 701 Gateway Boulevard (to remain) | 170,235 square feet of office space  |
| Total proposed new uses at 751 Gateway Boulevard   | 208,800 square feet  |
| R&D  | 118,000 square feet  |
| Office   | 78,700 square feet   |
| Amenity (including café and fitness center)        | 12,100 square feet   |
| Building height                                    | 148 feet   |
| Number of stories                                  | 7  |
| Site FAR <sup>1</sup>                              | 1.18   |
| Vehicle parking                                    | 418 spaces (including nine accessible spaces, 25 electric vehicle charging spaces, and 60 carpool spaces)                            |
| Short-term bicycle parking spaces                  | 90 spaces  |
| Long-term bicycle parking spaces                   | 36 spaces  |
| Trees  | 164 trees (accounting for the 175 existing trees to be removed, 52 existing trees to remain, and additional 112 trees to be planted) |

Source: 701 Gateway Center LLC, 2019.

### Notes:

<sup>&</sup>lt;sup>1</sup> Floor area ratio (FAR) is the relationship between the total amount of usable floor area that a building has, or has been permitted for the building, and the total area of the lot on which the building stands. A higher FAR number is more likely to indicate a dense or urban construction. The South San Francisco Municipal Code Sections 20.040.008 and 20.40.009, allow certain areas to be excluded from the calculation of square feet of Floor Area and FAR.

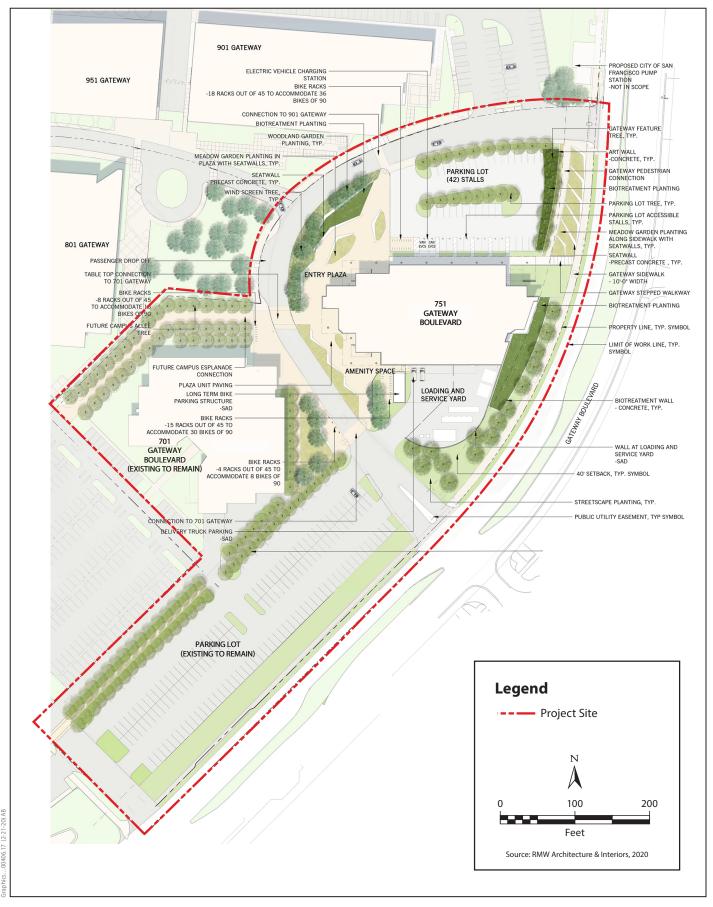




Figure 3-4
Conceptual Project Site Plan
751 Gateway Boulevard Project

City of South San Francisco Project Description

Figure 3-5 and Figure 3-6 show the interior configuration for the proposed building. The ground floor (floor 1) of the proposed building would include a "through lobby" with access from the north and south in the western portion of the building. The lobby would include an amenity space, including a café, which would be open to the public. In addition, floor 1 would include a fitness center, which would only be open to occupants of the Gateway Campus. Floor 2 would include additional lobby space. Floors 3 through 7 would be used for R&D and office space. Figure 3-7 and Figure 3-8 show the elevations for the proposed building.

A service and loading yard would be constructed south of the proposed building (Figure 3-5). The yard would be screened by a 15-foot aluminum wall along Gateway Boulevard that would be similar to the architecture of the proposed building; the screen along the southern and western portion of the yard would be constructed of a perforated aluminum panel. The yard would contain an emergency generator and loading docks. The proposed project would include one diesel 1,250-kilowatt (kW) generator (1,562-kilovolt amps) equipped with a level 3 enclosure. The generator would be required to meet the Bay Area Air Quality Management District's (BAAQMD's) permitting requirements for stationary sources. Periodic testing of the generator would be completed; testing is anticipated to consist of one test per week for 30 to 45 minutes per test at a load of 100 percent for up to 50 hours per year maximum, as limited by the BAAQMD. Other than testing, the generator would only operate during emergencies. The proposed project would include an aboveground tank to store diesel fuel for the proposed generator. The proposed project would include two loading docks in the yard, which would accommodate weekly trash and recycling pickups, daily deliveries (e.g., FedEx, postal service), building equipment servicing (e.g., PG&E checking meters), and occupants while moving in/moving out. In addition, all major heating, ventilation, and air conditioning (HVAC) equipment that would serve the proposed building would be located on the roof in a screened enclosure or in the rooftop penthouse for the chiller and boiler. The screened enclosure would comprise aluminum panels as an extension of the building.

# 3.3.2.1 Project Site Access, Circulation, and Parking

The existing access to the project site (two driveways on Gateway Boulevard, one driveway from the internal access drive south of the building at 951 Gateway Boulevard, and one driveway on an unnamed street that connects Poletti Way to Gateway Boulevard) would be retained under the proposed project (Figure 3-4). In addition, the existing internal access drive within the project site, which would curve around the proposed building and the proposed northern surface parking lot, would be retained under the proposed project. The proposed project would include a new shuttle stop/passenger pickup/drop-off zone for employee shuttles along the western portion of the access drive north of the existing building at 701 Gateway Boulevard. Emergency vehicle access to the project site would be provided by Gateway Boulevard and the proposed parking lot to be constructed north of the proposed building would serve as the main point of entry for emergency vehicles.

The parking for the proposed project would be provided as part of a master parking plan for the portion of the Gateway Campus consisting of 601 Gateway Boulevard, 611 Gateway Boulevard, 651 Gateway Boulevard, 681–685 Gateway Boulevard, 701 Gateway Boulevard, and 751 Gateway Boulevard. The master parking plan would provide 3,099 parking spaces, which would provide a ratio of 2.4 spaces/1,000 gross square feet for this portion of the Gateway Campus. Of these spaces, 1,916 spaces would serve 601, 611, and 651 Gateway Boulevard (office) in a shared parking

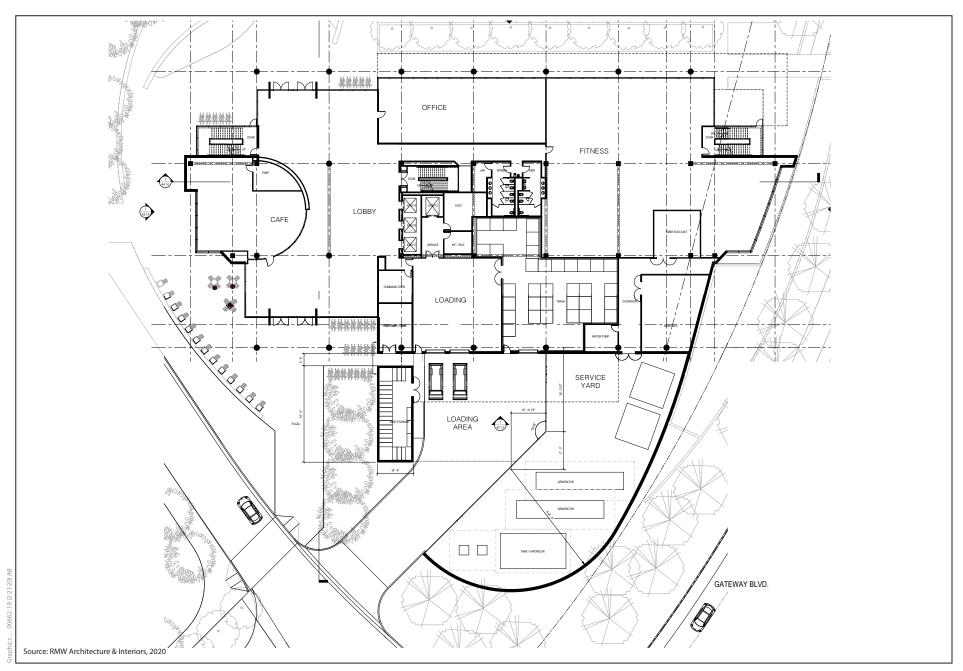
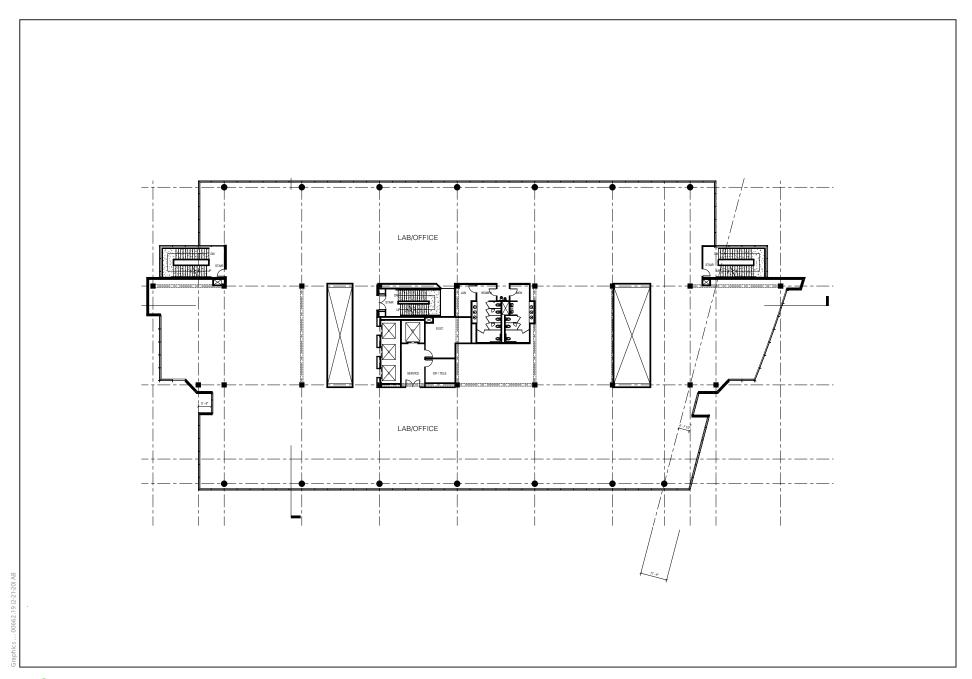
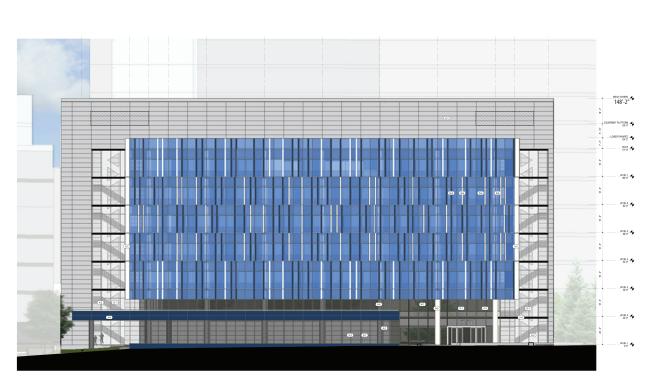




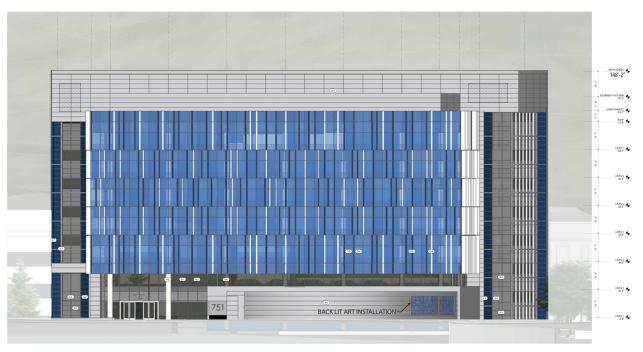
Figure 3-5
Conceptual Floor Plan (Floor 1)
751 Gateway Boulevard Project







North Elevation



South Elevation

Source: RMW Architecture & Interiors, 2019





**East Elevation** 



West Elevation

Source: RMW Architecture & Interiors, 2019



arrangement (2.5 spaces/1,000 gross square feet), 289 spaces would serve 681-685 Gateway Boulevard (lab) (2 spaces/1,000 gross square feet), 434 spaces would serve 701 Gateway Boulevard (office)(2.5 spaces/1,000 gross square feet), and 418 spaces would serve 751 Gateway Boulevard (lab) (2 spaces/1,000 gross square feet).

The project site would include a total of 418 parking spaces, including 42 parking spaces in a lot to be constructed north of the proposed building and 376 existing spaces in the rectangular parking lots in the southern portion of the project site. Of the total parking spaces, the proposed project would include nine accessible spaces that would be compliant with the Americans with Disabilities Act (ADA), 25 electric vehicle charging spaces, and 60 carpool spaces.

The proposed project would include 90 short-term bicycle parking spaces and 36 long-term bicycle parking spaces. The short-term bicycle parking spaces would be provided near the proposed entry plaza north of the proposed building, between the proposed outdoor amenity space and the service and loading yard south of the proposed building, and along the western side of the internal access drive near the existing building at 701 Gateway Boulevard. The long-term bicycle parking spaces would also be provided between the proposed outdoor amenity space and the service and loading yard. In addition, the proposed fitness center would include showers and clothes locker facilities.

A pedestrian walkway, also known as the Gateway pedestrian connection, would be constructed along Gateway Boulevard in the portion of the project site. The approximately 470-foot landscaped walkway would run parallel to the sidewalk and would connect pedestrians from the northern portion of the project site to the proposed building. In addition, pedestrian walkways would be constructed along the existing internal access drive to connect the proposed building to the rest of the Gateway Campus. The proposed project would also include a widened sidewalk and landscaping on the west side of Gateway Boulevard along the project frontage.

# 3.3.2.2 Site Landscaping and Open Space

The proposed project would include an outdoor entry plaza northwest of the proposed building and an outdoor amenity space southwest of the proposed building. Both the entry plaza and the amenity space would include landscaping, outdoor gathering areas, and seating areas. In addition, the project would include new landscaping along the perimeter of the site. The proposed project would include approximately 59,800 square feet of planted landscaped areas (not accounting for the proposed biotreatment areas, discussed below) and approximately 53,700 square feet of hardscape landscaped areas, for a total of 58,100 square feet of landscaped areas.

The proposed project would also include three biotreatment areas (e.g., planting areas), one near the entry plaza, one between the lot north of the proposed building and the Gateway pedestrian connection, and one immediately east of the proposed building. The biotreatment areas would total approximately 5,500 square feet.

The proposed project would include a total of 164 trees, accounting for the 175 existing trees to be removed (including three heritage trees and one protected tree), the 52 existing trees to remain, and the additional 112 trees to be planted.

### 3.3.2.3 Building Design

The proposed building would be constructed with contemporary materials and detailing, including white, light-blue, and dark-blue vision glass; solid aluminum panels; perforated aluminum panels; and metal railings and columns. The architectural style, which would include both vertical and horizontal elements (Figure 3-7 and 3-8), would include massing breaks, building openings, and wall planes that would combine architectural and landscaping features. The building construction type, per the California Building Code, would be Type III for the building frame. In addition, an interpretive art installation would be located along the pedestrian entry on Gateway Boulevard (Figure 3-7 [south elevation] and Figure 3-8 [east elevation]). Signage and lighting would be included at site entrances, along walkways, and in parking lots.

# 3.3.2.4 Employees

The proposed project would result in approximately 731 net new employees at the project site.<sup>13</sup> Upon project completion, there would be approximately 1,181 total employees on-site (including the 450 employees in the 701 Gateway building who would remain).

### 3.3.2.5 Infrastructure

As discussed above, the project site is serviced by existing water, wastewater, stormwater, natural gas, electric, telecommunications, and waste and recycling services. New on-site facilities would be connected to new services through the installation of new, localized connections. Expansion or an increase in capacity of off-site infrastructure would occur as required by the utility providers. The project could include off-site infrastructure improvements outside of the project site but within the Gateway Campus. Detailed descriptions of the proposed utility infrastructure are provided below.

### Potable Water<sup>14</sup>

New water utilities would be placed around the perimeter of the project site and throughout the site. A new 6-inch lateral would connect to the existing 12-inch lateral on the project site. Two new 8-inch laterals for fire needs would be constructed as part of the project. One 8-inch lateral would connect to the existing 12-inch lateral on the project site. The other 8-inch lateral would connect to the 12-inch water main in Gateway Boulevard.

### Stormwater<sup>15</sup>

The existing 18-inch storm pipe on the project site would be relocated around the proposed building and service and loading yard. New storm drain collector pipes and biotreatment areas (discussed above) would be constructed within the project site to drain to the existing 18-inch storm drain line in Gateway Boulevard.

The estimated number of employees is based on data provided by the project applicant; it assumes 60 percent of the proposed square footage (approximately 118,000 square feet) is R&D space and 40 percent of the proposed square footage (approximately 78,700 square feet) is office space. The average square footage per R&D employee is assumed to be 350, and the average square footage per office employee is assumed to be 200. The estimated number of employees associated with the proposed fitness center and café is accounted for in the estimate of the number of employees associated with the proposed R&D and office uses.

<sup>&</sup>lt;sup>14</sup> BKF. 2020. 701 and 751 Gateway Boulevard, South San Francisco Wet Utilities. March 5.

<sup>15</sup> Ibid.

### Sanitary Sewer System<sup>16,17</sup>

The 12-inch gravity pipe outfall in Gateway Boulevard may need to be upsized as part of the proposed project. A new 8-inch lateral would be constructed on the project site to serve the proposed building. In addition, the existing 8-inch lateral that serves the 701 Gateway Boulevard building would need to be replaced with a 10-inch lateral.

#### **Natural Gas and Electric**

Electrical service and natural gas service would continue to be provided by PG&E. The proposed building would connect to the PG&E grid. Specifically, the project would construct 4-inch electrical conduits to connect to the existing electricity lines in Gateway Boulevard. In addition, the project would construct a 4-inch natural gas lateral to connect to a new natural gas meter that would connect to the existing 4-inch natural gas line in Gateway Boulevard.

#### **Telecommunications**

The project site would continue to be served by the existing telecommunication providers. The project would construct 3- to 4-inch communication conduits to connect to the existing communication lines in Gateway Boulevard.

### Refuse and Recycling

The project site would continue to be served by the South San Francisco Scavenger Company and Blue Line Transfer Inc. Trash processing and loading areas at the proposed building would be on the south side of the building. Loading docks would be in the service and loading yard south of the proposed building and away from automobile and pedestrian circulation areas.

### **Mechanical Equipment**

The proposed heating, ventilation, and air conditioning (HVAC) systems and mechanical equipment for the project would include two chillers and three boilers to serve the heating and cooling needs in the building, which would be located in a rooftop penthouse. Nine pumps would also be located in the penthouse. Four air-handling units, two cooling towers and six large exhaust fans would also be located on the roof behind a screen.

# 3.3.2.6 Sustainability

The proposed project would be designed to enhance resource efficiency and ensure good indoor environmental quality, as well as reduce energy consumption, water consumption, and waste generation. Examples of the proposed sustainability measures include low-flow shower heads, aerators, and toilets; Energy Star-rated appliances; electric vehicle charging spaces; and a waste diversion program that would separate compost, bottles/cans, paper and cardboard, and landfill materials. Proposed design elements, such as connectivity with employee shuttles (via the new shuttle stop along the western portion of the access drive north of the existing building at 701 Gateway Boulevard) and bicycle parking, would encourage alternative transportation modes. The

<sup>16</sup> Ibid.

<sup>&</sup>lt;sup>17</sup> BKF. 2020. 751 Gateway Blvd - Sanitary Sewer Analyses. March 27.

project would be designed to meet the standards of the South San Francisco Municipal Code and CALGreen building requirements. In addition, the project would be designed to meet LEED Gold certification as well as International WELL and Fitwel Building Institute Standards. <sup>18,19</sup> The proposed project would include construction of rooftop solar photovoltaic panel–ready connectivity to allow for the potential future installation of solar panels.

The proposed project would also be designed to conserve resources and protect water quality through the management of stormwater runoff as part of green infrastructure through low-impact development (LID). This approach implements engineered controls to allow stormwater filtering, storage, and flood control. Biotreatment areas would be located adjacent to the proposed building.

### 3.3.2.7 Construction

Construction of the project is scheduled to commence with site preparation in 2020 and end in winter 2021, lasting approximately 18 months, if the related entitlements are approved by the City. The project would include the following construction stages: (1) site preparation and demolition, (2) foundation installation, (3) building structure construction, (4) exterior and roof buildout, (5) interior buildout, and (6) commissioning and final inspections.

The hours of construction would be stipulated by the Building Division, and the project contractor would be required to comply with Section 8.32.050 of the South San Francisco Municipal Code (the South San Francisco Noise Ordinance), which includes regulations related to noise generated by construction. Project construction would typically occur Monday through Friday, between 7:00 a.m. and 5:00 p.m., although some work is anticipated to occur on Saturdays between 9:00 a.m. and 8:00 p.m. or on Sundays between 10:00 a.m. and 6:00 p.m. Approximately 15 instances of nighttime construction work would occur for concrete pours. Nighttime construction would begin approximately at 4:00 a.m. and be completed by 5:00 p.m. Construction is not anticipated to occur on major legal holidays.

Construction materials and equipment would be staged entirely on-site, in areas where construction is not occurring. Construction workers would park on the project site or use existing parking within the Gateway Campus. No temporary road closures that would affect the public right-of-way would be required during project construction. However, temporary sidewalk rerouting on Gateway Boulevard is expected to occur. Roadway traffic control would be used as needed during construction.

The proposed building would be constructed on a mat slab foundation. Piles would not be required. Demolition of the existing surface parking lot would generate approximately 300 cubic yards of concrete and asphalt waste. The proposed project would require grading or disturbing an area of approximately 149,000 square feet during construction. The proposed project would excavate

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The proposed project would be designed to meet WELL tenant-ready standards, but may not formally certify. The WELL standards are performance-based building standards for measuring and monitoring features within the built environment that may affect human health through air, water, light, and other concepts. The standards provide ways for buildings to be designed to improve human comfort and enhance health and wellness within the built environment.

The Fitwel standards include evidence-based design and operational strategies that enhance a building's environment for its occupants. The Fitwel standards have seven health impact categories for evaluating a building, including, but not limited to, access to healthy food, opportunities for physical activity, and promotion of occupant safety.

approximately 1,850 cubic yards of soil that would be reused as fill on-site, and would import an additional 750 cubic yards of soil to be used as fill on-site. To accommodate utility trenches, the project would require a maximum depth of excavation reaching approximately 9 feet below ground surface. Construction activities for the proposed project would result in an average of up to approximately 13 daily construction truck trips during the most intensive construction stage and a maximum of approximately 110 daily construction worker round trips.

A stormwater pollution prevention plan (SWPPP) would be implemented during project construction. Project construction would use water from a metered hydrant (up to 1,600 gallons a day, maximum). No dewatering would be required during project construction.

For construction and demolition, 100 percent of all inert solids (building materials) and 65 percent of non-inert solids (all other materials) would be recycled as required by the City under Chapter 15.60 of the South San Francisco Municipal Code.

# 3.3.3 Transportation Demand Management Plan

The proposed project would require submittal of a TDM plan to the Planning Division for review and approval as part of the entitlement process, per the requirements of the South San Francisco Municipal Code and the General Plan. The City's TDM program is intended to reduce the amount of traffic generated by new development, reduce the share of drive-alone traffic during peak periods, and incentivize the use of alternative modes of transportation. The TDM plan may be refined during the planning review process for project entitlements. The TDM plan lays out policies and strategies to reduce peak-hour travel demand and encourage alternative modes of transportation that reduce single-occupant vehicle use. Although SSFMC Section 20.400 does not call out a specific alternate mode-share (AMS) requirement for the Gateway Specific Plan District, similar zoning districts, as well as General Plan requirements in the East of 101 area, require an AMS of 35-40 percent for development of a FAR of 1.0-1.25. This standard would be applied to the 751 Gateway Boulevard Project, consistent with City requirements and policies to increase AMS and decrease singleoccupancy vehicle traffic. . Although the regulatory TDM requirements call for a 35-40 percent AMS, the CEQA analysis assumes a higher and more conservative drive-alone share (AMS of 26 percent), consistent with the City/County Association of Governments of San Mateo County model and analysis for other similar projects within the City and the region. The proposed project would include a flexible TDM plan, which would include the requirements listed below, to achieve an alternative mode use goal<sup>20</sup> of 35 percent for the proposed project within the first three years of reporting, with an increase to 40 percent in the fourth year of reporting:21

- Carpool and vanpool ride-matching services
- Designated employer contact
- Direct route to transit
- Guaranteed ride home for emergency situations

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The alternative mode use goal indicates the percentage of total trips that would use alternative transportation modes rather than single-occupancy vehicle trips.

<sup>&</sup>lt;sup>21</sup> Silvani Transportation Consulting. 2019. *Proposed Transportation Management Plan: 751 Gateway Blvd., South San Francisco CA*. December.

- Information boards and kiosks
- Passenger loading zones
- Pedestrian connections
- Promotional programs (e.g., new tenant and employee orientation packets on transportation alternatives)
- Showers and clothes lockers
- Shuttle program
- Transportation Management Association participation
- · Short- and long-term bicycle parking
- · Free parking for carpools and vanpools

As part of the TDM plan, additional measures may be implemented (e.g., compressed work week, onsite amenities, and telecommuting). To ensure that the measures from the TDM plan would be effective and implemented, the SSFMC requires that the applicant administer an annual commuter survey to monitor the plan and report the results to the City on an annual basis. If the TDM plan requirements are not met, the applicant would be required to adjust its TDM strategies in order to meet the project's required AMS.

# 3.3.4 Lead Agency Approvals

Table 3-3 lists the anticipated permits and approvals that would be required for the proposed project.

Table 3-3. Required Permits and Approvals for the Proposed Project

| Agency   | Permit/Review Required  |  |
|--|---|--|
| City of South San Francisco                        | Planning Commission:  |  |
| •  | Design Review   |  |
|  | Precise Plan Approval   |  |
|  | TDM Plan Approval   |  |
|  | • Conditional Use Permit to Authorize a Parking Reduction to 2.5 spaces/1,000 gross square feet in a shared parking format for the 751 Gateway Boulevard portion of the Gateway Campus                      |  |
|  | <ul> <li>EIR Certification, Adoption of CEQA Findings of Fact, Adoption of<br/>Mitigation Monitoring and Reporting Program, Adoption of<br/>Statement of Overriding Considerations (if required)</li> </ul> |  |
|  | Engineering Division:   |  |
|  | <ul> <li>Grading Permit(s)</li> </ul>   |  |
|  | <ul><li>Encroachment Permit(s)</li></ul>  |  |
|  | Site Plan Check   |  |
|  | <ul> <li>Hauling Permit(s)</li> </ul>   |  |
|  | Building Division:  |  |
|  | <ul><li>Building Permit(s)</li></ul>  |  |
|  | Certificate of Occupancy  |  |
|  | Parks and Recreation Department:  |  |
|  | <ul> <li>Protected Tree Removal Permit</li> </ul>   |  |
|  | Other:  |  |
|  | Fire Code Compliance  |  |
| California Regional Water<br>Quality Control Board | Clean Water Act Section 402 National Pollutant Discharge Elimination System General Construction Stormwater Permit and Stormwater Pollution Prevention Plan   |  |
| Bay Area Air Quality<br>Management District        | Stationary source permit for the generator  |  |
| Federal Aviation<br>Administration                 | Notice of Proposed Construction and Alteration and Federal Aviation<br>Administration Determination per Code of Federal Regulations Title 14<br>Part 77.9   |  |

# 4.1 Approach to Environmental Analysis

# 4.1.1 Introduction to Analysis

This section describes the format of the environmental analysis in each environmental topic section of the chapter; discusses the effect of Public Resources Code Section 21099 on the scope of California Environmental Quality Act (CEQA) analysis for the project; and explains the general approaches to baseline setting and cumulative analysis in this EIR.

In December 2015, the California Supreme Court found that "CEQA generally does not require an analysis of how existing environmental conditions will impact a project's future users or residents," unless the project "could exacerbate hazards that are already present." The Supreme Court identified several exceptions to this general rule in which CEQA could apply to impacts of the environment on the project, all of which are statutory provisions in CEQA that specifically require consideration of impacts of the environment, such as consideration of projects near airports, school construction projects, and statutory exemptions from housing and transit priority projects. (*California Building Industry Assoc. v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369). None of these exceptions apply to the project; as such, this environmental impact report does not draw significance conclusions for those topics for which the environment could have an effect on the project.

# 4.1.2 Format of the Environmental Analysis

Sections 4.2 through 4.10 address the physical environmental effects of the proposed project on the required CEQA environmental topics, as follows:

Section 4.2, Air Quality

Section 4.3, Biological Resources

Section 4.4, Cultural Resources and Tribal Cultural Resources

Section 4.5, Energy

Section 4.6, Geology and Soils

Section 4.7, Greenhouse Gas Emissions

Section 4.8, Noise and Vibration

Section 4.9, Transportation and Circulation

Section 4.10, Less-than-Significant Impacts

4.10.1, Aesthetics

4.10.2, Agricultural and Forest Resources

4.10.3, Hazards and Hazardous Materials

4.10.4, Hydrology and Water Quality

4.10.5, Land Use

4.10.6, Mineral Resources

4.10.7, Population and Housing

4.10.8, Public Services

4.10.9, Recreation

4.10.10, Utilities

4.10.11, Wildfire

Sections 4.2 through 4.9 contain the following subsections: Environmental Setting, Regulatory Framework, and Impacts and Mitigation Measures, described below. In accordance with CEQA Guidelines Section 15128, Section 4.10 provides a brief discussion of topics where the proposed project would have less-than-significant impacts or no impacts, and therefore are not discussed in detail in this EIR. For each topic, Section 4.10 includes a brief description of the regulatory framework, significance criteria, and approach to analysis, and the lead agency's reasons for determining that there would be no impact or a less than significant impact.

### 4.1.2.1 Environmental Setting

The Environmental Setting subsection describes the existing conditions in the project site and the project vicinity as they relate specifically to that environmental topic. The description of existing environmental conditions serves as the "baseline" for measuring the changes to the environment that would result from the project and for determining whether those environmental effects would be significant. In general, existing conditions are the physical conditions that existed at the time that the Notice of Preparation (NOP) for the proposed project is issued (CEQA Guidelines Section 15125(a)).

However, in accordance with CEQA Guidelines Section 15125(a), the EIR baseline may include projects that are approved and may be under construction. The EIR baseline may also take into account former conditions or circumstances that have changed prior to publication of the NOP. The modified existing conditions that serve as the baseline for the analysis of environmental impacts are further described below in Section 4.1.4, *Approach to Baseline Setting*.

# 4.1.2.2 Regulatory Framework

The Regulatory Framework subsection describes federal, state, regional, and local regulatory requirements that are directly applicable to the environmental topic.

# 4.1.2.3 Impacts and Mitigation Measures

The Impacts and Mitigation Measures subsection describes the physical environmental impacts of the proposed project for each topic, as well as any mitigation measures that could reduce potentially significant impacts to less-than-significant levels. This subsection begins with a listing of the significance criteria used to assess the severity of the environmental impacts for that particular topic based on the CEQA Guidelines Appendix G checklist. Environmental topic sections also include a topic-specific "Approach to Analysis" explaining the parameters, assumptions, and data used in the analysis.

Under the "Impact Evaluation" discussion, the project-level impact analysis for each topic begins with an impact statement that reflects the applicable significance criteria. Some significance criteria may be combined in a single impact statement, if appropriate. Each impact statement is keyed to a subject area abbreviation (e.g., AQ for Air Quality) and an impact number (e.g., 1, 2, 3) for a combined alpha-numeric code (e.g., Impact AQ-1, Impact AQ-2, Impact AQ-3). When potentially significant impacts are identified, mitigation measures are presented, if feasible, to avoid, eliminate, or reduce significant adverse impacts of the project. Each mitigation measure is numbered to correspond to the impact statement to which it pertains (e.g., Mitigation Measure MM-AQ-1 corresponds to Impact AQ-1). If there is more than one mitigation measure for the same impact statement, the mitigation measure numbers include a lowercase letter suffix (e.g., Mitigation Measures MM-AQ-1a and AQ-1b).

Each impact statement describes the impact that would occur without mitigation. The level of significance of the impact is indicated in parentheses at the end of the impact statement based on the following terms:

- No Impact No adverse physical changes (or impacts) to the environment are expected.
- Less than Significant Impact that does not exceed the defined significance criteria or would be eliminated or reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations.
- Less than Significant with Mitigation Impact that is reduced to a less-than-significant level through implementation of the identified mitigation measures.
- Significant and Unavoidable with Mitigation Impact that exceeds the defined significance criteria and can be reduced through compliance with existing local, state, and federal laws and regulations and/or implementation of all feasible mitigation measures, but cannot be reduced to a less-than-significant level.
- Significant and Unavoidable Impact that exceeds the defined significance criteria and cannot be eliminated or reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations and for which there are no feasible mitigation measures.

In accordance with CEQA Guidelines Section 15130, the potential for the proposed project to result in significant cumulative impacts when combined with other current and future projects is described in a separate subsection following the project-level impact analysis for each environmental topic. Cumulative impact statements are numbered consecutively for each impact statement with an alpha-numeric code to signify it is a cumulative impact.

### 4.1.3 Public Resources Code Section 21099

Public Resources Code Section 21099 requires that the Office of Planning and Research (OPR) amend the CEQA Guidelines to provide an alternative to level of service (LOS) for evaluating traffic impacts of proposed projects. The new Guidelines must establish criteria that "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." Public Resources Code Section 21099(b)(2) states that upon certification of the revised guidelines for determining transportation impacts pursuant to Section 21099(b)(1), automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion, shall not be considered a significant impact on the environment under CEQA.

Senate Bill (SB) 743¹ is intended to better align CEQA transportation impact analysis practices and mitigation outcomes with the State's goals to reduce greenhouse gas (GHG) emissions, encourage infill development, and improve public health through more active transportation. SB 743 creates several key statewide changes to CEQA, as described in Section 4.9, *Transportation and Circulation*. To aid in SB 743 implementation, the following State guidance has been produced:

<sup>&</sup>lt;sup>1</sup> Full text of SB 743: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\_id=201320140SB743

- OPR's Technical Advisory on Evaluating Transportation Impacts in CEQA<sup>2</sup>
- California Air Resources Board's (CARB's) 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals<sup>3</sup>
- California Department of Transportation's (Caltrans') Local Development–Intergovernmental Review Program Interim Guidance, Implementing Caltrans Strategic Management Plan 2015–2020 Consistent with SB 743<sup>4</sup>

A vehicle miles traveled (VMT) impact analysis is provided in Section 4.9, *Transportation and Circulation*. The topic of automobile delay, nonetheless, may be considered by decision-makers, independent of the environmental review process, as part of their decision to approve, modify, or disapprove the proposed project. Therefore, a discussion of automobile delay is provided for informational purposes. The VMT metric does not apply to the analysis of impacts on non-automobile modes of travel such as riding transit, walking, and bicycling.

# 4.1.4 Approach to Baseline Setting

Project development characteristics are typically compared to the existing physical environment to isolate impacts caused by the project on its surroundings. In other words, the existing condition (also referred to as the environmental setting) is normally the baseline against which the project's impacts are measured to determine whether impacts are significant. Therefore, the Environmental Setting subsection of each topic describes existing conditions on and around the project site. These existing conditions are ordinarily established as of the date that the NOP is published. In some circumstances, however, it is appropriate to use a different baseline to identify project impacts to account for circumstances that can change over time during the course of the environmental review, project construction, and operation.

Figure 4.1-1 shows the location of baseline projects and cumulative projects in the City that were considered in the analysis for the proposed project. Baseline projects are development projects within 0.5 mile of the project site that are approved and may currently be under construction. As discussed below, the final adjusted baseline also accounts for several projects in the City that are located more than 0.5 mile from the project site, but are within the same infrastructure network as the project site. The baseline condition for the proposed project includes the existing uses on the two project site parcels (Assessor's Parcel Numbers 015-024-290 and 015-24-360).

Office of Planning and Research. 2018. *Technical Advisory on Evaluating Transportation Impacts in CEQA*. December. Available: http://opr.ca.gov/docs/20190122-743\_Technical\_Advisory.pdf. Accessed: June 10, 2020.

<sup>&</sup>lt;sup>3</sup> California Air Resources Board. 2017. *2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals*. January. Available: https://ww2.arb.ca.gov/sites/default/files/2019-01/2017\_sp\_vmt\_reductions\_jan19.pdf. Accessed: June 10, 2020.

<sup>&</sup>lt;sup>4</sup> California Department of Transportation. 2016. *Local Development–Intergovernmental Review Program Interim Guidance, Implementing Caltrans Strategic Management Plan 2015–2020 Consistent with SB 743*. November. Available: https://dot.ca.gov/programs/transportation-planning/office-of-smart-mobility-climate-change/sb-743. Accessed: June 10, 2020.

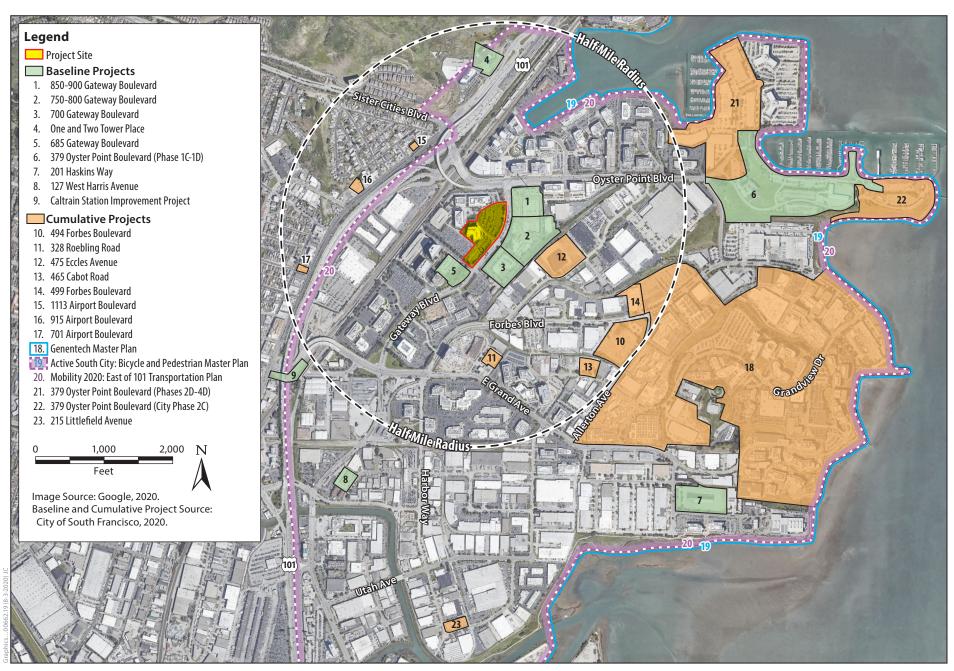




Figure 4.1-1 Location of Baseline and Cumulative Projects 751 Gateway Boulevard Project

The baseline projects listed below are considered part of the baseline condition against which the proposed project would be evaluated for environmental impacts, with the exception of the transportation analysis; the baseline condition for the transportation analysis represents existing conditions as of 2019 because the transportation analysis uses data collected in fall 2019 (before the COVID-19 pandemic, which substantially altered traffic patterns) for the existing office and research and development (R&D) campus adjacent to the project site.

For several physical environmental topics, project-related impacts are unlikely to interact with conditions greater than a 0.5-mile radius from the project site (e.g., aesthetics, geology and soils, hazards and hazardous materials, and noise and vibration). However, some impacts related to air quality, biological resources, greenhouse gas (GHG) emissions, population growth, and water quality can affect existing conditions on a more regional scale. Several other projects in the City are located more than 0.5 mile from the project site and are confined by the same infrastructure network, particularly regarding transportation and circulation, public services, and utilities and service systems. Therefore, the impacts generated by these projects have also been considered to provide a final adjusted baseline in order to properly reflect conditions against which the proposed project is analyzed.

Cumulative projects, which are discussed in more detail in Section 4.1.5 below, are considered reasonably foreseeable future development projects, transportation projects, or planning projects for which the City had an application on file but that have not been approved and for which construction had not commenced as of publication of the NOP for the proposed project (January 21, 2020) and/or projects that the City has otherwise determined are reasonably foreseeable.

The following baseline projects are located within an approximately 0.5-mile radius of the project site (the numbers are keyed to Figure 4.1-1):

- 1. **850–900 Gateway Boulevard:** Phase 1 of Gateway Business Park Master Plan, which includes construction of two office/R&D buildings (12 and five stories) totaling 451,485 square feet with a two-level subterranean parking garage and a 47,938-square-foot amenity building on a 6.3-acre site. (Entitled April 2013; construction to be completed in quarter 3 of 2020)
- 2. **750–800 Gateway Boulevard**: Phase 2 of Gateway Business Park Master Plan, which includes construction of an office/R&D building consisting of eight-story and nine-story building wings connected by an atrium, totaling 390,534 square feet, with a two-level subterranean parking garage and a seven-level parking structure on a 5.0-acre site. (Entitled December 2018; construction to be completed in quarter 3 of 2021)
- 3. **700 Gateway Boulevard**: Phase 3 of Gateway Business Park Master Plan, which includes construction of one office/R&D building (11 stories) totaling 314,395 square feet with a five-level parking garage on a 4.5-acre site. (Entitled December 2018; construction to be completed in quarter 3 of 2021)
- 4. **One and Two Tower Place**: Construction of two office towers totaling 665,000 square feet, including 24,000 square feet of commercial space, a 200-seat performing arts center, day care center for 100 children, and an amenity building, consisting of a 110-room hotel, wellness center, restaurant, retail, and various amenities adjacent and connected to the North Tower. (North Tower construction complete, amenity building construction to be completed in quarter 4 of 2020, hotel to be determined)

5. **685 Gateway Boulevard**: Precise Plan modification to construct a new 15,400-square-foot amenity building and outdoor dining area on a 3-acre site shared with the 681 Gateway Campus. *(Entitled March 2019; construction to be completed in quarter 3 of 2020)* 

The following baseline projects are located in the East of 101 area (the numbers are keyed to Figure 4.1-1)

- 6. **379 Oyster Point Boulevard (Phase 1C-1D)**: Construction of three 6-story office/R&D buildings totaling 508,000 square feet on a 10-acre parcel, including a parking structure, new road alignment with utilities, new park at Oyster Point Boulevard and Marina Boulevard, Bay Trail improvements, and a new open space parcel. (Entitled March 2011; construction to be completed in quarter 3 of 2020)
- 7. **201 Haskins Way:** Demolition of the existing building and construction of a new 280,765-square-foot office/R&D building and a five-level parking garage on a 6.5-acre site. (*Entitled March 2019; construction to be completed in quarter 1 of 2021*)
- 8. **127 West Harris Avenue:** Construction of a five-story hotel with 128 rooms on a 64,117-square-foot lot. (*Entitled August 2015; construction to be completed in quarter 3 of 2020*)
- 9. **Caltrain Station Improvement Project:** The project will realign the existing South San Francisco Caltrain station to allow easier pedestrian access to downtown, as well as improve station safety and disabled access. An underpass and plaza will be constructed to allow pedestrians access from downtown to the newly renovated station and to the east side of U.S. 101. (Construction initiated quarter 4 of 2017; construction to be completed in 2021)

# 4.1.5 Approach to Cumulative Impact Analysis

Cumulative impacts are two or more individual effects which, when considered together, are considerable or which compound or increase environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. Cumulative impacts are impacts of the project in combination with other closely related past, present, and reasonably foreseeable probable future projects (CEQA Guidelines Section 15355(a)-(b)). The following factors are considered to determine the level of cumulative analysis in this EIR:

- Similar Environmental Impacts A relevant project contributes to effects on resources that are also affected by a proposed project. A relevant future project is defined as one that is "reasonably foreseeable," such as a proposed project for which an application has been filed with the approving agency or has approved funding.
- Geographic Scope and Location A relevant project is located within the geographic area within
  which effects could combine. The geographic scope varies on a resource-by-resource basis. For
  example, the geographic scope for evaluating cumulative effects on air quality consists of the
  affected air basin, while the geographic scope for evaluating cumulative effects on traffic
  typically consists of the roadways within the region that could carry additional vehicles as a
  result of net new VMT generated by the proposed project.
- Timing and Duration of Implementation Effects associated with activities for a relevant project (e.g., short-term construction or demolition, or long-term operations) would likely coincide in timing with the related effects of a proposed project.

CEQA Guidelines Section 15130(b)(1) sets forth two primary approaches to the analysis of cumulative impacts. The analysis can be based on (1) a list of past, present, and probable future projects producing related impacts that could combine with those of a proposed project or (2) a summary of projections contained in a general plan or related planning document. For the purposes of this EIR, past and present projects that are approved and may be under construction are discussed as a part of the baseline, as established above. Any additional reasonably foreseeable probable future projects are considered further in cumulative impact analysis. The cumulative impact analysis in this draft EIR generally employs either a list-based approach or a projections approach, depending on which approach best suits the individual resource topic being analyzed.

The cumulative analyses for those topics using a list-based approach typically consider individual projects from a list of nearby future projects anticipated in the project vicinity (i.e., within approximately 0.5 mile of the project site). The particular projects to be considered in the cumulative analysis for each topic vary by environmental topic and are appropriately tailored to the particular environmental topic based on the potential for combined localized environmental impacts under the topic.

Presented below is a numbered list of reasonably foreseeable probable future projects. Generally, these are projects for which the City had an application on file but that have not been approved as of publication of the NOP for the proposed project (January 21, 2020) and/or projects that the City has otherwise determined are reasonably foreseeable. These projects are mapped on Figure 4.1-1 on p. 4.1-5.

For some physical environmental topics, project-related impacts are unlikely to interact with conditions greater than a 0.5-mile radius from the project site (e.g., aesthetics, geology and soils, hazards and hazardous materials, and noise and vibration). However, some impacts related to air quality, biological resources, GHG emissions, population growth, and water quality can affect existing conditions on a more regional scale. Several other City projects are located more than 0.5 mile from the project site and are confined by the same infrastructure network, particularly with regard to transportation and circulation, public services, and utilities and service systems.

The following cumulative projects are located within an approximate 0.5-mile radius of the project site (the number is keyed to Figure 4.1-1):

- 10. **494 Forbes Boulevard**: Construction of two four-to-five story research and development office buildings totaling 326,020 square feet and a three-level parking structure on a 7.5 acre site. (Original entitlement December 2012, Design Review Modification Planning Commission hearing November 2019; construction date to be determined)
- 11. **328 Roebling Road**: Demolition of an existing building (79,501 square feet), and construction two office/R&D buildings totaling 105,536 square feet and at grade and subterranean parking on a 2.97-acre site. (Entitled June 2020; construction date to be determined)
- 12. **475 Eccles Avenue**: Construction of two four-story office/R&D buildings totaling approximately 262,287 square feet, and a five-level parking structure on a 6.1-acre site. *(Entitled August 2016; construction date to be determined)*
- 13. **465 Cabot Road**: Construction of a new 34,365 square foot two-story office and service center. *(Entitled October 2018; permit issued September 2019)*

- 14. **499 Forbes Boulevard**: Construction of a five-story office/R&D building totaling 128,737 square feet, and a four-level parking structure on a 3-acre site. (*Under review; construction date to be determined*)
- 15. **1113 Airport Boulevard**: Construction of 12 additional guest rooms to the second and third floor of an existing 24-room hotel. *(Entitled January 2017; construction date to be determined)*
- 16. **915 Airport Boulevard**: Construction of a five-story hotel with 115 rooms on a 28,894-square-foot site. (*Under review; construction date to be determined*)
- 17. **701 Airport Boulevard**: Construction of a five-story hotel with 131 rooms on a 20,239-square-foot site. (*Incomplete. Project review on hold by the applicant; construction date to be determined*)
- 18. **Genentech Master Plan**: The Master Plan outlines a potential expansion that would allow the Central Campus to grow to approximately six million square feet during the 10-year planning period. This expansion represents a 100 percent increase in space compared with the current Central Campus development. The Master Plan indicates that Genentech will meet its potential space requirements by both the redevelopment of buildings that Genentech currently owns and occupies and by the redevelopment of expansion property that Genentech has recently acquired or may acquire in the ten-year planning period. (*Planning period is ongoing*)
- 19. Active South City: Bicycle and Pedestrian Master Plan: The Active South City: Bicycle and Pedestrian Master Plan will update existing plans and identify needs and opportunities to improve walking and bicycling in the City The plan recommends a comprehensive and integrated system of bikeways that promote bicycle riding for transportation and recreation. The recommendations are intended to provide safer, more direct bicycle routes through residential neighborhoods, employment and shopping areas, and to transit stops. The development of this plan is set forth in the City's General Plan. (Plan development is ongoing)
- 20. **Mobility 2020 East of 101 Transportation Plan:** The plan strives to achieve a more balanced transportation system where walking, biking, transit use, and carpooling are as convenient as driving. The Mobility Plan identifies projects, policies, and programs to support the transition to a robust multimodal network. (*Plan implementation is ongoing*)

The following cumulative projects are located in the East of 101 area (the number is keyed to Figure 4.1-1):

- 21. **379 Oyster Point Boulevard (Phases 2D-4D):** Current entitlements allow up to 1.7 million square feet of office/R&D buildings in Phases 2–4 on current Oyster Point Business Park properties. (*Master Plan approved March 2011, Precise Plan submitted August 2019; construction date to be determined*)
- 22. **379 Oyster Point Boulevard (City Phase 2C):** Phase IIC improvements will take place on Cityowned land managed by the Harbor District. They include a new pump station, repairs to the landfill clay cap, improved parking areas and landscaping. To complement the planned improvements, a planning effort will take place to set a vision for new land uses in the marina area. This effort will be conducted in partnership with the Harbor District and public stakeholders. (Schedule for planning; construction date has not yet been determined)
- 23. **215 Littlefield Avenue:** Construction of an 11,585-square-foot addition and exterior modifications to a newspaper and radio building. (*Planning Commission approved February 2020; construction date to be determined*)

The 1999 General Plan is currently being updated as part of the *Shape SSF 2040 General Plan.*<sup>5</sup> The 1999 General Plan remains active until completion and adoption of the new general plan. The general plan update is currently in progress and is not considered in the cumulative analysis. It is anticipated that approval of the general plan update will occur in quarter 4 of 2022.

City of South San Francisco. 2020. Shape SSF 2040 General Plan. Available: https://shapessf.com/. Accessed: May 8, 2020.

#### **Air Quality** 4.2

#### Introduction 4.2.1

This section describes the environmental and regulatory setting for air quality. It also describes impacts associated with air quality that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate.

#### **Environmental Setting** 4.2.2

The project site is located within the San Francisco Bay Area Air Basin (SFBAAB). Ambient air quality is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. The following sections summarize how air pollution moves through the air, water, and soil within the air basin as well as how it is chemically changed in the presence of other chemicals and particles. This section also summarizes regional and local climate conditions, existing air quality conditions, and the sensitive receptors that may be affected by the project-generated emissions.

#### **Pollutants of Concern** 4.2.2.1

### **Criteria Pollutants**

The federal and state governments have established ambient air quality standards for six criteria pollutants. Ozone is considered a regional pollutant because its precursors affect air quality on a regional scale. Pollutants such as carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide  $(SO_2)$ , and lead are considered local pollutants that tend to accumulate in the air locally. Particulate matter (PM) is both a regional and local pollutant. The primary criteria pollutants generated by the project are ozone precursors (nitrogen oxides [NO<sub>X</sub>] and reactive organic gases [ROGs]), CO, and PM.1,2,3

All criteria pollutants can have human health effects at certain concentrations. The ambient air quality standards for these pollutants are set to protect public health and the environment with an adequate margin of safety (Clean Air Act [CAA] Section 109). Epidemiological, controlled human exposure, and toxicology studies evaluate potential health and environmental effects of criteria pollutants, and form the scientific basis for new and revised ambient air quality standards.

The principal characteristics of the primary criteria pollutants generated by the project, as well as possible health and environmental effects from exposure, are discussed below.

<sup>1</sup> As discussed above, there are also ambient air quality standards for SO<sub>2</sub>, lead, sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. However, these pollutants are typically associated with industrial sources, which are not included as part of the project. Accordingly, they are not evaluated further.

Most emissions of NO<sub>x</sub> are in the form of nitric oxide. Conversion to NO<sub>2</sub> occurs in the atmosphere as pollutants disperse downwind. Accordingly, NO2 is not considered a local pollutant of concern for the project and is not evaluated further.

Resitoğlu, İbrahim A. 2018. NOx Pollutants from Diesel Vehicles and Trends in Control Technologies. Published November 5. DOI: 10.5772/intechopen.81112. Available: https://www.intechopen.com/online-first/noxpollutants-from-diesel-vehicles-and-trends-in-the-control-technologies. Accessed: January 6, 2020.

Ozone, or smog, is a photochemical oxidant that is formed when ROG and NO $_{\rm X}$  (both by-products of the internal combustion engine) react with sunlight. ROG compounds are made up primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Other sources of ROG are emissions associated with the use of paints and solvents, the application of asphalt paving, and the use of household consumer products such as aerosols. The two major forms of NO $_{\rm X}$  are nitric oxide (NO) and NO $_{\rm Z}$ . NO is a colorless, odorless gas that forms from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. NO $_{\rm Z}$  is an irritating reddish-brown gas that forms when NO and oxygen combine. In addition to serving as an integral participant in ozone formation, NO $_{\rm X}$  acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.

Ozone poses a higher risk to those who already suffer from respiratory diseases (e.g., asthma), such as children, older adults, and people who are active outdoors. Exposure to ozone at certain concentrations can make breathing more difficult, cause shortness of breath and coughing, inflame and damage the airways, aggravate lung diseases, increase the frequency of asthma attacks, and cause chronic obstructive pulmonary disease. Studies show associations between short-term ozone exposure and non-accidental mortality, including deaths from respiratory issues. Studies also suggest long-term exposure to ozone may increase the risk of respiratoryrelated deaths. The concentration of ozone at which health effects are observed depends on an individual's sensitivity, level of exertion (i.e., breathing rate), and duration of exposure. Studies show large individual differences in the intensity of symptomatic responses, with one study finding no symptoms to the least responsive individual after a 2-hour exposure to 400 parts per billion of ozone and a 50 percent decrease in forced airway volume in the most responsive individual. Although the results vary, evidence suggests that sensitive populations (e.g., asthmatics) may be affected on days when the 8-hour maximum ozone concentration reaches 80 parts per billion.<sup>5</sup> The average background level of ozone in the Bay Area is approximately 45 parts per billion.6

In addition to human health effects, ozone has been tied to crop damage, typically in the form of stunted growth, leaf discoloration, cell damage, and premature death. Ozone can also act as a corrosive and oxidant, resulting in property damage (e.g., degradation of rubber products and other materials).

**Carbon monoxide** is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. In the study area, high CO levels are of greatest concern during the winter when periods of light winds combine with ground-level temperature inversions from evening through early morning. These conditions trap pollutants near the ground, reducing the dispersion of vehicle emissions. Moreover, motor vehicles exhibit increased CO emission rates at low air temperatures. The primary adverse health effect associated with CO is

<sup>&</sup>lt;sup>4</sup> U.S. Environmental Protection Agency. 2018a. *Ground-level Ozone Basins*. Last updated: October 31. Available: https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics#wwh. Accessed: January 6, 2020.

U.S. Environmental Protection Agency. 2016. *Health Effects of Ozone in the General Population*. Last updated September 12, 2016. Available: https://www.epa.gov/ozone-pollution-and-your-patients-health/health-effects-ozone-general-population. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>6</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan.* Adopted: April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation. Exposure to CO at high concentrations can also cause fatigue, headaches, confusion, dizziness, and chest pain. There are no ecological or environmental effects of CO at or near existing background CO levels.<sup>7</sup>

**Particulate matter** consists of finely divided solids or liquids (e.g., soot, dust, aerosols, fumes, mists). Two forms of particulates are generally considered: inhalable course particles, or PM10, and inhalable fine particles, or PM2.5. A particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind on arid landscapes also contributes substantially to local particulate loading.

Particulate pollution can be transported over long distances and may affect human health adversely, especially people who are naturally sensitive or susceptible to breathing problems. Numerous studies have linked PM exposure to premature death in people with preexisting heart or lung disease, nonfatal heart attacks, an irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms. Studies show that long-term exposure to PM2.5 was associated with an increased risk of mortality, ranging from a 6 to 13 percent increased risk for every 10 micrograms per cubic meter ( $\mu g/m^3$ ) of PM2.5.8 Every 1  $\mu g/m^3$  reduction in PM2.5 results in a 1 percent reduction in the mortality rate for individuals over 30 years old.9 Studies also show an increase in overall mortality of approximately 0.5 percent for every 10 mg/m³ increase in PM10 measured the day before death.¹¹⁰ However, PM10 levels have been greatly reduced since 1990. Peak concentrations have declined by 60 percent, and annual average values have declined by 50 percent.¹¹¹ Depending on the composition, both PM10 and PM2.5 can also affect water quality and acidity, deplete soil nutrients, damage sensitive forests and crops, affect ecosystem diversity, and contribute to acid rain.¹²

### **Toxic Air Contaminants**

Although ambient air quality standards have been established for criteria pollutants, no ambient standards exist for toxic air contaminants (TACs). Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health

California Air Resources Board. 2020a. Carbon Monoxide & Health. Available: https://ww2.arb.ca.gov/resources/carbon-monoxide-and-health. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>8</sup> California Air Resources Board. 2010. *Estimate of Premature Deaths Associated with Fine Particle Pollution (PM2.5) in California Using a U.S. Environmental Protection Agency Methodology*. August 31. Available: https://ww3.arb.ca.gov/research/health/pm-mort/pm-report\_2010.pdf. Accessed: February 18, 2020.

<sup>&</sup>lt;sup>9</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan.* Adopted: April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

U.S. Environmental Protection Agency. 2005. *Final Report: The National Morbidity, Mortality, and Air Pollution Study: Morbidity and Mortality from Air Pollution in the United States*. Last updated February 18, 2020. Available: https://cfpub.epa.gov/ncer\_abstracts/index.cfm/fuseaction/display.highlight/abstract/2399/report/F. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>11</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan.* Adopted: April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

U.S. Environmental Protection Agency. 2018b. Particulate Matter (PM) Pollution. Late updated: June 2018. Available: https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm. Accessed: January 6, 2020.

risks. For TACs that are known or suspected carcinogens, the California Air Resources Board (CARB) has consistently found that there are no levels or thresholds below which exposure is risk free. Individual TACs vary greatly in the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. In California, TACs are identified and their toxicity is studied by the Office of Environmental Health Hazard Assessment (OEHHA). The primary TACs of concern associated with the project are asbestos and diesel particulate matter (DPM).

Asbestos is the name given to several naturally occurring fibrous silicate minerals. Before the adverse health effects of asbestos were identified, asbestos was widely used as insulation and fireproofing in buildings, and it can still be found in some older buildings. It is also found in its natural state in rock or soil. The inhalation of asbestos fibers into the lungs can result in a variety of adverse health effects, including inflammation of the lungs, respiratory ailments (e.g., asbestosis, which is scarring of lung tissue that results in constricted breathing), and cancer (e.g., lung cancer and mesothelioma, which is cancer of the linings of the lungs and abdomen).

DPM is generated by diesel-fueled equipment and vehicles. Within the Bay Area, the Bay Area Air Quality Management District (BAAQMD) has found that of all controlled TACs, emissions of DPM are responsible for about 82 percent of the total ambient cancer risk. Short-term exposure to DPM can cause acute irritation (e.g., eye, throat, and bronchial), neurophysiological symptoms (e.g., lightheadedness and nausea), and respiratory symptoms (e.g., cough and phlegm). The U.S. Environmental Protect Agency (EPA) has determined that diesel exhaust is "likely to be carcinogenic to humans by inhalation." 14

#### Odors

Offensive odors can be unpleasant and lead to citizen complaints to local governments and air districts. According to CARB's *Air Quality and Land Use Handbook*, <sup>15</sup> land uses associated with odor complaints are typically sewage treatment plants, landfills, recycling facilities, manufacturing plants, and agricultural areas. CARB provides recommended screening distances for siting new receptors near existing odor sources.

# 4.2.2.2 Climate and Meteorology

Although the primary factors that determine air quality are the locations of air pollutant sources and the amount of pollutants emitted from those sources, meteorological conditions and topography are also important factors. Atmospheric conditions, such as wind speed, wind direction, and air temperature gradients, interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. Unique geographic features define the 15 air basins throughout the state, each with its own distinctive regional climate. The air quality study area is located on the San Francisco Peninsula in the SFBAAB.

<sup>&</sup>lt;sup>13</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan*. Adopted: April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

U.S. Environmental Protection Agency. 2003. Diesel Engine Exhaust. CASRN N.A. February 28. Available: https://cfpub.epa.gov/ncea/iris/iris\_documents/documents/subst/0642\_summary.pdf#nameddest=woe. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>15</sup> California Air Resources Board. 2005. *Air Quality and Land Use Handbook: A Community Health Perspective.* April. Available: https://ww3.arb.ca.gov/ch/handbook.pdf. Accessed: January 6, 2020.

The Peninsula subregion extends from northwest of San José to the Golden Gate Bridge. The Santa Cruz Mountains run along the center of the peninsula, with elevations above 2,000 feet at the southern end but decreasing to 500 feet in South San Francisco. Coastal towns experience a high incidence of cool, foggy weather in the summer. San Francisco lies at the northern end of the peninsula. Because most of South San Francisco's topography is below 200 feet, marine air can flow easily across most of the City, making its climate cool and windy. Cities in the southeastern peninsula experience warmer temperatures and fewer foggy days because the marine layer is blocked by the ridgeline to the west.

The regional climate within the SFBAAB is considered semi-arid, characterized by warm summers, mild winters, infrequent seasonal rainfall, moderate onshore breezes in the daytime, and moderate humidity. A wide range of meteorological and emissions-related sources, such as the dense population centers, heavy vehicular traffic, and industrial activity, influence air quality in the SFBAAB.

Annual average wind speeds range from 5 to 10 mph throughout the peninsula. The tendency is for the higher wind speeds to be found along the western coast. However, winds on the east side of the peninsula can also be high in certain locales because low-lying areas in the mountains, at San Bruno Gap and Crystal Springs Gap, commonly allow the marine layer to pass across the peninsula.

The prevailing winds are westerly along the peninsula's western coastline. Individual sites can show significant differences, however. For example, Fort Funston in western San Francisco County shows a southwesterly wind pattern, while Pillar Point in San Mateo County to the south shows a northwesterly wind pattern. Sites on the east side of the mountains also show a westerly pattern, although their wind patterns are influenced by local topographic features. That is, an increase in elevation of a few hundred feet will induce flows around that feature instead of over it during stable atmospheric conditions. This can change the wind pattern by as much as 90 degrees over short distances. On mornings without a strong pressure gradient, areas on the east side of the peninsula often experience easterly flows in the surface layer. These are induced by upslope flows on the east-facing slopes and the bay breeze. The bay breeze is rarely seen after noon because the stronger sea breeze dominates the flow pattern.

On the peninsula, there are two important gaps in the Santa Cruz Mountains. The larger of the two is San Bruno Gap, extending from Fort Funston on the ocean side to San Francisco International Airport on the bay side. Because the gap is oriented in the same northwest-to-southeast direction as the prevailing winds, and because elevations along the gap are under 200 feet, marine air is easily able to penetrate into the bay.

The other gap in the Santa Cruz Mountains is Crystal Springs Gap, located along State Route 92 between Half Moon Bay and San Carlos. The low point is 900 feet, but elevations reach 1,500 feet north and south of the gap. As the sea breeze strengthens on summer afternoons, the gap permits maritime air to pass across the mountains. Its cooling effect is commonly seen from San Mateo to Redwood City.

Rainfall totals on the east side of the peninsula are somewhat lower than those on the west side, with South San Francisco reporting an average of 20.8 inches per year. On the west side, Half Moon Bay reports 25 inches per year. Areas in the Santa Cruz Mountains report significantly higher rainfall totals, especially west of the ridge line, because of induced condensation from orographic lifting, proximity to a moisture source, and fog drip.

Air pollution potential is lower in the northern portion of the peninsula because winds are generally fast enough to carry pollutants away before they can accumulate.

The average maximum daily summertime and wintertime temperatures in South San Francisco are in the low 70s and mid-50s, respectively. The average minimum daily summertime and wintertime temperatures in South San Francisco are in the mid-50s and low 40s, respectively. 16

# 4.2.2.3 Existing Air Quality Conditions

### **Ambient Criteria Pollutant Concentrations**

A number of ambient air quality monitoring stations are located in the SFBAAB to monitor progress toward attainment of the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). The NAAQS and CAAQS are discussed further under *Regulatory Framework*. There are no monitoring stations in the City. The nearest monitoring station is the San Francisco-Arkansas Street monitoring station, approximately 7.2 miles north of the project site.

Table 4.2-1 summarizes data regarding criteria air pollutant levels at the San Francisco-Arkansas Street monitoring station between 2016 and 2018, the last 3 years with complete data. Table 4.2-1 shows that the San Francisco-Arkansas Street monitoring station recorded violations of the federal PM2.5 standard in 2017 and 2018 and state PM10 standard in 2017. Federal and state standards for other pollutants were not exceeded. Violations of the ambient air quality standards for PM indicate that certain individuals, if exposed to this pollutant, may experience health effects, such as increased incidences of cardiovascular and respiratory ailments.

Table 4.2-1. Ambient Air Quality Data at the San Francisco-Arkansas Monitoring Station (2016–2018)

| Pollutant Standards                           | 2016  | 2017  | 2018  |
|---|-------|-------|-------|
| <i>Ozone (0<sub>3</sub>)</i>                  |       |       |       |
| Maximum 1-hour concentration (ppm)            | 0.070 | 0.087 | 0.065 |
| Maximum 8-hour concentration (ppm)            | 0.057 | 0.054 | 0.049 |
| Number of days standard exceeded <sup>a</sup> |       |       |       |
| CAAQS 1-hour standard (> 0.09 ppm)            | 0     | 0     | 0     |
| CAAQS 8-hour standard (> 0.070 ppm)           | 0     | 0     | 0     |
| NAAQS 8-hour standard (> 0.070 ppm)           | 0     | 0     | 0     |
| Carbon Monoxide (CO)                          |       |       |       |
| Maximum 8-hour concentration (ppm)            | 1.1   | 1.4   | 1.6   |
| Maximum 1-hour concentration (ppm)            | 1.7   | 2.5   | 1.9   |
| Number of days standard exceeded <sup>a</sup> |       |       |       |
| NAAQS 8-hour standard (≥ 9 ppm)               | 0     | 0     | 0     |
| CAAQS 8-hour standard (> 9.0 ppm)             | 0     | 0     | 0     |
| NAAQS 1-hour standard (≥ 35 ppm)              | 0     | 0     | 0     |
| CAAQS 1-hour standard (≥ 20 ppm)              | 0     | 0     | 0     |

Weather Channel. 2020. South San Francisco, CA, Monthly Weather. Available: https://weather.com/weather/monthly/l/58e3526471350bc59bfa920168f6bd001aa43f998b0af74fe60bea4e7ce80a23. Accessed: January 6, 2020.

| Pollutant Standards   | 2016 | 2017 | 2018  |
|---|------|------|-------|
| Nitrogen Dioxide (NO <sub>2</sub> )   |      |      |       |
| State maximum 1-hour concentration (ppb)  | 58   | 73   | 68    |
| State second-highest 1-hour concentration (ppb)                                 | 57   | 66   | 65    |
| Annual average concentration (ppb)  | 10   | 11   | 11    |
| Number of days standard exceeded <sup>a</sup>                                   |      |      |       |
| CAAQS 1-hour (180 ppb)  | 0    | 0    | 0     |
| Particulate Matter (PM10)   |      |      |       |
| National <sup>b</sup> maximum 24-hour concentration (µg/m³)                     | 35.7 | 75.9 | 40.9  |
| National <sup>b</sup> second-highest 24-hour concentration (μg/m³)              | 27.9 | 52.7 | 35.7  |
| State <sup>c</sup> maximum 24-hour concentration (µg/m <sup>3</sup> )           | 29.0 | 77.0 | 43.0  |
| State <sup>c</sup> second-highest 24-hour concentration (µg/m³)                 | 28.0 | 53.0 | 37.0  |
| National annual average concentration (μg/m³)                                   | 8.8  | 11.0 | 10.0  |
| State annual average concentration $(\mu g/m^3)^d$                              | 17   | 22   | 22    |
| Measured number of days standard exceeded <sup>a</sup>                          |      |      |       |
| NAAQS 24-hour standard (> 150 μg/m³)  | 0    | 0    | 0     |
| CAAQS 24-hour standard (> 50 µg/m³)   | 0    | 2    | 0     |
| Fine Particulate Matter (PM2.5)   |      |      |       |
| National <sup>e</sup> maximum 24-hour concentration (μg/m <sup>3</sup> )        | 19.6 | 49.9 | 177.4 |
| National <sup>e</sup> second-highest 24-hour concentration (μg/m <sup>3</sup> ) | 19.3 | 49.7 | 145.4 |
| State <sup>f</sup> maximum 24-hour concentration (µg/m³)                        | 19.6 | 49.9 | 177.4 |
| State <sup>f</sup> second-highest 24-hour concentration (µg/m³)                 | 19.3 | 49.7 | 145.4 |
| National annual average concentration ( $\mu g/m^3$ )                           | 7.5  | 9.7  | 11.6  |
| State annual average concentration ( $\mu g/m^3$ )                              | *    | 9.7  | 11.6  |
| Measured number of days standard exceeded <sup>a</sup>                          |      |      |       |
| NAAQS 24-hour standard (> 35 µg/m³)   | 0    | 7    | 14    |

#### Sources:

California Air Resources Board. 2020b. *iADAM: Air Quality Data Statistics – Top 4 Summary* (2016–2018, San Francisco County, 10 Arkansas Street). Available: https://www.arb.ca.gov/adam/topfour/topfourdisplay.php. Accessed: January 6, 2020

U.S. Environmental Protection Agency. 2018c. *Outdoor Air Quality Data. Monitor Values Reports* (Carbon Monoxide, 2016–2018, San Francisco County). Last updated: July 31. Available: https://www.epa.gov/outdoor-air-quality-data/monitor-values-report. Accessed: January 6, 2020.

### Notes:

ppb = parts per billion; ppm = parts per million

NAAQS = National Ambient Air Quality Standards CAAQS = California Ambient Air Quality Standards

 $\mu g/m^3 = micrograms per cubic meter$   $mg/m^3 = milligrams per cubic meter$ 

- \* = insufficient data available to determine the value
- <sup>a</sup> An exceedance is not necessarily related to a violation of the standard.
- b National statistics are based on standard-conditions data. In addition, national statistics are based on samplers, using federal reference or equivalent methods.
- <sup>c</sup> State statistics are based on approved local samplers and local-conditions data.
- d State criteria for ensuring that data are adequately complete for calculating valid annual averages are more stringent than the national criteria.
- e National statistics are based on samplers, using federal reference or equivalent methods.
- $f\quad \hbox{State statistics are based on local approved samplers}.$

### **Existing TAC Sources and Health Risks**

Existing TAC sources within 1,000 feet of the project site include stationary sources and the Caltrain right-of-way. Stationary sources include generators owned by AstraZeneca Pharmaceuticals, Alexandria Real Estate Equities, Health Plan of San Mateo, Life Technologies, the City of South San Francisco Water Quality Plant, Boston Properties, 425 Eccles, HCP Oyster Point, and Five Prime Therapeutics. <sup>17</sup> The Caltrain right-of-way is approximately 800 feet northwest of the project site.

### **Regional Attainment Status**

Local monitoring data are used to designate areas as nonattainment, maintenance, attainment, or unclassified areas for the ambient air quality standards. The four designations are defined below. Table 4.2-2 summarizes the attainment status of San Mateo County.

- Nonattainment—Assigned to areas where monitored pollutant concentrations consistently violate the standard in question.
- Maintenance—Assigned to areas where monitored pollutant concentrations exceeded the standard in question in the past but are no longer in violation of that standard.
- Attainment—Assigned to areas where pollutant concentrations meet the standard in question over a designated period of time.
- Unclassified—Assigned to areas where data are insufficient for determining whether a pollutant is violating the standard in question.

Table 4.2-2. Federal and State Ambient Air Quality Attainment Status for San Mateo County

| Criteria Pollutant                  | Federal Designation    | State Designation |
|-------------------------------------|------------------------|-------------------|
| Ozone (8-hour)                      | Marginal nonattainment | Nonattainment     |
| Carbon monoxide (CO)                | Attainment             | Attainment        |
| Particulate matter (PM10)           | Attainment             | Nonattainment     |
| Fine particulate matter (PM2.5)     | Attainment             | Nonattainment     |
| Nitrogen dioxide (NO <sub>2</sub> ) | Attainment             | Attainment        |
| Sulfur dioxide (SO <sub>2</sub> )   | Attainment             | Attainment        |
| Lead                                | Attainment             | Attainment        |
| Sulfates                            | (no federal standard)  | Attainment        |
| Hydrogen sulfide                    | (no federal standard)  | Unclassified      |
| Visibility-reducing particles       | (no federal standard)  | Unclassified      |

#### Source:

California Air Resources Board. 2019. *Area Designation Maps/State and National* (San Mateo County). Last reviewed: October 24, 2019. Available: https://ww3.arb.ca.gov/desig/adm/adm.htm. Accessed: January 6, 2020. U.S. Environmental Protection Agency. 2019. December 31. *Nonattainment Areas for Criteria Pollutants (Greenbook)* (San Mateo County). Available: https://www.epa.gov/green-book. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>17</sup> Bay Area Air Quality Management District. 2018. *Permitted Stationary Source Risk and Hazards*. Available: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65. Accessed: June 8, 2020.

# 4.2.2.4 Locations of Sensitive Receptors

Sensitive land uses are defined as locations where human populations, especially children, seniors, and sick persons, are located and where there is reasonable expectation of continuous human exposure according to the averaging period for the air quality standards (i.e., 24 hours, 8 hours). Typical sensitive receptors are residences, hospitals, schools, and parks.

The project site includes a six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and surface parking lots. The project site is in the Gateway Campus, an area with primarily commercial and office uses. The project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west.

There are no residential or recreational sensitive receptors within 1,000 feet of the project site. The nearest residence is over 1,200 feet (0.23 mile) from the project site, and Oyster Point Park is approximately 3,100 feet (0.70 mile) northeast of the project site. There are no hospitals or schools within 0.25 mile of the project site. The nearest school is Martin Elementary School, approximately 0.8 mile west. Two day-care centers are within 0.25 mile of the project site: the One and Two Tower Place Project and the Gateway Child Development Center Peninsula. The One and Two Tower Place Project day care center is approximately 0.25 mile north, the Gateway Child Development Center Peninsula is approximately 0.19 mile (1,000 feet) from the main project construction areas. However, the Gateway Child Development Center Peninsula is approximately 0.13 mile (670 feet) from the nearest project construction area, which would be at the southern terminus of the site and include repaving and curb work, as well as some landscaping activities.

# 4.2.3 Regulatory Framework

The federal CAA and its subsequent amendments form the basis for the nation's air pollution control effort. EPA is responsible for implementing most aspects of the CAA. A key element of the CAA is the NAAQS for criteria pollutants. The CAA delegates enforcement of the NAAQS to the states. In California, CARB is responsible for enforcing air pollution regulations and ensuring the NAAQS and CAAQS are met. CARB, in turn, delegates regulatory authority for stationary sources and other air quality management responsibilities to local air agencies. BAAQMD is the local air agency for the project area.

### 4.2.3.1 Federal

### Clean Air Act and National Ambient Air Quality Standards

The CAA was first enacted in 1963 but amended numerous times in subsequent years (1965, 1967, 1970, 1977, and 1990). The CAA establishes federal air quality standards, known as the NAAQS, for six criteria pollutants and specifies future dates for achieving compliance with the standards. The CAA also mandates that states submit and implement a State Implementation Plan (SIP) for local areas not meeting the standards. The plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA identify specific emissions reduction goals for areas not meeting the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or meet interim milestones. Table 4.2-3 shows the NAAQS currently in effect for each criteria pollutant as well as the CAAQS (discussed further below).

Table 4.2-3. Federal and State Ambient Air Quality Standards

|  | California          |                      | National S            | Standards <sup>a</sup> |
|--|---------------------|----------------------|-----------------------|------------------------|
| Criteria Pollutant                             | <b>Average Time</b> | Standards            | Primary               | Secondary              |
| Ozone  | 1 hour              | 0.09 ppm             | Noneb                 | Noneb                  |
|  | 8 hours             | 0.070 ppm            | 0.070 ppm             | 0.070 ppm              |
| Carbon Monoxide                                | 8 hours             | 9.0 ppm              | 9 ppm                 | None                   |
|  | 1 hour              | 20 ppm               | 35 ppm                | None                   |
| Particulate Matter<br>(PM10)                   | 24 hours            | $50  \mu g/m^3$      | 150 μg/m <sup>3</sup> | 150 μg/m <sup>3</sup>  |
|  | Annual mean         | $20 \mu g/m^3$       | None                  | None                   |
| Fine Particulate Matter (PM2.5)                | 24 hours            | None                 | 35 μg/m <sup>3</sup>  | 35 μg/m <sup>3</sup>   |
|  | Annual mean         | $12 \mu g/m^3$       | $12.0 \ \mu g/m^3$    | $15 \mu g/m^3$         |
| Nitrogen Dioxide (NO <sub>2</sub> )            | Annual mean         | 0.030 ppm            | 0.053 ppm             | 0.053 ppm              |
|  | 1 hour              | 0.18 ppm             | 0.100 ppm             | None                   |
| Sulfur Dioxide (SO <sub>2</sub> ) <sup>c</sup> | Annual mean         | None                 | 0.030 ppm             | None                   |
|  | 24 hours            | 0.04 ppm             | 0.14 ppm              | None                   |
|  | 3 hours             | None                 | None                  | 0.5 ppm                |
|  | 1 hour              | 0.25 ppm             | 0.075 ppm             | None                   |
| Lead   | 30-day average      | $1.5  \mu g/m^3$     | None                  | None                   |
|  | Calendar quarter    | None                 | $1.5  \mu g/m^3$      | $1.5  \mu g/m^3$       |
|  | 3-month average     | None                 | $0.15  \mu g/m^3$     | $0.15  \mu g/m^3$      |
| Sulfates                                       | 24 hours            | 25 μg/m <sup>3</sup> | None                  | None                   |
| Visibility-reducing<br>Particles               | 8 hours             | d                    | None                  | None                   |
| Hydrogen Sulfide                               | 1 hour              | 0.03 ppm             | None                  | None                   |
| Vinyl Chloride                                 | 24 hours            | 0.01 ppm             | None                  | None                   |

Source: California Air Resources Board. 2016. Ambient Air Quality Standards. May 4. Available:

https://ww3.arb.ca.gov/research/aags/aags2.pdf. Accessed: January 6, 2020.

Notes:

ppm = parts per million

 $\mu g/m^3$  = micrograms per cubic meter

- <sup>a</sup> National standards are divided into primary and secondary standards. Primary standards are intended to protect public health, whereas secondary standards are intended to protect public welfare and the environment.
- b The federal 1-hour standard of 12 parts per hundred million was in effect from 1979 through June 15, 2005. The revoked standard is referenced because it was employed for such a long period and is a benchmark for State Implementation Plans.
- <sup>c</sup> The annual and 24-hour National Ambient Air Quality Standards for SO<sub>2</sub> apply for only 1 year after designation of the new 1-hour standard to those areas that were previously in nonattainment for the 24-hour and annual National Ambient Air Quality Standards.
- d California Ambient Air Quality Standards for visibility-reducing particles are defined by an extinction coefficient of 0.23 per kilometer (visibility of 10 miles or more due to particles when relative humidity is less than 70 percent).

#### **Non-road Diesel Rule**

EPA has established a series of increasingly strict emission standards for new off-road diesel equipment, on-road diesel trucks, and locomotives. New equipment, including heavy-duty trucks and off-road construction equipment, is required to comply with the emission standards.

### **Corporate Average Fuel Economy Standards**

The Corporate Average Fuel Economy Standards (CAFÉ standards) were first enacted in 1975 to improve the average fuel economy of cars and light-duty trucks. The National Highway Traffic Safety Administrative (NHTSA) sets the CAFÉ standards, which are regularly updated to require additional improvements in fuel economy. The standards were last updated in October 2012; the updates apply to new passenger cars, light-duty trucks, and medium-duty passenger vehicles and cover model years 2017 through 2025, with a goal of 54.5 miles per gallon by 2025. However, on August 2, 2018, NHTSA and EPA proposed an amendment to the fuel efficiency standards for passenger cars and light trucks and established new standards for model years 2021 through 2026, thereby maintaining the current 2020 standards through 2026 (Safer Affordable Fuel-Efficient [SAFE] Vehicles Rule). On September 19, 2019, EPA and NHTSA issued a final action on the One National Program Rule, which is considered Part 1 of the SAFE Vehicles Rule and a precursor to the proposed fuel efficiency standards. The One National Program Rule enables EPA and NHTSA to provide uniform nationwide fuel economy and greenhouse gas (GHG) standards by 1) clarifying that federal law preempts state and local tailpipe GHG standards, 2) affirming NHTSA's statutory authority to set nationally applicable fuel economy standards, and 3) withdrawing California's CAA preemption waiver to set state-specific standards. EPA and NHTSA published their decision to withdraw California's waiver and finalized regulatory text related to the preemption on September 27, 2019 (84 Federal Register 51310). The agencies also announced that they will later publish the second part of the SAFE Vehicles Rule (i.e., the standards).

California, 22 other states, the District of Columbia, and two cities filed suit against the proposed One National Program Rule on September 20, 2019 (*California et al. v. United States Department of Transportation et al.*, 1:19-cv-02826, U.S. District Court for the District of Columbia). The lawsuit requests a "permanent injunction prohibiting defendants from implementing or relying on the preemption regulation" but does not stay its implementation during legal deliberations. Part 1 of the SAFE Vehicles Rule went into effect on November 26, 2019, and Part 2 went into effect on March 30, 2020. The rule decreases the stringency of the CAFÉ standards, calling for fuel efficiency increases of 1.5 percent each year through model year 2026 compared with the 5 percent annual increase under the 2012 standards.

#### 4.2.3.3 State

### California Clean Air Act and California Ambient Air Quality Standards

In 1988, the state legislature adopted the California CAA, which established a statewide air pollution control program. The California CAA requires all air districts in the state to endeavor to meet the CAAQS by the earliest practical date. Unlike the CAA, the California CAA does not set precise attainment deadlines. Instead, the California CAA establishes increasingly stringent requirements for areas that require more time to achieve the standards. The CAAQS are generally more stringent than the NAAQS and incorporate additional standards for sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride. The CAAQS and NAAQS are shown in Table 4.2-3.

CARB and local air districts bear responsibility for meeting the CAAQS, which are to be achieved through district-level air quality management plans incorporated into the SIP. In California, EPA has delegated authority to prepare SIPs to CARB, which, in turn, has delegated that authority to individual air districts. CARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

The California CAA substantially adds to the authority and responsibilities of air districts. The California CAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The California CAA also emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. The California CAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution.

### **Statewide Truck and Bus Regulation**

Originally adopted in 2005, the on-road truck and bus regulation requires heavy trucks to be retrofitted with PM filters. The regulation applies to privately and federally owned diesel-fueled trucks with a gross vehicle weight rating greater than 14,000 pounds. Compliance with the regulation can be reached through one of two paths: (1) vehicle retrofits according to engine year or (2) a phase-in schedule. The compliance paths ensure that nearly all trucks and buses will have model year 2010 engines or newer by January 2023.

### **State Tailpipe Emission Standards**

Like EPA at the federal level, CARB has established a series of increasingly strict emission standards for new off-road diesel equipment and on-road diesel trucks operating in California. New equipment used to construct the project would be required to comply with the standards.

### **Carl Moyer Program**

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) is a voluntary program that offers grants to owners of heavy-duty vehicles and equipment. The program is a partnership between CARB and the local air districts throughout the state to reduce air pollution emissions from heavy-duty engines. Locally, the air districts administer the Carl Moyer Program.

### **Toxic Air Contaminant Regulation**

California regulates TACs primarily through the Toxic Air Contaminant Identification and Control Act (Tanner Act) and the Air Toxics "Hot Spots" Information and Assessment Act of 1987 ("Hot Spots" Act). In the early 1980s, CARB established a statewide comprehensive air toxics program to reduce exposure to air toxics. The Tanner Act created California's program to reduce exposure to air toxics. The "Hot Spots" Act supplements the Tanner Act by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

CARB has identified DPM as a TAC and approved a comprehensive Diesel Risk Reduction Plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan is to reduce DPM emissions and the associated health risk by 75 percent by 2010 and by 85

percent by 2020. The plan identifies 14 measures that CARB will implement over the next several years. The project would be required to comply with any applicable diesel control measures from the Diesel Risk Reduction Plan. 18

# 4.2.3.4 Regional

### **Bay Area Air Quality Management District**

At the local level, responsibilities of air quality districts include overseeing stationary-source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality-related sections of environmental documents required by the California Environmental Quality Act (CEQA). The air quality districts are also responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws and for ensuring that the NAAQS and CAAQS are met.

The project falls under the jurisdiction of BAAQMD. BAAQMD has local air quality jurisdiction over projects in the SFBAAB, including San Mateo County. BAAQMD developed advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions, as outlined in the agency's California Environmental Quality Act Air Quality Guidelines (CEQA Guidelines). BAAQMD has also adopted air quality plans to improve air quality, protect public health, and protect the climate. These include the 2017 Clean Air Plan: Spare the Air, Cool the Climate.

The 2017 Clean Air Plan was adopted by BAAQMD on April 19, 2017. The 2017 Clean Air Plan updates the prior 2010 Bay Area ozone plan and outlines feasible measures to reduce ozone; provides a control strategy to reduce particulate matter, air toxics, and GHGs in a single, integrated plan; and establishes emission control measures to be adopted or implemented. The 2017 Clean Air Plan contains the primary goals listed below.

- Protect Air Quality and Health at the Regional and Local Scale: Attain all state and national air quality standards, and eliminate disparities among Bay Area communities in cancer health risk from TACs.
- Protect the Climate: Reduce Bay Area GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

The 2017 Clean Air Plan is the most current applicable air quality plan for the air basin. Consistency with this plan is the basis for determining whether the project would conflict with or obstruct implementation of an air quality plan. The proposed project's consistency with Senate Bill (SB) 32, which outlines the State's GHG reduction goals (i.e., achieving 1990 emissions levels by 2020 and

<sup>&</sup>lt;sup>18</sup> California Air Resources Board. 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engine and Vehicles.* October. Available: https://ww3.arb.ca.gov/diesel/documents/rrpfinal.pdf. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>19</sup> Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.* May. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>20</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan.* Adopted: April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

a level 40 percent below 1990 emissions levels by 2030), and Executive Order (EO) S-3-05, which further aims to reduce California's GHG emissions to 80 percent below the 1990 levels by 2050, is evaluated in Section 4.7, *Greenhouse Gas Emissions*.

In addition to air quality plans, BAAQMD also adopts rules and regulations to improve existing and future air quality. The project may be subject to the following district rules:

- Regulation 2, Rule 2 (New Source Review)—This regulation contains requirements for best available control technology and emission offsets.
- Regulation 2, Rule 5 (New Source Review of Toxic Air Contaminates)—This regulation outlines guidance for evaluating TAC emissions and their potential health risks.
- Regulation 6, Rule 1 (Particulate Matter)—This regulation restricts emissions of PM darker than No. 1 on the Ringlemann Chart to less than 3 minutes in any 1 hour.
- Regulation 7 (Odorous Substances)—This regulation establishes general odor limitations on odorous substances and specific emission limitations on certain odorous compounds.
- Regulation 8, Rule 3 (Architectural Coatings)—This regulation limits the quantity of ROG in architectural coatings.
- Regulation 9, Rule 6 (Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters)—This regulation limits emissions of NO<sub>X</sub> generated by natural gas-fired boilers.
- Regulation 9, Rule 8 (Stationary Internal Combustion Engines)—This regulation limits emissions of  $NO_X$  and CO from stationary internal combustion engines of more than 50 horsepower.
- Regulation 11, Rule 2 (Hazardous Pollutants Asbestos Demolition, Renovation, and Manufacturing)—This regulation, which incorporates EPA's asbestos-related National Emissions Standards for Hazardous Air Pollutants, controls emissions of asbestos to the atmosphere during demolition, renovation, and transport.

### 4.2.3.5 Local

#### South San Francisco General Plan

The 1999 South San Francisco General Plan (General Plan) provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City of South San Francisco's (City's) plans and policy standards. The General Plan contains an Open Space and Conservation Element, which outlines policies related to biological resources, water quality, air quality, GHG emissions, and historic and cultural resources. The General Plan includes the following policies that are applicable to air quality:

- Guiding Principle 7.3-G-1: Continue to work toward improving air quality and meeting all national and state ambient air quality standards by reducing the generation of air pollutants both from stationary and mobile sources, where feasible.
- Guiding Principle 7.3-G-4: Encourage land use and transportation strategies that promote use of alternatives to the automobile for transportation, including bicycling, bus transit, and carpooling.

- Guiding Principle 7.3-G-5: Promote clean and alternative fuel combustion in mobile equipment and vehicles.
- Guiding Principle 7.3-G-6: Minimize conflicts between sensitive receptors and emissions generators by distancing them from one another.
- Implementing Policy 7.3-I-1: Cooperate with BAAQMD to achieve emissions reductions for nonattainment pollutants and their precursors, including CO, ozone, and PM10, by implementation of air pollution control measures, as required by state and federal statutes.
- Implementing Policy 7.3-I-2: Use the City's development review process and CEQA regulations to evaluate and mitigate the local and cumulative effects of new development on air quality and GHG emissions.
- Implementing Policy 7.3-I-3: Adopt the standard construction dust abatement measures included in BAAQMD's CEQA Guidelines.
- Implementing Policy 7.3-I-9: Promote land uses that facilitate alternative transit use, including high-density housing, mixed uses, and affordable housing served by alternative transit infrastructure.
- Implementing Policy 7.3-I-13: Encourage efficient, clean energy and fuel use through collaborative programs, award programs, and incentives while removing barriers to the expansion of alternative fuel facilities and infrastructure.
- Implementing Policy 7.3-I-14: Ensure that design guidelines and standards support operation of alternative fuel facilities, vehicles, and equipment.

# 4.2.4 Impacts and Mitigation Measures

# 4.2.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have an air quality impact if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase in any criteria pollutant for which the
  project region is classified as nonattainment under an applicable federal or state ambient air
  quality standard;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

As discussed above, the pollutants that would be generated by the proposed project are associated with some form of health risk (e.g., asthma, lower respiratory problems). Regional pollutants can be transported over long distances and affect ambient air quality far from the emissions source. Localized pollutants affect ambient air quality near the emissions source. As discussed above, the primary pollutants of concern generated by the project are ozone precursors (ROG and  $NO_X$ ), CO, PM, and TACs (including DPM and asbestos). The emission thresholds that can be used to evaluate the significance level of regional and localized pollutants are discussed in the subsections that follow. Thresholds and guidance for evaluating potential odors associated with the project area are also presented.

# Regional Project-Generated Criteria Pollutant Emissions (Ozone Precursors and Regional Particulate Matter)

This analysis evaluates the impacts of regional emissions generated by the project. It uses a two-tiered approach that considers guidance recommended by BAAQMD in its CEQA Guidelines.<sup>21</sup> First, this analysis considers whether the project would conflict with the most recent air quality plan.<sup>22</sup> Specifically, the impact analysis evaluates whether the project supports the primary goals of the 2017 Clean Air Plan, including applicable control measures from the plan, and whether it would disrupt or hinder implementation of any control measure from the plan.

Second, calculated regional criteria pollutant emissions are compared to BAAQMD's project-level thresholds. BAAQMD's thresholds are summarized in Table 4.2-4 and recommended by the air district to evaluate the significance of a project's regional criteria pollutant emissions.<sup>23,24</sup> According to BAAQMD, projects with emissions in excess of the thresholds shown in Table 4.2-4 would be expected to have a significant cumulative impact on regional air quality because an exceedance of the thresholds is anticipated to contribute to CAAQS and NAAQS violations.

Table 4.2-4. BAAQMD Project-Level Regional Criteria Pollutant Emission Thresholds

| Analysis                                    | Thresholds  |
|---|---|
| Regional criteria pollutants (construction) | Reactive organic gases: 54 pounds/day Nitrogen oxides: 54 pounds/day Particulate matter: 82 pounds/day (exhaust only); compliance with best management practices (fugitive dust) Fine particulate matter: 54 pounds/day (exhaust only); compliance with best management practices (fugitive dust) |
| Regional criteria pollutants (operations)   | Reactive organic gases: Same as construction Nitrogen oxides: Same as construction Particulate matter: 82 pounds/day Fine particulate matter: 54 pounds/day   |

Source: Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines*. May. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>21</sup> Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.* May. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 6, 2020.

<sup>&</sup>lt;sup>22</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan.* Adopted: April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.*May. Available: https://www.baaqmd.gov/~/media/files/planning-andresearch/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 6, 2020.

The proposed project would include office and research-and-development uses. Although the proposed office and retail uses (approximately 78,700 square feet and 12,100 square feet, respectively) would be below BAAQMD's screening-level size for a general office building and various commercial land uses, there are no applicable screening criteria for the proposed project's research-and-development uses (approximately 118,000 square feet). In addition, the proposed project would include demolition activities. As such, per BAAQMD, construction-related emissions of criteria pollutants should be quantified and compared to the construction-related thresholds shown in Table 4.2-5.

Adverse health effects induced by regional criteria pollutant emissions generated by the proposed project (ozone precursors and PM) would be highly dependent on a multitude of interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). For these reasons, ozone precursors (ROG and  $NO_X$ ) contribute to the formation of ground-borne ozone on a regional scale. Emissions of ROG and NO<sub>x</sub> generated in one area may not equate to a specific ozone concentration in that same area. Similarly, some types of particulate pollution may be transported over long distances or formed through atmospheric reactions. As such, the magnitudes and locations of specific health effects from exposure to increased ozone or regional PM concentrations are the product of emissions generated by numerous sources throughout a region as opposed to a single individual project. Moreover, exposure to regional air pollution does not guarantee that an individual will experience an adverse health effect; there are large individual differences in the intensity of symptomatic responses to an air pollutant. These differences are influenced, in part, by the underlying health condition of an individual, which cannot be known. Nonetheless, emissions generated by the proposed project could increase photochemical reactions and the formation of tropospheric ozone and secondary PM, which, at certain concentrations, could lead to increased incidences of specific health consequences, such as various respiratory and cardiovascular ailments. As discussed previously, air districts develop region-specific CEQA thresholds of significance in consideration of existing air quality concentrations and attainment designations under the NAAQS and CAAQS. The NAAQS and CAAQS are informed by a wide range of scientific evidence that demonstrates there are known safe concentrations of criteria pollutants. Accordingly, the proposed project would expose receptors to substantial regional pollution if any of the thresholds summarized in Tables 4.2-4 are exceeded.

# Localized Project-Generated Criteria Pollutant Emissions (Carbon Monoxide and Particulate Matter) and Air Toxics (Diesel Particulate Matter)

Localized pollutants generated by a project are deposited near the emissions source, potentially affecting the population near that source. Because these pollutants dissipate with distance, emissions from individual projects can result in direct and material health impacts on adjacent sensitive receptors. The localized pollutants of concern that would be generated by the project are CO, PM, and DPM. The applicable thresholds for each pollutant are described below.

#### **Carbon Monoxide**

Heavy traffic congestion can contribute to high levels of CO. Individuals who are exposed to such "hot spots" may have a greater likelihood of developing adverse health effects. BAAQMD has adopted screening criteria that provide a conservative indication of whether project-generated traffic would result in a CO hot spot. If the screening criteria are not met, a quantitative analysis, through site-specific dispersion modeling of project-related CO concentrations, is not necessary. The project would not result in localized violations of the CAAQS for CO. BAAQMD's CO screening criteria are summarized below.<sup>25</sup>

<sup>&</sup>lt;sup>25</sup> Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.* May. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 6, 2020.

- 1. The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- 2. The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., a tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).
- 3. The project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, a regional transportation plan, and local congestion management agency plans.

BAAQMD does not consider construction-generated CO to be a significant pollutant of concern because construction activities typically do not generate substantial quantities of this pollutant.<sup>26</sup>

#### **Particulate Matter**

BAAQMD adopted an incremental concentration-based PM2.5 significance threshold in which a "substantial" contribution at the project level for an individual source is defined as total (i.e., exhaust and fugitive) PM2.5 concentrations exceeding 0.3  $\mu$ g/m³. In addition, BAAQMD considers projects to have a cumulatively considerable PM2.5 impact if sensitive receptors are exposed to PM2.5 concentrations from local sources within 1,000 feet that exceed 0.8  $\mu$ g/m³, including existing sources, project-related sources, and reasonably foreseeable future sources.<sup>27</sup>

BAAQMD has not established PM10 thresholds of significance. BAAQMD's PM2.5 thresholds apply to both new receptors and new sources. However, BAAQMD considers fugitive PM10 from earthmoving activities to be less than significant with applicable BAAQMD Basic Construction Mitigation Measures.

#### **Diesel Particle Matter**

DPM has been identified as a TAC. It is particularly concerning because long-term exposure can lead to cancer, birth defects, and damage to the brain and nervous systems. BAAQMD has adopted incremental cancer and hazard thresholds to evaluate receptor exposure to single sources of DPM emissions. The "substantial" DPM threshold defined by BAAQMD is exposure of a sensitive receptor to an individual emissions source that results in an excess cancer risk level of more than 10 in 1 million or a non-cancer (i.e., chronic or acute) hazard index (HI) greater than 1.0.<sup>28</sup> The air district also considers projects to have a cumulatively considerable DPM impact if they contribute to DPM emissions that, when combined with cumulative sources within 1,000 feet of sensitive receptors, result in excess cancer risk levels of more than 100 in 1 million or an HI greater than 10.0. BAAQMD considers projects to have a significant cumulative impact if they introduce new receptors at a location where the combined exposure level to all cumulative sources within 1,000 feet is in excess of cumulative thresholds.<sup>29</sup>

| 26 | Ihid    |
|----|---------|
|    | 1111111 |

<sup>&</sup>lt;sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>&</sup>lt;sup>29</sup> Ibid.

#### **Odors**

BAAQMD<sup>30</sup> and CARB<sup>31</sup> have identified several types of land uses as being commonly associated with odors, such as landfills, wastewater treatment facilities, and animal processing centers. BAAQMD's CEQA Guidelines publication recommends that project analyses identify the location of existing and planned odor sources and include policies to reduce potential odor impacts in the project area.

### 4.2.4.2 Approach to Analysis

#### **Methods**

#### **Construction Emissions**

Land uses that could be developed under the proposed project would generate construction-related emissions from mobile and stationary construction equipment exhaust, employee and haul truck vehicle exhaust, land clearing and material movement, paving, and the application of architectural coatings. Criteria pollutant emissions were estimated using the California Emissions Estimator Model (CalEEMod), version 2016.3.2. The construction schedule, equipment operating details, trip numbers and lengths, and material quantities were provided by the project sponsor. Daily construction emissions were estimated using these project-specific details. The construction modeling inputs and CalEEMod outputs are provided in Appendix B of this draft environmental impact report (EIR).

#### **Diesel Particulate Matter Analysis**

Diesel-powered construction equipment and the emergency generator during project operations would emit DPM that could expose nearby sensitive receptors to increased cancer and non-cancer risks. As noted above, the nearest sensitive receptors are located at the Gateway Child Development Center Peninsula, approximately 670 feet south of the project site. Given that the proposed project would introduce DPM emissions to an area near existing sensitive receptors, a human Health Risk Assessment (HRA) was performed using EPA's most recent dispersion model, AERMOD (version 191901); chronic risk assessment values presented by OEHHA; and other assumptions for model inputs from BAAQMD's *Air Toxics NSR Program Health Risk Assessment Guidelines*.<sup>32</sup> The HRA takes into account OEHHA's most recent guidance and calculation methods from the *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Risk Assessments*.<sup>33</sup>

The HRA analyzes health risks to nearby sensitive receptors from construction activities and testing of an emergency diesel-powered generator during project operation. The human HRA consists of three parts: a DPM inventory, air dispersion modeling, and risk calculations. A description of each of these parts follows.

<sup>30</sup> Ibid.

<sup>&</sup>lt;sup>31</sup> California Air Resources Board. 2005. *Air Quality and Land Use Handbook: A Community Health Perspective.* April. Available: https://ww3.arb.ca.gov/ch/handbook.pdf. Accessed: January 6, 2020.

Bay Area Air Quality Management District. 2016. Air Toxics NSR Program Health Risk Assessment Guidelines. December. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/permit-modeling/hra\_guidelines\_12\_7\_2016\_clean-pdf.pdf. Accessed: August 3, 2020.

Office of Environmental Health Hazard Assessment. 2015. Air Toxics Hot Spots Program Guidance Manual for the Preparation of Risk Assessments. Available: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed: August 3, 2020.

#### **DPM** Inventory

The DPM inventory includes mitigated emissions associated with short-term construction activity and emissions from testing of the emergency generator. The construction DPM inventory was assumed to be equal to the CalEEMod output results for diesel PM2.5 exhaust. The construction PM2.5 inventory was assumed to be equal to the CalEEMod output results for the sum of PM2.5 exhaust and fugitive dust. The operational DPM inventory is assumed to be equal to the CalEEMod output results for diesel PM2.5 exhaust from the generator.

#### Air Dispersion Modeling

The HRA uses EPA's AERMOD to model annual average DPM and PM2.5 concentrations at nearby receptors. Modeling inputs, including emissions rates (in grams of pollutant emitted per second) and source characteristics (e.g., release height, stack diameter, plume width), were based on guidance provided by OEHHA and BAAQMD. Meteorological data were obtained from CARB for the San Francisco International Airport, which is the nearest monitoring station, located approximately 1.5 miles south of the project site.

Construction equipment emissions were characterized as an area source (AREAPOLY) with a release height of 0.9 meters for fugitive dust emissions and 4.1 meters for all other emissions. One construction area source was modeled, which included the project site where construction is anticipated. Haul and vendor truck emissions were characterized as line/area sources (LINEAREA) with release heights of 0.9 meters for fugitive dust emissions and 3.4 meters for all other emissions. Emissions from off-road equipment were assumed to be generated throughout the construction footprint. Emissions from offsite trucks were modeled along 1,000-foot segments adjacent to the construction footprint along Gateway Boulevard and Oyster Point Boulevard.

The modeling of emissions from construction activities was based on the construction hours and days (7:00 a.m. to 5:00 p.m., five days per week<sup>34</sup>) during 2020 and 2021 described in Section 3.3.2.7 in Chapter 2, *Project Description*, of this draft EIR. To account for plume rise associated with mechanically generated construction emissions sources for the AERMOD run, the initial vertical dimension of the area source was modeled at 3.81 meters; for the line/area sources, it was modeled at 3.16 meters. The urban dispersion option was used based on the project site's characteristics.

Offsite sensitive receptors were placed at the Gateway Child Development Center Peninsula, the only sensitive receptors within 1,000 feet of the construction work areas and haul roads. A 20-by-20-meter receptor grid was used to place receptors.

Operational emissions from testing of the new 1,250 kilowatt (approximately 1,700 horsepower) diesel emergency generator were characterized as one separate vertical point source (POINT). The location of the generator in the service and loading yard south of the proposed building was estimated based on Figure 3-5 in Chapter 3, *Project Description*, of this draft EIR, and the urban dispersion option was assumed. The modeling of emissions from generator activities utilized a 12-hour testing window per day (8:00 a.m. to 8:00 p.m.), as testing was assumed to occur during daytime hours. Periodic testing of the generator would be completed; testing is anticipated to consist of one test per week for 30 to 45 minutes per test at a load of 100 percent for up to 50 hours per year maximum, as limited by

Though construction may occur some evenings and weekends, it was assumed that construction would occur during the work week (Monday-Friday) when the Gateway Child Development Center Peninsula, the only sensitive receptors within 1,000 feet of the construction work areas and haul roads, would be operational.

the BAAQMD. Variables, including release height (3.73 meters) and stack diameter (0.21 meters), were taken from comprehensive modeling information provided by the San Joaquin Valley Air Pollution Control District for a 1,500 to 1,850 horsepower generator.<sup>35</sup> Similar to the construction analysis, offsite sensitive receptors were placed at the Gateway Child Development Center Peninsula using a grid with 20-meter spacings. A complete list of dispersion modeling inputs is provided in Appendix B.

#### **Risk Calculations**

The risk calculations incorporate OEHHA's age-specific factors that account for increased sensitivity to carcinogens during early-in-life exposure. The approach for estimating cancer risk from long-term inhalation, with exposure to carcinogens, requires calculating a range of potential doses and multiplying by cancer potency factors in units corresponding to the inverse dose to obtain a range of cancer risks. For cancer risk, the risk for each age group is calculated using the appropriate daily breathing rates, age sensitivity factors, and exposure durations. The cancer risks calculated for individual age groups are summed to estimate the cancer risk for each receptor. Chronic cancer and hazard risks were calculated using from OEHHA's 2015 HRA guidance.<sup>36</sup> According to BAAQMD guidance, residential cancer risks assume a 30-year exposure.<sup>37</sup> Because mitigated emissions were used to model cancer risks and PM2.5 concentrations, unmitigated risks and PM2.5 concentrations were scaled proportionate to the unmitigated emissions inventory. The risk calculations and additional assumptions are provided in Appendix B.

#### **Operational Mobile-Source Emissions**

Air quality impacts from motor vehicles operating within the air basin while traveling to and from the project site were evaluated using CARB's EMFAC2017 emissions model (version 1.02) and traffic data provided by Fehr & Peers.<sup>38</sup> Because the office building at 701 Gateway Boulevard would remain on the site, operational mobile-source emissions associated with the office building were estimated and presented under existing (2019) and future conditions (2021).39

To determine running exhaust emissions (i.e., vehicle movement/travel), the number of employees on the project site daily and the conversion factor for vehicle miles traveled (VMT) per capita, both of which were provided by Fehr & Peers, were used to estimate total VMT with and without the proposed project. The trips generated by daily employees assumes a 26 percent alternative mode share consistent with the City/County Association of Governments (C/CAG) of San Mateo County model and analysis for other similar projects within the City and the region. Criteria pollutant emissions from vehicle running exhaust were then calculated by multiplying the VMT estimates by the appropriate emission factors provided by EMFAC2017.

<sup>35</sup> San Joaquin Valley Air Pollution Control District, 2015. Final Staff Report, Update to District's Risk Management Policy to Address OEHHA's Revised Risk Assessment Guidance Document. May 28.

<sup>&</sup>lt;sup>36</sup> Office of Environmental Health Hazard Assessment. 2015. Air Toxics Hot Spots Program Guidance Manual for the Preparation of Risk Assessments. Available: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed: August 3, 2020.

<sup>&</sup>lt;sup>37</sup> Bay Area Air Quality Management District. 2016. Air Toxics NSR Program Health Risk Assessment Guidelines. December. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/permitmodeling/hra\_guidelines\_12\_7\_2016\_clean-pdf.pdf. Accessed: August 3, 2020.

<sup>38</sup> Hawkins, Mike. Fehr & Peers. March 13, 2020—email to Jessica Viramontes: 751 Gateway Updated Transportation Materials.

<sup>&</sup>lt;sup>39</sup> No emissions sources are associated with the existing surface parking lots; therefore, no emissions are associated with the lot under existing conditions.

Daily trips for the proposed project were also provided by Fehr & Peers and used to estimate a per employee trip generation rate, which was used to estimate daily trips associated with the existing building at 701 Gateway Boulevard. The number of daily trips was calculated to quantify vehicle-process emissions, such as emissions generated from vehicle starts, running losses, etc. Process emissions were then calculated by multiplying the number of daily trips by the appropriate process-specific emissions factors from EMFAC2017. The running exhaust emissions and process emissions were combined to quantify total operational emissions from the project's use of vehicles.

The analysis incorporates CARB's criteria pollutant adjustment factors to account for Part 1 of the SAFE Vehicle Rule. The EMFAC0217 emissions factors and traffic data used in this analysis are provided in Appendix B of this draft EIR.

Refer to Section 4.9, *Transportation and Circulation*, of this draft EIR for more details regarding the project's trip generation.

#### Operational Area-, Energy-, and Stationary-Source Emissions

Area, energy, and stationary emissions were estimated using CalEEMod (version 2016.4.2). Areasource emissions are generated by the use of consumer products, the use of landscape maintenance equipment, and the repainting of buildings. Energy sources include the combustion of natural gas for building heating and hot water. Stationary sources include emergency backup generators. Emissions were quantified for existing and project conditions.<sup>40</sup> Operational emissions were estimated using project-specific details (e.g., energy consumption, emergency generator specifications) and the use of CalEEMod defaults when project-specific details were not available. Similar to mobile-source emissions, area-, energy-, and stationary-source emissions were also estimated for the existing office building at 701 Gateway Boulevard. The CalEEMod output files are provided in Appendix B of this draft EIR.

#### 4.2.4.3 Impact Evaluation

# Impact AQ-1: The proposed project would not conflict with or obstruct implementation of the applicable air quality plan. (*Less than Significant*)

The CAA requires that a SIP or an air quality control plan be prepared for areas with air quality that violates the NAAQS. The SIP sets forth the strategies and pollution control measures that states will use to attain the NAAQS. The California CAA requires attainment plans to demonstrate a 5 percent per year reduction in nonattainment air pollutants or their precursors, averaged every consecutive 3-year period, unless an approved alternative measure of progress is developed. Air quality attainment plans (AQAPs) outline emissions limits and control measures to achieve and maintain these standards by the earliest practical date. The current AQAP for the SFBAAB is the 2017 Clean Air Plan.<sup>41</sup>

<sup>40</sup> Ibid

<sup>&</sup>lt;sup>41</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan.* Adopted: April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

#### Support of 2017 Clean Air Plan Goals

The primary goals of the 2017 Clean Air Plan are to attain all state and national air quality standards and eliminate disparities among Bay Area communities in cancer health risk from toxic air contaminants. As discussed below (Impact AQ-2), the proposed project would not exceed BAAQMD's criteria pollutant thresholds and would not result in a significant level of air pollution such that air quality within the SFBAAB would be degraded. As such, the proposed project would not contribute to increases in the CAAQS and NAAQS and, thus, would not prevent attainment of the state and national air quality standards. As further discussed below (Impact AQ-3), the project would not have a significant impact related to TACs and thus would not contribute to disparities among Bay Area communities. Therefore, based on the above analysis, the proposed project would support the primary goals of the 2017 Clean Air Plan.

### **Support Applicable Control Measures and Their Implementation**

To meet the primary goals of the 2017 Clean Air Plan, specific control measures and actions are recommended. These control measures are grouped into various categories and include stationary-source measures, mobile-source measures, and transportation control measures. The 2017 Clean Air Plan recognizes that community design dictates individual travel modes and that a key long-term control strategy for reducing emissions of criteria pollutants, air toxics, and GHGs from motor vehicles is to channel future Bay Area growth into vibrant urban communities where goods and services are close at hand and people have a range of viable transportation options. To this end, the 2017 Clean Air Plan includes control measures to reduce air pollution in the SFBAAB.

The measures most applicable to the proposed project are transportation, energy, building, waste management, water, and stationary-source control measures. These measures include the following:

- TR1: Clean Air Teleworking Initiative Develop teleworking best practices for employers and develop additional strategies to promote telecommuting. Promote teleworking on Spare the Air Days.
- TR2: Trip Reduction Programs Implement the regional Commuter Benefits Program (Rule 14-1), which requires employers with 50 or more Bay Area employees to provide commuter benefits. Encourage trip reduction policies and programs in local plans (e.g., general and specific plans) while providing grants to support trip reduction efforts. Encourage local governments to require mitigation of vehicle travel as part of new development approval, adopt transit benefit ordinances in order to reduce transit costs to employees, and develop innovative ways to encourage ride sharing, transit, cycling, and walking for work trips. Fund various employer-based trip reduction programs.
- TR8: Ridesharing, Last-Mile Connection Promote carpooling and vanpooling by providing funding to continue regional and local ride-sharing programs and support the expansion of car-sharing programs. Provide incentive funding for pilot projects to evaluate the feasibility and cost effectiveness of innovative ride sharing and other last-mile trip reduction strategies. Encourage employers to promote ride sharing and car sharing to their employees.
- TR9: Bicycle and Pedestrian Access and Facilities Encourage planning for bicycle and pedestrian facilities in local plans (e.g., general and specific plans) to fund bike lanes, routes, paths, and bicycle parking facilities.

- TR13: Parking Policies Encourage parking policies and programs in local plans (e.g., reduce minimum parking requirements), limit the supply of off-street parking in transit-oriented areas, unbundle the price of parking spaces, and support implementation of demand-based pricing (such as "SF Park") in high-traffic areas.
- TR14: Cars and Light Trucks Commit regional clean air funds toward qualifying vehicle purchases and infrastructure development. Partner with private, local, state, and federal programs to promote the purchase and lease of battery and plug-in hybrid electric vehicles.
- TR15: Public Outreach and Education Implement the Spare the Air Every Day Campaign, including Spare the Air alerts, employer programs, community resource teams, a PEV outreach campaign, and the Spare the Air Youth Program.
- TR23: Lawn and Garden Equipment Seek additional funding to expand the Commercial Lawn and Garden Equipment Replacement Program into all nine Bay Area counties. Explore options to expand Lawn and Garden Equipment Program to cover shredders, stump grinders, and commercial turf equipment.
- EN2: Decrease Electricity Demand Work with local governments to adopt additional energy
  efficiency policies and programs. Support local government energy efficiency programs
  through best practices, model ordinances, and technical support. Work with partners to
  develop messaging to decrease electricity demand during peak times.
- BL1: Green Buildings Collaborate with partners such as KyotoUSA to identify energy-related improvements and opportunities for on-site renewable energy systems in school districts; investigate funding strategies to implement upgrades. Identify barriers to effective local implementation of the CALGreen (Title 24) statewide building energy code; develop solutions to improve implementation/enforcement. Work with ABAG's BayREN program to make additional funding available for energy-related projects in the buildings sector. Engage with additional partners to target reducing emissions from specific types of buildings.
- BL2: Decarbonize Buildings Explore potential air district rulemaking options regarding the sale of fossil fuel-based space and water heating systems for both residential and commercial use. Explore incentives for property owners to replace their furnace, water heater, or natural-gas-powered appliances with zero-carbon alternatives. Update air district guidance documents to recommend that commercial and multi-family developments install ground-source heat pumps and solar hot water heaters.
- BL4: Urban Heat Island Mitigation Develop and urge adoption of a model ordinance for "cool parking" that promotes the use of cool surface treatments for new parking facilities as well as existing surface lots undergoing resurfacing. Develop and promote adoption of model building code requirements for new construction or re-roofing/roofing upgrades for commercial and residential multi-family housing. Collaborate with expert partners to perform outreach to cities and counties to make them aware of cool roofing and cool paving techniques and new tools that are available.
- NW2: Urban Tree Planting Develop or identify an existing model municipal tree planting
  ordinance and encourage local governments to adopt such an ordinance. Include tree planting
  recommendations, the air district's technical guidance, best practices for local plans, and
  CEQA review.

- WA3: Green Waste Diversion Develop model policies to facilitate local adoption of ordinances and programs to reduce the amount of green waste going to landfills.
- WA4: Recycle and Waste Reduction Develop or identify and promote model ordinances on community-wide zero-waste goals and recycling of construction and demolition materials in commercial and public construction projects.
- WR2: Support Water Conservation Develop a list of best practices that reduce water consumption and increase on-site water recycling in new and existing buildings; incorporate into local planning guidance.
- SS32: Emergency Backup Generators Reduce emissions of diesel particulate matter and black carbon from backup generators through Draft Rule 11-18, resulting in reduced health risks to affected individuals and climate protection benefits.

The proposed project would include design features that would support emissions reductions in the transportation sector. For instance, the proposed project's TDM plan would promote transit and pedestrian connectivity and support transit priority measures (Measure TR9). The proposed project would construct new transit infrastructure, such as the new shuttle stop on the western portion of the access drive north of the existing building at 701 Gateway Boulevard, and improve the connection to the existing shuttle stop on the eastern side of Gateway Boulevard (Measures TR2 and TR8). Other improvements, such as electric charging stations and bicycle parking, would support alternative modes of transportation within the project site (Measures TR8, TR9, and TR14). The proposed project, through its TDM plan, would monitor parking demand and require annual travel surveys as part of ongoing outreach to evaluate the effectiveness of on-site programs (e.g., telecommuting) as well as the transportation demand measures (Measures TR1, TR13, and TR15).

In addition, the proposed project would implement a number of sustainability features, such as solar-ready rooftop connectivity for future installation of photovoltaic panels and Energy Star-rated and high-efficiency appliances (Measures BL1, BL2, BL4, and EN2); green infrastructure (e.g., biotreatment areas and other low-impact development) (Measures BL1 and NW2); low-flow shower heads, aerators, and toilets (Measure WR2); and waste diversion programs to reduce resource consumption as well as criteria pollutant and GHG emissions (Measures WA3 and WA4). The proposed project would be designed to meet the standards of the South San Francisco Municipal Code, CALGreen building requirements, LEED Gold certification, as well as International WELL and Fitwel Building Institute Standards (Measures BL-2 and EN2). The proposed project would result in a net tree loss (approximately 19 trees) with implementation of Mitigation Measure GHG-2. However, because younger trees typically sequester more CO<sub>2</sub>e compared to older and more mature trees, additional sequestration from newer trees planted as part of the proposed project could offset the loss of carbon sequestration from the net tree loss (Measure NW2). In addition, shrubs and biotreatment plantings as opposed to grass areas would in installed to further reduce emissions associated with lawn and garden equipment (Measure TR23). The proposed emergency generator would be subject to the permit authority of the BAAQMD to reduce associated health risks and air quality impacts (Measure SS32).

Based on the above analysis, the proposed project would generally support most of the applicable control measures and their implementation identified in the 2017 Clean Air Plan to meet the plan's primary goals.

#### Disrupt or Hinder Implementation of 2017 Clean Air Plan Control Measures

As discussed above, the proposed project would incorporate sustainable design features that address the transportation, energy, building, waste management, water, and stationary-source sectors. It would not disrupt, delay, or otherwise hinder implementation of any applicable control measure from the 2017 Clean Air Plan. Rather, the proposed project would support and facilitate implementation of control measures.

Based on the above analysis, the proposed project would support implementation of the 2017 Clean Air Plan. Accordingly, the proposed project would not fundamentally conflict with the 2017 Clean Air Plan and would have a *less-than-significant* air quality impact. No mitigation measures are required.

Impact AQ-2: The proposed project would not result in a cumulatively considerable net increase in any criteria pollutant for which the project region is classified as nonattainment under an applicable federal or state ambient air quality standard. (Less than Significant with Mitigation during construction; Less than Significant during operation)

#### Construction

Construction and demolition activities for the proposed project would include demolition of a surface parking lot, construction of a new building, various site improvements, and the provision of utility infrastructure. If the related entitlements are approved by the City, construction of the proposed project would begin in 2020 and occur over approximately 18 months, with anticipated completion in 2021. Construction and demolition activities would require mobile and stationary equipment as well as on-road vehicles, such as haul trucks for demolition debris and vendor trucks for deliveries. Site grading and excavation would be required for the building foundation, utilities, and landscaping. The unmitigated criteria air pollutant emissions that would be generated during construction were estimated using CalEEMod (version 2016.4.2), as presented in Table 4.2-5.

Table 4.2-5. Estimated Unmitigated Criteria Pollutant Emissions from Construction of the Proposed Project (pounds/day)

|                          |     |           |    | P    | PM10    |      | PM2.5   |  |
|--------------------------|-----|-----------|----|------|---------|------|---------|--|
| <b>Construction Year</b> | ROG | $NO_X$    | CO | Dust | Exhaust | Dust | Exhaust |  |
| 2020                     | 7   | <u>68</u> | 41 | 1    | 2       | < 1  | 2       |  |
| 2021                     | 29  | 46        | 31 | 14   | 1       | 3    | 5       |  |
| BAAQMD Threshold         | 54  | 54        | _  | BMPs | 82      | BMPs | 54      |  |
| Exceed Threshold?        | No  | Yes       | _  | _    | No      | _    | No      |  |

Source: See Appendix B of this draft EIR for CalEEMod outputs.

Exceedances of the BAAQMD thresholds are underlined.

ROG= reactive organic gases; NOx = nitrogen oxide; CO = carbon monoxide; PM10 = particulate matter no more than 10 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matte

As shown in Table 4.2-5, construction of the proposed project would not generate ROG or PM exhaust emissions in excess of BAAQMD's numeric thresholds. However, the proposed project would generate NO<sub>x</sub> emissions in excess of BAAOMD's significance threshold during construction in 2020. These emissions, if left unmitigated, could contribute to a ground-level formation of ozone in the SFBAAB, which, at certain concentrations, could contribute to short- and long-term human health effects. Currently, San Mateo County does not meet the NAAQS and CAAQS for ozone or the CAAQS for PM (see Table 4.2-2). Certain individuals residing in areas that do not meet the ambient air quality standards, including South San Francisco, could be exposed to pollutant concentrations that could cause or aggravate acute and/or chronic health conditions (e.g., asthma, premature mortality). Although construction of the proposed project would contribute to future NO<sub>x</sub> emissions, maximum daily construction-generated  $NO_X$  emissions would represent approximately 0.01 percent of the total  $NO_X$  in the SFBAAB.<sup>42</sup> As previously discussed, the magnitude and location of any potential change in ambient air quality, as well as the health consequences associated with additional emissions, cannot be quantified with a high level of certainty because of the dynamic and complex nature of pollutant formation and its distribution. However, it is known that public health will continue to be affected in South San Francisco as long as the region fails to meet the NAAQS and CAAQS.

Implementation of Mitigation Measure AQ-1, Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related  $NO_X$  Emissions, would reduce construction-related  $NO_X$  to below BAAQMD's threshold, as shown in Table 4.2-6. BAAQMD's CEQA Guidelines consider fugitive dust impacts to be less than significant with application of best management practices (BMPs). If BMPs are not implemented, the dust impact would be *significant*. Therefore, Mitigation Measure AQ-2, Implement BAAQMD Basic Construction Mitigation Measures, which includes BMPs to reduce fugitive dust, would be implemented to reduce impacts from construction-related fugitive dust emissions, including any cumulative impacts. As such, construction of the proposed project would not be expected to contribute a significant level of air pollution such that air quality within the SFBAAB would be degraded. Consequently, the impact from construction-generated criteria pollutant emissions would be *less than significant with mitigation*.

Table 4.2-6. Estimated Mitigated Criteria Pollutant Emissions from Construction of the Proposed Project (pounds/day)

|                          |     |        |    | PM10 |         | PM2.5 |         |
|--------------------------|-----|--------|----|------|---------|-------|---------|
| <b>Construction Year</b> | ROG | $NO_X$ | CO | Dust | Exhaust | Dust  | Exhaust |
| 2020                     | 2   | 14     | 78 | 1    | < 1     | < 1   | 1       |
| 2021                     | 28  | 11     | 62 | 14   | < 1     | 3     | 4       |
| BAAQMD Threshold         | 54  | 54     | _  | BMPs | 82      | BMPs  | 54      |
| Exceed Threshold?        | No  | No     | _  | _    | No      | _     | No      |

Source: See Appendix B of this draft EIR for CalEEMod outputs.

Emissions data in this table assume implementation of Mitigation Measure AQ-1. However, implementation of dust-related best management practices have not been explicitly quantified but would be required. ROG = reactive organic gas;  $NO_X$  = nitrogen oxide; CO = carbon monoxide; PM10 = particulate matter no more than 10 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = Bay Area Air Quality Management District; PM2.5 = best management practices.

 $<sup>^{42}</sup>$  NO<sub>x</sub> emissions reported in the Clean Air Plan totaled 300 tons per day. Maximum project-generated NO<sub>x</sub> emissions would be 87 pounds per day, which equates to 0.0435 ton per day.

# Mitigation Measure AQ-1: Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related $NO_X$ Emissions

The project sponsor shall ensure that all off-road diesel-powered equipment used during construction is equipped with EPA-approved Tier 4 Final engines. The construction contractor shall submit evidence of the use of EPA-approved Tier 4 Final engines or cleaner for project construction to the City prior to the commencement of construction activities.

#### Mitigation Measure AQ-2: Implement BAAQMD Basic Construction Mitigation Measures

The project sponsor shall require all construction contractors to implement the basic construction mitigation measures recommended by BAAQMD. The emissions reduction measures shall include, at a minimum, the following:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, unpaved access roads) shall be watered two times a day.
- All haul trucks shall be covered when transporting soil, sand, or other loose material offsite.
- All visible mud or dirt track-out material on adjacent public roads shall be removed using wet-power vacuum-type street sweepers at least once a day. The use of dry-power sweeping is prohibited.
- All vehicle speeds shall be limited to 15 miles per hour on unpaved roads.
- All roadways, driveways, and sidewalks that are to be paved shall be paved as soon as
  possible. Building pads shall be laid as soon as possible after grading, unless seeding or a soil
  binder is used.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications. All equipment shall be checked by a certified visibleemissions evaluator.
- Idling times shall be minimized, either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California Airborne Toxics Control Measure).
- Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

### Operation

Operation of the proposed project has the potential to result in air quality impacts from area, energy, mobile, and stationary sources. Area sources would include landscaping equipment; architectural coatings, with off-gassing during reapplication; and consumer products (e.g., solvents, cleaning supplies, cosmetics, toiletries). Energy sources would include on-site natural gas combustion for space and water heating. Mobile sources would include vehicle trips generated by land uses proposed within the project site. Stationary sources would include the testing of emergency generators. Each of these sources was considered in calculating the proposed project's long-term operational emissions, which were quantified using CalEEMod for area, energy, and stationary sources and EMFAC2017 for mobile sources, as described above.

Table 4.2-7 summarizes daily area-, energy-, mobile-, and stationary-source emissions generated under existing (2019) and 2021 conditions with the proposed project. No changes are proposed at the existing office building at 701 Gateway Boulevard; therefore, emissions estimated for the office building also represent 2021 conditions without the proposed project. To evaluate the magnitude of the change in the air quality environment due to implementation of the proposed project, emissions under 2021 conditions were compared to the emissions under existing (2019) conditions.

As shown in Table 4.2-7, the proposed project would result in a net increase in ROG (approximately 11 pounds per day),  $NO_X$  (26 pounds per day), CO (61 pounds per day), PM10 (59 pounds per day), and PM2.5 (16 pounds of per day). However, it would not exceed BAAQMD's numeric thresholds. Therefore, air quality impacts from criteria pollutant emissions would be *less than significant* during operation. No mitigation is required. Although not required to support a less-than-significant determination or quantified for the purposes of this analysis, implementation of Mitigation Measure TR-1, as discussed in Section 4.9, *Transportation and Circulation*, of this draft EIR, would fund the design and construction of offsite improvements to support the proposed project's first- and last-mile transportation demand management strategies, which would further reduce emissions.

Table 4.2-7. Estimated Criteria Pollutant Emissions from Operation of the Proposed Project (pounds/day)

| Condition/Source                   | ROG   | NOx | СО  | PM10 | PM2.5 |  |  |  |
|------------------------------------|---|-----|-----|------|-------|--|--|--|
| Existing (2019)                    |   |     |     |      |       |  |  |  |
| 701 Gateway (existing office       | 701 Gateway (existing office building) and 751 Gateway (existing parking lot) |     |     |      |       |  |  |  |
| Area Sources                       | 4   | < 1 | < 1 | < 1  | < 1   |  |  |  |
| Energy Sources                     | < 1   | 1   | 1   | <1   | < 1   |  |  |  |
| Mobile Sources                     | 2   | 9   | 42  | 36   | 9     |  |  |  |
| Stationary Sources                 | 3   | 15  | 9   | < 1  | < 1   |  |  |  |
| Total <sup>a</sup>                 | 10  | 25  | 52  | 37   | 10    |  |  |  |
| Proposed Project (2021)            |   |     |     |      |       |  |  |  |
| 701 Gateway (existing office       | building)   |     |     |      |       |  |  |  |
| Area Sources                       | 4   | < 1 | < 1 | < 1  | < 1   |  |  |  |
| Energy Sources                     | < 1   | 1   | 1   | 0    | 0     |  |  |  |
| Mobile Sources                     | 2   | 7   | 36  | 36   | 9     |  |  |  |
| Stationary Sources                 | 3   | 15  | 9   | 0    | 0     |  |  |  |
| 751 Gateway (proposed R&I          | and office building   | ng) |     |      |       |  |  |  |
| Area Sources                       | 5   | < 1 | < 1 | < 1  | < 1   |  |  |  |
| Energy Sources                     | 0   | 1   | 1   | 0    | 0     |  |  |  |
| Mobile Sources                     | < 1   | 12  | 58  | 59   | 15    |  |  |  |
| Stationary Sources                 | 3   | 15  | 9   | 0    | 0     |  |  |  |
| Total <sup>a</sup>                 | 21  | 51  | 112 | 96   | 26    |  |  |  |
| Net Increase with Proposed Project |   |     |     |      |       |  |  |  |
| 2021 v. Existing                   | 11  | 26  | 61  | 59   | 16    |  |  |  |
| BAAQMD Threshold                   | 54  | 54  | _   | 82   | 54    |  |  |  |
| Exceed Threshold?                  | No  | No  | _   | No   | No    |  |  |  |

Source: See Appendix B of this draft EIR for CalEEMod outputs and EMFAC2017 calculations.

ROG= reactive organic gases;  $NO_X$  = nitrogen oxide; CO = carbon monoxide; PM10 = particulate matter no more than 10 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matter no more than 2.5 microns in diameter; PM2.5 = particulate matt

<sup>a</sup> Totals may not add up because of rounding.

The improvements would require City acquisition of private right-of-way and funding from other sources. Should the improvements recommended in Mitigation Measure TR-1 be implemented, mobile-source emissions would be less than the emissions presented in Table 4.2-7.

# Impact AQ-3: The proposed project would not expose sensitive receptors to substantial pollutant concentrations. (Less than Significant with Mitigation during construction; Less than Significant during operation)

The primary pollutants of concern to human health generated by the proposed project are criteria pollutants and TACs.

#### **Regional Criteria Pollutants**

In its *Sierra Club v. County of Fresno* decision (6 Cal.5th 502), hereafter referred to as the Friant Ranch Decision, the California Supreme Court reviewed the long-term regional air quality analysis contained in the EIR for the proposed Community Plan Update and Friant Ranch Specific Plan (Friant Ranch Project). The Friant Ranch Project is a 942-acre master-plan development in unincorporated Fresno County and the San Joaquin Valley Air Basin, which is currently in nonattainment under the NAAQS and CAAQS for ozone and PM2.5. The court found that the EIR's air quality analysis was inadequate because it failed to provide enough detail "for the public to translate the bare [criteria pollutant emissions] numbers provided into adverse health impacts or to understand why such a translation is not possible at this time." According to the court's decision, environmental documents must attempt to connect a project's regional air quality impacts to specific health effects or explain why it is not technically feasible to perform such an analysis. As noted above, this project would not contribute to significant cumulative regional air quality impacts.

Models and tools have been developed to correlate regional criteria pollutant emissions with potential community health impacts. Appendix B of this draft EIR summarizes many of these tools, describes their intended application and resolution, and determines whether they could be used to reasonably correlate project-level emissions with specific health consequences. As described in Appendix B, although some models are capable of quantifying ozone and secondary PM formation, as well as associated health effects, these tools were developed to support regional planning and policy analysis. They have limited sensitivity with respect to the small changes in criteria pollutant concentrations induced by smaller individual projects, such as a few office buildings or a single multi-family building. Therefore, translating project-generated criteria pollutants to locations where specific health effects could occur or calculating the resultant number of additional days of nonattainment cannot be achieved with any degree of accuracy for relatively small projects (relative to the regional air basin).

As discussed above, BAAQMD's regional thresholds, as presented in Table 4.2-4, consider existing air quality concentrations and attainment or nonattainment designations under the NAAQS and CAAQS. The NAAQS and CAAQS are informed by a wide range of scientific evidence that demonstrates that there are known safe concentrations of criteria pollutants. Although recognizing that air quality is a cumulative problem, BAAQMD considers projects that generate criteria pollutant and ozone precursor emissions that are below the thresholds to be minor in nature; they would not adversely affect air quality to the extent that the health-protective NAAQS or CAAQS would be exceeded. Regional emissions generated by a project could increase photochemical reactions and the formation of tropospheric ozone and secondary PM, which, at certain concentrations, could lead to increased incidences of specific health consequences. Although these health effects are associated with ozone and particulate pollution, the effects are a result of cumulative and regional emissions.

Therefore, the project's incremental contribution cannot be traced to specific health outcomes on a regional scale, and a quantitative correlation of project-generated regional criteria pollutant emissions to specific human health impacts is not included in this analysis. Mitigation is being applied to reduce construction emissions of ozone precursors and PM to the extent possible (i.e., Mitigation Measure AQ-1, Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related NO<sub>X</sub> Emissions, and Mitigation Measure AQ-2, Implement BAAQMD Basic Construction Mitigation Measures). The project's operational emissions would not exceed the BAAQMD thresholds.

#### **Localized Criteria Pollutants**

Localized criteria pollutants generated by the proposed project (e.g., fugitive dust, carbon monoxide) can be deposited near an emissions source, with the potential to affect a population near that emissions source. Although these pollutants dissipate with distance, emissions from individual projects can result in direct and material health impacts on adjacent sensitive receptors. As discussed above, the NAAQS and CAAQS are health-protective standards. They have been set at levels that are considered safe to protect public health, including the health of sensitive populations, such as asthmatics, children, and the elderly.

During grading and excavation activities associated with construction, localized fugitive dust would be generated. The amount of dust generated by a project is highly variable and dependent on the size of the disturbed area at any given time, the amount of activity, soil conditions, and meteorological conditions. BAAQMD considers dust impacts to be less than significant if BAAQMD's construction BMPs are employed to reduce such emissions. Because BAAQMD's Basic Construction Mitigation Measures would be implemented, per Mitigation Measure AQ-2, Implement BAAQMD Basic Construction Mitigation Measures, construction-related fugitive dust emissions would be less than significant and would not expose receptors to substantial pollutant concentrations or risks.

The proposed project would install a new generator on the project site, which would increase  $PM_{2.5}$  concentrations. The nearest sensitive receptors are located at the Gateway Child Development Center Peninsula, approximately 670 feet south of the project site; thus, the proposed project may expose receptors to substantial pollutant concentrations or risks.  $PM_{2.5}$  concentrations anticipated from the generator are discussed below in conjunction with toxic air contaminants.

Continuous engine exhaust may elevate localized CO concentrations, resulting in hot spots. Receptors who are exposed to these CO hot spots may have a greater likelihood of developing adverse health effects. CO hot spots are typically observed at heavily congested intersections where a substantial number of gasoline-powered vehicles idle for prolonged durations throughout the day. As discussed in Section 4.2.4.1, *Significance Criteria*, BAAQMD has developed screening criteria to assist lead agencies in evaluating potential impacts from localized CO. The proposed project would fall within BAAQMD's CO hot-spot screening criteria. The proposed project would not increase traffic volumes at any intersection to more than 44,000 vehicles per hour or 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited, levels specified by BAAQMD, and would be consistent with the applicable congestion management plan.<sup>43</sup> Therefore, the proposed project would not contribute to a localized CO hot spot and would not expose receptors to substantial CO concentrations or risks.

<sup>&</sup>lt;sup>43</sup> Hawkins, Mike. Fehr & Peers. February 14, 2020—email to Jessica Viramontes: 751 Gateway – Transportation Schedule Check In.

#### **Toxic Air Contaminants**

The primary TAC of concern associated with the proposed project is DPM. DPM is a carcinogen emitted by diesel internal combustion engines. Construction activities would generate DPM (PM<sub>2.5</sub> exhaust)<sup>44</sup> that could expose adjacent receptors to significant health risks. DPM concentrations would be dramatically reduced as distance between the construction activities and sensitive receptors increases. As noted in BAAQMD's CEQA Guidelines:

Due to the variable nature of construction activity, the generation of TAC emissions in most cases would be temporary, especially considering the short amount of time such equipment is typically within an influential distance that would result in the exposure of sensitive receptors to substantial concentrations. Concentrations of mobile-source diesel PM emissions are typically reduced by 70 percent at a distance of approximately 500 feet... In addition, current models and methodologies for conducting health risk assessments are associated with longer-term exposure periods of 9, 40, and 70 years, which do not correlate well with the temporary and highly variable nature of construction activities. This results in difficulties with producing accurate estimates of health risk.<sup>45</sup>

As discussed under Impact AQ-2, Mitigation Measure AQ-1, Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related NO $_{\rm X}$  Emissions, and Mitigation Measure AQ-2, Implement BAAQMD Basic Construction Mitigation, are required to reduce construction emissions below air district thresholds. As such, mitigated construction emissions were modeled to determine localized health risks. Table 4.2-8 presents the maximum mitigated construction-related health risks at the Gateway Child Development Center Peninsula, the only sensitive receptors within 1,000 feet of the construction work areas and haul roads. As shown in Table 4.2-8, cancer risk, chronic hazard risk, and annual PM $_{\rm 2.5}$  concentration would not exceed BAAQMD's thresholds with implementation of Mitigation Measure AQ-1 and AQ-2. Although not anticipated with demolition of the surface parking lot, any asbestos encountered during construction would be subject to BAAQMD Regulation 11, Rule 2. Compliance with this rule would ensure a less-than-significant asbestos impact.

Table 4.2-8. Mitigated Project-level Cancer and Chronic Hazard Risks and PM<sub>2.5</sub> Concentrations During Construction

| Receptor                                      | Cancer Risk<br>(cases per million) | Non-Cancer<br>Hazard Index | Annual PM <sub>2.5</sub><br>Concentration<br>(μg/m³) |
|---|------------------------------------|----------------------------|--|
| Gateway Child Development Center<br>Peninsula | 0.6                                | <0.01                      | <0.01  |
| Significance Threshold                        | 10                                 | 1                          | 0.3  |
| Exceed Threshold?                             | No                                 | No                         | No   |

Source: See Appendix B for modeling outputs and calculations.

Notae:

Emissions assumes the implementation of Mitigation Measure AQ-1 and AQ-2. However, implementation of dust best management practices, other than watering two times a day and limiting speed to 15 miles per hour, have not been explicitly quantified per Mitigation Measure AQ-2, but would be required.

 $\mu g/m^3$  = micrograms per cubic meter;  $PM_{2.5}$  = particulate matter no more than 2.5 microns in diameter

 $<sup>^{\</sup>rm 44}~$  Per BAAQMD guidance, PM2.5 exhaust is used as a surrogate for DPM.

<sup>&</sup>lt;sup>45</sup> Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.* May Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 6, 2020.

In addition, the proposed project would include installation and operation of a diesel-fueled generator, a new stationary source of TACs. All new stationary sources would be subject to the permit authority of the BAAQMD. The BAAQMD will not issue a permit for a new permitted source that results in an operational cancer risk in excess of 10.0 cases per million or a hazard index in excess of 1.0. However, because BAAQMD's permit does not specifically address  $PM_{2.5}$ , concentrations from testing of the emergency generator were modeled and results are presented in Table 4.2-9. Cancer and non-cancer health risks are presented for informational purposes only; regulatory mechanisms would ensure health risk impacts from the stationary source would be less than significant. As shown in Table 4.2-9, operation of the proposed project would not result in a significant increase in  $PM_{2.5}$  exhaust concentrations at the Gateway Child Development Center Peninsula, the only sensitive receptors within 1,000 feet of the construction work areas and haul roads.

Table 4.2-9. Project-level Cancer and Chronic Hazard Risks and PM.5 Concentrations During Operation

| Receptor                                      | Cancer Risk<br>(cases per million) | Non-Cancer<br>Hazard Index | Annual PM <sub>2.5</sub> Concentration (µg/m³) |
|---|------------------------------------|----------------------------|--|
| Gateway Child Development<br>Center Peninsula | 0.1                                | <0.01                      | <0.01  |
| Significance Threshold                        | 10                                 | 1                          | 0.3  |
| Exceed Threshold?                             | No                                 | No                         | No   |

Source: See Appendix B for modeling outputs and calculations.

Notes: µg/m3 = micrograms per cubic meter; PM<sub>2.5</sub> = particulate matter no more than 2.5 microns in diameter

Air quality impacts during construction would be *less than significant with mitigation*. Air quality impacts during operation would be *less than significant* and no mitigation is required.

# Impact AQ-4: The proposed project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people. (*Less than Significant*)

BAAQMD and CARB have identified the following types of land uses as being commonly associated with odors. Although this list is not exhaustive, it is intended to help lead agencies recognize the types of facilities where more analysis may be warranted.

- Sewage treatment plants
- Coffee roasters
- Asphalt plants
- Metal smelters
- Landfills
- Recycling facilities
- Waste transfer stations
- Petroleum refineries
- Biomass operations
- Auto body shops
- Coating operations

- Fiberglass manufacturers
- Foundries
- Rendering plants
- Livestock operations

There are sensitive receptors within 1,000 feet of the project site, but the project would not include new sensitive receptors. As discussed above, the California Supreme Court has opined that impacts of the environment on projects are not subject to CEQA analysis, with limited exceptions. This general rule includes the impacts of existing odor-generating uses on future land uses. None of the above land uses are within 1 mile of the project site. The proposed project does not propose any changes that would affect odor-generating facilities. Therefore, odor complaints regarding existing odor-generating facilities are not anticipated upon implementation of the proposed project.

The potential odor-generating land uses identified above are generally not allowed under the City's existing Gateway Specific Plan District (commercial and research-and-development) zoning designations, as would continue to be the case with approval of the proposed project. The proposed project would not expressly encourage these uses or a substantial increase in the amount of land zoned for such uses. In addition, because the proposed project would be required to comply with the local zoning ordinance, odor-generating uses would be developed only in areas that are zoned for such uses, and would not be included in the proposed project.

Potential odor emitters during construction include diesel exhaust, asphalt paving, and the use of architectural coatings and solvents. However, construction-related operations would be temporary and would not be likely to result in nuisance odors that would violate BAAQMD's Regulation 7. Odors during operation could emanate from vehicle exhaust and the application of architectural coatings. These odors would be limited to areas adjacent to the building. Although such brief exhaust- and paint-related odors may be considered adverse, they would not affect a substantial number of people. Given mandatory compliance with BAAQMD rules, none of the proposed construction or operational activities would create a significant level of objectionable odors. Therefore, odor impacts would be *less than significant*. No mitigation is required.

### 4.2.4.4 Cumulative Impacts

The cumulative geographic context for air quality is the SFBAAB. The cumulative geographic context for health risks and odors is the immediate vicinity of the project site (i.e., 1,000 feet). Cumulative projects within 0.5 mile (2,640 feet) of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

Impact C-AQ-1: The proposed project in combination with past, present, and reasonably foreseeable future projects would not result in a cumulatively considerable impact on air quality plan consistency. (Less than Significant)

As discussed under Impact AQ-1, the proposed project would support the goals of BAAQMD's Clean Air Plan, would include all applicable control measures, and would not conflict with Clean Air Plan implementation. The purpose of the Clean Air Plan is to improve regional air quality in the air basin; therefore, the analysis and less-than-significant finding under Impact AQ-1 is inherently cumulative. For these reasons, the proposed project in combination with past, present, and reasonably foreseeable future projects would not result in a significant cumulative impact related to air quality plan consistency. The cumulative impact would be *less than significant*. No mitigation is required.

Impact C-AQ-2: The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts related to a net increase in criteria pollutants for which the region is in nonattainment for an applicable federal or state ambient air quality standard. (Less than Significant with Mitigation)

As discussed above, BAAQMD has identified project-level thresholds to evaluate criteria pollutant impacts (Table 4.2-4). In developing these thresholds, BAAQMD considers levels at which project emissions are cumulatively considerable. As noted in BAAQMD's guidelines,

In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts on the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary.

Exceedances of project-level thresholds would be cumulatively considerable, and the cumulative impact would be significant. As discussed under Impact AQ-2, construction of the proposed project would not generate ROG or PM emissions in excess of BAAQMD's numeric thresholds. However, the proposed project would generate NO<sub>X</sub> in excess of BAAQMD's daily threshold. Implementation of Mitigation Measure AQ-1, Use of Clean Diesel-Powered Equipment during Construction to Control Construction-Related NO<sub>X</sub> Emissions, would reduce NO<sub>X</sub> emissions to a less-than-significant level (see Table 4.2-6). In addition, Mitigation Measure AQ-2, Implement BAAQMD Basic Construction Mitigation Measures, would require construction within the project site to implement BMPs as recommended by BAAQMD to reduce fugitive dust emissions to less-than-significant levels. As discussed above, air quality impacts would be below BAAQMD's numeric thresholds during operation. Accordingly, the proposed project's contribution to a cumulative criteria pollutant emissions impact would be *less than cumulatively considerable with mitigation*.

# Impact C-AQ-3: The proposed project in combination with past, present, and reasonably foreseeable future projects would not contribute to cumulative health risks for sensitive receptors. (Less than Significant with Mitigation)

The project at 475 Eccles Avenue (Cumulative Project No. 16), which would involve new office/R&D buildings, is the only cumulative project located within 1,000 feet of the project site. There are no sensitive receptors within 1,000 feet of 475 Eccles Avenue. Construction and operation of the project at 475 Eccles Avenue would generate TACs but would be reduced with distance from the site and BAAQMD's regulatory mechanisms for stationary sources, respectively.

In addition, the proposed project would involve construction activities and locate a new diesel-fueled generator on the project site, generating DPM and PM<sub>2.5</sub>. There are existing nearby DPM and PM<sub>2.5</sub> sources within 1,000 feet of the project site which, along with the proposed project, could contribute to a cumulative health risk for existing sensitive receptors at the Gateway Child Development Center Peninsula. This is a potentially significant impact. BAAQMD data files and distance multipliers provided by the BAAQMD were used to estimate the background impacts and concentrations for existing stationary, roadway, and rail sources. The combined risks from construction and operation of the proposed project and ambient sources are summarized in Table 4.2-10. The methods used to estimate project emissions are described above in *Methods for Analysis* and supplemented with more detail in Appendix B.

Table 4.2-10. Maximum Mitigated Cumulative Health Risks from the Proposed Project

| Source  | Cancer Risk<br>(case per<br>million) | Non-Cancer<br>Hazard Index | Annual $PM_{2.5}$ Concentration ( $\mu g/m^3$ ) |
|---|--------------------------------------|----------------------------|---|
| Contribution from Existing Sources <sup>a</sup>     |                                      |                            |   |
| Stationary Sources                                  | 6.7                                  | 0.07                       | 0.04  |
| Roadway Sources                                     | 14.0                                 | -                          | 0.29  |
| Rail Sources  | 21.6                                 | -                          | 0.04  |
| Contribution from Project Construction <sup>b</sup> |                                      |                            |   |
| Gateway Child Development Center<br>Peninsula       | 0.6                                  | <0.01                      | <0.01   |
| <b>Contribution from Project Operation</b>          |                                      |                            |   |
| Gateway Child Development Center<br>Peninsula       | 0.1                                  | <0.01                      | <0.01   |
| <b>Cumulative Totals</b>                            |                                      |                            |   |
| Existing + Construction                             | 42.8                                 | 0.07                       | 0.37  |
| Existing + Operation                                | 42.4                                 | 0.07                       | 0.37  |
| Existing + Construction + Operation                 | 43.0                                 | 0.07                       | 0.37  |
| BAAQMD Thresholds                                   | 100                                  | 10                         | 0.8   |

Source: See Appendix B for modeling outputs and calculations.

Notes:

 $\mu g/m^3$  = micrograms per cubic meter

As shown in Table 4.2-10, cumulative risks and concentration levels of existing sources (i.e., stationary, roadway, and rail sources) do not exceed BAAQMD's cumulative thresholds. Implementation of Mitigation Measures AQ-1 and AQ-2 would reduce risks and concentration levels associated with construction (e.g., diesel particulate matter,  $PM_{2.5}$  exhaust,  $PM_{2.5}$  fugitive dust) of the proposed project and the the combined total cumulative cancer risks and hazard impacts would continue to not exceed the BAAQMD's cumulative thresholds. As such, there would be no significant cumulative impact from exposure to health risks associated with TACs.

For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact. The cumulative impact would be *less than significant with mitigation*.

Impact C-AQ-4: The proposed project in combination with past, present, and reasonably foreseeable future projects would not contribute to emissions (such as those leading to odors) adversely affecting a substantial number of people. (Less than Significant)

The project at 475 Eccles Avenue (Cumulative Project No. 16), which would involve new office/R&D buildings, is the only cumulative project located within 1,000 feet of the project site. These land uses are not commonly associated with odors and there are no sensitive receptors or odor-generating facilities within 1,000 feet of 475 Eccles Avenue. Construction of 475 Eccles Avenue would generate odors from diesel exhaust, asphalt paving, and the use of architectural coatings and solvents, but

<sup>&</sup>lt;sup>a</sup> Contribution from existing sources represent the health risks within 1,000 feet of the maximum exposed receptor at the Gateway Child Development Center Peninsula.

b Contributions from project construction reported with implementation of construction mitigation measures.

activities would be temporary and would not result in nuisance orders that would violate BAAQMD's Regulation 7. The project at 475 Eccles Avenue would not affect the operation of odor-generating facilities. In addition, as discussed under Impact AQ-4, the proposed project would not generate substantial odors. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative odor impact. The cumulative impact would be *less than significant*. No mitigation is required.

# 4.3 Biological Resources

### 4.3.1 Introduction

This section describes the environmental and regulatory setting for biological resources. It also describes impacts associated with biological resources that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate.

## 4.3.2 Environmental Setting

The 7.4-acre project site is completely developed. It includes a six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and surface parking lots with 558 parking spaces. The project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west. Landscaping on the project site is limited to trees and ornamental landscape features, such as parking and building buffers. The project site contains approximately 227 trees, including 35 protected trees. The trees and buildings on or adjacent to the project site could provide nesting substrate for bird species. No sensitive natural communities, wetlands, streams, or other aquatic features are present on the project site.

The determination rationale regarding the potential for special-status species to occur within the biological resources study area<sup>3</sup> is discussed in Section 4.3.4.2, *Approach to Analysis*.

## 4.3.3 Regulatory Framework

#### 4.3.3.1 Federal

#### **Federal Endangered Species Act**

The federal Endangered Species Act (FESA) (16 United States Code [USC], Section 1531 et seq.) designates threatened and endangered animal and plant species and provides measures for their protection and recovery. *Take* (i.e., to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct) of listed plant or wildlife species is prohibited without first obtaining a federal permit. The FESA also generally requires a determination of critical habitat for listed species. If critical habitat has been designated, impacts on areas that contain the primary constituent elements identified for the species, whether or not the species is currently present, are also prohibited. FESA Section 7 (for actions by federal agencies) and Section 10 (for actions by non-federal agencies) provide pathways for obtaining authority to take listed species.

<sup>&</sup>lt;sup>1</sup> Arborwell. 2020. 701 Gateway Boulevard Tree Inventory and Assessment, 701 Gateway Boulevard, South San Francisco, California. February 12.

<sup>&</sup>lt;sup>2</sup> City of South San Francisco. n.d. *South San Francisco Municipal Code*. Chapter 13.30, Tree Preservation. Available: http://www.qcode.us/codes/southsanfrancisco/?view=desktop&topic=13-13\_30-13\_30\_080. Accessed: March 25, 2020.

<sup>&</sup>lt;sup>3</sup> The biological resources study area varies depending on the type of resource (e.g., a one-mile radius from the project site, the 7.5-minute quadrangle in which the project site is located and the adjacent quadrangles, etc.).

#### **Migratory Bird Treaty Act**

The federal Migratory Bird Treaty Act (MBTA) (16 USC, Section 703, Supplement I, 1989) prohibits any attempt to take, kill, possess, sell, or trade migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act applies to whole birds, parts of birds, and bird nests and eggs. Although the MBTA itself does not provide specific take avoidance measures, the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW), over time, have developed measures regarding take avoidance with respect to nesting birds. These measures include avoiding vegetation removal or ground disturbance during the nesting season (typically February 15–September 15), conducting preconstruction nesting bird surveys in a project area during nesting season, and establishing appropriately sized protective buffers if active nests are found.

#### Federal Clean Water Act, Section 404

The Clean Water Act is the primary federal law that protects the quality of the nation's waters, including wetlands, lakes, rivers, and coastal areas. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into the waters of the United States, including wetlands. The Clean Water Act provides that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; issuance of such permits constitutes its principal regulatory tool.

The U.S. Army Corps of Engineers (USACE) is authorized to issue Section 404 permits, which allow the placement of dredged or fill materials into jurisdictional waters of the United States under certain circumstances. The USACE issues two types of permits under Section 404: general permits, which are either nationwide permits or regional permits, and standard permits, which are either letters of permission or individual permits. General permits are issued by the USACE to streamline the Section 404 permitting process for nationwide, statewide, or regional activities that have minimal direct or cumulative environmental impacts on the aquatic environment. Standard permits are issued for activities that do not qualify for a general permit because they may have more than a minimal adverse environmental impact.

#### Federal Clean Water Act, Section 401

Under Clean Water Act Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality, including projects that require federal agency approval, such as issuance of a Section 404 permit, must also comply with Clean Water Act Section 401 and the Porter-Cologne Water Quality Control Act (PCWQCA). In California, Section 401 certification is handled by the nine Regional Water Quality Control Boards (RWQCBs) and the State Water Resources Control Board (SWRCB). The City of South San Francisco falls under the jurisdiction of the San Francisco Bay RWQCB. The San Francisco Bay RWQCB must certify that the discharge will comply with State water quality standards and other requirements of the Clean Water Act.

#### 4.3.3.2 State

#### California Endangered Species Act

Administered by the CDFW, the California Endangered Species Act (CESA) prohibits the take of listed species as well as species that are formally under consideration for listing in California, referred to as *candidate species*. Under the CESA, *take* means to "hunt, pursue, catch, capture, or kill or attempt to

hunt, pursue, catch, capture, or kill" (California Fish and Game Code Section 86). Under this definition, in contrast to the FESA, the CESA does not prohibit harm to a listed species. Furthermore, take under the CESA does not include "the taking of habitat alone or the impacts of the taking." However, the killing of a listed species that is incidental to an otherwise lawful activity and not the primary purpose of the activity constitutes take under the CESA.

#### State Fish and Game Code, Section 1600–1616

The CDFW has jurisdictional authority over streams and lakes, as well as wetland resources associated with these aquatic systems, under California Fish and Game Code Section 1600 *et seq*. The CDFW has the authority to regulate work that will "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris waste or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake" (California Fish and Game Code Section 1602.). An entity that proposes to carry out such an activity must first inform CDFW. Where CDFW concludes that the activity will "substantially adversely affect an existing (2014) fish or wildlife resource," the entity proposing the activity must negotiate an agreement with CDFW that specifies terms under which the activity may be carried out in a way that protects the affected wildlife resource.

#### **Porter-Cologne Water Quality Control Act**

California Water Code Section 13260 requires "any person discharging waste, or proposing to discharge waste, in any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements)." Under the Porter-Cologne Water Quality Control Act (PCWQCA) definition, waters of the state are "any surface water or groundwater, including saline waters, within the boundaries of the state." Although all waters of the United States that are within the borders of California are also waters of the state, the reverse is not true. Accordingly, California retains authority to regulate discharges of waste into any waters of the state, regardless of whether USACE has concurrent jurisdiction under CWA Section 404. If USACE determines that a wetland is not subject to regulation under Section 404, CWA Section 401 water quality certification is not required. However, the RWQCB may impose waste discharge requirements (WDRs) if fill material is placed into waters of the state.

#### Waters of the State

Under the recent Wetland Riparian Area Protection Policy (May 28, 2020), RWQCBs will maintain jurisdiction over features excluded in the U.S. Environmental Protection Agency (EPA) and the Department of Army's Navigable Waters Protection Rule (NWPR). The newly adopted regulations (April 2, 2019) create a new statewide wetland definition that expands to features not previously covered under federal law and creates a new permitting program for activities that result in the discharge of dredged or fill materials to any waters of the state. The new rules are adopted under the state PCWQCA. Under the latter act, waters of the state are broadly defined as "[a]ny surface water or groundwater, including saline waters within state boundaries," including both natural and certain artificial or constructed facilities. Waters of the state include both waters of the United States and non-federal waters of the state.

#### **California Native Plant Protection Act**

The California Native Plant Protection Act of 1977 (CNPPA) prohibits the importation of rare and endangered plants into California, take of rare and endangered plants, and sale of rare and endangered plants. The CESA defers to the CNPPA, ensuring that state-listed plant species are protected when state agencies are involved in projects that are subject to CEQA. In this case, plants that are listed as rare under the CNPPA are not protected under the CESA but rather under CEQA.

#### California Fish and Game Code – Fully Protected Species

Certain species are considered fully protected, meaning that the California Fish and Game Code explicitly prohibits all take of individuals from these species, except for take permitted for scientific research. Fully protected amphibians and reptiles, fish, birds, and mammals are listed in Sections 5050, 5515, 3511, and 4700, respectively, of the California Fish and Game Code. It is possible for a species to be protected under the California Fish and Game Code but not be fully protected. For instance, the mountain lion (*Puma concolor*) is protected under Section 4800 et seq. but is not a fully protected species.

#### California Fish and Game Code - Protection of Birds and Their Nests

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.5 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls) or of their nests and eggs. Migratory non-game birds are protected under Section 3513, whereas other specified birds are protected under Section 3800.

#### 4.3.3.3 Local

#### South San Francisco General Plan

The City of South San Francisco (City) 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The City General Plan contains an Open Space and Conservation Element, which outlines policies relating to habitat and biological resources, water quality, air quality, greenhouse gas emissions and historic and cultural resources conservation. The General Plan includes the following policies applicable to biological resources:

- Policy 7.1-G-1: Protect special-status species and supporting habitats within South San Francisco, including species that are state or federally listed as endangered, threatened, or rare.
- Policy 7.1-I-1: Cooperate with state and federal agencies to ensure that development does not substantially affect special-status species appearing on any state or federal list for any rare, endangered, or threatened species. Require assessments of biological resources prior to approval of any development on sites with ecologically sensitive habitat, as depicted in Figure 7-1.
- Policy 7.2-G-1: Comply with the San Francisco Bay Regional Water Quality Control Board regulations and standards to maintain and improve the quality of both surface water and groundwater resources.

- Policy 7.2-G-3: Discourage use of insecticides, herbicides, or toxic chemical substances within the City.
- Policy 7.2-I-1: Continue working with the San Francisco Bay Regional Water Quality Control
  Board in the implementation of the National Pollutant Discharge Elimination System and
  continue participation in the San Mateo Countywide Stormwater Pollution Prevention Program
  for the protection of surface water and groundwater quality.

#### **South San Francisco Municipal Code**

Chapter 13.30, *Tree Preservation*, of the South San Francisco Municipal Code concerns the preservation of trees for the health, welfare, and quality of life of the citizens of the City. Trees preserve the scenic beauty of the City, maintain ecological balance, prevent the erosion of topsoil, counteract air pollution and oxygenate the air, absorb noise, maintain a climatic and microclimatic balance, help block wind, and provide shade and color. The chapter is designed to:

- Provide standards and requirements for the protection of certain large trees (trees with a circumference of 48 inches or greater at 54 inches above the natural grade), heritage trees, as well as trees and stands with unique characteristics (having been so designated by the Parks and Recreation director);
- Provide standards and requirements for the planting and maintenance of trees for new development; and
- Establish recommended standards for the planting and maintaining of trees on property that is already developed.

The chapter achieves these objectives in ways that support and encourage reasonable economic enjoyment of private property, not in ways that prevent it (Ordinance 1271, Section 1 [part], 2000; Ordinance 1060, Section 1 [part], 1989).

According to South San Francisco Municipal Code Chapter 13.30, certain trees are subject to conditions before being removed, pruned, or otherwise materially altered. Protected trees include heritage trees and are defined by South San Francisco Municipal Code Chapter 13.30.020 as follows:

- 1. Any upright, single-trunked tree of a species not considered to be a heritage tree, as defined in Subsection 3, below, or listed in Subsection 2, below, with a circumference of 48 inches or more when measured 54 inches above natural grade; or
- 2. Any upright, single-trunked tree of the following species: blue gum (*Eucalyptus globulus*), black acacia (*Acacia melanoxylon*), myoporum (*Myoporum lactum*), sweetgum (*Liquidambar styraciflua*), glossy privet (*Lingustrum lucidum*), or Lombardy poplar (*Populus nigra*), with a circumference of 75 inches or more when measured 54 inches above natural grade; or
- 3. Any upright, single-trunked tree considered to be a heritage tree species, with a circumference of 30 inches or more when measured at 54 inches above natural grade. A heritage tree means any of the following: California bay (*Umbellaria californica*), oak (*Quercus* spp.), cedar (*Cedrus* spp.), California buckeye (*Aesculus californica*), Catalina ironwood (*Lyonothamnus asplenifolium*), strawberry tree (*Arbutus* spp.), mayten (*Maytenus boaria*), or little gem dwarf southern magnolia (*Magnolia grandiflora*, "Little Gem").

- 4. A tree or stand of trees so designated by the director, based upon findings that it is unique and of importance to the public due to its unusual appearance, location, historical significance, or other factor; or
- 5. A stand of trees in which the director has determined each tree is dependent upon the others for survival.

Protected trees cannot be removed or pruned without a permit from the City and must be protected from development-related impacts such as soil compaction and underground trenching for utilities. In addition, new developments must conform to a series of tree planting requirements.

#### **Gateway Specific Plan**

The Gateway Specific Plan covers the portion of the East of 101 Area Plan from east of the Caltrain tracks to the eastern boundary of the parcels along the east side of Gateway Boulevard and the area between Oyster Point Boulevard and Grand Avenue on the northern and southern boundaries. The Specific Plan is "intended to provide for various commercial and research and development land uses integrated by consistent development standards." The Gateway Specific Plan includes the following construction standards and open space standards applicable to biological resources:

- Construction Standard 1(f): Protection of Trees. Construction vehicles and equipment and excavated soils shall be kept away from under the canopy of any trees on the Site which are to be preserved.
- Construction Standard 3(a)-(f): In general, to be approved, landscaping plans ordinarily must provide for the following:
  - a. Completion of landscaping on the Site contemporaneously with completion of the Building and other Improvements on the Site;
  - b. Automatic underground sprinkling systems for all landscaped areas;
  - c. Landscaping which does not obstruct sight lines at street or driveway intersections;
  - d. Preservation of existing trees to the extent practical;
  - e. At least one (1) tree for each 2,000 square feet of area between Building lines and street Property Lines with the exception of paved areas and parking islands;
  - f. Reasonable access to public and private utility lines and easements for installation and repair.
- Open Space Standards. Open space areas shall be conserved, designed and developed to enhance the environmental quality of the Site and to achieve safe, efficient and harmonious development of the Site.

#### East of 101 Area Plan

The East of 101 Area Plan, which was adopted in 1994 and most recently amended in 2016, sets forth specific land use policies for the East of 101 Area. The City interprets the East of 101 Area Plan as a design-level document. Per Policy IM-5, the Gateway Specific Plan is not affected by the land use regulations of the East of 101 Area Plan. Therefore, the policies set forth in the General

Plan are the guiding policies and supersede all Conservation Element policies set forth in Chapter 11 of the *East of 101 Area Plan*. Nonetheless, the *East of 101 Area Plan* contains the following policies applicable to biological resources:

- Policy CON-4: The City shall take all feasible measures to preserve any sensitive plant and animal species that occur in the East of 101 Area.
- Policy CON-5: Prior to receiving approval for construction activities or other disturbances on undeveloped land in the East of 101 Area project sponsors shall conduct environmental analyses to evaluate the site-specific status of sensitive plant and animal species.
- Policy CON-6: If sensitive plant or animal species would be unavoidably affected by a proposed project the City shall require the project developer to implement appropriate mitigation measures.
- Policy CON-7: New development adjacent to sensitive resource areas shall be required to incorporate the following measures into the project design:
  - Shield lights to reduce offsite glare.
  - Provide buffer areas of at least 100 feet between known sensitive resources and the development area.
  - Landscape all onsite buffer areas with native vegetation to screen habitat areas from adjacent land uses.
  - o Restrict entry to habitat areas through devices such as fencing, landscaping, or signage.
  - Ensure that runoff from development does not adversely affect the biotic values of adjacent wetlands or other habitat areas.

## 4.3.4 Impacts and Mitigation Measures

## 4.3.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant biological resources impact if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species
  identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or
  regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on state or federally protected wetlands, including, but not limited to, marsh, vernal pool, coastal areas, etc., through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife
  species, or with established native resident or migratory wildlife corridors, or impede the use of
  native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.

#### 4.3.4.2 Approach to Analysis

Evaluation of the proposed project is based on a desktop review of the following sources:

- California Natural Diversity Database<sup>4</sup> (CNDDB) species list query for a 1-mile buffer around the project site;
- California Native Plant Society<sup>5</sup> species list query for the U.S. Geological Survey (USGS) South San Francisco (3712264), Hunters Point (3712263), Montara Mountain (3712254), and San Mateo (3712253) 7.5-minute quadrangles;
- USFWS<sup>6</sup> Information for Planning and Consultation (IPaC) query of the project site;
- Arborwell 701 Gateway Boulevard Tree Inventory and Assessment;<sup>7</sup>
- City of South San Francisco General Plan;<sup>8</sup>
- National Wetland Inventory and U.S. Environmental Protection Agency (EPA) for the identification of waters and wetlands, using existing water/wetland inventory data;<sup>9,10</sup> and
- Aerial imagery from Google Earth.<sup>11</sup>

#### 4.3.4.3 Impact Evaluation

Impact BIO-1: The proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. (Less than Significant with Mitigation)

The project site and surrounding area are characterized by dense urban development and are void of natural land cover or communities. Special-status species that have the potential to occur on the project site or in the surrounding area include the pallid bat (*Antrozous pallidus*) and peregrine falcon (*Falco peregrinus*).

<sup>&</sup>lt;sup>4</sup> California Department of Fish and Wildlife. 2020. *California Natural Diversity Database RareFind Records Search*. RareFind Version 5. Available: https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed: March 24, 2020.

<sup>&</sup>lt;sup>5</sup> California Native Plant Society. 2019. *Online Inventory of Rare and Endangered Plants of California*. Available: http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Html?item=checkbox\_9.htm. Accessed: March 24, 2020.

<sup>&</sup>lt;sup>6</sup> U.S. Fish and Wildlife Service. 2019. *IPaC Species List*. Available: https://ecos.fws.gov/ipac/. Accessed: March 24, 2020.

<sup>&</sup>lt;sup>7</sup> Arborwell. 2020. *701 Gateway Boulevard Tree Inventory and Assessment*. Prepared for Alexandria Real Estate Equities, Inc., San Francisco, CA.

<sup>&</sup>lt;sup>8</sup> City of South San Francisco. 1999. *City of South San Francisco General Plan, Chapter 7: Open Space and Conservation Element*. Available: https://www.ssf.net/departments/economic-community-development/planning-division/general-plan. Accessed: March 25, 2020.

<sup>&</sup>lt;sup>9</sup> U.S. Fish and Wildlife Service. 2019. *National Wetland Inventory*. October 8. Available: https://www.fws.gov/wetlands/data/Mapper.html. Accessed: March 25, 2020.

U.S. Environmental Protection Agency. 2020. WATERS GeoViewer. Available: https://www.epa.gov/waterdata/waters-geoviewer. Accessed: March 24, 2020.

Google Earth Pro. 2018. Online research, 751 Gateway Boulevard, 37.660400°N and -122.397050°W. Available: https://www.google.com/earth/versions/#earth-pro. Accessed: March 24, 2020.

Pallid bat is designated as a species of special concern by CDFW. Suitable foraging habitat is open, natural land cover such as grasslands, shrublands, woodlands, and forests. For roosting, pallid bat prefers rocky outcrops, cliffs, and crevices with access to open habitats for foraging. Day roosts are in caves, crevices, mines, and occasionally in hollow trees and buildings; night roosts may be in more open sites, such as porches and open buildings. Roosts must protect bats from high temperatures, and pallid bats are very sensitive to disturbance of roosting sites. Although pallid bat may forage over the project area on occasion, the project site does not provide suitable foraging or roosting habitat for the species. Due to the marginal roosting habitat, lack of foraging habitat, and high level of disturbance, it is considered unlikely that pallid bat would be present at the project site. There are no recent CNDDB occurrences of pallid bat in San Mateo County and no CNDDB occurrences of pallid bat in nearby San Francisco County. The nearest CNDDB occurrence for pallid bat (occurrence #294) is from 1947 and located approximately 3.2 miles south of the project site. Therefore, impacts on pallid bat foraging habitat are not likely, and the impact on pallid bat would be *less than significant*.

Peregrine falcon is designated as fully protected by CDFW. Peregrine falcons normally nest in a scrape on a cliff ledge, but will also nest in snags or large vacant nests in trees and on structure ledges including buildings; pigeons are often favored prey around cities. 13 Although nesting habitat onsite is marginal due to the moderate stature of the existing on-site trees and the sixstory<sup>14</sup> existing building on the project site, the buildings and trees within and surrounding the project site may provide suitable nesting and roosting habitat for this species. Additionally, openair space in and around the project site provides foraging habitat if prey is present. The nearest CNDDB occurrence for peregrine falcon (occurrence #55) was in 2014. Although CNDDB does not disclose the exact location of the occurrence, the size of the occurrence area is approximately 8 square miles and it includes the project site. The CNDDB occurrence indicates the nest was located on the side of a hangar, which is a structure typically at an airport. Thus, it is presumed the occurrence was approximately two miles south of the project site at San Francisco International Airport. Nonetheless, if nests of this species are present on-site or in the surrounding area, and eggs, nestlings, or nesting individuals are harmed or killed during tree removal or substantially affected by construction noise or nighttime lighting during operation, a *significant* impact would occur.

On-site buildings and landscaped areas may also provide suitable nesting habitat for resident and migratory birds that are protected by state (California Fish and Game Code Sections 3503 and 3513) and federal (MBTA) laws. If the project is implemented during the nesting season (February 15–September 15), tree removal and construction associated with the project could impact active nests, resulting in take (i.e., direct mortality of adult or young birds, the destruction of active nests, disturbance of nesting adults, with associated nest abandonment and/or loss of reproductive effort), which would be a *significant* impact.

Harris, J. 2008. Life history account for Pallid Bat. California Wildlife Habitat Relationships (CWHR) Version 9.0. California Department of Fish and Game and California Interagency Wildlife Task Group. . Available from: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2349 Accessed: July 28, 2020. . Accessed July 28, 2020.

National Audubon Society, 2018. Guide to North American Birds – Peregrine Falcon (website). Available online at: https://www.audubon.org/field-guide/bird/peregrine-falcon. Accessed July 21, 2020.

The six-story building within the project site is considered to be of moderate stature because peregrine falcons have only been documented to nest on a 33-story building in the City of San Francisco.

Implementation of Mitigation Measure BI-1, Preconstruction Nesting Bird Surveys and Buffer Areas, would reduce potential impacts on peregrine falcon and other nesting birds covered under the California Fish and Game Code and MBTA to *less than significant with mitigation* by ensuring that project activities would not affect nesting special-status species or other resident or migratory birds.

#### Mitigation Measure BI-1: Preconstuction Nesting Bird Surveys and Buffer Areas

The project sponsor shall protect nesting birds and their nests during construction by implementation of the following measures:

- a. To the extent feasible, conduct initial activities, including, but not limited to, vegetation removal, tree trimming or removal, ground disturbance, building or parking lot demolition, site grading, and other construction activities which may compromise breeding birds or the success of their nests outside the nesting season (February 15–September 15).
- b. If construction occurs during the bird nesting season, a qualified wildlife biologist\* shall conduct a nesting bird preconstruction survey within 14 days prior to the start of construction or demolition at areas that have not been previously disturbed by project activities or after any construction breaks of 14 days or more. The survey shall be performed within 100 feet of the applicable construction phase area in order to locate any active nests of passerine species and within 300 feet of the applicable construction phase area to locate any active raptor (birds of prey) nests, and this survey shall be of those areas that constitute suitable habitat for these species.
- c. If active nests are located during the preconstruction nesting bird survey, a qualified biologist shall determine if the schedule of construction activities could affect the active nests; if so, the following measures would apply:
  - 1. If the qualified biologist determines that construction is not likely to affect an active nest, construction may proceed without restriction; however, a qualified biologist shall regularly monitor the nest at a frequency determined appropriate for the surrounding construction activity to confirm there is no adverse effect. Spot-check monitoring frequency would be determined on a nest-by-nest basis, considering the particular construction activity, duration, proximity to the nest, and physical barriers that may screen activity from the nest.
  - 2. If it is determined that construction may cause abandonment of an active nest, the qualified biologist shall establish a no-disturbance buffer around the nest(s), and all project work shall halt within the buffer to avoid disturbance or destruction until a qualified biologist determines that the nest is no longer active. Typically, buffer distances are 100 feet for passerines and 300 feet for raptors; however. the buffers may be shortened if an obstruction, such as a building, is within line-of-sight between the nest and construction.
  - 3. Modifying nest buffer distances, allowing certain construction activities within the buffer, and/or modifying construction methods in proximity to active nests shall be approved by the qualified biologist and in coordination with the Planning Division. To the extent necessary to remove or relocate an active nest, such removal or relocation shall be coordinated with the Planning Division, and the removal or relocation shall be in compliance with the California Fish and Game Code and other applicable laws.

- 4. Any work that must occur within established no-disturbance buffers around active nests shall be monitored by a qualified biologist. If adverse effects in response to project work within the buffer are observed and could compromise the nest, work within the no-disturbance buffer(s) shall halt until the nest occupants have fledged.
- 5. Any birds that begin nesting within the project area and survey buffers amid construction activities are assumed to be habituated to construction-related or similar noise and disturbance levels. Work may proceed around these active nests subject to Measure c.2 above.
- \* The experience requirements for a "qualified biologist" shall include a minimum of 4 years of academic training and professional experience in biological sciences and related resource management activities, and a minimum of 2 years of experience conducting surveys for each species that may be present within the project area.

Impact BIO-2: The proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. (*No Impact*)

The project site and surrounding area are completely developed, composed entirely of commercial and office buildings that are interspersed with turf areas and landscaping as well as paved parking lots, sidewalks, and surface streets. No riparian habitat or other sensitive natural community is present on the project site or in the immediate vicinity. The existing on-site ornamental vegetation is not a sensitive natural community. Colma Creek, located approximately 0.7 mile southwest of the project site, is concrete lined and has little to no riparian habitat. The proposed Project would not result in any impacts to this feature. The closest areas with potential for sensitive natural communities include the shoreline of San Francisco Bay and San Bruno Mountain State and County Park, approximately 0.2 mile northeast and 0.3 mile northwest of the project site, respectively. The proposed project would have no effect on these areas because of their respective distances from the project site. Therefore, the project would have *no impact*. No mitigation is required.

Impact BIO-3: The proposed project would not have a substantial adverse effect on state or federally protected wetlands, including, but not limited to, marsh, vernal pool, coastal areas, etc., through direct removal, filling, hydrological interruption, or other means. (No Impact)

No federally protected wetlands or other jurisdictional waters are present on the project site or in the immediate vicinity. The nearest federally protected wetlands in proximity to the project site are the riverine habitat located approximately 0.2 mile north of the project site, along the east side of U.S. 101, and the estuarine and marine deep-water habitat located approximately 0.2 mile northeast of the project site, which is associated with San Francisco Bay. The project site is separated from these features by dense urban development, including multiple paved roads. Therefore, the proposed project would have *no impact* on state or federally protected wetlands. No mitigation is required.

U.S. Fish and Wildlife Service. 2019. National Wetland Inventory. October 8. Available: https://www.fws.gov/wetlands/Data/Data-Download.html/. Accessed: March 25, 2020.

Impact BIO-4: The proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. (Less than Significant with Mitigation)

No wetlands or running waters are present in the vicinity of the project site; therefore, the project would have no impact on the movement of fish species. As discussed above under Impact BIO-1, existing structures and trees on the project site could provide nesting habitat for resident and migratory birds, therefore, the project has the potential to affect a native wildlife nursery site, which would be a *significant* impact. Implementation of Mitigation Measure BI-1, Preconstruction Nesting Bird Surveys and Buffer Areas would reduce this impact to *less than significant with mitigation* by ensuring that project activities would not impede the use of native wildlife nursery sites.

Wildlife corridors are described as pathways or habitat linkages that connect discrete areas of natural open space that would otherwise be separated or fragmented by topography, changes in vegetation, or natural or man-made obstacles, such as urbanization. Because the project site and surrounding area are developed, it does not connect directly to areas of natural open space. Any common urban-adapted species that currently move through the project site would continue to be able to do so following project construction. Nonetheless, the likelihood exists for trees on the project site to be used by migratory birds because of the site's location along the Pacific Flyway and proximity to San Bruno Mountain and San Francisco Bay. A potentially significant impact would occur if a substantial number of nesting migratory birds were injured or killed during construction or operation of the project. Implementation of Mitigation Measure BI-1, Preconstruction Nesting Bird Surveys and Buffer Areas would reduce potential impacts on nesting migratory birds covered under the California Fish and Game Code and MBTA to *less than significant with mitigation* by ensuring that project activities would not affect nesting migratory birds.

Operation of the proposed project would include the use of new lighting and a new 148-foot-tall, seven-story building with potentially reflective surfaces. The new lighting and new surfaces could misdirect or confuse migratory birds, resulting in disruption of natural behavioral patterns and possible injury or death from exhaustion or collisions with buildings, which would be a *significant* impact. The potential for these types of impacts could be heightened because of the project site's proximity to San Bruno Mountain and San Francisco Bay. Implementation of Mitigation Measures BI-3, Lighting Measures to Reduce Impacts on Birds, and BI-4b, Building Design Measures to Minimize Bird Strike Risk would reduce impacts on the movement of native resident or migratory wildlife species to *less than significant with mitigation* by ensuring that project activities would not affect migratory birds.

#### Mitigation Measure BI-2: Lighting Measures to Reduce Impacts on Birds

During design, the project sponsor shall ensure that a qualified biologist experienced with bird strikes and building/lighting design issues shall identify lighting-related measures to minimize the effects of the building's lighting on birds. The project sponsor shall incorporate such measures, which may include the following and/or other measures, into the building's design and operation.

- a. Use strobe or flashing lights in place of continuously burning lights for obstruction lighting. Use flashing white lights rather than continuous light, red light, or rotating beams.
- b. Install shields onto light sources not necessary for air traffic to direct light towards the ground.

- c. Extinguish all exterior lighting (i.e., rooftop floods, perimeter spots) not required for public safety.
- d. When interior or exterior lights must be left on at night, the operator of the buildings shall examine and adopt alternatives to bright, all-night, floor-wide lighting, which may include installing motion-sensitive lighting, using desk lamps and task lighting, reprogramming timers, or using lower-intensity lighting.
- e. Windows or window treatments that reduce transmission of light out of the building shall be implemented to the extent feasible.

#### Mitigation Measure BI-3: Building Design Measures to Minimize Bird Strike Risk

During design, the project sponsor shall ensure that a qualified biologist experienced with bird strikes and building/lighting design issues shall identify measures related to the external appearance of the building to minimize the risk of bird strikes. The project sponsor shall incorporate such measures, which may include the following and/or other measures, into the building's design.

- a. Minimize the extent of glazing.
- b. Use low-reflective glass and/or patterned or fritted glass.
- c. Use window films, mullions, blinds, or other internal or external features to "break up" reflective surfaces rather than having large, uninterrupted areas of surfaces that reflect, and thus to a bird may not appear noticeably different from, vegetation or the sky.

# Impact BIO-5: The proposed project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (*Less than Significant*)

Local policies and ordinaces for protecting biological resources include the Tree Preservation Ordinance (Chapter 13.30) in the City of South San Francisco Municipal Code. A tree inventory and assessment of the project site was performed by Arborwell in January 2020. A total of 227 trees were documented on the project site, 35 of which are protected under this ordinance. The proposed project would require the removal of 175 trees on the project site, including four protected trees. The project sponsor would be required to abide by all conditions specified in the City Municipal Code which requires that the project sponsor obtain permits to remove protected trees and to compensate for their removal by planting replacement trees of certain sizes and species as specified in the City Municipal Code and by the Parks and Recreation director. Therefore, the project would comply with local policies and ordinances for protecting biological resources, such as a tree preservation policy or ordinance, ensuring that project activities would not result in an unauthorized impact on a protected tree. This impact would be *less than significant*.

# Impact BIO-6: The proposed project would not conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan. (*No Impact*)

The project site is not part of an existing habitat conservation plan or natural community conservation plan or any other local, regional, or state habitat conservation plan. Therefore, the project would have *no impact* on the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat. No mitigation is required.

#### 4.3.4.4 Cumulative Impacts

Impact C-BIO-1: The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on biological resources. (*Less than Significant with Mitigation*)

The proposed project would not modify any natural habitat and would have no impact on sensitive natural communities, including riparian habitat; protected wetlands; the movement of native resident or migratory fish species; or an approved conservation plan. The cumulative geographic context for biological resources is the immediate vicinity of the project site, which is the area where construction activities, including tree removal, could affect biological resources including nesting special-status and migratory bird species, and protected trees that may be present on or near the site. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

Similar to the project site, the majority of the sites for cumulative projects contain development with ornamental landscaping and ruderal vegetation; therefore, habitat for candidate, sensitive, or specialstatus species is marginal. Most of the future projects would involve primarily the construction of new buildings or modifications to existing buildings or infrastructure, and associated tree removals. Therefore, as with the proposed project, such development could have an impact on nesting specialstatus and migratory bird species, the movement of native resident or migratory wildlife species, established native resident or migratory wildlife corridors, the use of native wildlife nursery sites, and local policies or ordinances for protecting biological resources. Cumulative impacts on these biological resources could be *significant* because reasonably foreseeable projects would affect or remove additional structures and trees and erect new structures. Structures and trees provide roosting and nesting habitat for special-status and migratory birds and act as potential nursery sites; new structures could affect the movement of species. However, these future projects would also be subject to the requirements of the wildlife protection laws, including CESA, MBTA, and the California Fish and Game Code, as well as wildlife protection policies and provisions in the City General Plan and the City Municipal Code, Chapter 13.30. Nonetheless, cumulative impacts on these biological resources would be *significant* because reasonably foreseeable projects could affect or remove a substantial number of structures and trees and erect new structures.

The project would remove 175 trees on the project site and construct a new 148-foot-tall, seven-story building. Implementation of Mitigation Measure BI-1, Preconstruction Nesting Bird Surveys and Buffer Areas; Mitigation Measure BI-2, Lighting Measures to Reduce Impacts on Birds; and Mitigation Measure BI-3, Building Design Measures to Minimize Bird Strike Risk, would require pre-construction surveys for nesting birds, and building design measures to minimize lighting effects on birds and bird strike risk. Implementation of these mitigation measures would ensure that the proposed project's contribution to cumulative impacts on nesting special-status and migratory bird species, the movement of native resident or migratory wildlife species, established native resident or migratory wildlife corridors, the use of native wildlife nursery sites, and local policies or ordinances for protecting biological resources would be *less than cumulatively considerable*.

## 4.4 Cultural Resources

### 4.4.1 Introduction

This section describes the environmental and regulatory setting for cultural resources and tribal cultural resources. It also describes impacts associated with cultural resources and tribal cultural resources that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate.

## 4.4.2 Environmental Setting

#### 4.4.2.1 Prehistoric Context

Summaries of the cultural chronologies of the Bay Area have divided the prehistoric cultural sequence into multiple phases or periods, which are delineated by changes in regional patterns of land use, subsistence, and tool types over time. The most recent chronologies encompass a time period that ranges from around 13,500 calibrated years before present (cal BP) to around 170 cal BP. The early periods of this section's chronology are based on research from along the California coast, while the later periods of this chronology are based on time periods that were recently proposed by Groza et al., with additional information integrated from the other chronologies mentioned above. The sequence incudes four periods. Importantly, these periods are academic constructs and do not necessarily reflect Native American viewpoints.

This summary presents the prehistory of the Bay Area by the geologic time segment.

## Terminal Pleistocene (13,500–11,600 cal BP)

Traditionally, it was thought that the earliest human inhabitants of North America were highly mobile terrestrial hunters. Commonly referred to as the Clovis, these people used intricate bone and stone technology. On the western coast of North America, Clovis assemblages are characterized by a wide but sparse distribution of isolated tools and caches, which have been dated to between 12,800 and 12,500 cal BP. However, over the last few decades, along the western coasts of North and South America, several archaeological sites and sets of human remains have been documented in island and mainland coastal contexts that date to the same period as the Clovis. These discoveries have forced researchers to reconsider how early humans migrated to the Americas and their land use strategies, with a greater emphasis placed on coastal environments.

#### Early Holocene (11,600–7700 cal BP)

The Early Holocene landscape of Central California is characterized by semi-mobile hunter-gatherers who exploited a wide range of food resources from marine, lacustrine, and terrestrial contexts.

Rick, T.C., J.M. Erlandson, R.L., Vellanoweth. 2001. Paleocoastal Marine Fishing on the Pacific Coast of the Americas: Perspectives from Daisy Cave, California. In *American Antiquity* 66(4). Pp. 595-613.

<sup>&</sup>lt;sup>2</sup> Erlandson, Rick, T.C., Jones, T., Porcasi, J.F. One if by Land, Two if by Sea: Who Were the First Californians? In *California Prehistory: Colonization, Culture, and Complexity.* Pp. 53-62. AltaMira Press. Lanham, Maryland

Groza, R.G., J. Rosenthal, J. Southon, R. Milliken. 2011. A Refined Shell Bead Chronology for Late Holocene Central California. *Journal of California and Great Basin Anthropology* 31(2). Pp. 135-154.

#### Middle Holocene (7700–3800 cal BP)

The Middle Holocene is characterized by a diverse range of habitation sites and artifact assemblages, which suggest higher population levels, more complex adaptive strategies, and longer seasonal occupations than those of the Early Holocene. The presence of seasonal waterfowl within assemblages dated to the Middle Holocene suggests more diverse, local niche-based exploitation strategies.

#### Late Holocene (3800–170 cal BP)

There are more than 200 documented Late Holocene sites in the Bay Area. The beginning of the Late Holocene is marked by the establishment of a number of large shell mounds. Sites of this type are present within 0.25 miles of the project area.

#### Middle Period of the Late Holocene (2050–900 cal BP)

The Middle Period of the Late Holocene is characterized by greater settlement permanence (either sedentary or multi-season occupation), mound building, and social complexity and ritual elaboration.

## Late Period of the Late Holocene (700–170 cal BP)

The Late Period of the Late Holocene is the best-documented Late Holocene division in the greater Bay Area. Small seed exploitation increased, as evidenced by archaeobotanical remains, and sea otters, rabbits, deer, clams, and horn snails were frequently exploited as foodstuffs. The bow and arrow first appeared during the Late Period, and extensive trade relations with neighboring groups continued.

#### 4.4.2.2 **Historic Context**

Spanish colonization of what is now California began in the late 1700s. It was based around a system of missions that intended to convert the native peoples to Catholicism, gain control of the native population, and create economically self-sufficient colonial communities. When Mexico won its independence from Spain in 1824, one of the first acts of the new government was to secularize the missions and redistribute the mission land holdings in the form of land grants to individuals who promised to work the land, primarily by raising cattle.4

In 1848, the United States won the Mexican-American War and, as a result, gained approximately 50 percent of Mexico's territory, including what would become the state of California. Within weeks of the end of the war, gold was discovered in the Sierra Nevada foothills, and by the summer of 1849, thousands of people were arriving in California in search of their fortunes.

After most of the Mexican land grants were judged invalid, the land was subject to sale, opening large areas to new ownership and initiating a shift to farming to supply the growing demand for fresh food. In the South Bay, a combination of wheat and barley production, dairy farms, and orchards dominated the valley floor from the 1860s until the late 1870s.

By the 1890s, orchard production was the dominant agricultural activity in the valley; it remained in that position through the 1940s. In the late nineteenth century, Leland Stanford, Sr., established the Palo Alto Stock Farm on his 8,650 acres of land along San Francisquito Creek. In 1891, he founded

Rawls, J.J. and W. Bean. 2003. California: An Interpretive History. McGraw Hill. Boston, Massachusetts.

Stanford University on this land. The population in the region grew substantially during the early twentieth century. Palo Alto expanded significantly, eventually incorporating Mayfield and Stanford University by the early part of World War II.5 Following World War II, the growth of light industry and high-tech R&D, coupled with expanding suburbanization, gradually eroded the valley's orchards.

#### 4.4.2.3 **Ethnographic Context**

The project site is on the cusp of what was traditionally the Lamchin territory, north of the border of the Puichon territory.6 Both the Lamchin and the Puichon spoke the Ramaytush dialect of Costanoan. The Costanoan languages are part of the larger Utian language family, which is part of a larger language family, the Penutian language, with languages and dialects spoken by groups of Native Americans across California, Oregon, and Washington. The territory of the Ohlone people, who were referred to as the Costanoans by the Spanish because they lived along the coast, extended from the Golden Gate to just below Carmel as well as through several valleys that led inland from the coastline.8

As with other Ohlone tribelets, the Lamchin and Puichon were primarily hunters and gatherers. They hunted terrestrial game such as mule deer, tule elk, pronged antelope, and mountain lion. Traps were set for smaller game such as rabbit and quail. Marine resources were hunted along the shores, including sea lions and whales, which were prized for their blubber. Water fowl were a very important part of the tribal diet and trapped along the tidal marshes. Other marine resources, such as salmon, steelhead, school fish, and shellfish, including mussels, were collected and were a major dietary staple. Tule boats were used to collect both saltwater and freshwater marine resources.

The Ohlone also used a wide range of other foods, including various seeds (the growth of which was promoted by controlled burning), buckeye, berries, roots, acorns, nuts, fruits, land and sea mammals, water fowl, reptiles, and insects. The Ohlone used tule balsas for watercraft, bows and arrows, cordage, and bone and ground-stone tools to procure and process their foodstuffs.9,10

The Ohlone were politically organized by tribelet, with each having a designated territory. A territory consisted of one or more villages and camps designated by physiographic features. Each tribelet consisted of several households, which averaged from 10 to 15 individuals and were grouped into clans and moieties. Primary sources describe tribelets as small groups of people, averaging 60 to 90 individuals, which were located 3 to 5 miles apart. These groups within a territory were often linked by marriage. The office of tribelet chief, which was inherited patrilineally, could be occupied by a man or a woman. If there was no son to inherit the position, a

Byrd, Brian F. and Jack Meyer. 2011. Initial Cultural Resources Investigation San Francisquito Creek Flood Damage Reduction and Ecosystem Restoration Project, Santa Clara and San Mateo Counties, California. Prepared by Far Western Anthropological Research Group. Prepared for Santa Clara Valley Water District.

Milliken, R. 1995. A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769-1810. Ballena Press. Novato, CA.

<sup>&</sup>lt;sup>7</sup> Callaghan, C.A. 1967. Miwok-Costanoan as a Subfamily of Penutian. *International Journal of American Linguistics* 33(3) Pp. 224-227.

<sup>&</sup>lt;sup>8</sup> Levy, R. 1978. Costanoan. In *The Handbook of North American Indians Volume 8: California*. Heizer, R.F., Editor. Pp. 485-493. Smithsonian Institution. Washington, D.C.

Krober, A.L. 1925. *Handbook of the Indians of California*. Dover Press. New York, New York.

<sup>&</sup>lt;sup>10</sup> Milliken, R. 1995. A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769-1810. Ballena Press. Novato, CA.

sister or daughter would assume the position. Duties of the chief included providing for visitors, directing ceremonial activities, and leading fishing, hunting, gathering, and warfare expeditions. The chief served as the leader of a council of elders, which functioned primarily in an advisory capacity to the community.

As stated above, a single tribelet, comprising patrilineal family groups, would occupy a village location at different times of the year. Ohlone villages in the Late Period of the Late Holocene typically had four types of structures. Dwellings were generally domed structures with central hearths. They were thatched with tule, grass, or other vegetal material and bound with willow withes. Permanent settlements were usually placed away from the ocean shore, on high ground. Sweathouses were used by men and women and usually located along streambanks. A sweathouse consisted of a pit that was excavated into the streambank, with a thatched portion constructed against the bank. Dance structures were circular or oval in plan and enclosed by a woven fence of brush or laurel branches and stood approximately 5 feet. These structures would have one main doorway, with a smaller opening directly opposite. The assembly house was a thatched dome structure that was large enough to accommodate all of the inhabitants of the village. 11

Although they have yet to receive formal recognition from the federal government, the Ohlone are becoming increasingly organized as a political unit and have developed an active interest in preserving their ancestral heritage. In the later part of the twentieth century, the Galvan family of Mission San José worked closely with the American Indian Historical Society and successfully prevented destruction of a mission cemetery that was in the path of a proposed freeway. These descendants incorporated as the Ohlone Indian Tribe and now hold title to the Ohlone Indian Cemetery in Fremont.<sup>12</sup> The descendants are active in maintaining their traditions and advocating for Native American issues.

#### 4.4.3 Regulatory Framework

#### 4.4.3.1 State

#### **Cultural Resources**

#### **State Historic Significance Criteria**

The CEQA Guidelines provide three ways for a cultural resource to qualify as a historical resource for the purposes of CEQA:

- 1. The resource is listed in, or determined eligible for listing in, the California Register of Historical Resources (CRHR).
- 2. The resource is included in a local register of historical resources, as defined in PRC Section 5020.1(k), or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g), unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
- 3. The lead agency determines the resource to be significant, as supported by substantial evidence in light of the whole record (14 California Code of Regulations [CCR] Section 15064.5[a]).

<sup>11</sup> Crespi, J. 1927. Manuscripts of Friar Juan Crespi. University of California Press. Berkeley, California.

<sup>12</sup> Bean, L.J. 1994. The Ohlone Past and Present: Native Americans of the San Francisco Bay Region. Ballena Press. Novato, California.

For a historical resource to be eligible for listing in the CRHR, it must be significant at the local, state, or national level under one or more of the following criteria from Public Resources Code Section 5024.1(c):

- 1. The resource is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- 2. The resource is associated with the lives of persons important in our past.
- 3. The resource embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values.
- 4. The resource has yielded, or may be likely to yield, information important in prehistory or history.

Historical resources automatically listed in the CRHR include those historic properties listed in, or formally determined to be eligible for listing in, the National Register of Historic Places (NRHP) (PRC Section 5024.1). In addition, CEQA distinguishes between two classes of archaeological resources: archaeological sites that meet the definition of a historical resource, as defined above, and unique archaeological resources.

An archaeological resource is considered unique if 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; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC Section 21083.2).

Resources that qualify as unique archaeological resources also typically meet at least one of the CRHR criteria. For the purposes of this project, significant cultural resources, as defined by CEQA, are those resources that meet at least one of the CRHR eligibility criteria or are unique archeological resources. Notably, a project that causes a substantial adverse change in the significance of a historical resource is a project that may have significant impact under CEQA (14 CCR Section 15064.5[b]). A substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource is materially impaired.

The significance of a historical resource is materially impaired if a project demolishes or materially alters any qualities that justify:

- Inclusion in, or eligibility for inclusion in, the CRHR (14 CCR Section 15064.5[b][2][A],[C]).
- Inclusion in a local register (14 CCR Section 15064.5[b][2][B]).

#### **Tribal Cultural Resources**

#### **Assembly Bill 52**

Tribal cultural resources were originally identified as a distinct CEQA environmental category with the adoption of Assembly Bill 52 (AB 52) in September 2014. For all projects that are subject to CEQA that received a notice of preparation, notice of negative declaration, or mitigated negative

declaration on or after July 1, 2015, AB 52 requires the lead agency on a proposed project to consult with the geographically affiliated California Native American tribes. The legislation creates a broad new category of environmental resources, "tribal cultural resources," which must be considered under CEQA. AB 52 requires a lead agency to not only consider the resource's scientific and historical value but also whether it is culturally important to a California Native American tribe.

AB 52 defines tribal cultural resources as sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are included or determined to be eligible for inclusion in the CRHR; included in a local register of historical resources, as defined in Public Resources Code Section 5020.1(k); or determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to the criteria of Public Resources Code Section 5024.1(c) (CEQA Section 21074).

The CRHR criteria for the listing of resources, as defined in Public Resources Code Section 5024.1(c), are the following:

- 1. The resource is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- 2. The resource is associated with the lives of persons important in our past.
- 3. The resource embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values.
- 4. The resource has yielded, or may be likely to yield, information important in prehistory or history.

AB 52 also sets up an expanded consultation process. For projects initiated after July 1, 2015, lead agencies are required to provide notice of the proposed projects to any tribe that is traditionally and culturally affiliated with the geographic area that requested to be informed by the lead agency, following Public Resources Code Section 21018.3.1(b). If, within 30 days, a tribe requests consultation, the consultation process must begin before the lead agency can release a draft environmental document. Consultation with the tribe may include discussion of the type of review necessary, the significance of tribal cultural resources, the significance of the project's impacts on the tribal cultural resources, and alternatives and mitigation measures recommended by the tribe. The consultation process will be deemed concluded when either (a) the parties agree to mitigation measures or (b) any party concludes, after a good-faith effort, that an agreement cannot be reached. Any mitigation measures agreed to by the tribe and lead agency must be recommended for inclusion in the environmental document. If a tribe does not request consultation, or otherwise assist in identifying mitigation measures during the consultation process, a lead agency may still consider mitigation measures if the agency determines that a project will cause a substantial adverse change to a tribal cultural resource.

#### 4.4.3.2 Local

#### **Cultural Resources**

#### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City of South

San Francisco's (City's) plans and policy standards. The General Plan contains an Open Space and Conservation Element, which outlines policies relating to habitat and biological resources, water quality, air quality, greenhouse gas emissions and historic and cultural resources conservation. The General Plan includes the following policies applicable to cultural resources:

- 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.

The General Plan also establishes several specific guidelines for implementation of the guiding principles of the document. Specific guidelines that are relevant to this project include:

- Guideline 7.5-I-3: Explore mechanisms to incorporate South San Francisco's industrial heritage in historic and cultural preservation.
- Guideline 7.5-I-4: Ensure the protection of known archaeological resources in the City by requiring a records review for any development proposed in areas with known resources.
- Guideline 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.

## 4.4.4 Impacts and Mitigation Measures

## 4.4.4.1 Significance Criteria

#### **Cultural Resources**

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant cultural resources impact if it would:

- Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5; or
- Disturb any human remains, including those interred outside of dedicated cemeteries.

#### **Tribal Cultural Resources**

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant tribal cultural resources impact if it would:

- Cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC Section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe and that is:
- Listed in, or eligible for listing in, the CRHR or a local register of historical resources, as defined in PRC Section 5020.1(k), or

• A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

## 4.4.4.2 Approach to Analysis

#### **Cultural Resources**

Evaluation of the proposed project is based on a records search conducted by ICF archaeologist Yuka Oiwa on February 21, 2020, at the Northwestern Information Center of the California Historic Resources Information System in Rohnert Park, California. Information centers are depositories of documentation for known archaeological and historic resources in California. The records search was conducted to identify all known archaeological and built-environment resources within the project area and within approximately 0.25 mile of the project site as well previous survey coverage of the project area. Records search results indicate that nineteen previous cultural resources studies have been conducted within 0.25 miles of the project site. Two of these studies have been conducted within the project site. The project site was previously surveyed in its entirety by Archaeological Resources Technology in 2016 and 2018. No cultural resources were identified within the project site as a result of the surveys.

Table 4.4-1 identifies the eight previously recorded cultural resources within 0.25 mile of the project site, including six built environment resources and two archaeological resources. The two archaeological resources within 0.25 mile of the project site, P-41-000044 and P41-002207, are prehistoric shell midden sites. There are no known archaeological or built-environment resources within the project site.

Table 4.4-1. Cultural Resources within 0.25 Mile of the Project Site

| Primary<br>Number | Trinomial  | Age         | Name                                      | Description                     | Within<br>Project Site? |
|-------------------|------------|-------------|---|---------------------------------|-------------------------|
| P-41-000044       | CA-SMA-40  | Prehistoric | N/A                                       | Shell Midden                    | No                      |
| P-41-000814       |            | Historic    | Grand Hotel                               | <b>Hotel Building</b>           | No                      |
| P-41-000885       |            | Historic    | 205 Juniper Avenue                        | Craftsman<br>Bungalow           | No                      |
| P-41-000956       |            | Historic    | 225 Juniper Avenue                        | Italianate False<br>Front House | No                      |
| P-41-002207       | CA-SMA-386 | Prehistoric | Airport & Armour<br>Buried Site           | Shell Midden                    | No                      |
| P-41-002318       |            | Historic    | T-Mobile West LLC<br>SF73113B             | PG&E Tower                      | No                      |
| P-41-002433       |            | Historic    | Signal Bridge North of Grand Ave Overpass | Signal Bridge                   | No                      |
| P-51-002434       |            | Historic    | 129 Sylvester Road                        | Industrial<br>Building          | No                      |

Source: Records search conducted by ICF archaeologist Yuka Oiwa on February 21, 2020, at the Northwestern Information Center of the California Historic Resources Information System in Rohnert Park, California.

#### **Tribal Cultural Resources**

Efforts to identify tribal cultural resources within the project area included consultation with interested Native American groups under AB 52.

On January 15, 2020, the City distributed tribal consultation letters to the following organizations: the Amah Mutsun Tribal Band of Mission San Juan, the Costanoan Rumsen Carmel Tribe, the Indian Canyon Mutsun Band of Costanoan, the Muwekma Ohlone Indian Tribe of the San Francisco Bay Area, and the Ohlone Indian Tribe. Included in the letters was a brief description of the project, the results of a records search, project location maps, and a request for comments, concerns, or knowledge regarding sacred lands or heritage sites in the project area. Native American groups had 30 days from the receipt of the letter to request consultation under AB 52; no requests for consultation were received during the 30-day period, which ended on February 15, 2020. A record of all AB 52 consultation is provided in Appendix C of this draft EIR.

### 4.4.4.3 Impact Evaluation

## Impact CR-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource, pursuant to Section 15064.5. (*No Impact*)

The project site is currently developed with a six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and surface parking lots. The existing building at 701 Gateway Boulevard was constructed in 1998. This existing structure is not historic in age and is not eligible for designation on the CRHR. Records search results indicate that there are no known built-environment resources within the project site. Therefore, the proposed project would have *no impact* on historical resources. No mitigation is required.

# Impact CR-2: The proposed project would not cause a substantial adverse change in the significance of an archaeological resource, pursuant to Section 15064.5. (*Less than Significant with Mitigation*)

Records search results indicate the project site is close to the prehistoric coastline, making it sensitive for the presence of prehistoric shell midden sites. There are two previously recorded cultural resources within 0.25 mile of the project site, P-41-000044 and P41-002207. Both resources are prehistoric shell midden sites. However, there are no previously recorded archaeological resources within the project site. In addition, the project site was previously surveyed in its entirety by Archaeological Resources Technology in 2016 and 2018. No cultural resources were identified within the project site as a result of the surveys. Furthermore, the project site is fully developed and lacks surface visibility. Any visible ground surface has been disturbed and/or covered with fill and gravel. All visible ground surfaces appear to have been graded, landscaped, or developed. Notwithstanding, given the presence of two known prehistoric sites within the vicinity of the project, and given the proximity of the project site to the coast, the project site has a moderate sensitivity for similar buried archaeological resources.

The proposed project would excavate approximately 1,850 cubic yards of soil that would be reused as fill on-site, and would import an additional 750 cubic yards of soil to be used as fill on-site. To accommodate utility trenches, the project would require a maximum depth of excavation reaching approximately 9 feet below ground surface. Previously unknown archaeological resources could be inadvertently unearthed during ground-disturbing activities, which would be a *significant* impact. Implementation of Mitigation Measure CR-1, Cultural Resources Worker

Environmental Awareness Program (WEAP), and Mitigation Measure CR-2, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Archaeological, Historical, and Tribal Resources, would reduce this impact to *less than significant with mitigation* by ensuring that project activities would not result in the inadvertent destruction of an archaeological resource.

## Mitigation Measure CR-1: Cultural Resources Worker Environmental Awareness Program

The project applicant shall ensure that a qualified archaeologist shall conduct WEAP training for all construction personnel on the project site prior to construction and ground-disturbing activities. The training shall include basic information about the types of artifacts that might be encountered during construction activities, and procedures to follow in the event of a discovery. This training shall be provided for any additional personnel added to the project even after the initiation of construction and ground-disturbing activities.

## Mitigation Measure CR-2: Halt Construction Activity, Evaluate Find, and Implement Mitigation for Archaeological, Historical, and Tribal Resources

In the event that previously unidentified archaeological, historical, or tribal resources are uncovered during site preparation, excavation, or other construction activity, the project applicant shall cease or ensure the ceasing of all such activity within 25 feet of the discovery until the resources have been evaluated by a qualified professional, and specific measures can be implemented to protect these resources in accordance with Sections 21083.2 and 21084.1 of the California Public Resources Code. If the find is significant, the project applicant shall ensure that a qualified archaeologist excavate the find in compliance with state law, keeping project delays to a minimum. If the qualified archaeologist determines the find is not significant, then proper recordation and identification will ensue and the project shall continue without delay.

## Impact CR-3: The proposed project would not disturb any human remains, including those interred outside of formal cemeteries. (Less than Significant with Mitigation)

Records search results did not indicate the presence of human remains within the project site. As discussed under Impact CR-3, no formal cemeteries have been located on the project site, and human remains would be unlikely to be found. However, if inadvertent discovery of human remains occurs during ground-disturbing activities, this would be a *significant* impact. Implementation of Mitigation Measure CR-3, Halt Construction Activity, Evaluate Remains, and Take Appropriate Action in Coordination with Native American Heritage Commission, would reduce this impact to *less than significant with mitigation* by ensuring that discovery procedures for human remains would be implemented.

## Mitigation Measure CR-3: Halt Construction Activity, Evaluate Remains, and Take Appropriate Action in Coordination with Native American Heritage Commission

In the event that human remains are uncovered during site preparation, excavation, or other construction activity, the project applicant shall cease or ensure the ceasing of all such activity within 25 feet of the discovery until the remains have been evaluated by the County Coroner and appropriate action taken in coordination with the NAHC, in accordance with Section 7050.5 of the CHSC or, if the remains are Native American, Section 5097.98 of the California Public Resources Code.

Impact CR-4: The proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code Section 21074. (Less than Significant with Mitigation)

No Native American tribes have identified tribal cultural resources within the project site. In addition, no Native American tribes requested further consultation under AB 52 regarding the project, and no Native American tribes have identified unrecorded tribal cultural resources within the project area. However, if inadvertent discovery of tribal cultural resources occurs during ground-disturbing activities, this would be a *significant* impact. Implementation of Mitigation Measure CR-1, Cultural Resources Worker Environmental Awareness Program (WEAP), and Mitigation Measure CR-2, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Archaeological, Historical, and Tribal Resources, would reduce this impact to *less than significant with mitigation* by ensuring that discovery procedures for tribal cultural resources would be implemented.

## 4.4.4.4 Cumulative Impacts

Impact C-CR-1: The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on archaeological resources, human remains, and tribal cultural resources. (*Less than Significant with Mitigation*)

The cumulative geographic context for archaeological resources and human remains is the immediate vicinity of the project site, which is the area where construction activities, including ground-disturbing activities, could encounter archaeological resources, human remains, and tribal cultural resources that may be present on or near the site. The cumulative projects within 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

The cumulative projects in the vicinity of the project site would be constructed on infill sites in highly disturbed areas. It is likely that the cumulative projects would be constructed on sites where the ground surface has been disturbed and/or covered with fill and gravel. Similar to the proposed project, all cumulative projects would be required to implement mitigation measures to ensure that project activities would not result in the inadvertent destruction of an archaeological resource and that human remains discovery procedures would be implemented. Nonetheless, cumulative impacts on archaeological resources, human remains, and tribal cultural resources could be *significant* because the reasonably foreseeable projects would likely involve ground-disturbing activities that could uncover resources related to resources that could be uncovered by the project.

Implementation of Mitigation Measure CR-1, Cultural Resources Worker Environmental Awareness Program; Mitigation Measure CR-2, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Archaeological, Historical, and Tribal Resources; and Mitigation Measure CR-3, Halt Construction Activity, Evaluate Remains, and Take Appropriate Action in Coordination with Native American Heritage Commission, would ensure that the proposed project's contribution to cumulative impacts on archaeological resources, human remains, and tribal cultural resources would be *less than cumulatively considerable*.

## 4.5 Energy

#### 4.5.1 Introduction

This section describes the environmental and regulatory setting for energy. It also describes impacts associated with energy that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate. The detailed methodologies used to assess the level of impacts related to energy are provided in Appendix B of this draft environmental impact report (EIR).

## 4.5.2 Environmental Setting

Energy resources in the State of California include natural gas, electricity, water, wind, oil, coal, solar, geothermal, and nuclear resources. Energy production and energy use both result in the depletion of nonrenewable resources, such as oil, natural gas, and coal, and emissions of pollutants.

#### 4.5.2.1 State Energy Resources and Use

California's diverse portfolio of energy resources produced 2,536 trillion British thermal units (BTUs)¹ in 2017.² Excluding offshore areas, the state ranked fourth in the nation in crude oil production in 2017 (the most recent year for which data are available), producing the equivalent of 996.4 trillion BTUs.³ The state ranked first in total renewable energy generation, with 1,115.3 trillion BTUs. Other energy sources in the state include natural gas (236.8 trillion BTUs), nuclear (187.2 trillion BTUs), and biofuel (29.8 trillion BTUs).⁴,5,6 In addition, because of the mild Mediterranean climate and strict conservation requirements for energy efficiency, California has lower energy consumption rates than most parts of the United States. According to the U.S. Energy Information Administration, California consumed approximately 7,881.3 trillion BTUs of energy in 2017.7 California's per capita energy consumption of 200 million BTUs is one of the lowest in the country and ranked 48th in the nation as of 2017.8

One BTU is the amount of energy required to heat 1 pound of water by 1°F at sea level. BTU is a standard unit of energy that is used in the United States and is on the English system of units (foot-pound-second system).

<sup>&</sup>lt;sup>2</sup> U.S. Energy Information Administration. 2019a. *Table P5B—Primary Energy Production Estimates, Renewable and Total Energy, in Trillion BTU, Ranked by State, 2017*. Available: https://www.eia.gov/state/seds/sep\_prod/pdf/P5B.pdf. Accessed: April 22, 2020.

US Energy Information Administration. 2019b. *Table P5A—Primary Energy Production Estimates, Fossil Fuels and Nuclear Energy, in Trillion BTU, Ranked by State, 2017*. Available: https://www.eia.gov/state/seds/sep\_prod/pdf/P5A.pdf. Accessed: April 22, 2020.

<sup>4</sup> No coal production occurs in California.

US Energy Information Administration. 2019a. *Table P5B—Primary Energy Production Estimates, Renewable and Total Energy, in Trillion BTU, Ranked by State, 2017.* 

<sup>&</sup>lt;sup>6</sup> US Energy Information Administration. 2019b. *Table P5A—Primary Energy Production Estimates, Fossil Fuels and Nuclear Energy, in Trillion BTU, Ranked by State, 2017.* 

<sup>&</sup>lt;sup>7</sup> US Energy Information Administration. 2019c. *Table C10—Energy Consumption Estimates by End-Use Sector, Ranked by State, 2017.* Available: https://www.eia.gov/state/seds/sep\_sum/html/rank\_use.html. Accessed: April 22, 2020.

<sup>&</sup>lt;sup>8</sup> US Energy Information Administration. 2019d. *Table C13—Energy Consumption Estimates per Capita by End-Use Sector, Ranked by State, 2017.* Available: https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep\_sum/html/rank\_use\_capita. html&sid=US. Accessed: April 22, 2020.

In 2017, natural gas accounted for the majority of energy consumption (2,190.6 trillion BTUs, or 28 percent), followed by gasoline (1,720.8 trillion BTUs or 22 percent); renewable energy, including nuclear electric power, hydroelectric power, biomass, and other renewables (1,416.8 trillion BTUs, or 18 percent); distillates and jet fuel (1,270.3 trillion BTUs, or 16 percent); and interstate electricity (659.4 trillion BTUs, or 8 percent), with the remaining 8 percent coming from a variety of other sources. Of the natural gas consumed, commercial uses consumed approximately 11 percent, followed by residential uses (20 percent) and industrial uses (36 percent), among many other uses.

The transportation sector consumed the greatest quantity of energy (3,174.9 trillion BTUs, or 40.3 percent), followed by the industrial (1,817.8 trillion BTUs, or 23.1 percent), commercial (1,473.1 trillion BTUs, or 18.7 percent), and residential (1,415.5 trillion BTUs, or 18 percent) sectors.<sup>11</sup>

Per capita energy consumption, in general, is declining because of improvements in energy efficiency and designs. However, despite this reduction in per capita energy use, the state's total overall energy consumption (i.e., non-per capita energy consumption) is expected to grow over the next several decades as a result of increases in population, jobs, and vehicle miles traveled (VMT).

#### 4.5.2.2 Regional Energy Resources and Use

Pacific Gas and Electric (PG&E) provides natural gas and electricity services to the vast majority of Northern California, including the City of South San Francisco and the project site. PG&E's service extends from Eureka to Bakersfield (north to south) and from the Sierra Nevada to the Pacific Ocean (east to west). PG&E purchases gas and power from a variety of sources, including other utility companies. PG&E also obtains energy supplies from power plants and natural gas fields in Northern California. PG&E operates a grid distribution system that channels all power produced at the various generation sources into one large energy pool for distribution throughout the service territory. PG&E provides all of the natural gas and electric infrastructure in South San Francisco. PG&E has two plan options, known as Solar Choice options, in addition to its base plan, which gives customers the option to purchase energy from solar resources. The first Solar Choice option provides up to 50 percent of a customer's energy from solar resources, while the other option provides up to 100 percent of customer's energy from solar resources. In addition, Peninsula Clean Energy (PCE) is San Mateo County's official electricity provider. PCE's power comes from a mix of various sources, including solar, wind, geothermal, biomass and biowaste, and hydroelectric generation resources. PCE delivers power to its customers via existing PG&E utility infrastructure. 12 PCE allows customers to choose between two different electricity product operations: ECOplus (50 percent renewable resources as electricity sources) and ECO100 (100 percent renewable resources as electricity sources).<sup>13</sup>

US Energy Information Administration. 2020a. *California State Energy Profile*. Available: https://www.eia.gov/state/print.php?sid=CA. Accessed: April 22, 2020.

<sup>&</sup>lt;sup>10</sup> US Energy Information Administration. 2020b. *Natural Gas Consumption by End Use—California*. Available: https://www.eia.gov/dnav/ng/ng\_cons\_sum\_dcu\_SCA\_a.htm. Accessed: April 22, 2020.

<sup>&</sup>lt;sup>11</sup> US Energy Information Administration. 2019c. *Table C10—Energy Consumption Estimates by End-Use Sector, Ranked by State, 2017.* 

 $<sup>^{12}</sup>$  PCE charges each of its customers an electric delivery charge for maintenance of PG&E's wires, infrastructure, and delivery of electricity to customers.

<sup>&</sup>lt;sup>13</sup> Peninsula Clean Energy. 2020. What are My Rates? Available: https://www.peninsulacleanenergy.com/forbusinesses/. Accessed: July 23, 2020.

In San Mateo County, a total of 209.7 million therms of natural gas were consumed in 2018 (the most recent year for which data are available). In 2018, natural gas in San Mateo County was consumed primarily by the residential sector (55 percent), followed by the non-residential sector (45 percent). In 2018, San Mateo County consumed a total of 4,254.6 million kilowatts of electricity. In San Mateo County, electricity was consumed primarily by the non-residential sector (65 percent), followed by the residential sector (35 percent). Electricity usage for different land uses varies substantially by the type of uses in a building, the types of construction materials used, and the efficiency of the electricity-consuming devices. However, energy consumption in the City of South San Francisco has generally decreased over recent years despite a growing population, as shown in the 2010–2015 data in Table 4.5-2 (the most recent years for which data are available). 16

Table 4.5-1 outlines PG&E's and PCE's power mix in 2018, compared to the power mix for the state, and Table 4.5-2 outlines the City of South San Francisco's electricity and natural gas consumption from 2010 to 2015.

Table 4.5-1. PG&E, PCE, and the State of California Power Mix in 2018

| Energy Resources    | PG&E<br>Option:<br>Base<br>Plan | PG&E<br>Option:<br>50% Solar<br>Choice | PG&E<br>Option:<br>100% Solar<br>Choice | PCE<br>Option:<br>ECOplus | PCE<br>Option:<br>ECO100 | California<br>Power<br>Mix 2018 |
|---------------------|---------------------------------|--|---|---------------------------|--------------------------|---------------------------------|
| Eligible Renewable: | 39%                             | 69%                                    | 100%                                    | 51%                       | 100%                     | 31%                             |
| Biomass and Waste   | 4%                              | 2%                                     | 0%                                      | 5%                        | 0%                       | 2%                              |
| Geothermal          | 4%                              | 2%                                     | 0%                                      | 2%                        | 0%                       | 5%                              |
| Small Hydroelectric | 3%                              | 1%                                     | 0%                                      | 5%                        | 0%                       | 2%                              |
| Solar               | 18%                             | 59%                                    | 100%                                    | 7%                        | 50%                      | 11%                             |
| Wind                | 10%                             | 5%                                     | 0%                                      | 33%                       | 50%                      | 11%                             |
| Coal                | 0%                              | 0%                                     | 0%                                      | 0%                        | 0%                       | 3%                              |
| Large Hydroelectric | 13%                             | 6%                                     | 0%                                      | 35%                       | 0%                       | 11%                             |
| Natural Gas         | 15%                             | 7%                                     | 0%                                      | 0%                        | 0%                       | 35%                             |
| Nuclear             | 34%                             | 17%                                    | 0%                                      | 0%                        | 0%                       | 9%                              |
| Other               | 0%                              | 0%                                     | 0%                                      | 0%                        | 0%                       | < 1%                            |
| Unspecified1        | 0%                              | 0%                                     | 0%                                      | 14%                       | 0%                       | 11%                             |
| Total               | 100%                            | 100%                                   | 100%                                    | 100%                      | 100%                     | 100%                            |

Source: PG&E. 2019. Where Your Electricity Comes From. Available:

https://www.pge.com/pge\_global/common/pdfs/your-account/your-bill/understand-your-bill/bill-inserts/2019/1019-Power-Content-Label.pdf. Accessed: April 22, 2020.

PCE. 2019. 2018 Power Content Label. Available: https://www.peninsulacleanenergy.com/wp-content/uploads/2019/10/PCE\_EV-Incentive-Program-Postcard-Series\_Final.pdf. Accessed: July 23, 2020.

<sup>a</sup> Electricity from transactions that are not traceable to specific generation sources are classified as unspecified sources of power.

<sup>&</sup>lt;sup>14</sup> California Energy Commission. n.d. *Gas Consumption by County—San Mateo County 2018*. Available: https://ecdms.energy.ca.gov/gasbycounty.aspx. Accessed: April 22, 2020.

<sup>&</sup>lt;sup>15</sup> California Energy Commission. n.d. *Electricity Consumption by County—San Mateo County 2018*. Available: https://ecdms.energy.ca.gov/elecbycounty.aspx. Accessed: April 22, 2020.

County of San Mateo Datahub. 2019. South San Francisco Energy Contribution to Greenhouse Gas Emissions, Natural Gas Consumption Bar Graph 2. Available: https://datahub.smcgov.org/Environment/South-San-Francisco-Energy-Contribution-to-Greenho/rsnt-9iwn. Accessed: April 21, 2020.

Table 4.5-2. Electricity and Natural Gas Consumption in the City of South San Francisco, 2010–2015

| Energy Resources          | Electricity (kWh) | Natural Gas (therms) |
|---------------------------|-------------------|----------------------|
| 2010                      |                   |                      |
| Residential               | 106,482,913       | 9,430,667            |
| Commercial and Industrial | 231,478,981       | 14,967,060           |
| Total                     | 337,961,894       | 24,397,727           |
| 2011                      |                   |                      |
| Residential               | 104,502,797       | 9,472,247            |
| Commercial and Industrial | 228,863,085       | 15,054,584           |
| Total                     | 333,365,882       | 24,526,831           |
| 2012                      |                   |                      |
| Residential               | 103,260,746       | 9,208,976            |
| Commercial and Industrial | 223,204,783       | 14,878,901           |
| Total                     | 326,465,529       | 24,087,877           |
| 2013                      |                   |                      |
| Residential               | 101,583,862       | 9,130,055            |
| Commercial and Industrial | 217,442,565       | 14,529,796           |
| Total                     | 319,026,427       | 23,659,851           |
| 2014                      |                   |                      |
| Residential               | 96,370,466        | 7,379,210            |
| Commercial and Industrial | 224,214,612       | 12,837,263           |
| Total                     | 320,585,078       | 20,216,473           |
| 2015                      |                   |                      |
| Residential               | 95,163,472        | 7,310,750            |
| Commercial and Industrial | 221,831,910       | 13,295,230           |
| Total                     | 316,995,382       | 20,605,980           |

Source: County of San Mateo Datahub. 2019. *South San Francisco Energy Contribution to Greenhouse Gas Emissions, Natural Gas Consumption Bar Graph 2*. Available: https://performance.smcgov.org/stories/s/pii5-fvmc. Accessed: April 21, 2020.

kWh = kilowatt hour

## 4.5.2.3 Project Site Energy Resources and Use

The project site includes a six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and surface parking lots. Table 4.5-3 provides the existing energy usage at the project site.

As stated previously, PG&E provides natural gas and electricity to the City of South San Francisco, and therefore the project site, through its right-of-way electric and natural gas lines. The project site is served by existing natural gas and electric infrastructure provided by PG&E. Underground electric lines are located in the eastern portion of the north surface parking lot, and a 4-inch natural gas main is located in Gateway Boulevard.

Table 4.5-3. Existing Energy Consumption at the Project Site

| Energy                                  | Existing Usage          |  |
|---|-------------------------|--|
| Electricity                             | 1,753,936 kWh/year      |  |
| Natural Gas                             | 44,677 therm/year       |  |
| Gasoline                                | 243,226 gallons/year    |  |
| Diesel                                  | 28,680 gallons/year     |  |
| Source: See Appendix B of this draft EI | R for CalEEMod outputs. |  |
| kWh = kilowatt hour                     |                         |  |

## 4.5.3 Regulatory Framework

#### 4.5.3.1 Federal

As discussed in Sections 4.2, *Air Quality*, and 4.7, *Greenhouse Gas Emissions*, of this draft EIR, the National Highway Traffic Safety Administration (NHTSA) sets the Corporate Average Fuel Economy (CAFÉ) standards to improve average fuel economy (i.e., reduce fuel consumption) and reduce greenhouse gas (GHG) emissions generated by cars and light-duty trucks. NHTSA and the U.S. Environmental Protection Agency (EPA) have proposed amendments to the current fuel efficiency standards for passenger cars and light-duty trucks and new standards for model years 2021 through 2026. Under the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, current 2020 standards would be maintained through 2026. California, 22 other states, the District of Columbia, and two cities filed suit against the proposed action on September 20, 2019 (*California et al. v. United States Department of Transportation et al.*, 1:19-cv-02826, U.S. District Court for the District of Columbia). The lawsuit requests a "permanent injunction prohibiting defendants from implementing or relying on the preemption regulation" but does not stay its implementation during legal deliberations. Part 1 of the SAFE Vehicles Rule went into effect on November 26, 2019.

#### 4.5.3.2 State

California has adopted statewide legislation to address various aspects of climate change and greenhouse gases, which often pertain directly or indirectly to energy resources and uses. This section is focused on State legislation that specifically mentions energy use or resources. For other State legislation mainly focused on greenhouse gas reduction and climate change, refer to Section 4.7, *Greenhouse Gas Emissions*, of this draft EIR.

## Assembly Bill 1493, Pavley Rules (2002, amendments 2009)/Advanced Clean Cars (2011)

Known as Pavley I, Assembly Bill (AB) 1493 provided the nation's first GHG standards for automobiles. AB 1493 required the California Air Resources Board (CARB) to adopt vehicle standards to lower GHG emissions from automobiles and light-duty trucks to the maximum extent feasible beginning in 2009. In 2012, strengthening of the Pavley standards (referred to previously as Pavley II but now referred to as the Advanced Clean Cars measures) was adopted for vehicle model years 2017 through 2025. Together, the two standards are expected to increase average fuel economy to roughly 54.5 miles per gallon in 2025. The increase in fuel economy will help lower the demand for fossil fuels.

## California Energy Efficiency Standards for Residential and Nonresidential Buildings—California Green Building Standards Code (2011), Title 24 Updates

The California Green Building Standards Code (Part 11, Title 24), or CALGreen, was adopted as part of the California Building Standards Code (24 California Code of Regulations). CALGreen applies to the planning, design, operation, construction, use, and occupancy of newly constructed buildings and requires energy- and water-efficient indoor infrastructure to be installed at all new projects beginning January 1, 2011. CALGreen also requires newly constructed building to develop a waste management plan and divert at least 50 percent of the construction materials generated during project construction.

The current 2019 Building Energy Efficiency Standards were adopted in 2019 and took effect on January 1, 2020. Under the 2019 standards, homes will use about 53 percent less energy than homes constructed under the 2016 standards, while nonresidential buildings will use about 30 percent less energy. Later standards are expected to require zero net energy for new commercial buildings.

### **Executive Order B-16-12 (2012)**

Executive Order (EO) B-16-12 orders state entities under the direction of the governor, including CARB, the California Energy Commission (CEC), and the California Public Utilities Commission (CPUC), to support rapid commercialization of zero-emission vehicles. It directs these entities to achieve various benchmarks related to zero-emission vehicles.

#### Senate Bill 350, Chapter 547, Clean Energy and Pollution Reduction Act of 2015

Senate Bill (SB) 350 (DeLeon), also known as the Clean Energy and Pollution Reduction Act of 2015, was approved by California legislature in September 2015 and signed by Governor Brown in October 2015. Its key provisions require the following by 2030: (1) a Renewables Portfolio Standard (RPS)<sup>17</sup> of 50 percent and (2) doubling of the statewide energy efficiency savings related to natural gas and electricity end uses. In order to meet these provisions, the bill requires large utilities to develop and submit integrated resource plans that detail how the utilities will reduce GHG emissions and increase the use of clean energy resources while meeting customers' needs.

### Senate Bill 100—The 100 Percent Clean Energy Act of 2018 (2018)

SB 100 builds on SB 350, the Clean Energy and Pollution Reduction Act of 2015. SB 100 increases the 2030 RPS target set in SB 350 to 60 percent and requires an RPS of 100 percent by 2045.

#### **4.5.3.3** Regional

#### **PG&E Integrated Resource Plan**

PG&E adopted the 2018 Integrated Resource Plan (IRP) on August 1, 2018, to provide guidance for serving the electricity and natural gas needs of residents and businesses within its service area while fulfilling regulatory requirements. The IRP contains the following objectives that are relevant to the proposed project:

The RPS is one of California's key programs for promoting renewable energy use within the state. The program sets forth continuous procurement of renewable energy for load-serving entities within California (California Energy Commission 2020).

- **Clean Energy**: In 2017, PG&E delivered nearly 80 percent of its electricity from GHG-free resources and 33 percent of its electricity from RPS-eligible renewable resources, such as solar, wind, geothermal, biomass, and small hydro.
- **Reliability**: PG&E's IRP analysis includes PG&E's contribution to system and local reliability, in compliance with the CPUC's resource adequacy requirements.
- Affordability: PG&E's IRP analysis selects resources to meet the state's clean energy and
  reliability goals and provides a system average rate forecast in compliance with the CPUC's
  requirements for investor-owned utilities.

#### **PCE 2018 Integrated Resource Plan**

Peninsula Clean Energy (PCE) is a community choice energy program that serves the entirety of San Mateo County, including the City of South San Francisco. PCE adopted the 2018 IRP on December 14, 2017 to provide guidance for serving the electricity needs of the residents and businesses in the County, all while fulfilling regulatory requirements over a 10-year period form 2018-2027. The plan contains the following strategic goals that are relevant to the proposed project:

- Design a diverse power portfolio that is greenhouse gas free
  - o 100 percent GHG free by 2021
  - o 100 percent RPS-eligible renewable energy by 2025
  - o Minimum of 20 MWs of new local power by 2025
- Stimulate development of new renewable energy projects and clean-tech innovation in San Mateo County and California through PCE's procurement activities
- Implement programs to further reduce greenhouse gas emissions by investing in programs such as local clean power production, electric vehicles, energy efficiency, and demand response, and partnering effectively with local businesses, schools, and nonprofit organizations

PCE meets its renewable energy requirements with a combination of RPS-eligible energy products. According to PCE's 2018 IRP, PCE procured enough renewable energy to meet a 50 percent voluntary target as of 2017. The proportion of PCE's resource mix that is sourced from bundled renewable energy products will significantly increase as PCE transitions toward 100 percent renewable energy content in 2025. Based on targeted renewable energy percentages, PCE intends to significantly outpace California's annual RPS procurement mandates throughout the 2018-2027 planning period.

#### 4.5.3.4 Local

#### **South San Francisco General Plan**

The City of South San Francisco (City) 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The City General Plan contains an Open Space and Conservation Element, which outlines policies related to habitat and biological resources, water quality, air quality, GHG emissions, and historic and cultural resources. The City General Plan includes the following policies that are applicable to energy:

- Guiding Policy 7.3-G-3: Reduce energy use in the built environment.
- Guiding Policy 7.3-G-4: Encourage land use and transportation strategies that promote the use of alternatives to the automobile for transportation, including bicycling, bus transit, and carpooling.
- Guiding Policy 7.3-G-5: Promote clean and alternative-fuel combustion in mobile equipment and vehicles.
- Implementing Policy 7.3-I-9: Promote land uses that facilitate alternative transit use, including high-density housing, mixed uses, and affordable housing served by alternative transit infrastructure.
- Implementing Policy 7.3-I-10: Facilitate energy efficiency in building regulations and streamlined review processes, providing flexibility to achieve specified energy performance levels and requiring energy efficiency measures as appropriate.
- Implementing Policy 7.3-I-13: Encourage efficient, clean energy and fuel use through collaborative programs, award programs, and incentives while removing barriers to the expansion of alternative-fuel facilities and infrastructure.
- Implementing Policy 7.3-I-14: Ensure that design guidelines and standards support operation of alternative-fuel facilities, vehicles, and equipment.

#### **Climate Action Plan**

The City's Climate Action Plan (CAP), adopted in 2014, includes goals, policies, and strategies to reduce the City's greenhouse gas (GHG) emissions, in compliance with AB 32 and SB 375. GHG reduction strategies identified in the CAP include a development checklist to identify applicable plan measures for discretionary projects. The City's CAP was adopted with the purpose of reducing GHGs community wide to achieve a reduction target of 15 percent below 2005 emission levels by 2020. The City has identified GHG reduction measures in the transportation, energy, waste, water and wastewater, and land use sectors, coupled with state and exiting local actions, to reduce GHG emissions. GHG emissions largely involve energy consumption, (i.e., fossil-fuel usage); therefore, a reduction in GHG emissions would also equate to a reduction in energy consumption.

The following GHG reduction measures are applicable to energy:18

- Measure 1.1: Expand active transportation alternatives by providing infrastructure and enhancing connectivity for bicycle and pedestrian access.
- Measure 2.1: Expand the use of alternative-fuel vehicles, in part, by requiring large-scale nonresidential developments to provide a conduit for future electric-vehicle charging installations and encouraging the installation of conduits or electric-vehicle charging stations for all new development.
- Measure 3.1: Maximize energy efficiency in the built environment through standards and the plan review process.

<sup>&</sup>lt;sup>18</sup> City of South San Francisco. 2014. *City of South San Francisco Climate Action Plan.* Adopted: February 13. Available: https://www.ssf.net/home/showdocument?id=1318. Accessed: April 22, 2020

• Measure 4.1: Promote the installation of alternative energy facilities, in part by (i) requiring new nonresidential conditioned space of 5,000 square feet or more to meet energy reduction standards by providing a minimum of 50 percent of building electricity needs through on-site renewable energy, participating in a power purchase agreement to offset a minimum of 50 percent of modeled building electricity use, or complying with CALGreen (Title 24) Tier 2 energy efficiency requirements to exceed mandatory energy efficiency requirements by 20 percent or more and (ii) requiring all new development to install a conduit to accommodate wiring for solar.

The City's CAP is currently being updated, as part of the General Plan Update process. The 2014 CAP remains active until completion and adoption of the new CAP.

#### **Gateway Specific Plan**

The Gateway Specific Plan covers the portion of the East of 101 Area Plan from east of the Caltrain tracks to the eastern boundary of the parcels along the east side of Gateway Boulevard and the area between Oyster Point Boulevard and Grand Avenue on the northern and southern boundaries. The Specific Plan is "intended to provide for various commercial and research and development land uses integrated by consistent development standards." The Gateway Specific Plan includes the following construction standard applicable to energy:

• Construction Standard 1(d): Energy Conservation. All Buildings shall be designed, insulated and lighted in accordance with applicable federal and state energy conservation laws and regulations.

#### East of 101 Area Plan

The *East of 101 Area Plan*, which was adopted in 1994 and most recently amended in 2016, sets forth specific land use policies for the East of 101 Area. The City interprets the *East of 101 Area Plan* as a design-level document. Per Policy IM-5, the Gateway Specific Plan is not affected by the land use regulations of the East of 101 Area Plan. Therefore, the policies in the General Plan Open Space and Conservation Element are the guiding policies and supersede policies set forth in the *East of 101 Area Plan*. Nonetheless, the *East of 101 Area Plan* contains the following goals and policies applicable to energy:

- Goal 2.5: Encourage and support transportation modes other than single-occupancy automobiles, including ride sharing, bicycling, walking, and transit.
- Goal 2.6: Promote the use of public transit to and within the East of 101 Area.
- Policy CIR-7: All new developments shall contain facilities to support transit, provided by both public and private means.
- Policy CIR-8: The City of South San Francisco and the employers of the area shall work with the Multi-City TSM Agency, or any other applicable transportation management agencies, to increase shuttle bus service and usage.
- Policy CIR-13: All new developments of 25,000 square feet or more of gross building floor area and projected to accommodate 30 or more full-time equivalent employees, should include showers, locker rooms, and secure parking areas to support the use of bicycles.
- Goal 3.4: Promote water and energy conservation in all new development.

#### **Impacts and Mitigation Measures** 4.5.4

#### 4.5.4.1 **Significance Criteria**

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant energy impact if it would:

- Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation; or
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

#### 4.5.4.2 **Approach to Analysis**

Energy impacts associated with construction and operation of the proposed project were assessed and quantified where applicable using standard and accepted software tools and techniques. A summary of the methodology for calculating the project's energy use is provided below.

Appendix F of the State CEQA Guidelines provides guidance on determining whether a project would result in the wasteful, inefficient, or unnecessary consumption of energy resources. As stated in Appendix F, the goal of conserving energy implies the wise and efficient use of energy. The means for achieving this goal include:

- Decreasing overall per capita energy consumption;
- Decreasing reliance on fossil fuels such as coal, natural gas, and oil; and
- Increasing reliance on renewable energy sources.

Based on Appendix F, environmental considerations in the assessment of energy consumption impacts may include the following:

- The project's energy requirements and its energy efficiency by amount and fuel type for each stage of the project, including construction, operation, maintenance, and/or removal. If appropriate, the energy intensiveness of materials may be discussed.
- The effects of the project on local and regional energy supplies and requirements for additional capacity.
- The effects of the project on peak- and base-period demands for electricity and other forms of
- The degree to which the project complies with existing energy standards.
- The effects of the project on energy resources.
- The project's forecast transportation energy use requirements and its overall use of efficient transportation alternatives.

#### **Project Construction**

Construction of the project would require energy usage, such as electricity for mobile offices and fuel for off-road equipment, haul trucks, vendor trips, and workers' trips. The construction schedule, equipment operating details, trip numbers and lengths, and material quantities were provided by the project sponsor. In addition, information regarding total electricity usage during project construction was provided by the project sponsor. Fuel usage was quantified using the construction emissions profile generated by the California Emissions Estimator Model (CalEEMod), version 2016.3.2. The

number of metric tons of carbon dioxide equivalent ( $CO_2e$ ) associated with each construction activity (e.g., off-road equipment usage, worker trips) was converted to gallons of diesel or gasoline and summed accordingly, assuming all off-road activities, hauling, and vendor activities would be carried out with use of diesel equipment and vehicles and that all workers would use gasoline vehicles while traveling to and from the project site. For ease of comparison across all energy consumption amounts, gallons of diesel and gasoline was converted to BTUs, assuming an energy intensity of 124,000 BTUs per gallon of gasoline and 139,000 BTU per gallon of diesel. 19 The CalEEMod output files and fuel-use calculations are provided in Appendix B of this draft EIR.

#### **Project Operation**

Traffic data for the proposed project was provided by Fehr & Peers and evaluated using CARB's EMFAC2017 emissions model (version 1.02). The data were used to estimate energy consumption for motor vehicles traveling to and from the project site.<sup>20</sup> Because the office building at 701 Gateway Boulevard would remain on the site, operational mobile energy consumption associated with the existing building was estimated and presented under existing (2019) and future conditions (2021).21

To determine the energy consumption from mobile sources (i.e., from vehicle movement/travel), the number of employees on the project site and a VMT per capita conversion factor, both provided by Fehr & Peers, were used to estimate total VMT with and without the project. The number of daily employee trips assumes an alternate mode share (AMS) of 26 percent consistent with the City/County Association of Governments of San Mateo County (C/CAG) model and analysis for other similar projects within the City and the region. Fuel use was quantified by multiplying annual VMT under existing (2019) and with-project (2021) conditions as well as the respective per mile gasoline and diesel factors provided by EMFAC2017. The EMFAC0217 fuel factors and traffic data used in this analysis are provided in Appendix B of this draft EIR.

Energy consumption associated with the project site includes the combustion of natural gas and electricity usage, including the electricity used to convey water to the project site. Similar to mobilesource consumption, because the office building at 701 Gateway Boulevard would remain on the site, energy consumption associated with the existing building was estimated and presented under existing (2019) and future (2021) conditions. Water consumption numbers for the existing office building at 701 Gateway Boulevard and anticipated water consumption for the building were provided by the project sponsor. Per the project applicant, the existing parking lot at 751 Gateway Boulevard has no associated energy or water consumption.<sup>22</sup> A detailed discussion of existing and proposed water consumption is provided in Section 4.10, Less-than-Significant Impacts, Subsection 4.10.11, Utilities, of this draft EIR. Annual energy consumption at 751 Gateway was estimated using CalEEMod under future (2021) conditions. Energy associated with water conveyance was estimated

<sup>19</sup> Environment and Ecology. 2020. Energy Units and Calculators. Available: http://environmentecology.com/what-is-energy/90-energy-units-and-calculators.html. Accessed: April 17, 2020.

<sup>&</sup>lt;sup>20</sup> Hawkins, Mike. Fehr & Peers. March 13, 2020—email to Jessica Viramontes: 751 Gateway Updated Transportation Materials.

<sup>&</sup>lt;sup>21</sup> There are no emission sources associated with the existing surface parking lot; therefore, there are no emissions associated with the lot under the existing condition. Emissions presented for the existing condition represent those from the office building at 701 Gateway Boulevard.

<sup>&</sup>lt;sup>22</sup> Muchow, Chase. RMW Architecture & Interiors. March 2, 2020—email to Jessica Viramontes: 751 Gateway – Priority 1 and 2 Follow-Up.

using CalEEMod and added to the energy usage of the respective components. The 2021 modeling reflects implementation of state measures to reduce energy use and resulting GHG emissions (e.g., SB 100, Pavley). Quantifiable features, consistent with the proposed project, including low-flow fixtures, were incorporated into the CalEEMod model. The CalEEMod output files are provided in Appendix B of this draft EIR.

For ease of comparison, electricity consumption was converted to BTUs, assuming an energy intensity of 3,416 BTU per kilowatt hour.<sup>23</sup> Natural gas consumption is presented in CalEEMod in the million BTU (mBTU) format. In addition, gallons of diesel and gasoline was converted to BTUs, assuming an energy intensity of 124,000 BTU per gallon of gasoline and 139,000 BTU per gallon of diesel.<sup>24</sup>

### 4.5.4.3 Impact Evaluation

Impact EN-1: The proposed project would not result in a potentially significant environmental impact due to the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation. (*Less than Significant with Mitigation*)

#### Construction

Construction activities for the project would include demolition of a surface parking lot, tree removal, construction of a new office building, various site improvements, and utility installations. Construction-related energy usage would include the electricity needed to power electric construction equipment or deliver water to the construction site, the gasoline and diesel fuel used for transporting workers and materials to and from the construction site, and the fuel used for the operation of off-road equipment. Construction-related energy usage and consumption would vary throughout the course of project buildout and depend on the level of activity, the length of the construction period, the specific construction operations, the types of equipment, and the number of personnel, which could result in a *significant* energy impact if best management practices (BMPs) are not implemented. The estimated construction-related energy consumption for the project is provided in Table 4.5-4. As shown, project construction would consume approximately 18,502.5 million BTUs over the approximately 18-month construction period.

Table 4.5-4. Estimated Construction Energy Consumption from the Project (Million BTUs)

| Construction Year        | Electricity | Gasoline | Diesel   | Total by Year |
|--------------------------|-------------|----------|----------|---------------|
| 2020                     | 177.4       | 414.9    | 11,036.6 | 11,628.9      |
| 2021                     | 177.4       | 2,326.5  | 4,369.7  | 6,873.6       |
| <b>Total by Resource</b> | 354.8       | 2,741.4  | 15,406.3 | 18,502.5      |

Source: See Appendix B of this draft EIR for CalEEMod model outputs and construction energy calculations.

<sup>&</sup>lt;sup>23</sup> Environment and Ecology. 2020. *Energy Units and Calculators*. Available: http://environment-ecology.com/what-is-energy/90-energy-units-and-calculators.html. Accessed: April 17, 2020.

<sup>&</sup>lt;sup>24</sup> Ibid.

Mitigation Measure GHG-1, Require Implementation of BAAQMD-recommended Construction BMPs, would be implemented to reduce the amount of fossil fuel consumed during construction activities, such as ensuring that 15 percent of the construction vehicles/equipment fleet utilize alternative fuel (e.g., biodiesel or electricity). It would also reduce the energy intensiveness associated with new building materials and discarded construction and demolition waste by requiring construction contractors to implement the Bay Area Air Quality Management District's recommended BMPs—specifically, those associated with alternative fuel and recycling. Consequently, project construction would not result in the wasteful, inefficient, or unnecessary consumption of energy resources, and this impact would be *less than significant with mitigation*.

#### Operation

Operation of the proposed project would result in the consumption of electricity, natural gas, diesel, and gasoline (e.g., for emergency generator testing, heating, cooling, landscape maintenance). Operational energy consumption was evaluated under existing-year (2019) and buildout-year (2021) conditions. The analysis considers implementation of quantifiable measures to reduce energy usage (e.g., SB 100) as well as the benefits achieved through quantifiable sustainability measures, including the use of green consumer products, such as low-flow fixtures, which are incorporated into the project design. Table 4.5-5 presents the results of the operational energy analysis (expressed in terms of million BTU, or mBTU). The project's net energy consumption is the difference in operational energy consumption between 2021 with-project conditions and existing (2019) conditions at the project site.

As shown in Table 4.5-5, below, buildout of the project would increase operational energy consumption on the project site by approximately 73,712 million BTUs compared with existing conditions. Energy use per square foot would increase slightly to 0.31 million BTU per square foot compared with the existing condition, 0.26 million BTU per square foot, despite the increase in building area (i.e., more than double). This comparatively small increase in energy usage per square foot is attributable to the energy efficiency measures to be incorporated into the project, which are described below.

The project would install Energy Star appliances, provide electric-vehicle parking spaces, and qualify for United States Green Building Council Leadership in Energy and Environmental Design (LEED) Gold certification. It would also meet South San Francisco Municipal Code and CALGreen building requirements as well as the International WELL and Fitwel Building Institute Standards. <sup>25,26</sup> Although the proposed project would allow for the use of natural gas appliances and heaters, all units would meet high-efficiency standards, thereby limiting the amount of natural gas consumed to the greatest extent possible. In addition, the proposed project would also incorporate solar-ready rooftop connectivity for future installation

The proposed project would be designed to meet WELL tenant-ready standards but may not formally certify. The WELL Building Standard is a performance-based building standard for measuring and monitoring features within the built environment that may affect human health through air, water, light, and other concepts. The standards provide ways for buildings to be designed to improve human comfort and enhance health and wellness within the built environment.

<sup>&</sup>lt;sup>26</sup> The Fitwel Standard includes evidence-based design and operational strategies that enhance a building's environment for its occupants. The Fitwel Standard has seven health impact categories for evaluating a building, including, but not limited to, access to healthy food, opportunities for physical activity, and promotion of occupant safety.

Table 4.5-5. Estimated Operational Energy Consumption of the Proposed Project

| Condition/Source   | Million BTU/Year    |
|--|---------------------|
| Existing (2019)  |                     |
| 701 Gateway (existing office building) and 751 Gateway (ex | isting parking lot) |
| Electricity  | 5,985               |
| Natural Gas  | 4,467               |
| Mobile – gasoline  | 30,160              |
| Mobile – diesel  | 3,986               |
| Total <sup>a</sup>   | 44,598              |
| Proposed Project (2021)                                    |                     |
| 701 Gateway Boulevard (existing office building)           |                     |
| Electricity  | 5,985               |
| Natural Gas  | 4,467               |
| Mobile – gasoline  | 28,532              |
| Mobile – diesel  | 4,101               |
| 751 Gateway Boulevard (proposed R&D and office building)   |                     |
| Electricity  | 18,764              |
| Natural Gas  | 3,451               |
| Mobile – gasoline  | 46,349              |
| Mobile – diesel  | 6,661               |
| Total <sup>a</sup>   | 118,310             |
| Net Increase with Proposed Project                         |                     |
| 2021 v. Existing   | 73,712              |
| Energy per Square Foot (mBTU/SF)                           |                     |
| Existing (2019)  | 0.26                |
| 2021 with Proposed Project                                 | 0.31                |

Source: See Appendix B of this draft EIR for CalEEMod model outputs and mobile emissions calculations.

Note: The energy consumption amounts provided in the table reflect implementation of quantifiable state measures to reduce energy consumption (e.g.,  $SB\ 100$ ).

of photovoltaic panels. Furthermore, the project would implement a robust transportation demand management program that would encourage alternatives mode of transportation to reduce single-occupant vehicle use as well as fuel consumption. This program would include, but would not be limited to, carpool and vanpool ride-matching services, a shuttle program, short-and long-term bicycle parking, free parking for carpools and vanpools, a guaranteed ride home for emergency situations, a direct route to transit, showers and lockers, a designated employer contact, information boards and kiosks, passenger loading zones, pedestrian connections, Transportation Management Association participation, and promotional programs, such as orientation packets for new tenants and employees regarding transportation alternatives, which reduce VMT and, consequently, the amount of energy (i.e., gasoline and diesel) consumed.

<sup>&</sup>lt;sup>a</sup> Totals may not add up because of rounding.

mBTU/SF = million BTUs per square foot

Based on the above analysis, operation of the project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources, and this impact would be *less than significant*. No mitigation is required. Although not required to support a less-than-significant determination or quantified for the purposes of this analysis, implementation of Mitigation Measure TR-1, as discussed in Section 4.9, *Transportation and Circulation*, of this draft EIR, would fund the project's fair share towards design and construction of off-site improvements to reduce the number of vehicle trips, which would reduce the project's annual gasoline and diesel usage. The improvements would require City acquisition of private right-of-way and funding from other sources. Should the improvements recommended in Mitigation Measure TR-1 be implemented, the project's energy usage is anticipated to be less than the amount presented in Table 4.5-5, above.

## Impact EN-2: The proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. (Less than Significant)

State and local renewable energy and energy efficiency plans that are applicable to the proposed project are discussed above under *Regulatory Framework*. State plans include the AB 1493 Pavley Rules, California Title 24 energy efficiency standards, EO B-16-12, SB 350, and SB 100. Each of these contains required standards related to energy efficiency and renewable energy development. Local plans that address energy efficiency and are designed to achieve the state's RPS mandates include PG&E's and PCE's 2018 IRPs and the City's CAP. The City's General Plan and East of 101 Area Plan also include goals and policies related to energy use and energy reductions.

As discussed above under Impact EN-1, the project would incorporate sustainability and transportation features. Furthermore, energy use by square foot would increase only slightly compared to existing conditions, despite the increase in building area that would occur (more than double). The proposed project would install Energy Star appliances and qualify for United States Green Building Council Leadership in Energy and Environmental Design (LEED) Gold certification and meet the International WELL and Fitwel Building Institute Standards. In addition, any natural gas appliance or heater installed as a result of the project would meet high-efficiency energy standards, and electric-vehicle parking spaces would be provided on-site. Furthermore, the proposed project would incorporate solar-ready rooftop connectivity for future installation of photovoltaic panels.

The project would be required to comply with state and local renewable energy and energy efficiency plans. As a result, it would benefit from renewable energy development and increases in energy efficiency. Energy usage from increases in VMT and the number of average daily trips in the area is expected to become more efficient under regulations included in Pavley and E0 B-16-12, which address average fuel economy and commercialization of zero-emission vehicles, respectively. Building energy efficiency is also expected to increase as a result of compliance with Title 24 building codes, which are expected to move toward zero net energy for new construction and 100 percent renewable energy under SB 350 and SB 100 regulations. With implementation of the project, PG&E and PCE would continue to pursue the procurement of renewable energy sources to meet their RPS portfolio goals and comply with state regulations. Therefore, the proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency, and the impact would be *less than significant*. No mitigation is required.

### 4.5.4.4 Cumulative Impacts

The cumulative geographic context for energy is the service area of PG&E (i.e., electric and natural gas service area), which comprises the larger Northern California area and includes the PCE service area.

Impact C-EN-1: The proposed project in combination with past, present, and reasonably foreseeable projects would not result in the wasteful, inefficient, or unnecessary consumption of energy resources during construction or operation. (*Less than Significant*)

Continued growth throughout PG&E's service area could contribute to ongoing increases in demand for electricity and natural gas. These anticipated increases would be countered, in part, as state and local requirements related to renewable energy become more stringent and energy efficiency increases. The extent to which cumulative development through 2021, the project's buildout year, could result in the wasteful, inefficient, or unnecessary consumption of energy resources would depend on the specific characteristics of new development, which are not known at this time. As discussed previously, SB 100 obligates utilities to supply 100 percent carbon-free electricity by 2045; PG&E reached California's 2020 renewable energy goal 3 years ahead of schedule and is currently projected to meet the new SB 100 goal that calls for 60 percent renewable energy by 2030, also ahead of schedule. Similarly, the Pavley standards are expected to increase average fuel economy to roughly 54.5 miles per gallon by 2025, thereby lowering the demand or fossil fuels. Therefore, it is anticipated that future energy users will become more efficient and less wasteful over time.

The proposed project would be completed in 2021. Buildout of the proposed project would increase operational energy consumption on the project site by 73,710 million BTUs compared to existing conditions. However, energy use per square foot would increase only slightly to 0.31 million BTU per square foot from 0.26 million BTU per square foot, despite more than doubling the building area, because of the energy efficiency of the future building and vehicles, which would be subject to increasingly robust regulations over time to meet the state's renewable energy mandates. As discussed above in the impact analysis, the proposed project would install Energy Star appliances, incorporate high-efficiency natural gas appliances, qualify for United States Green Building Council LEED Gold certification standards, and meet South San Francisco Municipal Code and CALGreen building requirements.

Similar to the proposed project, the cumulative projects would most likely include features that would reduce energy consumption and increase renewable energy generation. For these reasons, the proposed project in combination with past, present, and reasonably foreseeable future projects would not result in a significant cumulative impact related to the wasteful, inefficient, or unnecessary consumption of energy resources. The cumulative impact would be *less than significant*. No mitigation is required.

Impact C-EN-2: The proposed project in combination with past, present, and reasonably foreseeable projects would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. (*Less than Significant*)

Similar to the proposed project, the cumulative projects would be required to comply with all adopted state and local renewable energy and energy efficiency regulations and plans. Therefore, the proposed project in combination with past, present, and reasonably foreseeable future projects would not result in a significant cumulative impact related to conflicting with or obstructing a state or local plan for renewable energy or energy efficiency. The cumulative impact would be *less than significant*. No mitigation is required.

## 4.6 Geology and Soils

## 4.6.1 Introduction

This section describes the environmental and regulatory setting for geology and soils. It also describes impacts associated with geology and soils that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate.

## 4.6.2 Environmental Setting

## 4.6.2.1 Physiography

South San Francisco comprises three distinct topographic zones: a lowland zone, primarily east of U.S. 101, underlain by deposits of bay mud up to 80 feet; an upland zone, mostly urbanized with cut and fill in some areas superimposed over alluvial soils of the Colma Creek floodplain; and a hillside zone with some slopes of more than 30 percent, with soils characterized as sandy and gravelly loams having generally high to very high erosion potential. The project site is in the lowland zone at approximately 34 to 21 feet above mean sea level. It gently slopes from west to east, toward Gateway Boulevard.

#### 4.6.2.2 Subsurface Conditions

The project site is underlain by medium-dense to very dense sands, with some very stiff to hard clays overlying residual soil. Bedrock was encountered at depths between 40.5 feet below ground surface (bgs) and 80 feet bgs. Rock was not encountered in some borings, including boring LB-8, which extended to 101.5 feet bgs. Within the building footprint, bedrock is expected to be present approximately 40 to 75 feet bgs.

## 4.6.2.3 Seismicity and Seismic Hazards

#### **Primary Seismic Hazards**

#### **Surface Fault Rupture**

The project site is not located within an Alquist-Priolo earthquake fault zone and no known fault or potentially active fault exists on the project site. The nearest fault is the Hillside fault, located approximately 0.3 mile south of the project site. The Hillside fault is pre-Quaternary (i.e., older than 1.6 million years or without recognized Quaternary displacement), and a review of the Quaternary Fault and Fold Database as well as the Fault Activity Map of California concluded that the Hillside fault was inactive, with the latest activity occurring at least 1.6 million years ago. In a seismically active area such as the San Francisco Bay Area, the possibility of future faulting occurring in areas where faults have not been mapped is small but the possibility exists.

California Geologic Survey, 2000. San Francisco South Quadrangle Earthquake Fault Zones and Seismic Hazard Zones Map, released November 17, 2000. Available: http://gmw.conservation.ca.gov/SHP/EZRIM/Maps/SAN\_FRANCISCO\_SOUTH\_EZRIM.pdf. Accessed May 10, 2018.

#### **Seismic Ground Shaking**

Ground shaking is the most widespread hazardous phenomenon associated with seismic activity. The project site is within a seismically active area that will most likely experience periodic minor earthquakes and a major earthquake (i.e., moment magnitude greater than 6) on one of the nearby faults during the service life of the project. Table 4.6-1 identifies the major faults in the project area and their distance from the project site. The San Andreas, Hayward, and Calaveras faults are the most active and have the highest probability of experiencing a magnitude 6.7 or greater earthquake in the next 30 years.

Table 4.6-1. Regional Faults and Seismicity

| Fault Segment                | Approximate<br>Distance from<br>Project Site (mile) | Direction<br>from<br>Project Site | Mean<br>Moment<br>Magnitude |
|------------------------------|---|-----------------------------------|-----------------------------|
| N. San Andreas – Peninsula   | 3.1   | West                              | 7.2                         |
| N. San Andreas (1906 event)  | 3.1   | West                              | 8.05                        |
| San Gregorio Connected       | 8.7   | West                              | 7.5                         |
| N. San Andreas – North Coast | 13.0  | Northwest                         | 7.5                         |
| Total Hayward                | 14.9  | Northeast                         | 7.0                         |
| Total Hayward-Rodgers Creek  | 14.9  | Northeast                         | 7.3                         |
| Monte Vista-Shannon          | 17.4  | Southeast                         | 6.5                         |
| Total Calaveras              | 23.6  | East                              | 7.0                         |
| Mount Diablo Thrust          | 34.9  | Northeast                         | 6.7                         |
| Green Valley Connected       | 28  | Northeast                         | 6.8                         |
| Rodgers Creek                | 29.8  | North                             | 7.1                         |
| Point Reyes                  | 31.1  | Northwest                         | 6.9                         |

Source: Langan Engineering and Environmental Services, Inc. 2019. Geotechnical Investigation, 751 Gateway Boulevard, South San Francisco, CA 75065-1501. November. Oakland, CA.

The San Andreas fault is the nearest active fault to the project site. Since 1800, four major earthquakes have been recorded on the San Andreas fault. The Hayward fault experienced a major earthquake in 1868, and the Calaveras experienced significant earthquakes in 1861 and 1984. The 2014 Working Group on California Earthquake Probabilities forecast that there is a 72 percent chance that an earthquake with a magnitude 6.7 or greater in the San Francisco Bay Area over the next 30 years. The intensity of earthquake ground motion at the project site would depend on the characteristics of the generating fault, the distance to the earthquake epicenter, the magnitude, and the duration of the earthquake.

<sup>&</sup>lt;sup>2</sup> The 2014 Working Group on California Earthquake Probabilities (2015). "UCERF3: A new earthquake forecast for California's complex fault system", U.S. Geological Survey 2015–3009, 6 p., http://dx.doi.org/10.3133/fs20153009.

#### **Secondary Seismic Hazards**

#### Liquefaction

Liquefaction occurs when saturated soils lose cohesion, strength, and stiffness with applied shaking, such as that from an earthquake. The lack of cohesion causes solid soil to behave like a liquid, resulting in ground failure. When a load such as a structure is placed on ground that is subject to liquefaction, ground failure can result in the structure sinking and soil being displaced. Ground failure can take on many forms, including flow failures, lateral spreading, lowering of the ground surface, ground settlement, loss of bearing strength, ground fissures, and sand boils. Liquefaction within subsurface layers, which can occur during ground shaking associated with an earthquake, can also result in ground settlement.

The project site is within an area that has not been evaluated for liquefaction or seismic landslides by the California Geological Survey. The Health and Safety Element of the General Plan notes that a large portion of the City, primarily east of U.S. 101, is underlain by deposits of bay mud, up to 80 feet deep in some places, that could be subject to liquefaction. The geotechnical investigation prepared for the project concluded that some of the subsurface soil layers could liquefy during an earthquake, resulting in settlement on the order of 1 inch. The liquefiable layers do not appear to be continuous and would not create bearing issues for the foundation. However, liquefaction could lead to differential settlement.

#### **Lateral Spreading**

Lateral spreading is a phenomenon in which a surficial soil displaces along a shear zone that formed within an underlying liquefied layer. The surficial blocks are transported downslope or in the direction of a free face, such as a bay, by earthquake and gravitational forces. Lateral spreading is generally the most pervasive and damaging type of liquefaction-induced ground failure generated by earthquakes. San Mateo County, where the project site is located, has not been evaluated for seismic hazard zones for liquefaction or seismic landslides.<sup>3</sup> The geotechnical investigation prepared for the project indicated that soils would need to consist of saturated, cohesionless sandy sediments for significant lateral spreading to occur. In general, the potentially liquefiable soils underlying the project site consist of clayey and silty sands that are not likely to be continuous beneath the site. Therefore, the potential for lateral spreading at the project site is low.

## 4.6.2.4 Expansive Soils and Weak Soils

Seismic densification can occur when strong ground shaking in loose, clean granular deposits above the water table results in ground surface settlement. The geotechnical investigation prepared for the project encountered approximately 13 feet of medium-dense to dense sand above the water table and estimated that up to 0.5 inch of settlement could occur because of seismic densification. However, the maximum predicted amount does not necessarily occur at the same locations. Laboratory testing performed on near-surface samples of clay indicates that the site has low expansion potential,<sup>4</sup> with plasticity indices of 7 to 15. The geotechnical investigation prepared for the project indicated that the project site has a low expansion potential.

<sup>&</sup>lt;sup>3</sup> California Geological Survey. 2020. *Earthquake Zones of Required Investigation*. Available: https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed: June 4, 2020.

Expansive soil undergoes volume changes with changes in moisture content.

#### 4.6.2.5 Landslides

Landslides occur when the stability of a slope changes from a stable to an unstable condition. The stability of a slope is affected by the following primary factors: inclination, material type, moisture content, orientation of layering, and vegetative cover. In general, steeper slopes are less stable than more gently inclined ones. San Mateo County, where the project site is located, has not been evaluated for seismic hazard zones for seismic landslides. In South San Francisco, the highest landslide risk is near the south flank of San Bruno Mountain, which is approximately 1.5 miles north of the project site. The project site, which is approximately 34 to 21 feet above mean sea level, slopes gently from west to east, toward Gateway Boulevard. Therefore, due to the distance between the project site and potential landslide areas, the likelihood of a landslide at the project site is low.

## 4.6.2.6 Paleontological Resources

Geologic units present at the project site are older Holocene- and Pleistocene-aged continental and marine deposits (Qc) at ground surface and the Franciscan Formation, specifically sandstone, shale, and conglomerate (KJfss), at depth.<sup>5</sup> The Holocene- and Pleistocene-aged continental and marine deposits consist of sand, silt, clay, and gravel and include the Colma Formation, as at the project site.<sup>6</sup> The Colma Formation is a gravelly, sandy clay.<sup>7</sup> The Franciscan Formation consists of chaotic mixtures of rock masses in a sheared matrix.

The older Holocene- and Pleistocene-aged continental and marine deposits include the Colma Formation, which is known to have yielded vertebrate fossils.<sup>8</sup> At a site on Pacific Avenue in San Francisco, *Mammuthus* (an extinct genus that belongs to the order of trunked mammals, including mammoth) and *Bison* (bison) fossils were recovered. Furthermore, vertebrate paleontological resources have been recovered from sites in South San Francisco from sediments of a similar age. The University of California Museum of Paleontology identified remains of *Alces* (moose and elk) and *Equus* (horse, donkey, and zebra) in this area.<sup>9</sup>

The geotechnical investigation identified the Franciscan Formation at depths exceeding the maximum depth of excavation; however, because the project site is adjacent to a surface exposure of the Franciscan Formation, it is possible that this unit could underlie areas of proposed excavation. Paleontological resources records have identified significant fossils in the Franciscan Formation. Vertebrate paleontological resources recovered from this unit include *Ichthyosaurus* (San Joaquin County) and *Plesiosaurus* (San Luis Obispo County). Although vertebrate fossils are uncommon in this geologic unit, fossils have been important in understanding formation of the Franciscan Formation. 11

Wagner, D.L., E.J. Bortugno, and R.D. McJunkin. 1991. *Geologic Map Explanation of the San Francisco-San Jose Quadrangle, California, 1991.* Available: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/rgm/RGM\_005A/RGM\_005A\_SanFrancisco-SanJose\_1991\_Sheet2of5.pdf. Accessed: March 12, 2020.

<sup>6</sup> Ibid.

Rodda, P.U., and N. Baghai. 1993. Late Pleistocene Vertebrates from Downtown San Francisco, California. *Journal of Paleontology* 67(5):1058–1063.

<sup>8</sup> Ibid.

<sup>&</sup>lt;sup>9</sup> University of California Museum of Paleontology. 2020. *Advanced Specimen Search, San Mateo County*. Available: https://ucmpdb.berkeley.edu/advanced.html. Accessed: March 12, 2020.

<sup>&</sup>lt;sup>10</sup> University of California Museum of Paleontology. 2020. *Advanced Specimen Search, Franciscan Formation.* Available: https://ucmpdb.berkeley.edu/advanced.html. Accessed: March 12, 2020.

Wakabayashi, J. 1992. Nappes, Tectonics of Oblique Plate Convergence, and Metamorphic Evolution Related to 140 Million Years of Continuous Subduction, Franciscan Complex, California. *The Journal of Geology* 100:1(19-40). Chicago, IL: University of Chicago Press.

## 4.6.3 Regulatory Framework

#### 4.6.3.1 Federal

#### **Earthquake Hazard Reduction Act of 1977**

Federal laws codified in United States Code Title 42, Chapter 86, were enacted to reduce risks to life and property from earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. Implementation of the requirements are regulated, monitored, and enforced at the state and local levels.

#### 4.6.3.2 State

#### The Alquist-Priolo Earthquake Fault Zoning Act of 1972

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Alquist-Priolo Act) (PRC Section 2621 et seq.) is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location and construction of most types of structures intended for human occupancy<sup>12</sup> over active fault traces and strictly regulates construction in corridors along active faults. The California state geologist has established regulatory zones along active faults,<sup>13</sup> called "earthquake fault zones," and published maps that identify areas where surface traces of active faults are present.<sup>14</sup>

#### **Seismic Hazards Mapping Act**

The Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) directs the California Geological Survey to identify and map areas that are prone to liquefaction and landslides resulting from seismic evens. The act mandates project sponsors to have a site-specific geotechnical investigation performed to identify potential seismic hazards and formulate mitigation measures prior to permitting most developments within specific zoned areas.

#### **California Building Standards Code**

The California Building Standards Code, or state building code, is codified in CCR Title 24. The state building code provides standards that must be met to safeguard life and limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures within the state. The state building code generally applies to all occupancies in California, with modifications adopted in some instances by state agencies or local governing bodies. The current state building code incorporates, by adoption, the 2018 edition of the International Building Code of the International Code Council, with California amendments. These amendments include building design and construction criteria that have been tailored for California earthquake conditions.

With reference to the Alquist-Priolo Act, a structure for human occupancy is defined as one "used or intended for supporting or sheltering any use or occupancy that is expected to have a human occupancy rate of more than 2,000 person-hours per year" (CCR, Title 14, Division 2, Section 3601[e]).

<sup>&</sup>lt;sup>13</sup> An active fault, for the purposes of the Alquist-Priolo Act, is one that has ruptured in the past 11,000 years.

<sup>&</sup>lt;sup>14</sup> California Geological Survey. 2020. *The Alquist-Priolo Earthquake Fault Zoning Act*. Available: http://www.conservation.ca.gov/cgs/rghm/ap. Accessed: March 17, 2020.

Chapter 16 of the state building code deals with structural design requirements governing seismically resistant construction (Section 1604), including, but not limited to, factors and coefficients used to establish a seismic site class and seismic occupancy category appropriate for the soil/rock at the building location and the proposed building design (Sections 1613.5 through 1613.7). Chapter 18 includes, but is not limited to, the requirements for foundation and soil investigations (Section 1803); excavation, grading, and fill (Section 1804); allowable load-bearing values of soils (Section 1806); foundations and retaining walls (Section 1807); and foundation support systems (Sections 1808 through 1810). Chapter 33 includes, but is not limited to, requirements for safeguards at work sites to ensure stable excavations and cut-and-fill slopes (Section 3304) as well as the protection of adjacent properties, including requirements for noticing (Section 3307). Appendix J of the state building code includes, but is not limited to, grading requirements for the design of excavation and fill (Sections J106 and J107), specifying maximum limits on the slope of cut-and-fill surfaces and other criteria, required setbacks and slope protection for cut-and-fill slopes (J108), and erosion control through the provision of drainage facilities and terracing (Sections J109 and J110).

#### **California Division of Occupational Safety and Health Regulations**

Construction activities are subject to occupational safety standards pertaining to excavation, shoring, and trenching, as specified in California Division of Occupational Safety and Health regulations (Title 8).

#### State Historic Significance Criteria

As discussed in Section 4.7.5.2, Significance Criteria, Appendix G of the California Environmental Quality Act (CEQA) Guidelines includes the following question: "Would the project directly or indirectly destroy a unique paleontological resource or site?" Although CEQA does not define what constitutes "a unique paleontological resource or site," Section 21083.2 defines *unique* archaeological resources as "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."

This definition is equally applicable to recognizing a unique paleontological resource or site. CEQA Section 15064.5(a)(3)(D) provides additional guidance, indicating that, generally, a resource shall be considered historically significant if it has yielded, or may be likely to yield, information important in prehistory or history.

The CEQA lead agency having jurisdiction over a project is responsible for ensuring that paleontological resources are protected in compliance with CEQA and other applicable statutes. PRC Section 21081.6, Mitigation Monitoring Compliance and Reporting, requires the CEQA lead agency to demonstrate project compliance with the mitigation measures developed during the environmental impact review process.

#### 4.6.3.3 Local

#### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Health and Safety Element, which acknowledges and mitigates the risks posed by hazards (e.g., fire). The General Plan includes the following policy applicable to seismic activity and geologic hazards:

• Policy 8.1-G-1: Minimize the risk to life and property from seismic activity and geologic hazards in South San Francisco.

#### **City of South San Francisco Building Code**

The City Building Division enforces the minimum standards found in the various codes adopted by the state through the Building Standards Commission and as adopted and amended by the City Council. In particular, the City adopted by reference the California Building Standards Code, volumes 1 and 2 (2019 edition), as the building code for the City of South San Francisco.<sup>15</sup>

## East of 101 Area Plan<sup>16</sup>

The *East of 101 Area Plan*, which was adopted in 1994 and most recently amended in 2016, sets forth specific land use policies for the East of 101 Area. The City interprets the *East of 101 Area Plan* as a design-level document. Per Policy IM-5, the *Gateway Specific Plan* is not affected by the land use regulations of the *East of 101 Area Plan*. Therefore, the policies in the General Plan Health and Safety Element are the guiding policies and supersede all Geotechnical Safety Element policies set forth in Chapter 10 of the *East of 101 Area Plan*. Nonetheless, applicable policies from the *East of 101 Area Plan* Geotechnical Safety Element are as follows:

- Policy GEO-1: The City shall assess the need for geotechnical investigations on a project-byproject basis on site in areas of fill shown on Figure 17, and shall require such investigations where needed.
- Policy GEO-2: Where fill remains under a proposed structure, project developers shall design and construct appropriate foundations.
- Policy GEO-7: New slopes greater than 5 feet in height, either cut in native soils or rock, or
  created by placing fill material, shall be designed by a geotechnical engineer and should have an
  appropriate factor of safety under seismic loading. If additional load is to be placed at the top of
  the slope, or if extending a level area at the toe of the slope requires removal of part of the slope,
  the proposed configuration shall be checked for an adequate factor of safety by a geotechnical
  engineer.

<sup>&</sup>lt;sup>15</sup> South San Francisco Municipal Code Section 15.08.010.

<sup>&</sup>lt;sup>16</sup> City of South San Francisco. 1994. East of 101 Area Plan. Prepared by Brady and Associates. Available: https://www.ssf.net/home/showdocument?id=508. Accessed: May 8, 2020.

- Policy GEO-8: The surface of fill slopes shall be compacted during construction to reduce the likelihood of surficial sloughing. The surface of cut or fill slopes shall also be protected from erosion due to precipitation or runoff by introducing a vegetative cover on the slope or by other means. Runoff from paved and other levels areas at the top of the slope shall be directed away from the slope.
- Policy GEO-10: In fill areas mapped on Figure 17, a geotechnical investigation to determine the true nature of the subsurface materials and the possible effects of liquefaction shall be conducted by the project developer before development.
- Policy GEO-11: Development shall be required to mitigate the risk associated with liquefaction.
- Policy GEO-12: Structural design of buildings and infrastructure shall be conducted according to the Uniform Building Code and appropriate local codes of practice which specify procedures and details to reduce the effects of ground shaking on structures.

## 4.6.4 Impacts and Mitigation Measures

## 4.6.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant geology and soils impact if it would:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo
     Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other
     substantial evidence of a known fault. (Refer to Division of Mines and Geology Special
     Publication 42.);
  - Strong seismic ground shaking;
  - Seismically related ground failure, including liquefaction;
  - o Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater; or
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

# 4.6.4.2 Approach to Analysis

Evaluation of the proposed project is based on the geotechnical investigation prepared for the project, unless otherwise noted.<sup>17</sup> The geotechnical investigation concluded that the proposed project is feasible from a geotechnical standpoint, provided the recommendations included in the investigation are incorporated into project plans and specifications.

In the *California Building Industry Association v. Bay Area Air Quality Management District* case, decided in 2015,<sup>18</sup> the California Supreme Court held that CEQA does not generally require lead agencies to consider how existing environmental conditions might affect a project, except where the project would significantly exacerbate an existing environmental condition. Accordingly, placing new development in an existing or future seismic hazard area or an area with unstable soils is not considered an impact under CEQA unless the project would significantly exacerbate the seismic hazard or unstable soil conditions. Therefore, the analysis below evaluates whether the proposed project would exacerbate existing or future seismic hazards or unstable soils at the project site and result in a substantial risk of loss, injury, or death.

### **Paleontological Resources**

The Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources (Procedures)<sup>19</sup> of the Impact Mitigation Guidelines Revision Committee of the Society of Vertebrate Paleontology include procedures for the investigation, collection, preservation, and cataloging of fossil-bearing sites. This includes the designation of paleontological sensitivity. The Procedures are widely accepted among paleontologists and followed by most investigators. The Procedures identify two key phases of paleontological resource protection, (1) assessment and (2) implementation. Assessment involves identifying the potential for a project site or area to contain significant, nonrenewable paleontological resources that could be damaged or destroyed by project excavation or construction. Implementation involves formulating and applying measures to reduce such adverse effects.

For the assessment phase, the Society of Vertebrate Paleontology uses one of four sensitivity categories for sedimentary rocks (i.e., high, undetermined, low, no potential) to define the level of potential.<sup>20</sup>

• **High Potential**. Assigned to geologic units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered as well as sedimentary rock units suitable for the preservation of fossils (middle Holocene and older fine-grained fluvial sandstones, fine-grained marine sandstones, etc.). Paleontological potential refers to the potential for yielding abundant fossils, a few significant fossils, or recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data.

<sup>&</sup>lt;sup>17</sup> Langan Engineering and Environmental Services, Inc. 2019. *Geotechnical Investigation, 751 Gateway Boulevard, South San Francisco*, CA 75065-1501. November. Oakland, CA.

<sup>&</sup>lt;sup>18</sup> California Building Industry Association v. Bay Area Air Quality Management District, 62 Cal.4th 369. Opinion filed December 17, 2015. Available: https://caselaw.findlaw.com/ca-supreme-court/1721100.html. Accessed: March 13, 2020.

Society of Vertebrate Paleontology. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Available: http://vertpaleo.org/Membership/Member-Ethics/SVP\_Impact\_ Mitigation\_Guidelines.aspx. Accessed: March 12, 2020.

<sup>20</sup> Ibid.

- **Undetermined Potential.** Assigned to geologic units for which little information is available concerning their paleontological content, geologic age, and depositional environment. In cases where no subsurface data already exist, paleontological potential can sometimes be assessed by subsurface site investigations.
- **Low Potential.** Field surveys or paleontological research may determine that a geologic unit has low potential for yielding significant fossils (e.g., basalt flows).
- **No Potential.** Some geologic units have no potential to contain significant paleontological resources (e.g., high-grade metamorphic rocks [gneisses and schists] and plutonic igneous rocks [granites and diorites]).

The methods used to analyze potential impacts on paleontological resources and develop mitigation for the identified impacts followed the Society of Vertebrate Paleontology's Procedures.

#### Assessment

- o Identify the geologic units that would be affected by the project, based on the project's depth of excavation—either at the ground surface or below the ground surface, defined as at least 5 feet below the ground surface.
- Evaluate the potential of the identified geologic units to contain significant fossils (paleontological sensitivity).
- o Identify impacts on paleontologically sensitive geologic units as a result of near-term and longer-term construction and operation that involve ground disturbance.
- Evaluate impact significance.

#### Implementation

 According to the identified degree of sensitivity, formulate and implement measures to mitigate potential impacts.

The potential of the project to affect paleontological resources is related to ground disturbance. Geologic units at the project site were identified through California Geological Survey regional maps.<sup>21</sup> A determination regarding the presence of paleontological resources in the units was based on the fossil record, as documented by the University of California Museum of Paleontology, 22,23

After the records search, the paleontological sensitivity of the units was assessed according to the Procedures.24

<sup>&</sup>lt;sup>21</sup> Wagner, D.L., E.J. Bortugno, and R.D. McJunkin. 1991. Geologic Map of the San Francisco-San Jose Quadrangle, California, 1:250,000. Available: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/rgm/RGM\_005A/ RGM\_005A\_SanFrancisco-SanJose\_1991\_Sheet1of5.pdf. Accessed: March 12, 2020.

<sup>&</sup>lt;sup>22</sup> University of California Museum of Paleontology. 2020. *Advanced Specimen Search, San Mateo County.* Available: https://ucmpdb.berkeley.edu/advanced.html. Accessed: March 12, 2020.

<sup>&</sup>lt;sup>23</sup> University of California Museum of Paleontology. 2020. Advanced Specimen Search, Franciscan Formation. Available: https://ucmpdb.berkeley.edu/advanced.html. Accessed: March 12, 2020.

<sup>&</sup>lt;sup>24</sup> Society of Vertebrate Paleontology. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Available: http://vertpaleo.org/Membership/Member-Ethics/SVP\_Impact\_Mitigation\_Guidelines.aspx. Accessed: March 12, 2020.

For the purposes of this analysis, an impact on paleontological resources was considered significant, thereby requiring mitigation, if it would result in any of the following:

- Damage to, or destruction of, vertebrate paleontological resources.
- Damage to, or destruction of, any paleontological resource that:
  - Provides important information about evolutionary trends, including the development of biological communities;
  - o Demonstrates unusual circumstances in the history of life;
  - o Represents a rare taxon or a rare or unique occurrence;
  - o Is in short supply and in danger of being destroyed or depleted;
  - Has a special and particular quality, such as being the oldest of its type or the best available example of its type; or
- Provides information used to correlate strata for which it may be difficult to obtain other types of age information.

# 4.6.4.3 Impact Evaluation

Impact GEO-1: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismically related ground failure, including liquefaction, or landslides. (*Less than Significant*)

# **Fault Rupture**

As discussed in Section 4.6.2.3, *Seismicity and Seismic Hazards*, the project site is not within an Alquist-Priolo earthquake fault zone, and no known potentially active fault exists in the vicinity of the project site. In addition, the geotechnical investigation found no evidence of active faulting on the project site and concluded that the risk of surface faulting and consequent secondary failure from previous unknown faults is very low. Therefore, the project would not exacerbate the risk of surface fault rupture and this impact would be *less than significant*. No mitigation is required.

#### **Ground Shaking**

As discussed in Section 4.6.2.3, *Seismicity and Seismic Hazards*, the project site is in a seismically active area. The project site is expected to experience strong to violent ground shaking during a major earthquake.<sup>25</sup> However, the proposed project would comply with the California Building Standards Code's seismic requirements, which were established to reduce risks to life from damage to newly constructed buildings due to seismic hazards. Therefore, the project would not exacerbate the risk of ground shaking resulting from a seismic and this impact would be *less than significant*. No mitigation is required.

A "strong" earthquake is defined on the Modified Mercalli Intensity scale as an VI. It would be felt by all and cause damage to weak plaster, adobe buildings, and some masonry buildings. A "violent" earthquake is defined on the Modified Mercalli Intensity scale as a IX. It could cause some masonry buildings to collapse and other buildings shift off their foundations (see http://resilience.abag.ca.gov/shaking/mmi/).

## **Soil Liquefaction**

As discussed in Section 4.6.2.3, *Seismicity and Seismic Hazards*, the project site is within an area that is underlain by deposits of bay mud. The geotechnical investigation concluded that some underlying layers could liquefy during an earthquake. Therefore, the geotechnical investigation recommends that the building foundation be designed to accommodate localized settlement under the building footprint (i.e., up to 1 inch of differential liquefaction settlement between column locations). The proposed project would comply with the recommendations in the geotechnical investigation and standard regulatory requirements—including completion of a detailed geotechnical investigation required by the California Building Code, which are adopted by reference under the South San Francisco Building Code—and, therefore, would result in a *less-than-significant* impact related to seismically related ground failure, including liquefaction. No mitigation is required.

#### Seismic Densification

As discussed in Section 4.6.2.4, *Expansive Soils and Weak Soils*, the project site is underlain by approximately 13 feet of medium-dense to dense sand above the water table. This could result in seismically induced settlement of up to 2 inches within the proposed building footprint and 1 inch outside the proposed building footprint. Therefore, the geotechnical investigation recommends that the building foundation be designed to accommodate localized settlement under the building footprint and entrances be designed to accommodate settlement. The proposed project would comply with the recommendations in the geotechnical investigation and standard regulations required by the California Building Code, which are adopted by reference under the South San Francisco Building Code—and, therefore, would result in a *less-than-significant* impact related to densification-induced settlement. No mitigation is required.

# **Lateral Spreading**

As discussed in Section 4.6.2.3, *Seismicity and Seismic Hazards*, the clayey and silty sands underlying the project site are not likely to be continuous; therefore, the potential for lateral spreading at the project site is low. The proposed project would comply with standard regulatory requirements—including completion of a detailed geotechnical investigation required by the California Building Code, which are adopted by reference under the South San Francisco Building Code—and, therefore, would result in a *less-than-significant* impact related to lateral spreading. No mitigation is required.

#### Landslides

As discussed in Section 4.6.2.5, *Landslides*, the project site has a gentle slope. It is not located in a landslide risk area; therefore, the potential for a landslide occurring at or near the project site is low. The proposed project would comply with standard regulatory requirements—including completion of a detailed geotechnical investigation required by the California Building Code, which is adopted by reference under the South San Francisco Building Code—and, therefore, would result in a *less-than-significant* impact related to landslides. No mitigation is required.

# Impact GEO-2: The proposed project would not result in substantial soil erosion or the loss of topsoil. (*Less than Significant*)

The project site, which is approximately 34 to 21 feet above mean sea level, slopes gently from west to east, toward Gateway Boulevard. The proposed project would require grading or disturbing an area of approximately 149,000 square feet during construction and excavating approximately 1,850 cubic yards of soil that would be reused as fill on the site. The proposed project would not involve substantial changes to the existing grade, and no unprotected, exposed soils at risk of substantial erosion would remain on the project site. As discussed in Section 4.10.4, Hydrology, construction activities associated with the proposed project must comply with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit, the Municipal Regional Permit (MRP), and City's General Plan and Municipal Code. These requirements include preparation and implementation of a stormwater pollution prevention plan (SWPPP) that incorporates best management practices (BMPs), such as the installation of erosion control measures (e.g., silt fences, staked straw bales/wattles, silt/sediment basins or traps), geofabric, sandbag dikes, covers for stockpiles, or storage precautions for outdoor material storage areas. Furthermore, the proposed project would comply with the City's standard conditions of approval, which requires a grading permit prior to any onsite grading. The City's grading permit requires applicants to have erosion control measures in place, such as desilting basins, silt fences, asphaltic emulsions, hay bales, fabric and sand filters, swales, and/or sumps. Therefore, with adherence to the BMPs included in the SWPPP, compliance with the City's standard conditions of approval regarding grading, and compliance with the California Building Standards Code, impacts related to soil erosion would be less than significant. No mitigation is required.

# Impact GEO-3: The proposed project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project. (*Less than Significant*)

As discussed under Impact GEO-1, some of the layers below the water table could be susceptible to liquefaction, resulting in settlement on the order of 1 inch after a seismic event. In addition, seismic densification could occur in the 13 feet of medium-dense to dense sand above the water table, resulting in about 0.5 inch of settlement. The geotechnical investigation estimated up to 2 inches of seismically induced settlement could occur within the proposed building footprint and 1 inch could occur outside the proposed building footprint.

Sand boils and liquefaction-related ground fissures can occur when surface layers above the liquefiable soils are thin. Although liquefiable layers have been identified in borings, they are not continuous and are located 20, 30, 45, and/or 60 feet below ground surface. Therefore, the potential of sand boils or fissures during a seismic event is low.

Lateral spreading is a phenomenon in which a surficial soil displaces along a shear zone that formed within an underlying liquefied layer. As discussed under Impact GEO-1, the geotechnical investigation determined that the potential for lateral spreading at the project site is low and instability would not occur as a result of the project.

Weak soils can compress or subside under the weight of buildings and fill, causing settlement relative to the thickness of the weak soil. Usually the thickness of weak soil will vary, and differential settlement will occur. Weak soils also tend to amplify shaking during an earthquake and can be susceptible to liquefaction. The geotechnical investigation determined that the native soil at the foundation level of the project site has moderate to high strength and relatively low compressibility. Therefore, the potential for settlement resulting from soil compression at the project site is low.

Dewatering, if it is extensive, can result in subsidence. To account for seasonal fluctuations in the groundwater level, the geotechnical investigation considered groundwater levels to be approximately 7.5 to 18.5 feet below ground surface. To accommodate utility trenches, the project would require a maximum depth of excavation reaching approximately 9 feet below ground surface. Given the range of groundwater elevation (7.5 feet to 18.5 feet below ground surface), the proposed depth of excavation (9 feet), the specific areas of excavation, and the limited duration of trenching activities, it is unlikely that groundwater would be encountered during project construction. Therefore, construction dewatering is not anticipated. Nonetheless, if excavation is performed during the wet season, the contractor would be prepared for dewatering. Because any dewatering would be limited in geographic extent, in the unlikely event that dewatering is needed, the amount of groundwater removed would be so small as not to pose a risk of subsidence.

The proposed project would comply with the recommendations in the geotechnical investigation regarding the design of foundations, floor slabs, and other geotechnical aspects of this project. In addition, the proposed project would comply with regulations required by the California Building Code, which are adopted by reference under the South San Francisco Building Code. Therefore, impacts related to potential liquefaction, lateral spreading, soil compression, and settlement and subsidence due to dewatering in soil that is unstable, or could become unstable as a result of such construction, would be *less than significant*. No mitigation is required.

# Impact GEO-4: The proposed project would not be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property. (Less than Significant)

As discussed in Section 4.6.2.4, *Expansive Soils and Weak Soils*, near-surface samples of clay from the project site indicated that the site has low expansion potential, with plasticity indices of 7 to 15. The geotechnical investigation prepared for the project indicated that the project site has low expansion potential. The proposed project would comply with standard regulatory requirements—including completion of a detailed geotechnical investigation required by the California Building Code, which are adopted by reference under the South San Francisco Building Code—and, therefore, would result in a *less-than-significant* impact related to expansive soils. No mitigation is required.

# Impact GEO-5: The proposed project would not have soils that would be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater. (*No Impact*)

The proposed project would connect to South San Francisco's sewer and stormwater collection and treatment system. Therefore, the proposed project would not use a septic or alternative water disposal system and would have *no impact*. No mitigation is required.

According to Langan Engineering and Environmental Services, the preparer of the geotechnical investigation for the proposed project, the shallowest groundwater expected during the life of the project would be 7.5 feet below ground surface. This estimate does not account for seal level rise. Ultimately, groundwater levels will depend on season and precipitation.

# Impact GEO-6: The proposed project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (*Less than Significant with Mitigation*)

As discussed in Section 4.6.2.6, *Paleontological Resources*, both geologic units underlying the project site are known to have yielded significant fossils. The Colma Formation has yielded vertebrate fossils, and the Franciscan Formation has yielded fossils that are important in understanding this geologic unit. Therefore, the paleontological sensitivity of these geologic units is high, and both have the potential to contain significant fossils.

Because paleontological resources are located below the ground surface, ground disturbances such as excavating, grading, and resurfacing can affect any paleontological resources that may be present. The proposed project would require grading or disturbing an area of approximately 149,000 square feet during construction. The proposed project would excavate approximately 1,850 cubic yards of soil that would be reused as fill on-site and would import an additional 750 cubic yards of soil to be used as fill on-site. To accommodate utility trenches, the project would require a maximum depth of excavation reaching approximately 9 feet below ground surface. Therefore, project construction would disturb geologic units with high paleontological sensitivity. Destruction of any paleontological resources present at the project site would constitute a significant impact. Implementation of Mitigation Measure GEO-1, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Paleontological Resources, would reduce this significant impact on paleontological resources to *less than significant with mitigation* by providing training for construction personnel related to the possibility of encountering fossils. Construction personnel would learn the required actions to take in response to fossil discoveries, such as ceasing all earthmoving activities within 25 feet of any potential fossil find and providing for the recovery of fossils at the project site.

# Mitigation Measure GEO-1: Halt Construction Activity, Evaluate Find, and Implement Mitigation for Paleontological Resources

In the event that previously unidentified paleontological resources are uncovered during site preparation, excavation, or other construction activity, the project sponsor shall cease or ensure that all such activity within 25 feet of the discovery cease until the resources have been evaluated by a qualified professional, and specific measures can be implemented to protect these resources in accordance with sections 21083.2 and 21084.1 of the California Public Resources Code. If the find is significant, a qualified paleontologist shall excavate the find in compliance with state law, keeping project delays to a minimum. If the qualified paleontologist determines the find is not significant then proper recordation and identification shall ensue and the project will continue without delay.

# 4.6.4.4 Cumulative Impacts

Impact C-GEO-1: The project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on geology and soils. (*Less than Significant*)

In general, a project's potential impacts related to geology and soils are individual and localized, depending on the project site and underlying soils. Each structure will have different levels of excavation, cut-and-fill work, and grading, which would affect local geologic conditions in different ways. Therefore, the geographic context for geology and soils is site-specific. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, in this draft EIR and shown in Figure 4.1-1.

The cumulative projects would be required to go through environmental and regulatory review and comply with the California Building Code. Each project would also be required to have a site-specific geotechnical investigation performed, which would provide design recommendations to reduce each project's impacts. Similar seismic safety standards and conditions of approval would apply to the reasonably foreseeable future projects. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative geology and soils impact. The cumulative impact would be *less than significant*. No mitigation is required.

# Impact C-GEO-2: The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on paleontological resources. (*Less than Significant with Mitigation*)

The geographic context for paleontology is specific to the geologic unit(s) affected. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, in this draft EIR and shown in Figure 4.1-1. The cumulative projects could encounter paleontological resources. Depending on mitigation adopted for the cumulative projects, the cumulative impact could be *significant*. If paleontological resources are discovered during project construction, implementation of Mitigation Measure GEO-1 would ensure that the proposed project's contribution to cumulative impacts paleontological resources would be *less than cumulatively considerable with mitigation* because it would require compliance with state law, which would ensure that any information that can be recovered from any recovered paleontological resources would be recorded and the find itself properly curated.

# 4.7 Greenhouse Gas Emissions

# 4.7.1 Introduction

This section describes the environmental and regulatory setting for greenhouse gas (GHG) emissions. It also describes impacts associated with GHG emissions that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate.

# 4.7.2 Environmental Setting

# 4.7.2.1 Global Climate Change

The process known as the *greenhouse effect* keeps the atmosphere near Earth's surface warm enough for the successful habitation of humans and other life forms. The greenhouse effect is created by sunlight that passes through the atmosphere. Some of the sunlight striking Earth is absorbed and converted to heat, which warms the surface. The surface emits a portion of this heat as infrared radiation, some of which is re-emitted toward the surface by GHGs. Human activities that generate GHGs increase the amount of infrared radiation absorbed by the atmosphere, thereby enhancing the greenhouse effect and amplifying the warming of Earth.

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution. Rising atmospheric concentrations of GHGs in excess of natural levels result in increasing global surface temperatures—a process commonly referred to as *global warming*. Higher global surface temperatures, in turn, result in changes to Earth's climate system, including increases in ocean temperatures and acidity, less sea ice, variable precipitation, and increased frequencies and intensities for extreme weather events. Large-scale changes to Earth's system are collectively referred to as *climate change*.

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC estimates that humaninduced warming reached approximately 1 degree Celsius (°C) above pre-industrial levels in 2017, increasing at 0.2°C per decade. Under the current nationally determined contributions of mitigation, global warming is expected to increase 3°C by 2100 and continue afterwards.³ Large increases in global temperatures could have substantial adverse effects on natural and human environments in California and worldwide.

Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Available: https://www.ipcc.ch/site/assets/uploads/2018/05/ar4\_wg1\_full\_report-1.pdf. Accessed: January 7, 2020.

<sup>&</sup>lt;sup>2</sup> Intergovernmental Panel on Climate Change. 2018. *Global Warming of 1.5°C. Contribution of Working Group I, II, and III* (Summary for Policy Makers). Available: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15\_SPM\_version\_report\_LR.pdf. Accessed: January 7, 2020.

<sup>&</sup>lt;sup>3</sup> Ibid.

#### 4.7.2.2 Greenhouse Gases

The principal anthropogenic (human-made) GHGs contributing to global warming are carbon dioxide ( $CO_2$ ), methane ( $CH_4$ ), nitrous oxide ( $N_2O$ ), and fluorinated compounds, including sulfur hexafluoride ( $SF_6$ ), hydrofluorocarbons (HFCs), and perfluorocarbons. Water vapor, the most abundant GHG, is not included in this list because its natural concentrations and fluctuations far outweigh its anthropogenic sources.

The primary GHGs of concern associated with the project are  $CO_2$ ,  $CH_4$ , and  $N_2O$ . The principal characteristics of these pollutants are discussed below.

 $CO_2$  enters the atmosphere through fossil-fuel (oil, natural gas, coal) combustion, solid waste decomposition, plant and animal respiration, and chemical reactions (e.g., from the manufacture of cement).  $CO_2$  is also removed from the atmosphere (or *sequestered*) when it is absorbed by plants as part of the biological carbon cycle.

CH<sub>4</sub> is emitted during the production and transport of coal, natural gas, and oil. CH<sub>4</sub> emissions also result from livestock and agricultural practices as well as the decay of organic waste in municipal solid waste landfills.

N<sub>2</sub>O is emitted during agricultural and industrial activities as well as the combustion of fossil fuels and solid waste.

Methods have been set forth to describe emissions of GHGs in terms of a single gas to simplify reporting and analysis. The most commonly accepted method for comparing GHG emissions is the global warming potential (GWP) methodology defined in IPCC reference documents. IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of the carbon dioxide equivalent ( $CO_2e$ ), which compares the gas in question to that of the same mass of  $CO_2$  ( $CO_2$  has a global warming potential of 1 by definition).

Table 4.7-1 lists the global warming potential of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O and their lifetimes in the atmosphere.

Table 4.7-1. Lifetimes and Global Warming Potentials of Key Greenhouse Gases

| Greenhouse Gas                    | Global Warming Potential<br>(100 years) | Lifetime<br>(years) |
|-----------------------------------|---|---------------------|
| Carbon dioxide (CO <sub>2</sub> ) | 1                                       | a                   |
| Methane (CH <sub>4</sub> )        | 25                                      | 12                  |
| Nitrous oxide (N <sub>2</sub> O)  | 298                                     | 114                 |

Source: California Air Resources Board. 2020a. *GHG Global Warming Potentials*. Available: https://ww2.arb.ca.gov/ghg-gwps. Accessed: January 7, 2020.

<sup>a</sup> No lifetime (years) for CO<sub>2</sub> was presented by the California Air Resources Board.

The California Air Resources Board (CARB) recognizes the importance of reducing emissions of short-lived climate pollutants (described in Section 4.7.3, *Regulatory Framework*) to the atmosphere to achieve the State's overall climate change goals. Short-lived climate pollutants have atmospheric lifetimes on the order of a few days to a few decades. Their relative climate-forcing impacts, when

measured in terms of how they heat the atmosphere, can be tens, hundreds, or even thousands of times greater than that of  $CO_2$ .<sup>4</sup> Recognizing their short-term lifespan and warming impact, short-lived climate pollutants are measured in terms of  $CO_2$ e, using a 20-year time period. The use of GWPs with a time horizon of 20 years captures the importance of the short-lived climate pollutants and gives a better perspective regarding the speed at which emissions controls affect the atmosphere relative to  $CO_2$  emissions controls. The Short-Lived Climate Pollutant Reduction Strategy, discussed in Section 4.7.3, *Regulatory Framework*, addresses  $CH_4$ , HFC gases, and anthropogenic black carbon.  $CH_4$  has lifetime of 12 years and a 20-year GWP of 72. HFC gases have lifetimes of 1.4 to 52 years and a 20-year GWP of 437 to 6,350. Anthropogenic black carbon has a lifetime of a few days to weeks and a 20-year GWP of 3,200.<sup>5</sup>

# 4.7.2.3 Greenhouse Gas Reporting

A GHG inventory is a quantification of all GHG emissions and sinks<sup>6</sup> within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale (e.g., for global and national entities) or on a small scale (e.g., for a building or person). Although many processes are difficult to evaluate, several agencies have developed tools to quantify emissions from certain sources. Table 4.7-2 outlines the most recent global, national, statewide, and local GHG inventories to help contextualize the magnitude of potential project-related emissions.

Table 4.7-2. Global, National, State, and Regional Greenhouse Gas Emission Inventories

| Emissions Inventory   | Carbon Dioxide Equivalent (CO2e) (metric tons) |
|---|--|
| 2010 IPCC Global GHG Emission Inventory                               | 52,000,000,000                                 |
| 2018 Environmental Protection Agency National GHG Emissions Inventory | 6,676,600,000                                  |
| 2017 CARB State GHG Emissions Inventory                               | 424,100,000                                    |
| 2015 Bay Area Air Quality Management District GHG Emissions Inventory | 85,000,000                                     |
| 2005 South San Francisco Inventory                                    | 548,600  |

#### Sources:

Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan*. Adopted April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

California Air Resources Board. 2020b. *GHG Current California Emission Inventory Data* (2017). Available: https://ww2.arb.ca.gov/ghg-inventory-data. Accessed: January 7, 2020.

 $Intergovernmental\ Panel\ on\ Climate\ Change.\ 2014.\ {\it Climate\ Change\ Synthesis\ Report}.\ Available:$ 

https://www.ipcc.ch/site/assets/uploads/2018/02/SYR\_AR5\_FINAL\_full.pdf. Accessed: January 7, 2020.

City of South San Francisco. 2014. *City of South San Francisco Climate Action Plan.* Adopted February 13. Available: https://www.ssf.net/home/showdocument?id=1318. Accessed: January 7, 2020.

U.S. Environmental Protection Agency. 2020. *Inventory of U.S. Greenhouse Gas Emissions and Sinks* (2018). Last updated: April 13. Available: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks. Accessed: April 20, 2020.

<sup>&</sup>lt;sup>4</sup> California Air Resources Board. 2017. *Short-Lived Climate Pollutant Reduction Strategy*. Available: https://ww2.arb.ca.gov/sites/default/files/2018-12/final\_slcp\_report%20Final%202017.pdf. Accessed: January 7, 2020.

<sup>5</sup> Ibid

<sup>6</sup> A GHG sink is a process, activity, or mechanism that removes a GHG from the atmosphere.

# 4.7.2.4 Potential Climate Change Effects

Climate change is a complex process that has the potential to alter local climatic patterns and meteorology. Although modeling indicates that climate change will result in sea-level rise (both globally and regionally) as well as changes in climate and rainfall, among other effects, there remains uncertainty about characterizing precise local climate characteristics and predicting precisely how various ecological and social systems will react to changes in the existing climate at the local level. Regardless of this uncertainty, it is widely understood that substantial climate change is expected to occur in the future, although the precise extent will take further research to define. Specifically, significant impacts from global climate change in California and worldwide could include:

- Declining sea ice and mountain snowpack levels, thereby increasing sea levels and sea surface
  evaporation rates, with a corresponding increase in atmospheric water vapor due to the
  atmosphere's ability to hold more water vapor at higher temperatures.<sup>7</sup>
- Rising average global sea levels, primarily due to thermal expansion and the melting of glaciers, ice caps, and the Greenland and Antarctic ice sheets.<sup>8</sup>
- Changing weather patterns, including changes in precipitation and wind patterns, and more energetic episodes of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and intense tropical cyclones.<sup>9</sup>
- Declining Sierra Mountain snowpack levels, which account for approximately half of the surface water storage in California. Snow levels could decline by 70 to as much as 90 percent over the next 100 years.<sup>10</sup>
- Increases in the number of days that could be conducive to ozone formation (e.g., clear days with intense sunlight) by the end of the 21st century in high ozone areas. 11 The number of days could increase by 25 to 85 percent, depending on the future temperature scenario.
- Increases in the potential for erosion of California's coastlines as well as seawater intrusion into the Sacramento Delta and associated levee systems due to the rise in sea level.<sup>12</sup>
- The severity of drought conditions in California could be exacerbated (e.g., durations and intensities could be amplified, ultimately increasing the risk of wildfires and consequential damage).13

California Natural Resources Agency. 2018. California's Fourth Climate Change Assessment Statewide Summary Report. Available: http://www.climateassessment.ca.gov/state/docs/20190116-StatewideSummary.pdf. Accessed: January 7, 2020.

Intergovernmental Panel on Climate Change. 2018. *Global Warming of 1.5°C. Contribution of Working Group I, II, and III* (Summary for Policy Makers). Available: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15\_SPM\_version\_report\_LR.pdf. Accessed: January 7, 2020.

<sup>9</sup> Ibid.

California Natural Resources Agency. 2018. California's Fourth Climate Change Assessment Statewide Summary Report. Available: http://www.climateassessment.ca.gov/state/docs/20190116-StatewideSummary.pdf. Accessed: January 7, 2020.

<sup>&</sup>lt;sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>&</sup>lt;sup>13</sup> Ibid.

- Under changing climate conditions, agricultural operations are forecast to experience lower crop yields due to extreme heat waves, heat stress, increased water needs of crops and livestock (particularly during dry and warm years), and new and changing pest and disease threats.<sup>14</sup>
- The impacts of climate change, such as increased numbers of heat-related events, droughts, and wildfires, pose direct and indirect risks to public health, with people experiencing worsening episodes of illness and an earlier death. Indirect impacts on public health include increases in incidents of vector-borne diseases, stress and mental trauma due to extreme events and disasters, economic disruptions, and residential displacement.<sup>15</sup>

# 4.7.3 Regulatory Framework

#### 4.7.3.1 International

In 2015, the twenty-first session of the Conference of Parties (COP21) took place in Paris, France. The session included representatives from 196 parties to the United Nations Framework Convention on Climate Change. The Paris Agreement included limiting global temperature increases to well below 2°C, establishing binding commitments so all parties make Nationally Determined Contributions (NDCs) as well as pursuing domestic policies to achieve the NDCs, and having all countries report regularly regarding their emissions and progress made in implementing and achieving their NDCs. In April 2016, 174 states and the European Union signed the agreement, including the United States. However, on November 4, 2019, President Donald Trump formally notified the United Nations that the United States would withdraw from the Paris Agreement. The United States has begun the 1-year process of exiting the deal, which can occur no sooner than November 2020.

The Under2 Coalition is an international coalition of jurisdictions that signed the Global Climate Leadership Memorandum of Understanding (Under2 MOU) following President Trump's decision to withdraw from the Paris Agreement. Under2 MOU aims to limit global warming to 2°C, limit GHGs to below 80 to 95 percent below 1990 levels, and/or achieve a per capita annual emissions goal of less than 2 metric tons by 2050. Under2 MOU has been signed or endorsed by 135 jurisdictions, including California, representing 32 countries and six continents.

# 4.7.3.2 Federal

There is currently no federal overarching law related specifically to climate change or reductions in GHG emissions. Under the Obama administration, the U.S. Environmental Protection Agency (EPA) had been developing regulations under the Clean Air Act (CAA). There have also been settlement agreements between EPA, several states, and nongovernmental organizations to address GHG emissions from electric generating units and refineries. In addition, EPA issued an Endangerment Finding and a Cause or Contribute Finding. EPA has also adopted a Mandatory Reporting Rule and Clean Power Plan. Under the Clean Power Plan, EPA issued regulations to control CO<sub>2</sub> emissions from new and existing coal-fired power plants. However, on February 9, 2016, the Supreme Court issued a stay regarding these regulations pending litigation. In addition, former EPA Administrator Scott Pruitt signed a measure to repeal the Clean Power Plan. The fate of the proposed regulations is uncertain, given the change in federal administrations and the pending deliberations in federal courts.

<sup>&</sup>lt;sup>14</sup> Ibid.

<sup>15</sup> Ibid.

The National Highway Traffic Safety Administration (NHTSA) sets the Corporate Average Fuel Economy (CAFÉ) standards to improve average fuel economy and reduce GHG emissions generated by cars and light-duty trucks. NHTSA and EPA have proposed amendments to the current fuel efficiency standards for passenger cars and light-duty trucks and new standards for model years 2021 through 2026. Under the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, current 2020 standards would be maintained through 2026. California, 22 other states, the District of Columbia, and two cities filed suit against the proposed action on September 20, 2019 (California et al. v. United States Department of Transportation et al., 1:19-cv-02826, U.S. District Court for the District of Columbia). The lawsuit requests a "permanent injunction prohibiting defendants from implementing or relying on the preemption regulation" but does not stay its implementation during legal deliberations. Part 1 of the SAFE Vehicles Rule went into effect on November 26, 2019. Part 2 of the rule was finalized on March 30, 2020. The rule will decrease the stringency of the CAFÉ standards 1.5 percent each year through model year 2026; the standards issued in 2012 would have required annual fuel efficiency increases of about 5 percent.

#### 4.7.3.3 State

California has adopted statewide legislation to address various aspects of climate change and GHG emissions. Much of this legislation establishes a broad framework for the State's long-term GHG reduction and climate change adaptation program. The State's governors have also issued several executive orders (EOs) related to the State's evolving climate change policy. Of particular importance are Assembly Bill (AB) 32 and Senate Bill (SB) 32, which outline the State's GHG reduction goals (i.e., achieving 1990 emissions levels by 2020 and a level 40 percent below 1990 emissions levels by 2030). In the absence of federal regulations, control of GHGs is generally regulated at the State level. It is typically approached by setting emissions reduction targets for existing sources of GHGs, setting policies to promote renewable energy and increase energy efficiency, and developing statewide action plans. Summaries of key policies, legal cases, regulations, and legislation at the State level that are relevant to the proposed project are identified below.

#### **Assembly Bill 1493**

With the 2002 passage of AB 1493, also known as Pavley I, California launched an innovative and proactive approach to dealing with GHG emissions and climate change at the State level. AB 1493 requires CARB to develop and implement regulations to reduce GHG emissions from automobiles and light-duty trucks. These stricter emissions standards were designed to apply to automobiles and light-duty trucks beginning in the 2009 model year. Although litigation challenged these regulations and EPA initially denied California's related request for a waiver, the waiver request was granted. In 2012, additional strengthening of the Pavley standards (referred to previously as Pavley II but now referred to as the Advanced Clean Cars measure) was adopted for vehicle model years 2017 through 2025. Together, the two standards are expected to increase average fuel economy numbers to roughly 54.5 miles per gallon in 2025.

<sup>&</sup>lt;sup>16</sup> As noted above, however, California's waiver to set state-specific standards is currently uncertain because of the SAFE Vehicles Rule.

#### **Executive Order S-3-05**

On June 1, 2005, Governor Arnold Schwarzenegger signed EO S-3-05. The goal of this EO was to reduce California's GHG emissions to (1) 2000 levels by 2010 (achieved), (2) 1990 levels by 2020, and (3) 80 percent below the 1990 levels by 2050. EO S-3-05 also called for the California Environmental Protection Agency to prepare biennial science reports on the potential impact of continued global warming on certain sectors of the California economy. As a result of the scientific analysis presented in these biennial reports, a comprehensive Climate Adaptation Strategy was released in December 2009, following extensive interagency coordination and stakeholder input. The latest of these reports, the *Climate Action Team Biennial Report*, was published in December 2010.

#### **Executive Order S-01-07**

With EO S-01-07 in 2007, Governor Schwarzenegger set forth the low-carbon fuel standard (LCFS) for California. Under this EO, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

#### **Executive Order B-55-18**

EO B-55-18 acknowledges the environmental, community, and public health risks posed by future climate change. It further recognizes the climate stabilization goal adopted by 194 states and the European Union under the Paris Agreement. Although the United States was not party to the agreement, California is committed to meeting the Paris Agreement goals and going beyond them wherever possible. Based on the worldwide scientific agreement that carbon neutrality must be achieved by mid-century, EO B-55-18 establishes a new state goal to achieve carbon neutrality as soon as possible, no later than 2045, and achieve and maintain net negative emissions thereafter. The EO charges the CARB with developing a framework for implementing and tracking progress toward these goals. This EO extends EO S-3-05 but is binding only on state agencies.

#### **Assembly Bill 32**

One goal of EO S-03-05 was further reinforced by AB 32 (Chapter 488, Statutes of 2006), the Global Warming Solutions Act of 2006, which required the State to reduce GHG emissions to 1990 levels by 2020. Since AB 32 was adopted, CARB, the California Energy Commission (CEC), the California Public Utilities commission (CPUC), and the Building Standards Commission have been developing regulations to help meet the goals of AB 32. Under AB 32, CARB is required to prepare a scoping plan and update it every 5 years. The scoping plan was approved in 2008, the First Update was approved in 2014, and an additional update was approved in 2017 (see discussion of SB 32, below). The scoping plan identifies specific measures for reducing GHG emissions to 1990 levels by 2020. It also requires CARB and other state agencies to develop and enforce regulations and other initiatives for reducing GHGs. Specifically, the AB 32 scoping plan articulates a key role for local governments, recommending they establish GHG reduction goals for both their municipal operations and the community consistent with those of the State. In 2018, CARB announced that inventory year 2016 emissions had dropped below 1990 levels, which would mean achievement of the AB 32 goal if emissions continue on their current trajectory.<sup>17</sup>

<sup>&</sup>lt;sup>17</sup> California Air Resources Board. 2018. *Climate Pollutants Fall Below 1990 Levels for the First Time.* Available: https://ww2.arb.ca.gov/news/climate-pollutants-fall-below-1990-levels-first-time. Accessed: April 20, 2020.

# Assembly Bill 939 (1989) and Assembly Bill 341 (2011)

To minimize the amount of solid waste that must be disposed of in landfills, the State legislature passed the California Integrated Waste Management Act of 1989 (AB 939), effective January 1990. According to AB 939, all cities and counties were required to divert 25 percent of all solid waste from landfill facilities by January 1, 1995, and 50 percent by January 1, 2000. Through other statutes and regulations, this 50 percent diversion rate also applies to state agencies. In order of priority, waste reduction efforts must promote source reduction, recycling and composting, and environmentally safe transformation and land disposal.

In 2011, AB 341 modified the California Integrated Waste Management Act and directed the California Department of Resources Recycling and Recovery (CalRecycle) to develop and adopt regulations for mandatory commercial recycling. As of July 1, 2012, the resulting Mandatory Commercial Recycling Regulation required certain businesses that generate 4 cubic yards or more of commercial solid waste per week to arrange recycling services. To comply with this requirement, businesses may either separate recyclables and self-haul them or subscribe to a recycling service that includes mixed-waste processing. AB 341 also established a statewide recycling goal of 75 percent; the 50 percent disposal reduction mandate still applies for cities and counties under AB 939.

#### Senate Bill 97

SB 97 required the Governor's Office of Planning and Research (OPR) to develop recommended amendments to the California Environmental Quality Act (CEQA) Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.

# Senate Bill 350—De Leon (Clean Energy and Pollution Reduction Act of 2015)

SB 350 was approved by the California legislature in September 2015 and signed by Governor Brown in October 2015. Its key provisions are to require the following by 2030: (1) a renewables portfolio standard of 50 percent and (2) a doubling of energy efficiency (electrical and natural gas) by 2030, including improvements to the efficiency of existing buildings. These mandates will be implemented by future actions of the CPUC and CEC.

#### Senate Bill 375

SB 375, signed into law by Governor Schwarzenegger on September 30, 2008, became effective January 1, 2009. This law requires the State's 18 metropolitan planning organizations to develop sustainable communities strategies (SCS) as part of their regional transportation plans (RTPs) through integrated land use and transportation planning and demonstrate an ability to attain the GHG emissions reduction targets that CARB established for the region by 2020 and 2035. This would be accomplished through either the financially constrained SCS as part of the RTP or an unconstrained alternative planning strategy. If regions develop integrated land use, housing, and transportation plans that meet the SB 375 targets, new projects in these regions can be relieved of certain CEQA review requirements.<sup>18</sup>

This project does not quality for streamlined CEQA review because it is not a mixed-used transit priority project.

#### Senate Bills 1078, 107, and 2

SBs 1078 (2002), 107 (2006), and 2 (2011), California's Renewables Portfolio Standard (RPS), obligates investor-owned utilities, energy service providers, and community choice aggregators to procure additional retail sales each year from eligible renewable sources, with the long-range target of procuring 33 percent of retail sales from renewable resources by 2020. The CPUC and CEC are jointly responsible for implementing the program.

## Senate Bill 32 and Assembly Bill 197

SB 32 (2016) requires CARB to ensure that statewide GHG emissions are reduced to at least 40 percent below the 1990 level by 2030, consistent with the target set forth in EO B-30-15. The companion bill to SB 32, AB 197, creates requirements to form a joint legislative committee on climate change policies, requires CARB to prioritize direct emission reductions and consider social costs when adopting regulations to reduce GHG emissions beyond the 2020 statewide limit, requires CARB to prepare reports on sources of GHGs and other pollutants, establishes 6-year terms for voting members of CARB, and adds two legislators as non-voting members of CARB. CARB adopted the 2017 Climate Change Scoping Plan in November 2017 to meet the GHG reduction requirement set forth in SB 32. The updated scoping plan includes various elements, including doubling energy efficiency savings, increasing the LCFS from 10 to 18 percent, adding 4.2 million zero-emission vehicles on the road, implementing the sustainable freight strategy, implementing a post-2020 capand-trade program, creating walkable communities with expanded mass transit and other alternatives to traveling by car, and developing an integrated natural and working lands action plan to protect land-based carbon sinks.

#### Senate Bill 605 and Senate Bill 1383

SB 605 directed CARB, in coordination with other state agencies and local air districts, to develop a comprehensive Short-Lived Climate Pollutant (SLCP) Reduction Strategy. SB 1383 directed CARB to approve and implement the SLCP reduction strategy to achieve the following reductions:

- 40 percent reduction in CH<sub>4</sub> from the 2013 levels by 2030
- 40 percent reduction in HFC gases from the 2013 levels by 2030
- 50 percent reduction in anthropogenic black carbon from the 2013 levels by 2030

The bill also establishes the following targets for reducing organic waste in landfills and  $CH_4$  emissions from dairy and livestock operations:

- 50 percent reduction in organic waste disposal from the 2014 level by 2020
- 75 percent reduction in organic waste disposal from the 2014 level by 2025
- 40 percent reduction in CH<sub>4</sub> emissions from livestock and dairy manure management operations by 2030 compared with the livestock and dairy sectors' 2013 levels

CARB and CalRecycle are currently developing regulations to achieve the organic waste reduction goals found under SB 1383. In January 2019 and June 2019, CalRecycle proposed new and amended regulations in Titles 14 and 27 of the California Code of Regulations. Among other things, the regulations set forth minimum standards for organic waste collection, hauling, and composting. The final regulations will take effect on or after January 1, 2022.

## **Short-Lived Climate Pollutant Reduction Strategy**

CARB adopted the SLCP Reduction Strategy in March 2017 as a framework for achieving the CH<sub>4</sub>, HFC, and anthropogenic black carbon reduction targets set by SB 1383. The SLCP Reduction Strategy includes 10 measures that fit within a wide range of ongoing planning efforts throughout the State, including CARB's and CalRecycle's proposed rulemaking on organic waste diversion.

#### Senate Bill 100

The State's existing renewables portfolio standard requires all retail sellers to procure a certain amount of electricity from eligible renewable energy resources so that the total number of kilowatthours sold to their retail customers equals 25 percent of sales by December 31, 2016 (achieved); 33 percent by December 31, 2020; 40 percent by December 31, 2024; 45 percent by December 31, 2027; and 50 percent by December 31, 2030. SB 100 revises and extends these renewable resource targets to 50 percent by December 31, 2026; 60 percent by December 31, 2030; and 100 percent by December 31, 2045.

#### Senate Bill 743

SB 743 requires revisions to the State CEQA Guidelines to establish new impact analysis criteria for the assessment of a project's transportation impacts. The intent behind SB 743 and revising the State CEQA Guidelines is to integrate and balance the needs of congestion management, infill development, active transportation, and GHG emissions reduction. OPR recommends that vehicle miles traveled (VMT) serve as the primary analysis metric, replacing the existing criteria of delay and level of service. In 2018, OPR released a technical advisory, outlining potential VMT significance thresholds for different project types. For example, it would be reasonable to conclude that office projects with a VMT level that is 15 percent<sup>19</sup> less than existing conditions (2015–2018 average) would be consistent with statewide GHG reduction targets. With respect to retail land uses, any net increase in VMT may indicate a significant transportation impact. The new VMT methodology is required as of July 1, 2020, although it can be used earlier.

#### Senate Bill X7-7

SB X7-7, the Water Conservation Act of 2009, sets a goal of reducing per capita urban water use by 20 percent by December 31, 2020. The State was required to make incremental progress toward this goal by reducing per capita water use by at least 10 percent by December 31, 2015. This is an implementing measure of the water sector of the AB 32 scoping plan, which will continue to be implemented beyond 2020. Reductions in water consumption reduce the amount of energy necessary, as well as associated emissions, to convey, treat, and distribute water; it also reduces emissions from wastewater treatment.

The 15 percent figure is based on analyses completed by CARB. CARB's analysis determined that per capita VMT numbers that are 14.3 percent lower than the numbers under existing conditions or per capita VMT numbers for light-duty vehicles that are approximately 16.8 percent lower than the numbers under existing conditions are consistent with statewide GHG reduction targets. California Air Resources Board. 2019. 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals. January. Available: https://ww2.arb.ca.gov/sites/default/files/2019-01/2017\_sp\_vmt\_reductions\_jan19.pdf. Accessed: February 20, 2020.

# California Green Building Standards Code and Title 24 Updates

The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (24 California Code of Regulations). Part 11 established voluntary standards that became mandatory under the 2010 edition of the code. These involved sustainable site development, energy efficiency (in excess of California Energy Code requirements), water conservation, material conservation, and internal air contaminants. The current energy efficiency standards were adopted in 2019 and took effect on January 1, 2020.

## **4.7.3.4** Regional

## **Metropolitan Transportation Commission**

The Metropolitan Transportation Commission (MTC) is the metropolitan planning organization for the nine counties that make up the San Francisco Bay Area and the San Francisco Bay Area Air Basin (SFBAAB), which includes the City of South San Francisco. The first per capita GHG emissions targets for the SFBAAB were a 7 percent reduction by 2020 and a 15 percent reduction by 2035 compared with 2005 levels. In 2013, MTC adopted an SCS as part of its RTP for the SFBAAB. This was known as Plan Bay Area. The plan goes beyond the regional per capita targets, achieving 10 and 16 percent reductions in per capita GHG emissions by 2020 and 2035, respectively. <sup>20</sup> On July 26, 2017, the strategic update to this plan, known as Plan Bay Area 2040, was adopted by the Association of Bay Area Governments (ABAG) and the MTC. As a limited and focused update, Plan Bay Area 2040 builds upon the growth pattern and strategies developed in the original Plan Bay Area but with updated planning assumptions that incorporate key economic, demographic, and financial trends since 2013. <sup>21</sup> As required by SB 375, CARB updated the per capital GHG emissions reduction targets in 2018. The new targets, which will be addressed in MTC's forthcoming RTPs, are a 10 percent per capita GHG reduction by 2020 and 19 percent per capita reduction by 2035 compared with 2005 levels. <sup>22</sup>

# **Bay Area Air Quality Management District**

As discussed in Section 4.2, *Air Quality*, of this draft environmental impact report (EIR), the Bay Area Air Quality Management District (BAAQMD) is responsible for air quality planning within the SFBAAB, including projects in the City. BAAQMD has adopted advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's GHG emissions, including long-range plans (e.g., general plans, specific plans), which are outlined in the agency's California

Metropolitan Transportation Commission and Association of Bay Area Governments. 2013. *Plan Bay Area.* Adopted: July 18. Available: http://files.mtc.ca.gov/library/pub/28536.pdf. Accessed: June 8, 2020.

Metropolitan Transportation Commission and Association of Bay Area Governments. 2017. Plan Bay Area 2040. Adopted: July 26. Available: http://2040.planbayarea.org/cdn/ff/buje2Q801oUV3Vpib-FoJ6mk0fWC9S9sgrSgJrwFBgo/1510696833/public/2017-11/Final\_Plan\_Bay\_Area\_2040.pdf. Accessed: February 7, 2020.

California Air Resources Board 2020c. SB 375 Regional Plan Climate Targets. Available: https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/regional-plan-targets. Accessed: February 7, 2020.

Environmental Quality Act, Air Quality Guidelines.<sup>23</sup> The BAAQMD CEQA Guidelines also outline methods for quantifying GHG emissions as well as developing potential mitigation measures. As discussed in Section 4.2, *Air Quality*, BAAQMD has also adopted air quality plans to protect the climate, including the 2017 Clean Air Plan: Spare the Air, Cool the Climate.<sup>24</sup> The 2017 Clean Air Plan outlines feasible measures to reduce GHGs to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

#### 4.7.3.5 Local

#### South San Francisco General Plan

The 1999 City of South San Francisco (City) General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The City General Plan contains an Open Space and Conservation Element, which outlines policies related to habitat and biological resources, water quality, air quality, GHG emissions, and historic and cultural resources. The City General Plan includes the following policies, which are applicable to GHG emissions:

- Guiding Policy 7.3-G-4: Encourage land use and transportation strategies that promote the use of alternatives to the automobile for transportation, including bicycling, bus transit, and carpooling.
- Guiding Policy 7.3-G-5: Promote clean and alternative fuel combustion in mobile equipment and vehicles.
- Implementing Policy 7.3-I-2: 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 and GHG emissions.
- Implementing Policy 7.3-I-6: Periodically update the inventory of community-wide GHG emissions and evaluate appropriate GHG emissions reduction targets, consistent with current state objectives, statewide guidance, and regulations.
- Implementing Policy 7.3-I-7: Adopt and implement the City's Climate Action Plan (CAP), which will identify a GHG emissions reduction target and measures and actions to achieve the reduction target.
- Implementing Policy 7.3-I-8: Evaluate and regularly report to City Council, or its designee, on the implementation status of the CAP and update the CAP as necessary should the City find that adopted strategies are not achieving anticipated reductions or to otherwise incorporate new opportunities.

Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.*May. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 7, 2020.

<sup>&</sup>lt;sup>24</sup> Bay Area Air Quality Management District. 2017a. *Final 2017 Clean Air Plan.* Adopted April 19. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: January 6, 2020.

- Implementing Policy 7.3-I-9: Promote land uses that facilitate alternative transit use, including high-density housing, mixed uses, and affordable housing served by alternative transit infrastructure.
- Implementing Policy 7.3-I-10: Facilitate energy efficiency in building regulations and streamlined review processes, providing flexibility to achieve specified energy performance levels and requiring energy efficiency measures as appropriate.
- Implementing Policy 7.3-I-11: Coordinate with the business community to encourage energy efficiency in the city's largest energy users while supporting economic growth objectives.
- Implementing Policy 7.3-I-12: Adopt guidelines, standards, and flexible regulations that promote on-site renewable energy systems while strengthening South San Francisco's economic competitiveness.
- Implementing Policy 7.3-I-13: Encourage efficient, clean energy and fuel use through collaborative programs, award programs, and incentives while removing barriers to the expansion of alternative fuel facilities and infrastructure.
- Implementing Policy 7.3-I-14: Ensure that design guidelines and standards support operation of alternative-fuel facilities, vehicles, and equipment.

#### Climate Action Plan

The Climate Action Plan (CAP), adopted in 2014, includes goals, policies, and strategies to reduce the City's GHG emissions, in compliance with AB 32 and SB 375. GHG reduction strategies identified in the CAP include a development checklist to identify applicable plan measures for discretionary projects. The City's CAP was adopted in 2014, with the purpose of reducing GHGs community-wide to achieve a reduction target of 15 percent below 2005 emission levels by 2020. As discussed in Section 4.5, *Energy*, of this draft EIR, the City has identified GHG reduction measures to reduce GHG emissions. Strategies include implementation of transportation demand management plans, expanding active transportation alternatives, maximizing energy efficiency in the build environment, developing a waste reduction strategy to increase recycling and reuse of materials, and reducing water demand.<sup>25</sup> The City's CAP is currently being updated, as part of the General Plan Update. The 2014 CAP remains active until completion and adoption of the new CAP.

# **Gateway Specific Plan**

The Gateway Specific Plan covers the portion of the East of 101 Area Plan from east of the Caltrain tracks to the eastern boundary of the parcels along the east side of Gateway Boulevard and the area between Oyster Point Boulevard and Grand Avenue on the northern and southern boundaries. The Specific Plan is "intended to provide for various commercial and research and development land uses integrated by consistent development standards." The Gateway Specific Plan includes the following construction standards standard applicable to greenhouse gas emissions:

• Construction Standard 1(d): Energy Conservation. All Buildings shall be designed, insulated and lighted in accordance with applicable federal and state energy conservation laws and regulations.

<sup>&</sup>lt;sup>25</sup> City of South San Francisco. 2014. *City of South San Francisco Climate Action Plan.* Adopted: February 13. Available: https://www.ssf.net/home/showdocument?id=1318. Accessed: January 7, 2020.

## **Transportation Demand Management Ordinance**

The City's Transportation Demand Management (TDM) Ordinance identifies several required and optional trip reduction measures for inclusion in a TDM Plan. The ordinance requires an annual employee mode share survey of the project site to ensure that desired transportation mode shares are achieved. Where the mode share target is not achieved, City officials may require program modifications intended to increase alternative mode share or impose administrative penalties. TDM measures implemented by the proposed project would support reductions in the number of trips made by automobile and associated GHG emissions.

# 4.7.4 Impacts and Mitigation Measures

# 4.7.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant GHG emissions impact if it would:

- Generate GHG 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 emissions of GHGs.

State CEQA Guidelines Section 15064.4 provides guidance to lead agencies for determining the significance of environmental impacts pertaining to GHG emissions. State CEQA Guidelines Section 15064.4(a) states that a lead agency should make a good-faith effort that is based, to the extent possible, on scientific and factual data to describe, calculate, or estimate the amount of GHG emissions that would result from implementation of a project. State CEQA Guidelines Section 15064.4(b) also states that, when assessing the significance of impacts from GHG emissions, a lead agency should consider (1) the extent to which the project may increase or reduce GHG emissions compared with existing conditions, (2) whether the project's GHG emissions would exceed a threshold of significance that the lead agency has determined to be applicable to the project, and (3) the extent to which the project would comply with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

The California Supreme Court's decision in *Center for Biological Diversity et al. v. California Department of Fish and Wildlife* (62 Cal.4th 204) confirmed that there are multiple potential pathways for evaluating GHG emissions consistent with CEQA. Several air quality management agencies throughout the State have also drafted or adopted various threshold approaches and guidelines for analyzing GHG emissions in CEQA documents. Common threshold approaches include (1) compliance with a qualified GHG reduction strategy, (2) numeric "bright-line" thresholds, (3) efficiency-based thresholds, (4) performance-based reductions, 26 and (5) compliance with regulatory programs.

Performance-based thresholds are based on the percentage reduction from a projected future condition (e.g., reducing future business-as-usual emissions to meet the SB 32 target [40 percent below 1990 levels] through a combination of state measures; project design features, such as features related to renewable energy; and mitigation.

BAAQMD's CEQA Guidelines do not identify a GHG emission threshold for construction-related emissions. Instead, BAAQMD recommends that GHG emissions from construction be quantified and disclosed and that a determination regarding the significance of the GHG emissions be made with respect to whether a project is consistent with the emissions reduction goals. The BAAQMD further recommends incorporation of best management practices (BMPs) to reduce GHG emissions during construction, as feasible and applicable. This approach is used to evaluate construction-generated emissions.

The City has not adopted a qualified GHG reduction plan beyond 2020 (when the proposed project would be constructed and operational), and tiering per State CEQA Guidelines Section 15183.5 is not an applicable option to assess the proposed project's GHG impacts.

BAAQMD has adopted a numeric threshold of 10,000 metric tons of  $CO_2e$  for stationary-source projects. This threshold is consistent with stationary-source thresholds adopted by other air quality management districts throughout the State. The threshold level is intended to capture 95 percent of all GHG emissions associated with new permit applications for stationary-sources in the air basin. It would do so by capturing only the large, significant projects, because permit applications with emissions above the threshold of 10,000 metric tons of  $CO_2e$  account for less than 10 percent of all applications. The emergency generator included as part of the proposed project would be a permitted source, and as such, the BAAQMD's threshold of 10,000 metric tons of  $CO_2e$  is appropriate for analyzing the significance of emissions generated by the generator. Impacts from stationary-source emissions would be considered less than significant if the emissions total less than 10,0000 metric tons of  $CO_2e$ .

In addition, BAAQMD has adopted a bright-line and efficiency-based threshold for land use projects  $(1,100 \text{ metric tons of } CO_2e$  per year and  $4.6 \text{ metric tons of } CO_2e$ /service population per year,  $^{27}$  respectively)  $^{28}$  to evaluate a project's total GHG emissions. However, these thresholds were developed by BAAQMD in accordance with the reduction goals of the AB 32 2020 GHG reduction targets. The proposed project would begin to be operational in 2021 and would operate entirely in the post-2020 period. Thus, it is not appropriate to evaluate the project's emissions relative to 2020 thresholds.  $^{29}$  Therefore, in absence of an applicable threshold, this analysis references the proposed project's GHG emissions relative to BAAQMD's thresholds adjusted for 2021 (1,056 annual metric tons of  $CO_2e$ /year) for information purposes and to contextualize the proposed project's GHG emissions. Ultimately, the analysis examines the proposed project's consistency with applicable best management practices and design features required by regulations (e.g., Title 24, CalGreen, etc.), and guidance from state agencies (e.g., CARB, OPR, etc.) that pertains to achieving GHG reduction targets. Such an approach is recognized by the Supreme Court as an acceptable pathway for evaluating project-level GHG emissions under CEQA (62 Cal.4th 204). The proposed project is assumed to be operational by 2021. The State's 2030 target has been codified

<sup>&</sup>lt;sup>27</sup> Service population refers to the total number of residents and/or employees. For the proposed project, the service population for the entire project site (701 Gateway and 751 Gateway) is 1,181 employees.

<sup>&</sup>lt;sup>28</sup> Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.*May. Available: https://www.baaqmd.gov/~/media/files/planning-andresearch/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 7, 2020.

<sup>&</sup>lt;sup>29</sup> These thresholds do not account for GHG emissions reductions from new development post-2020 and are not tailored to the proposed project.

in law through SB 32 and the 2017 climate change scoping plan<sup>30</sup> that was adopted to meet this 2030 target. Therefore, 2030 marks the next statutory statewide milestone target that would be applicable to the proposed project.

The analysis focuses on the 2030 target and the plans, policies, and regulations adopted pursuant to achieving 2030 reductions. Emissions generated in 2021 are used as an indicator for long-term emissions reduction progress and are evaluated as they relate to the proposed project's impacts on the State's long-term GHG emission reduction targets. More specifically, best management practices and project design features stipulated by Title 24, California Department of Water Resources Model Water Efficient Landscape Ordinance, the 2019 California Green Building Standards Code, and CARB's 2017 scoping plan, for instance, could be utilized to show compliance with performance-based standards needed to fulfill the statewide goal for reducing GHG emissions.

The proposed project's compliance with best management practices, design features, and regulatory plans and programs adopted by CARB and other State agencies is therefore used to discuss the significance of the proposed project's GHG emissions. While the regulatory framework to achieve long-term (post-2030) emissions reductions is in its infancy, many of the best management practices, design features, and programs discussed in the sections below are likely to be carried forward or have already been adopted with post-2030 requirements (e.g., Renewable Portfolios Standard, Title 24, etc.). Accordingly, evaluating consistency with best management practices, design features, and programs and relevant guidance published by agencies such as CARB and OPR for the reduction of long-term emissions is therefore considered in the analysis of the proposed projects emissions.

Mobile sources: CARB's 2017 scoping plan recognizes that, although vehicle technologies and low-carbon fuels will continue to reduce transportation sector emissions, VMT reductions are necessary to achieve California's long-term GHG emissions reduction target. Recent CARB analysis demonstrates that a 16.8 percent reduction in light-duty VMT per service population by 2050 (compared to a 2015–2018 average) would be needed statewide to meet long-term climate change planning goals through 2050.31 This reduction target is consistent with recent OPR guidance<sup>32</sup> issued in SB 743, as discussed in Section 4.7.3, Regulatory Framework, and Section 4.9, Transportation and Circulation. Construction of the proposed project would commence in 2020 and be operational in 2021, if related entitlements are approved by the City. Accordingly, use of CARB's threshold of a 16.8 percent reduction in light-duty VMT per service population for mobile-source emissions is applicable to the proposed project. Mobile-source emissions would be considered less than significant if the proposed project achieves a per service population VMT reduction of at least 16.8 percent (compared to a 2015–2018 average). In addition to VMT reductions, compliance with regulatory programs (e.g., AB 1493, LCFS, SB 743, and SB 375) would also be required to reduce statewide mobile GHG emissions to a lessthan-significant impact.

California Air Resources Board. 2019. 2017 Scoping Plan – Identified VMT Reductions and Relationship to State Climate Goals. January. Available: https://ww2.arb.ca.gov/sites/default/files/2019-01/2017\_sp\_vmt\_reductions\_jan19.pdf. Accessed: February 20, 2020.

<sup>31</sup> Ibid

<sup>&</sup>lt;sup>32</sup> Governor's Office of Planning and Research. 2018. *Technical Advisory on Evaluating Transportation Impacts in CEQA*. December. Available: http://opr.ca.gov/docs/20190122-743\_Technical\_Advisory.pdf. Accessed: February 20, 2020.

• Energy, water, waste, area, and land sources. CARB's 2017 scoping plan, which relies heavily on state programs (e.g., Title 24 and SB 100), outlines the strategies required to reduce statewide GHG emissions and achieve California's SB 32 reduction target.<sup>33</sup> Projects that implement applicable strategies from the 2017 scoping plan and other best management practices and design features outlined in other programs would be consistent with the State's GHG reduction framework and requirements for these sectors. Accordingly, a sector-by-sector review of the respective project features and sustainability measures included in the proposed project is provided to evaluate consistency with best management practices, design features, plans, and policies. This assessment also considers recent OPR guidance<sup>34</sup> related to long-term reductions in statewide emissions. Accordingly, impacts from energy, water, waste, area, and land use source emissions would be considered less than significant if the proposed project is consistent with all applicable best management practices, design features, strategies and supporting regulations and guidance.

# 4.7.4.2 Approach to Analysis

#### **Construction Emissions**

The proposed project would generate construction-related GHG emissions from the exhaust of mobile and stationary construction equipment, exhaust of employees' vehicles and haul trucks, electricity consumption, and tree removal. GHG emissions were estimated using the California Emissions Estimator Model (CalEEMod), version 2016.3.2. The construction schedule, details regarding equipment operations, trip numbers and lengths, and material quantities were provided by the project sponsor. Annual construction emissions were estimated using these project-specific details. The construction modeling inputs and CalEEMod outputs are provided in Appendix B of this draft EIR.

#### **Operational Mobile-Source Emissions**

GHG impacts from motor vehicles traveling to and from the project site were evaluated using CARB's EMFAC2017 emissions model (version 1.02) and traffic data provided by Fehr & Peers.<sup>35</sup> The existing office building at 701 Gateway Boulevard would remain on the site. Therefore, operational mobile-source emissions associated with the office building at 701 Gateway Boulevard were estimated and presented under existing (2019) and future conditions (2021).<sup>36</sup>

<sup>&</sup>lt;sup>33</sup> California Air Resources Board. 2017. *California's 2017 Climate Change Scoping Plan*. November. Accessed: https://ww3.arb.ca.gov/cc/scopingplan/scoping\_plan\_2017.pdf. Accessed: February 20, 2020.

<sup>&</sup>lt;sup>34</sup> California Air Resources Board. 2019. 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals. January. Available: https://ww2.arb.ca.gov/sites/default/files/2019-01/2017\_sp\_vmt\_reductions\_jan19.pdf. Accessed: February 20, 2020.

<sup>35</sup> Hawkins, Mike. Fehr & Peers. March 13, 2020—email to Jessica Viramontes: 751 Gateway Updated Transportation Materials.

There are no emission sources associated with the existing surface parking lot; therefore, there are no emissions associated with the lot under the existing condition. Emissions presented for the existing condition represent those from the office building at 701 Gateway Boulevard.

To determine GHG emissions (i.e., from vehicle movement/travel), the number of daily employees on the project site and a VMT per capita conversion factor, both provided by Fehr & Peers, were used estimate total VMT with and without the proposed project. GHG emissions from vehicle exhaust were calculated by multiplying the VMT estimates by the appropriate emission factors from EMFAC2017 with SAFE Vehicle Rule adjustments per CARB.

Daily trips for the proposed project were also provided by Fehr & Peers and used to estimate a per employee trip generation rate, which was used to estimate existing daily trips associated with the existing building at 701 Gateway Boulevard. The number of daily employee trips associated with the proposed project assumes a mode share consistent with the City/County Association of Governments of San Mateo County (C/CAG) travel demand model and recent analysis for other similar projects within the City and the region. The number of daily trips was calculated to quantify vehicle-process emissions, such as emissions generated from vehicle starts, running losses, etc. Process GHG emissions were then calculated by multiplying the number of daily trips by the appropriate process-specific GHG emission factors from EMFAC2017. The running exhaust emissions and process emissions were combined to quantify total operational GHG emissions from the project's use of vehicles. The EMFAC0217 emission factors and traffic data used in this analysis are provided in Appendix B of this draft EIR.

## Operational Area, Energy, Stationary, Water, and Waste Emissions

Area, energy, stationary, water, and waste emissions were estimated using CalEEMod (version 2016.3.2). Landscaping equipment, including gasoline-powered equipment (e.g., trimmers, mowers), is the primary area source of GHG emissions. Calculations of area-source emissions rely on CalEEMod's default assumptions, which represent a conservative estimate of equipment usage, based on the square footage of the new building space. The combustion of natural gas for building heating and hot water, as well as the use and generation of electricity, is the primary energy source of GHG emissions. Stationary sources include one emergency generator. Water consumption results in indirect GHG emissions from the conveyance and treatment of water. Waste generation results in fugitive  $\text{CH}_4$  and  $\text{N}_2\text{O}$  emissions from the decomposition of organic matter.

Emissions were quantified for existing (2019) and 2021 conditions with the proposed project. Similar to mobile-source emissions (discussed above), area-, energy-, and stationary-source emissions were also estimated for the existing office building at 701 Gateway Boulevard. Annual energy (e.g., electricity and natural gas) consumption and annual water consumption for the existing office building at 701 Gateway Boulevard and the proposed project were provided by the project sponsor and used to model energy and water emissions.<sup>37</sup> The project sponsor also provided details on the proposed generator to be located on the project site. The 2021 modeling reflects implementation of state measures to reduce GHG emissions (e.g., SB 100, Pavley). Quantifiable features, consistent with the proposed project, including the installation of low-flow fixtures, were incorporated into the CalEEMod model. The net change in the number of trees on the project site was also modeled to account for changes to sequestration. The CalEEMod output files are provided in Appendix B of this draft EIR.

Muchow, Chase. RMW Architecture & Interiors. March 2, 2020—email to Jessica Viramontes: 751 Gateway – Priority 1 and 2 Follow-Up.

# 4.7.4.3 Impact Evaluation

Impact GHG-1a: The proposed project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment during construction. (*Less than Significant with Mitigation*)

Construction associated with the proposed project would result in the temporary generation of GHG emissions. Emissions would originate from the exhaust of mobile and stationary construction equipment as well as employees' vehicles and haul trucks. Construction activities for the proposed project would include demolition of a surface parking lot, construction of a new building, various site improvements, and the provision of utility infrastructure. These activities would require mobile and stationary construction equipment as well as on-road vehicles, such as haul trucks for demolition debris and vendor trucks for deliveries. Site grading and excavation would also be required for the building foundation, utilities, and landscaping. Estimated construction GHG emissions are presented in Table 4.7-3. The table shows that project construction would generate approximately 1,335 metric tons of CO<sub>2</sub>e over the 18-month construction period.

Table 4.7-3. Estimated Construction GHG Emissions from the Proposed Project (metric tons)

| Construction       |        |                 |        |  |
|--------------------|--------|-----------------|--------|--|
| Year               | $CO_2$ | CH <sub>4</sub> | $N_2O$ | $\mathbf{CO_2}\mathbf{e}^{\mathrm{a}}$ |
| 2020               | 843    | < 1             | < 1    | 845                                    |
| 2021               | 488    | < 1             | < 1    | 490                                    |
| Total <sup>b</sup> | 1,331  | 0               | 0      | 1,335                                  |

Source: See Appendix B of this draft EIR for CalEEMod model outputs and construction energy calculations. Notes:

For a typical building, emissions from concrete production are generated to create the materials that would be required to construct new buildings. As a project design feature, the proposed project would utilize no-carbon emission concrete. These emissions associated with concrete production are lifecycle emissions<sup>38</sup>, however, are not required to be analyzed under CEQA. The project's use of no-carbon emission concrete would result in lower total emissions for the project and is consistent with state goals to reduce GHG emissions, but because life-cycle emissions are outside of the scope of CEQA, the emissions benefits were not quantified.

As described above, BAAQMD has not established a quantitative threshold for assessing construction-related GHG emissions. Rather, the air district recommends evaluating whether construction activities would conflict with statewide emissions reduction goals and recommends implementing feasible BMPs. If a project does not implement feasible BMPs, it is anticipated that it would conflict statewide emission goals, and construction-related GHG emission impacts would be *significant*. Therefore, Mitigation Measure GHG-1, Require Implementation of BAAQMD-

<sup>&</sup>lt;sup>a</sup> Emissions represent the sum of emissions from the CalEEMod construction output and energy consumption (approximately 52,000 kilowatt-hours per year) during construction.

<sup>&</sup>lt;sup>b</sup> Totals may not add up because of rounding.

<sup>&</sup>lt;sup>38</sup> Lifecycle emissions are those that are generated during the manufacturing process, for example, to turn raw resources into buildings materials.

recommended Construction BMPs, would be implemented to avoid any conflict with statewide emissions reduction goals. Consequently, the impact from construction-related GHG emissions would be *less than significant with mitigation*.

# Mitigation Measure GHG-1: Require Implementation of BAAQMD-recommended Construction BMPs

The project sponsor shall require its contractors, as a condition in contracts (e.g., standard specifications), to reduce construction-related GHG emissions by implementing BAAQMD's recommended BMPs as set forth in BAAQMD's 2017 CEQA Guidelines, including (but not limited to) the following measures:<sup>39</sup>

- Ensure alternative-fuel (e.g. biodiesel, electric) construction vehicles/equipment make up at least 15 percent of the fleet;
- Use local building materials (at least 10 percent) sourced from within 100 miles of the planning area; and
- Recycle and reuse at least 50 percent of construction waste or demolition materials.

The project sponsor shall submit evidence of compliance to the City prior to the start of construction.

# Impact GHG-1b: The proposed project would generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment during operation. (Significant and Unavoidable with Mitigation)

Operation of the proposed project would generate direct and indirect GHG emissions. Sources of direct emissions include vehicle trips, emergency generators, natural gas combustion, and landscaping activities. Indirect emissions would be associated with electricity consumption, waste and wastewater generation, and water use. Operational GHG emissions were evaluated under existing-year (2019) and proposed project conditions (2021). The analysis includes emissions benefits from statewide GHG emissions reduction programs (e.g., SB 100) as well as quantifiable sustainability measures, including the installation of low-flow fixtures, incorporated into the project design. Table 4.7-4 presents the proposed project's net annual GHG emissions, which is the difference between proposed project conditions (2021) and existing emissions (2019), and total GHG emissions.

As shown in Table 4.7-4, the proposed project would result in a net annual increase of 4,338 metric tons of  $CO_{2}e$ , exceeding the adjusted threshold of 1,056 annual metric tons of  $CO_{2}e$  discussed above. Though comparisons with BAAQMD's adjusted threshold are discussed here for informational purposes, an analysis of the proposed project's consistency with best management practices and design features outlined in regulatory plans and programs aimed at meeting the state's long term GHG reduction targets was completed to determine whether the proposed project would generate significant levels of GHG emissions. The following sections present this analysis.

Bay Area Air Quality Management District. 2017b. *California Environmental Quality Act, Air Quality Guidelines.* May. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa\_guidelines\_may2017-pdf.pdf?la=en. Accessed: January 7, 2020.

#### **Area Emissions**

As shown in Table 4.7-4, annual emissions from the proposed project associated with area sources would amount to less than 1 metric ton of  $CO_2e$ . The proposed landscaping would include trees, shrubs, and biotreatment plantings as opposed to grass areas, which would minimize the routine use of mowers and other landscaping equipment.

There are no relevant measures in the scoping plan for landscaping equipment. Although a transition away from fossil-fueled equipment would be needed to achieve carbon neutrality by 2045, the scoping plan did not assume all-electric landscaping equipment in the 2030 reduction analysis. The proposed landscaping would reduce landscaping emissions compared with emissions from buildings with grass areas. This is consistent with the scoping plan's overall goal of reducing emissions from fossil-fueled landscaping equipment.

## **Energy Emissions**

As shown in Table 4.7-4, annual building energy emissions from the proposed project would amount to approximately 655 metric tons of  $CO_2e$ . OPR's 2018 CEQA and Climate Change Advisory notes that a land use development project that "achieves applicable building energy efficiency standards, uses no natural gas or other fossil fuels, and includes Energy Star appliances, where available, may be able to demonstrate a less-than-significant greenhouse gas impact associated with project operation." Although OPR recommends that new buildings should avoid use of fossil fuels, the scoping plan does not assume all-electric buildings in the 2030 reduction analysis. Rather, the scoping plan assumes new gas appliances will be high-efficiency units.

The proposed project would consume both electricity and natural gas. Electricity-related emissions would be mitigated through compliance with the scoping plan through SB 100. Per SB 100, electricity generation will become progressively less carbon intensive until 100 percent reliance on renewable energy is achieved in 2045. In addition, the proposed project would install Energy Star appliances and meet the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) requirements for Gold certification as well as the International WELL and Fitwel Building Institute Standards. Although the proposed project would allow natural gas appliances and heaters, all units would meet high-efficiency standards, consistent with the assumptions and emissions reduction requirements of the scoping plan for 2030. The proposed project would also install and include solar-ready rooftop connectivity for future installation of photovoltaic panels. This is consistent with the scoping plan's overall goal of reducing energy emissions from buildings that consume fossil fuels.

#### **Land Use Emissions**

The proposed project would retain 52 trees, remove 175 trees and plant 112 trees, for a net tree loss of 63 trees. Younger trees typically sequester more  $CO_2e$  compared to older and more mature trees.<sup>40</sup> However, additional sequestration from newer trees would be offset by the potential net

<sup>40</sup> Mongabay. 2019. *Tall and Old or Dense and Young: Which Kind of Forest Is Better for the Climate?* May. Available: https://news.mongabay.com/2019/05/tall-and-old-or-dense-and-young-which-kind-of-forest-is-better-for-the-climate/#:~:text=While%20young%20forests%20tend%20to,rate%20accelerates%20as%20it%20ages.&text=A%2 0study%20found%20the%20logging,the%20world's%20dirtiest%20coal%20plant. Accessed: July 21, 2020.

Table 4.7-4. Estimated GHG Emissions from Operation of the Proposed Project (metric tons/year)

| Condition/Source  | $CO_2$            | CH <sub>4</sub> | $N_20$              | CO <sub>2</sub> e | % CO <sub>2</sub> e |  |
|---|-------------------|-----------------|---------------------|-------------------|---------------------|--|
| Existing (2019)   |                   |                 |                     |                   |                     |  |
| 701 Gateway (existing office building) and 751 Gateway (existing parking lot) |                   |                 |                     |                   |                     |  |
| Area Sources  | <1                | <1              | <1                  | <1                | 0%                  |  |
| Energy Sources  | 398               | <1              | <1                  | 401               | 14%                 |  |
| Mobile Sources  | 2,331             | <1              | <1                  | 2,360             | 82%                 |  |
| Stationary Sources  | 39                | <1              | <1                  | 39                | 1%                  |  |
| Waste Generation  | 32                | 2               | <1                  | 80                | 3%                  |  |
| Water Consumption   | 2                 | <1              | <1                  | 4                 | <1%                 |  |
| Totala  | 2,802             | 2               | 0                   | 2,884             | 100%                |  |
| Proposed Project (2021)   |                   |                 |                     |                   |                     |  |
| 701 Gateway (existing office building)  |                   |                 |                     |                   |                     |  |
| Area Sources  | < 1               | < 1             | < 1                 | < 1               | < 1%                |  |
| <b>Energy Sources</b>   | 382               | < 1             | < 1                 | 385               | 5%                  |  |
| Mobile Sources  | 2,229             | < 1             | < 1                 | 2,256             | 31%                 |  |
| Stationary Sources  | 39                | < 1             | < 1                 | 39                | 1%                  |  |
| Waste Generation  | 32                | 2               | < 1                 | 80                | 1%                  |  |
| Water Consumption   | 2                 | < 1             | < 1                 | 4                 | < 1%                |  |
| 751 Gateway (proposed R&D and office building)                                |                   |                 |                     |                   |                     |  |
| Area Sources  | < 1               | < 1             | < 1                 | <1                | < 1%                |  |
| <b>Energy Sources</b>   | 649               | < 1             | < 1                 | 655               | 9%                  |  |
| Mobile Sources  | 3,619             | < 1             | < 1                 | 3,662             | 51%                 |  |
| Stationary Sources  | 39                | < 1             | < 1                 | 39                | 1%                  |  |
| Waste Generation  | 19                | 1               | < 1                 | 48                | 1%                  |  |
| Water Consumption   | 3                 | < 1             | < 1                 | 7                 | < 1%                |  |
| Total <sup>a,b</sup>  | 7,006             | 3               | < 1                 | 7,168             | 100%                |  |
| Net Increase with Proposed  | Project           |                 |                     |                   |                     |  |
| 2021 v. Existing <sup>a, b, c</sup>   |                   |                 |                     | 4,292             |                     |  |
| Land Use Emissions/Sequest  | ration Loss (Prop | osed Tree Ren   | noval) <sup>c</sup> | 46                |                     |  |
| Total <sup>b</sup>  |                   |                 |                     | 4,338             |                     |  |

Source: See Appendix B of this draft EIR.

Notes:

 $CO_2$  = carbon dioxide;  $CH_4$  = methane;  $N_2O$  = nitrous oxide;  $CO_2e$  = carbon dioxide equivalent

<sup>&</sup>lt;sup>a</sup> The number of existing parking spots within the project site was revised from 558 to 564 subsequent to the GHG analysis. Parking lots generate limited GHG emissions; therefore, the six additional parking spots would not substantially change the numeric values presented in this table.

b Totals may not add up because of rounding.

<sup>&</sup>lt;sup>c</sup> The proposed project would result in a net loss of 63 trees at the project site, resulting in losses in carbon sequestration and a net carbon increase in the atmosphere. The CalEEMod model assumes loss of new trees, which sequester more CO<sub>2</sub> than older trees. As such, land use emissions presented are conservative. Implementation of Mitigation Measure GHG-2 would result in a net loss of 19 of trees, which would reduce land use emissions and sequestration loss. As such "Total" emissions presented are conservative.

release of carbon from the removal of the replaced trees.  $^{41}$  Therefore, it is conservatively assumed that the loss in trees would result in the loss of some carbon sequestration (up to 46 metric tons of  $CO_2e)^{42}$ . There are no relevant measures in the scoping plan or explicit regulatory requirements related to tree planting. Although the magnitude of emissions generated by the net loss in trees within the project site would be relatively minor, it would not be consistent with the scoping plan's overall goal of avoiding losses in carbon sequestration.

#### **Mobile-Source Emissions**

As shown in Table 4.7-4, annual mobile-source emissions from the proposed project would amount to approximately 3,662 metric ton of CO<sub>2</sub>e. This figure is driven primarily by the additional VMT expected as a result of the proposed project. The proposed project would install 25 electric vehicle (EV) charging spots per CalGreen. As discussed in Section 4.9, *Transportation and Circulation*, of this draft EIR, the proposed project would increase VMT per service population relative to existing conditions (2019) and would not meet the 16.8 percent VMT per service population reduction target recommended by CARB to be achieved by 2030; therefore, the proposed project would conflict with the State's long-term emissions reduction trajectory.

#### **Stationary-Source Emissions**

As shown in Table 4.7-4, stationary sources (i.e., the proposed emergency generator) would generate approximately 39 metric tons of  $CO_{2}e$  annually. This net increase is below BAAQMD's stationary-source threshold of 10,000 metric tons of  $CO_{2}e$  per year.

#### **Waste Emissions**

As shown in Table 4.7-4, annual waste emissions from the proposed project would amount to approximately 48 metric tons of  $CO_2e$ . The proposed project would install communal receptacles for trash/recyclables/compostables and provide tenants with bins for separating waste. In addition, the proposed project would have dedicated areas where recyclable materials from the building would be collected and stored. These areas would be accessible for both waste haulers and tenants. Recyclable materials include mixed paper products, corrugated cardboard, glass, plastics, and metals. The proposed project would also facilitate the collection, storage, and disposal of batteries, mercury-containing lamps, and electronic waste. These features are consistent with the scoping plan's overall goal of reducing waste emissions and its specific strategy to avoid landfill  $CH_4$  emissions by reducing the disposal of landfilled waste and organics. These features would support and comply with the mandatory recycling requirement in AB 341 and support the State's recycling goal.

#### **Water Emissions**

As shown in Table 4.7-4, annual emissions from the proposed project's water use would amount to approximately 7 metric tons of  $CO_2e$ . The proposed project includes several water conservation features. For example, the proposed project would achieve LEED Gold certification or equivalent and

<sup>&</sup>lt;sup>41</sup> Trinity Consultants. 2017. *Appendix A, Calculation Details for CalEEMod.* October. http://www.aqmd.gov/docs/default-source/caleemod/02\_appendix-a2016-3-2.pdf?sfvrsn=6. Accessed: July 29, 2020.

<sup>&</sup>lt;sup>42</sup> The CalEEMod model assumes loss of new trees, which sequester more CO<sub>2</sub> than older trees. As such, estimated land use emissions are conservative.

install low-flow fixtures. Outdoor water conservation measures would include the installation and maintenance of water-efficient landscaping with low-usage plant material to minimize irrigation requirements. Furthermore, the proposed project would comply with all applicable water conservation (indoor and outdoor) measures, including Title 24, Part 6, California Energy Code baseline standard requirements for energy efficiency, based on the 2019 Energy Efficiency Standards, California Department of Water Resources Model Water Efficient Landscape Ordinance, and the 2019 California Green Building Standards Code, commonly referred to as CALGreen. These features are consistent with the scoping plan's overall goal of reducing water emissions and serve to support ongoing regulatory programs (e.g., SB X7-7 Title 24) that aim to reduce GHG emissions associated with conveying and distributing water to ultimately achieve climate neutrality.

#### Conclusion

The proposed project's sustainability measures represent a robust suite of strategies that are consistent with applicable policies, design features, and best management practices from the scoping plan and regulatory programs for the area, energy, waste, and water sectors. Stationary-source emissions would be below BAAQMD's stationary source threshold.

The proposed project would result in a net loss in the number of trees on the project site, which would result in losses in carbon sequestration and a relatively minor carbon increase in the atmosphere. Implementation of Mitigation GHG-2, Operational GHG Reduction Measures, would plant 44 additional trees on the project site's existing parking lots. However, there would still a net tree loss of 19 trees. In addition, the proposed project would not achieve the 16.8 percent VMT per service population reduction target. The proposed project would be subject to regulatory programs related to fuel and vehicle efficiency as well as vehicle electrification. Implementation of Mitigation Measure GHG-2, Operational GHG Reduction Measures would lead to installation of 28 more EV chargers than required by the 2019 Building Code. This measure would incentivize the use of electric vehicles, but the associated emission reductions would depend on individual choices to purchase electric vehicles and therefore were not quantified. Implementation of Mitigation Measure TR-1, as discussed in Section 4.9. Transportation and Circulation, of this draft EIR, would contribute a fair share toward funding the design and construction of off-site improvements to support the proposed project's first- and last-mile transit connection strategies, which are necessary to support reductions in the number of trips made by automobile. These improvements include fair-share contributions toward the City's cost of upgrading sidewalks, upgrading and extending bicycle and pedestrian pathways, providing a more direct connection to on-street shuttle stops, participating in first/last shuttle programs, and striping unmarked crosswalks. However, the lead agency cannot determine with certainty that implementation of Mitigation Measures GHG-2 and TR-1 would reduce the proposed project's VMT to a less-thansignificant level because the mitigation measure's effectiveness cannot be precisely quantified. Given that the proposed project already includes a robust TDM plan, financial support for last mile improvements, and other GHG reduction features, such as installation of EV chargers, there are no other feasible mitigation measures.

Consequently, although emissions from the stationary-source, area, energy, waste, and water sectors would generally be consistent with BAAQMD's stationary threshold or the scoping plan, applicable guidance from relevant agencies, and regulatory programs, policies, design features, and best management practices, land use emissions from the proposed project would not be consistent with the scoping plan with implementation of mitigation. Mobile-source emissions, with implementation of mitigation, would also not reduce GHG emissions to ensure consistency with the State's goals. Therefore, operational GHG impacts would be *significant and unavoidable with mitigation*.

#### Mitigation Measure GHG-2: Operational GHG Reduction Measures

The project sponsor shall:

- Plant 44 additional trees on existing surface parking lots; and
- Install 28 more electric vehicle (EV) charging spots than required by the 2019 Building Code.

Impact GHG-2: The proposed project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. (Significant and Unavoidable with Mitigation)

# SB 32 and CARB's 2017 Scoping Plan

SB 32 outlines the State's GHG emissions reduction targets for 2030 and builds on the reduction targets adopted by AB 32. The proposed project includes many GHG reduction features and would not impede the State from reaching these goals. In 2008 and 2014, CARB adopted the scoping plan and first update, respectively, as a framework for achieving AB 32. The scoping plan and first update outlined a series of technologically feasible and cost-effective measures to reduce statewide GHG emissions. CARB adopted the climate change scoping plan in November 2017 as a framework for achieving the 2030 GHG reduction goal described in SB 32. There is no state plan for addressing GHG reductions beyond 2030. Because this analysis is focused on emissions in 2030, it addresses the project's operational emissions (construction would be completed by 2021).

Based on CARB's 2017 scoping plan, many of the reductions needed to meet the 2030 target will come from state regulations, including cap-and-trade requirements, the requirement for additional renewable energy sources in California's energy supply, updates to Title 24, and increased emissions reduction requirements for mobile sources. The 2017 scoping plan indicates that reductions will need to come in the form of changes pertaining to vehicle emissions and mileage standards, changes related to sources of electricity, and increased energy efficiency at existing facilities as well as state and local plans, policies, or regulations to lower GHG emissions relative to business-as-usual conditions. The 2017 scoping plan carries forward GHG reduction measures from the first update as well as new potential measures to help achieve the State's 2030 target across all sectors of the California economy, including transportation, energy, and industry.

The 2017 scoping plan recommends prioritizing on-site GHG reduction features in the project's region. Appendix B to the 2017 scoping plan includes examples of on-site project design features and mitigation measures that may be feasible to minimize GHG emissions from land use development projects. The proposed project is generally consistent with the on-site project design features and mitigation measures outlined in Appendix B to 2017 scoping plan, reducing GHG emissions and associated impacts from area, energy, water, and waste source. For instance, the proposed project would reduce area emissions by minimizing the use of fossil fueled landscaping equipment; reduce energy emissions by installing Energy Star and high efficiency appliances, and meeting LEED Gold or equivalent certification requirements, the international WELL and Fitwel Building Institute Standards; reduce waste emissions by reducing the disposal of landfilled waste and organics and mandating recycling; reduce water emissions by achieving LEED Gold certification or equivalent, installing low-flow fixtures, installing water-efficient landscaping with low-usage plant material, and supporting ongoing water regulatory programs. These reductions would help the State meet its GHG reduction goals. As discussed above, stationary-source emissions would be below BAAQMD's stationary-source threshold.

Implementation of Mitigation GHG-2 would reduce the proposed project's net tree loss by planting additional trees on the project site's existing parking lots, but would still result in losses in overall carbon sequestration. Implementation of an aggressive TDM program, Mitigation Measure GHG-2 (i.e., EV charging stations) and Mitigation Measure TR-1 would reduce mobile-source emissions during operation but would not reduce emissions enough to meet the 16.8 percent VMT per service population reduction target developed by CARB. As discussed in the transportation chapter of this EIR and above, there are no additional, feasible VMT reduction measures. Therefore, the GHG impacts of the proposed project would be *significant and unavoidable with mitigation* because the project would not be consistent with every scoping plan policy even though it would help the state reduce GHG emissions because it incorporates GHG reduction measures beyond those required by law.

#### SB 375 and Plan Bay Area

Climate protection and transportation system effectiveness are two of seven goals addressed in MTC's Plan Bay Area (2013 and 2040). Plan Bay Area provides a long-range framework for minimizing transportation impacts on the environment, improving regional air quality, protecting natural resources, and reducing GHG emissions. The plan supports smart growth principles, promotes infill development, and proactively links land use, air quality, and transportation needs in the region. Plan Bay Area is consistent with SB 375, which requires MTC to adopt an SCS that outlines policies to reduce per service population GHG emissions from automobiles and light trucks. The SCS policies include a mix of strategies that encourage compact growth patterns, alternative transportation, transit, mobility and access, network expansion, and transportation investment.

Implementation of the SCS is intended to improve the efficiency of the transportation system and promote a variety of land use types throughout the Bay Area that meet market demands in a balanced and sustainable manner. As discussed under Impact GHG-1b, the proposed project would be built around the concept of sustainability and would include green building techniques as well as energy efficiency, water conservation, and waste reduction measures.

The proposed project would allow development that would accommodate forecast growth within the project site. Consistent with MTC goals, the proposed project would promote a transit-/pedestrian-/bicycle-friendly environment. Specifically, the proposed project would improve connectivity with employee shuttles through construction of a new shuttle stop on the project site, bicycle parking, and charging spaces for electric vehicles. These features would support alternative transportation within the project site, which could help reduce per service population GHG emissions from passenger vehicles, consistent with Plan Bay Area. However, as discussed under Impact GHG-1b, the proposed project would not meet the VMT per service population reduction target developed by CARB. Implementation of Mitigation Measure TR-1 would reduce mobile-source emissions during operation but would not reduce emissions enough to meet the reduction target. As such, it is conservatively assumed that the proposed project would not meet the 2035 per capita GHG per SB 375<sup>43</sup>. This may affect the ability for the region to meet its SB 375 reduction target. Therefore, the proposed project is conservatively assumed to be inconsistent with the goals of SB 375 and Plan Bay Area, and this impact would be *significant and unavoidable with mitigation*.

<sup>&</sup>lt;sup>43</sup> California Air Resources Board. 2020c. *SB 375 Regional Plan Climate Targets*. Available: https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/regional-plan-targets. Accessed: February 7, 2020.

# **Consistency with Other State Regulations**

Systemic changes will be required at the State level to achieve California's future GHG reduction goals. Regulations, such as future amendments to the LCFS, future updates to the State's Title 24 standards, and implementation of the State's SLCP Reduction Strategy, including forthcoming regulations for composting and organics diversion, will be necessary to attain the magnitude of reductions required for the State's goals. The proposed project would be required to comply with these regulations in new construction (in the case of updated Title 24 standards) or directly affected by the outcomes (i.e., vehicle trips and energy consumption would be less carbon intensive because of statewide compliance with future LCFS amendments and increasingly stringent RPS). Therefore, for the foreseeable future, the proposed project would not conflict with any other state-level regulations pertaining to GHGs in the post-2020 era, and this impact would be *less than significant*.

# 4.7.4.4 Cumulative Impacts

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. Given the long atmospheric lifetimes, GHGs emitted by various sources worldwide accumulate in the atmosphere. No single emitter of GHGs is large enough to trigger global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources. Therefore, GHG impacts are inherently cumulative, and the analysis above is inclusive of cumulative impacts.

# 4.8 Noise and Vibration

#### 4.8.1 Introduction

This section describes the environmental and regulatory setting for noise and vibration. It also describes impacts associated with noise and vibration that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate.

San Francisco International Airport (SFO) submitted a comment on the Notice of Preparation (NOP). The commenter stated that the project site is outside of the 65 dB community noise equivalent level (CNEL) noise contour and is not within a runway end safety zone. As a result of being located outside of the 65 CNEL contour, the commenter stated that the proposed project would not pose an airport land use compatibility issue related to noise. The commenter also stated that noise impact to any sensitive receptors or nighttime uses associated with the proposed project should be evaluated in the EIR. The proposed project does not propose any nighttime uses or noise-sensitive uses, such as residences; the potential for noise impacts from aircraft activity is evaluated under Impact NOI-3.

# 4.8.2 Environmental Setting

#### 4.8.2.1 Fundamentals of Environmental Noise

#### **Overview of Noise and Sound**

Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Because noise is an environmental pollutant that can interfere with human activities, an evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is mechanical energy (i.e., vibration) transmitted by pressure waves over a medium such as air or water. Sound is characterized by various parameters, including the rate of oscillation of sound waves (i.e., frequency), the speed of propagation, and the pressure level or energy content (i.e., amplitude). In particular, the sound pressure level is the most common descriptor for characterizing the loudness of an ambient (i.e., existing) sound level. Although the decibel (dB) scale, which is a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called A-weighting, written as dBA and referred to as A-weighted decibels. Table 4.8-1 defines sound measurements and other terminology used in this chapter, and Table 4.8-2 summarizes typical A-weighted sound levels for different noise sources.

In general, human sound perception is such that a change in sound level of 1 dB cannot typically be perceived by the human ear, a change of 3 dB is barely noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level as it increases or decreases, respectively.

**Table 4.8-1. Definition of Sound Measurements** 

| Sound Measurements  | Definition  |
|---|---|
| Decibel (dB)  | A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude with respect to a reference sound pressure amplitude. The reference pressure is 20 micropascals.  |
| A-Weighted Decibel (dBA)                                      | An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.  |
| C-Weighted Decibel (dBC)                                      | The sound pressure level in decibels as measured using the C-weighting filter network. The C-weighting is very close to an unweighted or <i>flat</i> response. C-weighting is used only in special cases (i.e., when low-frequency noise is of particular importance). A comparison of the measured A- and C-weighted level gives an indication of low-frequency content. |
| Maximum Sound Level (Lmax)                                    | The maximum sound level measured during the measurement period.   |
| Minimum Sound Level (L <sub>min</sub> )                       | The minimum sound level measured during the measurement period.   |
| Equivalent Sound Level ( $L_{eq}$ )                           | The equivalent steady-state sound level that in a stated period of time would contain the same acoustical energy.   |
| Percentile-Exceeded Sound Level ( $L_{xx}$ )                  | The sound level exceeded X% of a specific time period. $L_{10}$ is the sound level exceeded 10% of the time, and $L_{90}$ is the sound level exceeded 90% of the time. $L_{90}$ is often considered to be representative of the background noise level in a given area.   |
| Day-Night Level (L <sub>dn</sub> )                            | The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.   |
| Community Noise Equivalent<br>Level (CNEL)                    | The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.  |
| Vibration Velocity Level (or<br>Vibration Decibel Level, VdB) | The root-mean-square velocity amplitude for measured ground motion expressed in dB.   |
| Peak Particle Velocity<br>(Peak Velocity or PPV)              | A measurement of ground vibration, defined as the maximum speed (measured in inches per second) at which a particle in the ground is moving relative to its inactive state. PPV is usually expressed in inches per second.  |
| Frequency: Hertz (Hz)   | The number of complete pressure fluctuations per second above and below atmospheric pressure.   |

Table 4.8-2. Typical A-weighted Sound Levels

|                                   | Noise Level    |                                |
|-----------------------------------|----------------|--------------------------------|
| <b>Common Outdoor Activities</b>  | (dBA)          | Common Indoor Activities       |
|                                   | —110—          | Rock band                      |
| Jet flyover at 1,000 feet         |                |                                |
|                                   | —100—          |                                |
| Gas lawnmower at 3 feet           |                |                                |
|                                   | <b>—90—</b>    |                                |
| Diesel truck at 50 feet at 50 mph |                | Food blender at 3 feet         |
|                                   | —80—           | Garbage disposal at 3 feet     |
| Noisy urban area, daytime         |                |                                |
| Gas lawnmower at 100 feet         | <del></del> 70 | Vacuum cleaner at 10 feet      |
| Commercial area                   |                | Normal speech at 3 feet        |
| Heavy traffic at 300 feet         | <del>60</del>  |                                |
|                                   |                | Large business office          |
| Quiet urban daytime               | <b>—50—</b>    | Dishwasher in next room        |
|                                   |                |                                |
| Quiet urban nighttime             | <b>—40—</b>    | Theater, large conference room |
|                                   |                | (background)                   |
| Quiet suburban nighttime          |                |                                |
|                                   | —30—           | Library                        |
| Quiet rural nighttime             |                | Bedroom at night, concert hall |
|                                   |                | (background)                   |
|                                   | —20—           |                                |
|                                   |                | Broadcast/recording studio     |
|                                   | —10—           |                                |
|                                   |                |                                |
|                                   | —0—            |                                |

Source: Federal Transit Administration. 2018. Transit Noise and Vibration Impact Assessment. FTA Report 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123\_0.pdf. Accessed: May 20, 2020.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (Leq), the minimum and maximum sound levels (Lmin and Lmax), percentile-exceeded sound levels (such as L10, L20), the day-night sound level (Ldn), and the CNEL. Ldn and CNEL values differ by less than 1 dB. As a matter of practice, Ldn and CNEL values are considered to be equivalent and are treated as such. These measurements are defined in Table 4.8-1.

For a point source, such as a stationary compressor or a piece of construction equipment, sound attenuates (i.e., lessens in intensity), based on geometry, at a rate of 6 dB per doubling of distance. For a line source, such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per

doubling of distance perpendicular to the source.¹ Atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate than sound that travels over a hard surface such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers such as buildings or topographic features that block the line of sight between a source and receiver also increase the attenuation of sound over distance.

Community noise environments are generally perceived as quiet when the 24-hour average noise level is below 45 dBA, moderate in the 45 to 60 dBA CNEL range, and loud above 60 dBA CNEL. Very noisy urban residential areas are usually around 70 dBA CNEL. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA CNEL. Incremental changes of 3 to 5 dB in the existing 1-hour Leq, or the CNEL, are commonly used as thresholds for an adverse community reaction to a noise increase. However, there is evidence that incremental thresholds in this range may not be sufficiently protective in areas where noise-sensitive uses are located and CNEL is already high (i.e., above 60 dBA). In these areas, limiting noise increases to 3 dB or less is recommended.<sup>2</sup> Noise intrusions that cause short-term interior noise levels to rise above 45 dBA at night can disrupt sleep. Exposure to noise levels greater than 85 dBA for 8 hours or longer can cause permanent hearing damage.

#### **Noise from Multiple Sources**

Since sound pressure levels in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. Adding a new noise source to an existing noise source, both producing noise at the same level, will not double the noise level. If the difference between two noise sources is 10 dBA or more, the higher noise source will dominate and the resultant noise level will be equal to the noise level of the higher noise source. In general, if the difference between two noise sources is 0 to 1 dBA, the resultant noise level will be 3 dBA higher than the higher noise source, or both sources if they are equal. If the difference between two noise sources is 2 to 3 dBA, the resultant noise level will be 2 dBA above the higher noise source. If the difference between two noise sources is 4 to 10 dBA, the resultant noise level will be 1 dBA higher than the higher noise source.

#### **Attenuation of Noise**

A receptor's distance from a noise source affects how noise levels attenuate (decrease). Transportation noise sources tend to be arranged linearly such that roadway traffic attenuates at a rate of 3.0 to 4.5 dBA per doubling of distance from the source, depending on the intervening surface (paved or vegetated, respectively). Point sources of noise, such as stationary equipment or construction equipment, typically attenuate at a rate of 6.0 to 7.5 dBA per doubling of distance from

<sup>&</sup>lt;sup>1</sup> California Department of Transportation (Caltrans). 2020. *Transportation and Construction Vibration Guidance Manual*. April. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf. Accessed May 20, 2020.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123\_0.pdf. Accessed: May 20, 2020.

the source, depending on the intervening surface.<sup>3</sup> For example, a sound level of 80 dBA at 50 feet from the noise source will be reduced to 74 dBA at 100 feet, 68 dBA at 200 feet, and so on, based on the 6 dB point source reduction over a non-absorptive surface (e.g. pavement instead of vegetation). Noise levels can also be attenuated by "shielding" or providing a barrier between the source and the receptor. With respect to interior noise levels, noise attenuation effectiveness depends on whether windows are closed or open. Based on the U.S. Environmental Protection Agency's (EPA's) national average, closed windows reduce noise levels by approximately 25 dBA and open windows reduce noise levels by about 15 dBA.<sup>4</sup>

#### **Noise-Sensitive Land Uses**

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include single- and multi-family residential areas, health care facilities, lodging facilities, and schools. Noise-sensitive land uses where people typically sleep are typically more sensitive to noise during nighttime hours (when people are typically sleeping). Recreational areas where quiet is an important part of the environment as well as some commercial areas, such as outdoor restaurant seating areas, can also be considered sensitive to noise.

#### **Overview of Ground-borne Vibration**

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Several different methods are typically used to quantify vibration amplitude; one is peak particle velocity (PPV) and another is root mean square (RMS) velocity. PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. RMS velocity is defined as the average of the squared amplitude of the signal. Vibration is typically measured in inches per second or millimeters per second.

Operation of heavy construction equipment, particularly pile-driving equipment and other impact devices (e.g., pavement breakers), creates seismic waves that radiate along the surface of and downward into the ground. These surface waves can be felt as ground vibration. Vibration from the operation of this type of equipment can result in effects that range from annoyance for people to damage for structures. Variations in geology and distance result in different vibration levels, including different frequencies and displacements. In all cases, vibration amplitudes decrease with increased distance.

Perceptible ground-borne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they cause rock and soil particles to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of vibration amplitude, referred to as PPV.

The 1.5-dBA variation in attenuation rate (6 dBA vs. 7.5 dBA) can result from ground-absorption effects, which occur as sound travels over soft surfaces such as soft earth or vegetation (7.5 dBA attenuation rate) versus hard ground such as pavement or very hard-packed earth (6 dBA rate) (U.S. Housing and Urban Development, *The Noise Guidebook*, 1985, p. 24. Available online at: https://www.hudexchange.info/onecpd/assets/File/Noise-Guidebook-Chapter-4.pdf. Accessed May 20, 2020.)

<sup>&</sup>lt;sup>4</sup> U.S. Environmental Protection Agency, 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, Appendix B, Table B-4, p. B-6, March 1974.

Vibration amplitude attenuates over distance. This is a complex function of how energy is imparted into the ground and the soil or rock conditions through which the vibration is traveling. The following equation is used to estimate the vibration level at a given distance for typical soil conditions.  $^5$  PPV<sub>ref</sub> is the reference PPV at 25 feet (Table 4.8-3).

 $PPV = PPV_{ref} \times (25/Distance)^{1.5}$ 

Table 4.8-3. Vibration Source Levels for Construction Equipment

| Equipment       | PPV at<br>25 Feet | PPV at<br>50 Feet | PPV at  | PPV at  | PPV at<br>100 Feet |
|-----------------|-------------------|-------------------|---------|---------|--------------------|
| Equipment       | 25 reet           | 50 reet           | 75 Feet | 80 Feet | 100 reet           |
| Auger drill     | 0.089             | 0.0315            | 0.0171  | 0.016   | 0.011              |
| Hoe ram         | 0.089             | 0.0315            | 0.0171  | 0.016   | 0.011              |
| Large bulldozer | 0.089             | 0.0315            | 0.0171  | 0.016   | 0.011              |
| Loaded trucks   | 0.076             | 0.0269            | 0.0146  | 0.013   | 0.010              |
| Jackhammer      | 0.035             | 0.0124            | 0.0067  | 0.006   | 0.004              |
| Small bulldozer | 0.003             | 0.0011            | 0.0006  | 0.001   | 0.0004             |

Source: Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123\_0.pdf. Accessed: May 20, 2020.

Table 4.8-3 summarizes typical vibration levels generated by construction equipment at the reference distance of 25 feet and other distances, as determined with use of the attenuation equation above.<sup>6</sup> Tables 4.8-4 and 4.8-5 summarize the guidelines developed by the California Department of Transportation (Caltrans) for damage and annoyance potential from the transient and continuous vibration that is usually associated with construction activity. The activities that are typical of continuous vibration include the use of excavation equipment, static compaction equipment, tracked vehicles, vehicles on a highway, vibratory pile drivers, pile-extraction equipment, and vibratory compaction equipment. The activities that are typical of single-impact (transient) or low-rate, repeated impact vibration include the use of drop balls, blasting, and the use of impact pile drivers, "pogo stick" compactors, and crack-and-seat equipment.<sup>7</sup>

# 4.8.2.2 Existing Noise Environment

#### **Regional and Local Setting**

The project site is in the City of South San Francisco in northern San Mateo County. The project site is served by Gateway Boulevard as the primary arterial road, fed by Oyster Point Boulevard (running east to west) to the north and East Grand Avenue (running east to west) to the south. In addition, the project site is approximately 0.5 mile north of the South San Francisco Caltrain station and approximately 0.2 mile east of U.S. 101. SFO is approximately 2 miles south of the project site.

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123\_0.pdf. Accessed: May 20, 2020.

<sup>6</sup> California Department of Transportation. 2020. *Transportation and Construction Vibration Guidance Manual*. April. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf. Accessed May 20, 2020.

<sup>&</sup>lt;sup>7</sup> Ibid.

**Table 4.8-4. Vibration Damage Potential Threshold Criteria Guidelines** 

|  | Maximum PPV (inches per second) |   |
|--|---------------------------------|---|
| Structure and Condition  | Transient<br>Sources            | Continuous/Frequent<br>Intermittent Sources |
| Extremely fragile historic buildings, ruins, ancient monuments | 0.12                            | 0.08  |
| Fragile buildings  | 0.2                             | 0.1   |
| Historic and some old buildings                                | 0.5                             | 0.25  |
| Older residential structures                                   | 0.5                             | 0.3   |
| New residential structures                                     | 1.0                             | 0.5   |
| Modern industrial/commercial buildings                         | 2.0                             | 0.5   |

Source: California Department of Transportation. 2020. *Transportation and Construction Vibration Guidance Manual*. April. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf. Accessed May 20, 2020.

Note: Transient sources create a single, isolated vibration event (e.g., blasting or the use of drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 4.8-5. Vibration Annoyance Potential Criteria Guidelines

|                        | Maximum P            | PV (inches per second)                      |
|------------------------|----------------------|---|
| Human Response         | Transient<br>Sources | Continuous/Frequent<br>Intermittent Sources |
| Barely perceptible     | 0.04                 | 0.01  |
| Distinctly perceptible | 0.25                 | 0.04  |
| Strongly perceptible   | 0.9                  | 0.10  |
| Severe                 | 2.0                  | 0.4   |

Source: California Department of Transportation. 2020. *Transportation and Construction Vibration Guidance Manual*. April. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf. Accessed May 20, 2020.

Note: Transient sources create a single, isolated vibration event (e.g., blasting or the use of drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

#### **Existing Uses at the Project Site**

The project site is located in the Gateway Campus, an area with primarily commercial and office uses. The project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west.

#### **Existing Noise-Sensitive Uses in the Vicinity**

There are no residential land uses located within 1,000 feet of the project site; the nearest residential land uses are located along Airport Boulevard, over 1,200 feet from the project site. Two hotels, Larkspur Landing and Hilton Garden Inn, are within 600 and 900 feet of the main project construction areas, respectively, and the Gateway Child Development Center Peninsula is approximately 1,000 feet from the main project construction areas. However, the Gateway Child Development Center Peninsula is approximately 670 feet from the nearest project construction area, which would be at the southern terminus of the site and include repaving and curb work, as well as some landscaping activities. This

construction area is approximately 300 feet from the Larkspur Landing Hotel and 400 feet from the Hilton Garden Inn. The project site is in the Gateway Specific Plan Area, which includes a variety of commercial (including hotel and childcare) and R&D land uses. As shown in Figure 3-3 in Chapter 3, Project Description, of this draft EIR, the parcels in the vicinity of the project site are zoned Gateway Specific Plan District (GSPD).

#### **Existing Noise Levels**

The existing ambient noise environment at the project site is characteristic of an urban environment (e.g., highway and local traffic, aircraft overflights, commercial noise sources). Traffic noise from vehicles traveling on surrounding streets and freeways (e.g., U.S. 101) is typically the dominant noise source in urban areas. Traffic noise is the primary source contributing to ambient noise levels at the project site. In addition to traffic noise, noise from aircraft overflights traveling to or from SFO, approximately 2 miles south of the project site, is sometimes audible at the project site. The Caltrain right-of-way is located along the western boundary of the Gateway Campus. Thus, intermittent Caltrain noise also contributes to the noise environment in the project area.

As discussed above, traffic noise is the primary source contributing to ambient noise levels in the project vicinity. Thus, to estimate existing ambient noise levels at and around the project site, existing traffic noise levels in the project area were modeled based on traffic data provided by Fehr & Peers. Refer to Table 4.8-6 for modeled existing noise levels along roadway segments within approximately 0.5 mile of the project site.

# 4.8.3 Regulatory Framework

#### 4.8.3.1 State

#### **California Code of Regulations**

California Code of Regulations Title 24, part 2, Sound Transmission, establishes minimum noise insulation standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and dwellings other than single-family residences. Under this regulation, interior noise levels attributable to exterior noise sources cannot exceed 45 dB in any habitable room. The noise metric is either the  $L_{dn}$  or the CNEL. Compliance with Title 24 interior noise standards occurs during the permit review process and generally protects a proposed project's users from existing ambient outdoor noise levels. If determined necessary, a detailed acoustical analysis of exterior wall and window assemblies may be required.

## 4.8.3.2 Regional

#### **Comprehensive Airport Land Use Compatibility Plan8**

Refer to Section 4.10.3, *Hazards and Hazardous Materials*, of this draft EIR for a discussion of the 2012 SFO Airport Land Use Compatibility Plan (ALUCP). Noise associated with airport and aircraft operations is considered one of the main areas of important concern for airport land use commissions, especially in highly urbanized areas like the Bay Area.

<sup>&</sup>lt;sup>8</sup> C/CAG. 2012. Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport. November 2012. Available: https://ccag.ca.gov/wp-content/uploads/2014/10/Consolidated\_CCAG\_ALUCP\_November-20121.pdf. Accessed: March 27, 2020.

Table 4.8-6. Modeled Existing Noise Levels within 0.5 mile of the Project Site

| Roadway                 | Segment                          | Existing Noise Level (dBA Ldn) |
|-------------------------|----------------------------------|--------------------------------|
| Airport Boulevard       | North of Sister Cities Boulevard | 65.4                           |
| Airport Boulevard       | South of Sister Cities Boulevard | 64.1                           |
| Airport Boulevard       | North of Grand Avenue            | 65.3                           |
| Airport Boulevard       | South of Grand Avenue            | 65.5                           |
| Sister Cities Boulevard | East of Airport Boulevard        | 69.3                           |
| Sister Cities Boulevard | West of Airport Boulevard        | 68.8                           |
| Oyster Point Boulevard  | East of Dubuque Avenue           | 66.2                           |
| Oyster Point Boulevard  | West of Dubuque Avenue           | 69.1                           |
| Oyster Point Boulevard  | East of Gateway Boulevard        | 69.0                           |
| Oyster Point Boulevard  | West of Gateway Boulevard        | 69.9                           |
| Gateway Boulevard       | South of Oyster Point Boulevard  | 66.0                           |
| Gateway Boulevard       | North of East Grand Avenue       | 65.2                           |
| Gateway Boulevard       | South of East Grand Avenue       | 65.3                           |
| East Grand Avenue       | East of Gateway Boulevard        | 68.8                           |
| East Grand Avenue       | West of Gateway Boulevard        | 68.1                           |
| Grand Avenue            | East of Airport Boulevard        | 67.1                           |
| Grand Avenue            | West of Airport Boulevard        | 64.5                           |
| Dubuque Avenue          | South of Oyster Point Boulevard  | 67.9                           |
| Dubuque Avenue          | South of U.S. 101 Ramps          | 61.6                           |

Note: Due to the COVID-19 shelter-in-place orders that were in effect at the time of the draft EIR preparation, existing noise levels were modeled based on traffic data for year 2019 rather than based on noise measurements taken in the field. Traffic noise is usually the dominant source of overall ambient noise in urban areas, and field work conducted during the shelter-in-place orders would not accurately capture typical traffic noise levels (with schools and many businesses closed and many people working remotely). Thus, the modeled traffic noise levels provide a reasonable approximation for typical ambient noise levels in the vicinity of the project site. In addition, the modeled traffic noise levels for the project area are generally similar to measured pre-COVID-19 noise levels for other projects in the area, including the 499 Forbes Boulevard Office Project EIR and the 201 Haskins Way Project Draft EIR.

Source: Traffic volumes provided by Fehr & Peers. Modeling conducted using a spreadsheet based on the Federal Highway Administration (FHWA) Traffic Noise Model (TNM), version 2.5 at a fixed distance of 50 feet from the roadway centerline.

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According to the 2012 SFO ALUCP, the Airport Influence Area (AIA), which is the geographic area that is subject to the land use compatibility considerations identified in the ALUCP, is divided into two areas: Area A and Area B. Area A encompasses all of San Mateo County and the incorporated cities within it. Area B roughly follows the noise compatibility and safety zone contours. Consistent with Title 14 of the Code of Federal Regulations (CFR) Part 77, the 2012 SFO ALUCP establishes height restrictions within specific contours of airport facilities throughout Area A and Area B. The project site is located within both Area A and Area B.

The 2012 SFO ALUCP has four primary areas of concern, two of which pertain to noise, as listed below.

- 1. Aircraft Noise Impact Reduction: To reduce the potential number of future airport area residents who could be exposed to noise impacts from airport and aircraft operations.
- 2. Over-flight Notification: To establish an area within which aircraft flights to and from the airport occur frequently enough and at a low enough altitude to be noticeable by sensitive residents. Within this area, real estate disclosure notices shall be required, pursuant to state law.

According to the 2012 SFO ALUCP, the project site is not located within the CNEL 65 dB noise contour<sup>9</sup> or any safety zones.<sup>10</sup>

#### 4.8.3.3 Local

#### South San Francisco General Plan

The 1999 General Plan for the City of South San Francisco (City) provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Noise Element, which is intended to ensure compliance with state requirements and promote a comprehensive, long-range program of achieving acceptable noise levels throughout the City.

The General Plan includes the following policies applicable to noise and vibration.

- 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.

Local plans, policy actions, or development activities within SFO's 65 dB CNEL contour require the approval of the San Mateo County Airport Land Use Commission (ALUC) prior to local permit issuance. To assist this process, the ALUC has established noise/land use compatibility standards as the basis of plan review, which are included in the City's General Plan Noise Element (see Table 9.2-1). The City also applies these standards in its review of development applications located within the 65 dB CNEL boundary. The standards are shown below in Table 4.8.7. As previously noted, the project site is located outside of the 65 dB CNEL boundary.

#### **South San Francisco Municipal Code**

Chapter 8.32, Noise Regulations, contains the noise regulations of the South San Francisco Municipal Code. The code's quantitative noise limits and construction noise regulations are described below.

Exhibit IV-5, *Noise Compatibility Zones* in the 2012 SFO ALUCP.

<sup>&</sup>lt;sup>10</sup> Exhibit IV-2, Airport Influence Area B – Land Use Policy Action/Project Referral Area in the 2012 SFO ALUCP.

Table 4.8-7. General Plan Land Use Criteria for Noise-Impacted Areas

| Land Use    | <b>CNEL Range</b>        | General Land Use Criteria  |
|-------------|--------------------------|--|
| Residential | Less than 65<br>65 to 70 | Satisfactory; no special insulation requirements Development requires analysis of noise reduction requirements |
|             | Over 70                  | and insulation as needed Development should not be undertaken  |
| Commercial  | Less than 70             | Satisfactory; no special insulation requirements   |
|             | 70 to 80                 | Development requires analysis of noise reduction requirements  |
|             | Over 80                  | and insulation as needed 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  |
|             | Over 85                  | and insulation as needed Airport-related development only; special noise insulation should be provided         |
| Open        | Less than 75             | Satisfactory; no special insulation requirements   |
|             | Over 75                  | Avoid uses involving concentrations of people or animals   |

Source: South San Francisco General Plan, Noise Element.

Table 4.8-8 specifies the maximum permissible sound levels to be generated by any property within the City according to Section 8.32.030 of the City's Noise Ordinance. The maximum allowable level is determined by the land use category of the receiving property and is measured on any receiving property. All references to dB in the code use the A-weighting scale. All land uses within the Gateway Specific Plan Area are governed by noise thresholds of 65 dBA during the daytime hours of 7 a.m. to 10 p.m. and 60 dBA during the nighttime hours of 10 p.m. to 7 a.m.

Table 4.8-8. City of South San Francisco Noise Level Standards

| Land Use Category   | Time Period                                  | Noise Level (dB) <sup>a</sup> |
|---|--|-------------------------------|
| R-E, R-1 and R-2 zones or any single-family or duplex residential in a specific plan district                         | 10:00 p.m.—7:00 a.m.<br>7:00 a.m.—10:00 p.m. | 50<br>60                      |
| R-3 and D-C zones or any multiple-family residential or mixed residential/commercial in any specific plan district    | 10:00 p.m.—7:00 a.m.<br>7:00 a.m.—10:00 p.m. | 55<br>60                      |
| C-1, P-C, Gateway and Oyster Point Marina specific plan districts or any commercial use in any specific plan district | 10:00 p.m.—7:00 a.m.<br>7:00 a.m.—10:00 p.m. | 60<br>65                      |
| M-1, P-1  | Anytime                                      | 70                            |

Source: Table 8.32.030 of the South San Francisco Municipal Code

If the measured ambient level for any area is higher than the standard set in the City Municipal Code, then the threshold is 5 dB above the measured ambient level.

Section 20.300.010(F) of the South San Francisco Municipal Code states that no vibration shall be produced that is transmitted through the ground and is discernible without the aid of instruments by a reasonable person at the lot lines of the site. Vibration from temporary construction, demolition, and vehicles that enter and leave the subject parcel (e.g., construction equipment, trains, trucks) are exempt from this standard.

The noise level standard for each land use for a cumulative period of more than thirty minutes in any hour (L50). Standards increase for durations less than 15 minutes per hour.

Section 8.32.050 (d) of the South San Francisco Municipal Code identifies a special provision that allows construction activities with a City permit between the hours of 8:00 a.m. to 8:00 p.m. on weekdays, 9:00 a.m. to 8:00 p.m. on Saturdays, and 10:00 a.m. to 6:00 p.m. on Sundays and holidays. Other hours may be authorized by obtaining a permit, provided the construction meets at least one of the following requirements.

- 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 of the property plane of the project shall not exceed 90 dB.

#### **Gateway Specific Plan**

The *Gateway Specific Plan* covers the portion of the *East of 101 Area Plan* from east of the Caltrain tracks to the eastern boundary of the parcels along the east side of Gateway Boulevard and the area between Oyster Point Boulevard and Grand Avenue on the northern and southern boundaries. The Specific Plan is "intended to provide for various commercial and research and development land uses integrated by consistent development standards." The *Gateway Specific Plan* includes the following construction standards and open space standards applicable to noise.

- Construction Standard 1(c): Noise Abatement.
  - (1) Buildings shall be designed and oriented on the Site to reduce interior noise levels within the Buildings caused by on-site activities or by adjacent highways, roads, flight paths or rail facilities to a level complying with all then applicable federal, state, and local health and safety requirements. Noise generated on a Site during construction or in areas outside completed Buildings shall be minimized as necessary to avoid creation of a nuisance.
  - (2) All construction contracts for any work to be performed on a Site shall require the contractor to comply with all applicable federal, state and local governmental requirements relating to noise limitations on construction vehicles and equipment.

#### East of 101 Area Plan

The East of 101 Area Plan, which was adopted in 1994 and most recently amended in 2016, sets forth specific land use policies for the East of 101 Area. The City interprets the East of 101 Area Plan as a design-level document. Per Policy IM-5, the Gateway Specific Plan is not affected by the land use regulations of the East of 101 Area Plan. Therefore, the policies in the General Plan Noise Element are the guiding policies and supersede all Noise Element policies set forth in Chapter 9 of the East of 101 Area Plan. Nonetheless, the East of 101 Area Plan contains the following goals and policies applicable to noise.

- Goal 6.1: Encourage the development of land uses which will be compatible with the noise environment of the East of 101 Area.
- Goal 6.2: Provide guidelines for noise attenuation for hotel and office uses in the East of 101 Area.
- Policy NO-2: Office and retail developments in the East of 101 Area shall be designed so that the calculated hourly average noise levels during the daytime does not exceed an Leq of 45 dBA, and instantaneous maximum noise levels do not exceed 60 dBA.
- Policy NO-4: New development shall be designed so that the average noise level resulting from the new development does not exceed an Leq of 60 dBA at the nearest open space or recreational area.

# 4.8.4 Impacts and Mitigation Measures

# 4.8.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a noise and vibration impact if it would:

- Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of
  the project in excess of standards established in the local general plan or noise ordinance, or
  applicable standards of other agencies;
- Generate excessive ground-borne vibration or ground-borne noise levels; or
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

## 4.8.4.2 Approach to Analysis

This noise and vibration impact analysis evaluates the temporary noise and vibration increases associated with project construction and demolition activities, traffic noise associated with project-related changes in traffic patterns, and operational noise generated by sound-generating equipment and onsite activities.

#### **Construction and Demolition Noise**

The construction schedule, a list of construction equipment expected to be used for each construction stage, and construction equipment operating details were provided by the project sponsor. Noise impacts associated with onsite demolition and construction were evaluated using construction equipment noise data in the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). The data include the A-weighted  $L_{max}$ , measured at a distance of 50 feet from the construction equipment and the utilization factors for the equipment. The utilization factor is the percentage of time each piece of construction equipment is typically operated at full power over the specified time period. It is used to estimate  $L_{eq}$  values from  $L_{max}$  values. For example, the  $L_{eq}$  value for a piece of equipment that operates at full power over 50 percent of the time is 3 dB less than the  $L_{max}$  value.

Construction noise levels of typical equipment from the FHWA RCNM user guide were compared to the applicable construction noise thresholds during daytime hours. For construction outside of these daytime hours, the FHWA RCNM the noise calculation methods were used to estimate reasonable worst-case noise from the loudest two pieces of equipment proposed for use during a single construction phase. Estimated construction noise levels were compared against the maximum permissible sound levels according to Section 8.32.030 of the City's Noise Ordinance, which are identified in Table 4.8-8. For this analysis,  $L_{\rm eq}$  is considered a reasonable proxy for assessing noise against the  $L_{\rm 50}$  standards<sup>12</sup> in Table 4.8-8.

Federal Highway Administration (FHWA). 2006. FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January. Available: https://www.gsweventcenter.com/Draft\_SEIR\_References/2006\_01\_Roadway\_Construction\_Noise\_Model\_User\_Guide\_FHWA.pdf. Accessed: May 20, 2020.

<sup>12</sup> L<sub>50</sub> is the noise level standard for each land use for a cumulative period of more than 30 minutes in any hour.

#### **Traffic Noise During Operation**

Noise impacts associated with increased traffic volumes generated by the proposed project were evaluated for the following conditions, which are described in Section 4.9, *Transportation and Circulation*, of this draft EIR.

- Existing Conditions
- Existing Plus Project Conditions
- Cumulative Conditions
- Cumulative Plus Project Conditions

Quantitative modeling of traffic noise that may be generated by the proposed project was conducted using a spreadsheet that was based on the FHWA TNM version 2.5. The spreadsheet calculates the traffic noise level at a fixed distance from the centerline of a roadway based on the traffic volume, roadway speed, and vehicle mix, which is predicted to occur under each condition. Traffic volumes were provided by Fehr & Peers and traffic noise levels were modeled to estimate potential traffic noise increases along the major vehicle access routes resulting from project implementation. A reasonable default vehicle mix (i.e., the proportion of automobiles, trucks, buses, and other vehicles) was used in the model, and were based on guidance from Fehr & Peers; roadway speeds were obtained from Google Earth StreetView. Traffic noise was evaluated in terms of how project-related noise increases could affect existing noise-sensitive land uses.

As discussed above, a change of 3 dB is barely noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level as it increases or decreases. The City's noise regulations and guidance documents do not include a specific threshold that pertains to traffic noise impacts from implementation of a project. The following criteria to determine potential project-related traffic noise impacts.

A project impact related to traffic noise would be identified if:

- A 5 dBA or greater increase in traffic noise resulting from project implementation occurs, if the future noise level is within the normally acceptable range (CNEL 65 dBA or less for residences and childcare; CNEL 70 dBA or less for offices and retail).
- A 3 dBA or greater increase in traffic noise resulting from project implementation occurs, if future noise level is above the normally acceptable range.

A cumulative impact related to traffic noise would be identified if:

- A 5 dBA or greater increase in traffic noise from existing to cumulative with project conditions occurs, if the future noise level is within the normally acceptable range (CNEL 65 dBA or less for residences and childcare; CNEL 70 dBA or less for offices and retail; CNEL 75 dBA or less for industrial land uses) AND the project's contribution is cumulatively considerable (greater than 1 dBA).
- A 3 dBA or greater increase in traffic noise from existing to cumulative with project conditions occurs, if future noise level is above the normally acceptable range AND the project's contribution is cumulatively considerable (greater than 1 dBA).

#### **Stationary Source Noise During Operation**

Operational noise impacts associated with proposed onsite activities and stationary sources of noise were evaluated based on the proposed site plan layout and the types of noise-generating equipment and activities that are anticipated under the proposed project. In accordance with applicable South San Francisco Municipal Code noise thresholds, the proposed mechanical equipment may not result in noise levels at nearby land uses in the Gateway Specific Plan Area in excess of 65 dBA during the hours of 7:00 a.m. to 10:00 p.m. or in excess of 60 dBA during the hours of 10:00 p.m. to 7:00 a.m. Noise at various distances from point sources (e.g., stationary operational equipment such as generators and heating and cooling equipment) was estimated using point-source attenuation of 6 dB per doubling of distance. The South San Francisco Municipal Code also provides if measured ambient noise levels are higher than the standards set forth Table 4.8-8, generated noise levels may exceed measured ambient noise levels by up to 5 dB. For purposes of this analysis, the thresholds outlined in Table 4.8-8, which are more conservative, are used.

#### 4.8.4.3 Impact Evaluation

Impact NOI-1: The proposed project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. (Less than Significant with Mitigation)

#### **Construction Equipment Noise**

Construction and demolition activities for the proposed project would include demolishing a surface parking lot, constructing a new building, undertaking various site improvements, and providing utility infrastructure. Construction of the proposed project, if the related entitlements are approved by the City, would begin in 2020 and occur over approximately 18 months, with an anticipated completion date in 2021.

Construction and demolition activities would generate noise and temporarily increase noise levels onsite and at nearby land uses. The level of noise generated would depend on the types of construction equipment used, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive receptors. Potential construction noise impacts are typically more substantial when construction occurs during noise-sensitive times of the day (i.e., early morning, evening, or nighttime hours) in areas immediately adjoining noise-sensitive land uses or for extended periods of time.

#### Construction Noise Impacts During Daytime Hours

As described in *Regulatory Framework*, construction activities in the City that are authorized by a valid City permit are generally allowed on weekdays between the hours of 8:00 a.m. and 8:00 p.m., on Saturdays between the hours of 9:00 a.m. and 8:00 p.m., and on Sundays and holidays between the hours of 10:00 a.m. and 6:00 p.m. (or at such other hours as may be authorized by the permit) if they meet at least one of two outlined noise limitations. Construction would be allowed during the daytime hours specific on the permit as long as noise from each individual piece of equipment is limited to 90 dB at a distance of 25 feet or as long as combined construction noise at any point outside of the property plane of the project does not exceed 90 dB.

Noise levels for the equipment proposed for project construction are provided in Table 4.8-9. As shown, noise from each individual piece of equipment proposed for project construction would not be expected to exceed 90 dBA  $L_{eq}$  at a distance of 25 feet. For this reason, construction that takes place during daytime hours defined by the South San Francisco Municipal Code would not conflict with local construction noise regulations and this impact would be *less than significant*. No mitigation measures are required.

Table 4.8-9. Noise from Equipment Proposed for Project Construction (Leg)

| <b>Construction Stage</b>              | Equipment Type       | Noise at 25 Feet (Leq) |
|--|----------------------|------------------------|
| Site Preparation and Demolition        | Excavator            | 83                     |
|  | Crusher              | 89                     |
|  | Dump Truck           | 78                     |
| Foundation Installation                | Excavator            | 83                     |
|  | Dump Truck           | 78                     |
|  | Concrete Mixer Truck | 81                     |
|  | Concrete Pump Truck  | 80                     |
| <b>Building Structure Construction</b> | Crane                | 79                     |
|  | Welder               | 76                     |
|  | Man lift             | 74                     |
|  | Gradall              | 85                     |
| Exterior and Roof Buildout             | Mobile Crane         | 79                     |

#### Construction Noise Impacts Outside of Daytime Hours

Outside of the daytime hours specified by the City permit, construction noise would be regulated by Section 8.32.030 of the City of South San Francisco Municipal Code (Table 4.8-8). The project site is in the Gateway Specific Plan District (GSPD) per the City Municipal Code. Noise at in this district are is limited to the same noise level standard regardless of the type of land use. For example, both a hotel and an office building in the district would be governed by the same noise standard of 60 dBA during the nighttime hours of 10:00 p.m. to 7:00 a.m. and 65 dBA during the daytime hours of 7:00 a.m. to 10:00 p.m.

Project construction would typically occur Monday through Friday, between 7:00 a.m. and 5:00 p.m., although some work is anticipated to occur on Saturdays between 9:00 a.m. and 8:00 p.m. or on Sundays between 10:00 a.m. and 6:00 p.m. Between the hours of 7:00 and 8:00 a.m., construction noise in the City is restricted to the more stringent general noise standard criteria of 65 dBA rather than the individual equipment threshold or property line construction noise threshold of 90 dBA. Therefore, the reasonable worst-case combined construction noise must be estimated to determine potential construction noise impacts between 7:00 and 8:00 a.m.

To estimate the reasonable worst-case combined construction noise levels from the use of construction equipment during project construction, this analysis assumes the three loudest pieces of equipment proposed for a single construction stage would operate concurrently in the same general location on the project site. The screening analysis determined that the site preparation and demolition stage, during which a dump truck, crusher and excavator could all operate simultaneously, would have the potential to produce the highest sound level of all construction

stages. Table 4.8-10 identifies the combined noise level (both  $L_{max}$  and  $L_{eq}$ ) from operation of these three pieces of construction equipment and the anticipated reasonable worst-case noise levels during project construction at various distances from the project site.

Table 4.8-10. Combined Project Construction Noise Levels at Various Distances from 7:00 to 8:00 am  $(L_{max}$  and  $L_{eq})_a$ 

| Source Data   | Maximum<br>Sound Level<br>(dBA)         | Utilization<br>Factor<br>(%)                                     | L <sub>eq</sub> Sound Level<br>(dBA)                            |
|---|---|--|---|
| <b>Construction Stage: Site Prepar</b>                  | ration and Demolition                   |  |   |
| Source 1: Dump truck—<br>Sound level (dBA) at 50 feet = | 76                                      | 40   | 72.0  |
| Source 2: Excavator—<br>Sound level (dBA) at 50 feet =  | 81                                      | 40   | 77.0  |
| Source 3: Crusher—<br>Sound level (dBA) at 50 feet =    | 87                                      | 40   | 83.0  |
| Calculated Data   |   |  |   |
| All Source  | es Combined—L <sub>max</sub> sound lev  | el (dBA) at 50 feet =  | 88 L <sub>max</sub>   |
| All Source  | ces Combined— $L_{eq}$ sound lev        | el (dBA) at 50 feet =  | 84 Leq  |
| Distance Between Source<br>and Receiver<br>(feet)       | Geometric Attenuation (dB) <sup>b</sup> | Calculated L <sub>max</sub><br>Sound Level<br>(dBA) <sup>c</sup> | Calculated L <sub>eq</sub><br>Sound Level<br>(dBA) <sup>c</sup> |
| 25  | 6                                       | 94   | 90  |
| 45 <sup>d</sup>   | 1                                       | 89   | 85  |

|   | Distance Between Source<br>and Receiver<br>(feet) | Geometric Attenuation (dB) <sup>b</sup> | Calculated L <sub>max</sub><br>Sound Level<br>(dBA) <sup>c</sup> | Calculated L <sub>eq</sub><br>Sound Level<br>(dBA) <sup>c</sup> |
|---|---|---|--|---|
|   | 25  | 6                                       | 94   | 90  |
|   | 45 <sup>d</sup>                                   | 1                                       | 89   | 85  |
|   | 50  | 0                                       | 88   | 84  |
|   | 100   | -6                                      | 82   | 78  |
|   | 200   | -12                                     | 76   | 72  |
|   | 400   | -18                                     | 70   | 66  |
|   | 500   | -20                                     | 68   | 64  |
|   | 600   | -22                                     | 67   | 63  |
| _ | 900   | -25                                     | 63   | 59  |
|   |   |   |  |   |

Source: Federal Highway Administration (FHWA). 2006. FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January. Available: https://www.gsweventcenter.com/Draft\_SEIR\_References/2006\_01\_Roadway\_Construction\_Noise\_Model\_User\_Guide\_FHWA.pdf. Accessed: May 20, 2020. Notes:

- This analysis is to estimate construction noise from activities that occur outside of the standard daytime construction hours defined by the municipal code (e.g. between the hour of 7:00 and 8:00 a.m.).
- b Geometric attenuation based on 6 dB per doubling of distance.
- <sup>c</sup> This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Bolded results: Results at 45 feet are bolded because 45 feet is the approximate distance to the nearest existing land uses to project construction areas (701 Gateway Boulevard and 901 Gateway Boulevard).

The nearest existing land uses to project construction areas are the buildings at 701 Gateway and 901 Gateway, which are both located approximately 45 feet from project construction areas.

As shown in Table 4.8-11, the reasonable worst-case combined construction noise is expected to be approximately 85 dBA  $L_{eq}$  at a distance of 45 feet. Construction activities are proposed during the hours of 7:00 and 8:00 a.m. weekdays, which is outside of the normal construction hours outlined in the South San Francisco Municipal Code and construction noise during this hour could be in excess of the 65 dBA threshold at the nearest noise-sensitive land use. Therefore, construction that takes place between 7:00 and 8:00 a.m. on weekdays could conflict with local construction noise regulations and this impact would be *significant*.

Table 4.8-11. Combined Project Construction Noise Levels at Various Distances During Nighttime Concrete Pours ( $L_{max}$  and  $L_{eq}$ )

| Source Data   | Maximum<br>Sound Level<br>(dBA) | Utilization<br>Factor<br>(%) | L <sub>eq</sub> Sound Level<br>(dBA) |
|---|---------------------------------|------------------------------|--------------------------------------|
| <b>Construction Condition: Nighttime</b>                          | Concrete Pour                   |                              |                                      |
| Source 1: Concrete mixer truck—<br>Sound level (dBA) at 50 feet = | 79                              | 90                           | 75.0                                 |
| Source 2: Concrete mixer truck—<br>Sound level (dBA) at 50 feet = | 79                              | 90                           | 75.0                                 |
| Source 3: Concrete pump truck—<br>Sound level (dBA) at 50 feet =  | 81                              | 80                           | 74.0                                 |

| Calculated Data |  |                     |
|-----------------|--|---------------------|
|                 | All Sources Combined— $L_{max}$ sound level (dBA) at 50 feet = | 85 L <sub>max</sub> |
|                 | All Sources Combined— $L_{eq}$ sound level (dBA) at 50 feet =  | $84 L_{eq}$         |

| Distance Between Source<br>and Receiver<br>(feet) | Geometric Attenuation (dB) <sup>a</sup> | Calculated L <sub>max</sub><br>Sound Level<br>(dBA) <sup>b</sup> | Calculated L <sub>eq</sub><br>Sound Level<br>(dBA) <sup>b</sup> |
|---|---|--|---|
| 45 °  | 1                                       | 85   | 85  |
| 50  | 0                                       | 85   | 84  |
| 100   | -6                                      | 79   | 78  |
| 200   | -12                                     | 73   | 72  |
| 300   | -16                                     | 69   | 68  |
| 400   | -18                                     | 66   | 66  |
| 450   | -19                                     | 65   | 65  |
| 500   | -20                                     | 65   | 64  |
| 600   | -22                                     | 63   | 62  |

#### Notes:

- <sup>a</sup> Geometric attenuation based on 6 dB per doubling of distance.
- <sup>b</sup> This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Bolded = results: Results at 45 feet are bolded because 45 feet is the approximate distance to the nearest existing land uses to project construction areas (701 Gateway Boulevard and 901 Gateway Boulevard).

In addition to the daytime construction activities proposed for the project that may begin prior to the 8:00 a.m. standard construction start time, approximately 15 instances of nighttime construction work would occur for concrete pours. Nighttime construction would begin approximately at 4:00 a.m. and be completed by 5:00 p.m. Between the hours of 4:00 a.m. and 7:00 a.m., construction noise must comply with the nighttime noise standard of 60 dBA. Between the hour of 7:00 a.m. and 8:00 a.m., construction noise must comply with the daytime noise standard of 65 dBA.

The loudest pieces of equipment required for a nighttime concrete pour would be two concrete mixer trucks and a concrete pump truck. Table 4.8-11 presents the potential noise levels during simultaneous operation the three loudest pieces equipment that would operate during nighttime concrete pours at various distances from the project site.

As shown in Table 4.8-11, noise levels from two concrete mixer trucks and a concrete pump truck are estimated to be approximately 85 dBA  $L_{eq}$  at a distance of 45 feet. Therefore, noise from concrete pour activities would exceed the City's 60 dBA nighttime noise standard at the nearest land use. There are no residential land uses near the project site. However, the nearest noise-sensitive land use where people typically sleep is the Larkspur Landing Hotel, which is located approximately 600 feet from areas where nighttime concrete pour activities could occur. At a distance of 600 feet, noise levels from two concrete mixer trucks and a concrete pump truck are estimated to be approximately 62 dBA  $L_{eq}$ . Although noise may be further attenuated at this distance from intervening features, or may be reduced if the concrete pour activities occur in the northern portion of the project site and at greater distances from this hotel, this estimated noise level exceeds the nighttime threshold of 60 dBA.

For these reasons, during the nighttime hours of 4:00 a.m. to 7:00 a.m. and during the daytime, but non-standard, hour of 7:00 a.m. to 8:00 a.m., noise from concrete pouring activities would potentially exceed the local standard, and impacts would be *significant*. Therefore, Mitigation Measure NOI-1, Construction Noise Control Plan to Reduce Noise Outside of the Standard Construction Hours in the City of South San Francisco, which includes measures to reduce noise from construction activity during non-standard construction hours, would be implemented to reduce impacts from construction-related noise. Consequently, the impact from construction-generated noise that could occur during the 7:00 a.m. to 8:00 a.m. hour before standard construction noise hours begin and during the 15 occurrences of nighttime concrete pours (which would start at 4:00 a.m.) would be *less than significant with mitigation*.

# Mitigation Measure NOI-1: Construction Noise Control Plan to Reduce Noise Outside of the Standard Construction Hours in the City of South San Francisco

The project sponsor and/or the contractor(s) for the proposed project shall obtain a permit to complete work outside of the standard construction hours outlined in the City Municipal Code. In addition, the project sponsor and/or the contractor(s) for the proposed project shall develop a construction noise control plan to reduce noise levels to within the City's daytime and nighttime noise standards. Specifically, the plan shall demonstrate that noise from construction activities that occur daily between 7:00 and 8:00 a.m. weekdays and Saturday will comply with the applicable City noise limit of 65 dBA at the nearest existing land use, and construction activities that occur between 10:00 p.m. and 7:00 a.m. will comply with the applicable City noise limit of 60 dBA at the nearest existing land use. Measures to help reduce noise from construction activity during non-standard construction hours to these levels shall be incorporated into this plan and may include, but are not limited to, the following.

- Require all construction equipment be equipped with mufflers and sound control devices (e.g., intake silencers and noise shrouds) that are in good condition (at least as effective as those originally provided by the manufacturer) and appropriate for the equipment.
- Maintain all construction equipment to minimize noise emissions.
- Locate construction equipment as far as feasible from adjacent or nearby noise-sensitive receptors.
- Require all stationary equipment be located to maintain the greatest possible distance to the nearby existing buildings, where feasible.
- Require stationary noise sources associated with construction (e.g., generators and compressors) in proximity to noise-sensitive land uses to be muffled and/or enclosed within temporary enclosures and shielded by barriers, which can reduce construction noise by as much as 5 dB.
- Use noise-reducing enclosures around noise-generating equipment during nighttime/nonstandard daytime hours. Prohibit the use of impact tools (e.g., jack hammers) during these hours.
- Prohibit idling of inactive construction equipment for prolonged periods during nighttime hours (i.e., more than 2 minutes).
- Advance notification shall be provided to surrounding land uses disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period.
- The construction contractor shall provide the name and telephone number of an on-site construction liaison. If construction noise is found to be intrusive to the community (complaints are received), the construction liaison shall investigate the source of the noise and require that reasonable measures be implemented to correct the problem.
- Use electric motors rather than gasoline- or diesel-powered engines to avoid noise associated with compressed air exhaust from pneumatically powered tools during nighttime hours. Where the use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust could be used; this muffler can lower noise levels from the exhaust by about 10 dB. External jackets on the tools themselves could be used, which could achieve a reduction of 5 dB.

#### Construction Haul Truck Noise

Haul trucks and material delivery trucks would be used to transport materials to and from the site during project construction. According to the project sponsor, the maximum number of trucks that would travel to and from the site in a given hour would be 22 trucks. This would occur during the concrete pours for the project. Note that this is a reasonable worst-case maximum, and for most construction activities, truck trips would be somewhat spread out throughout the day and there would be fewer per-hour trips than this number.

The City's Municipal Code does not include a specific threshold that pertains to construction haul truck noise. However, and as discussed above, a change of 3 dB is considered barely noticeable by the human ear. Therefore, anticipated loudest-hour haul truck noise was assessed to determine if a 3 dB increase over ambient noise levels would occur.

The City has published general truck routes in the City,<sup>13</sup> but the routes of trucks during project construction is not known with certainty at this time. Based on the City's general truck routes, the closest access to the U.S. 101 is located northeast of the project site. It is likely that trucks would travel to the project site via U.S. 101, then travel east on Oyster Point Boulevard after exiting the freeway, and turning south on Gateway Boulevard to access the project site. Along this route, there are only commercial and office land uses, which are not typically considered sensitive to noise. Noise in these areas is already somewhat elevated from the nearby U.S. 101 freeway and other local roadways, as well.

Existing worst-hour traffic noise modeling was conducted to estimate the peak-hour  $L_{eq}$  noise level along these two segments. Existing traffic noise from vehicles traveling on Oyster Point Boulevard east of Dubuque Avenue was modeled to be approximately 70.3 dBA  $L_{eq}$  during the peak hour, and traffic noise from vehicles traveling along Gateway Boulevard south of Oyster Point was modeled to be 66.6 dBA  $L_{eq}$  during the worst-case peak hour. The addition of 22 trucks to these two segments would increase noise to approximately 70.7 and 67.4 dBA  $L_{eq}$  respectively, which equates to an approximately 0.4 and 0.9 dB increase along these segments.

A less than 3 dB increase in noise would occur (with a change of 3 dB considered barely noticeable); thus, temporary noise increases from project haul and materials delivery trucks in the project vicinity would be *less than significant*.

#### Traffic Noise

As discussed in Section 4.9, *Transportation and Circulation*, of this draft EIR, implementation of the proposed project would lead to an increase in traffic in the vicinity of the project site. Quantitative modeling of traffic noise increases resulting from project implementation was conducted using a spreadsheet that is based on the FHWA TNM version 2.5.

As shown in Table 4.8-12, project-related noise increases on roadway segments in the project vicinity range from 0 to 0.5 dB. Project-related traffic noise would not result in a 5 dBA or greater increase in areas where future noise level are within the normally acceptable range, and would not result in a 3 dBA or greater increase in areas where future noise level are above the normally acceptable range. Thus, project-related traffic noise impacts would be *less than significant*.

#### Heating, Ventilation, and Air Conditioning, and Mechanical Equipment Noise

The proposed heating, ventilation, and air conditioning (HVAC) systems and mechanical equipment for the proposed project would include two chillers and three boilers to serve the heating and cooling needs in the building, which would be located in a rooftop penthouse. Nine pumps would also be located in the penthouse. Four air-handling units, two cooling towers and six large exhaust fans would also be located on the roof behind a screen.

Noise generated by equipment located in the mechanical equipment room or the rooftop penthouse would be attenuated somewhat by the walls of the equipment room. A reasonably conservative assumption of 10 dB of reduction was applied to all equipment located inside the equipment room. The rooftop screen may not be as tall as the height of the equipment and there would be a gap at the

<sup>&</sup>lt;sup>13</sup> City of South San Francisco. 2020. *Truck Routes.* Available: https://www.google.com/maps/d/viewer? mid=1ePU1NiJj2omRVWwagk4bBUKU9t58-Y0K&ll=37.649158157197135%2C-122.40959426201982&z=14. Accessed: July 28, 2020.

Table 4.8-12. Modeled Traffic Noise Impacts on Existing Land Uses

| Roadway                 | Segment                          | Existing No<br>Project<br>(dB L <sub>dn</sub> ) | Existing<br>Plus Project<br>(dB L <sub>dn</sub> ) | Project-<br>related<br>Increase <sup>a</sup><br>(dB) |
|-------------------------|----------------------------------|---|---|--|
| Airport Boulevard       | North of Sister Cities Boulevard | 65.4  | 65.4  | 0.0  |
| Airport Boulevard       | South of Sister Cities Boulevard | 64.1  | 64.1  | 0.0  |
| Airport Boulevard       | North of Grand Avenue            | 65.3  | 65.3  | 0.0  |
| Airport Boulevard       | South of Grand Avenue            | 65.5  | 65.5  | 0.0  |
| Sister Cities Boulevard | East of Airport Boulevard        | 69.3  | 69.3  | 0.0  |
| Sister Cities Boulevard | West of Airport Boulevard        | 68.8  | 68.8  | 0.0  |
| Oyster Point Boulevard  | East of Dubuque Avenue           | 66.2  | 66.2  | 0.0  |
| Oyster Point Boulevard  | West of Dubuque Avenue           | 69.1  | 69.1  | 0.0  |
| Oyster Point Boulevard  | East of Gateway Boulevard        | 69.0  | 69.0  | 0.0  |
| Oyster Point Boulevard  | West of Gateway Boulevard        | 69.9  | 70.0  | 0.2  |
| Gateway Boulevard       | South of Oyster Point Boulevard  | 66.0  | 66.5  | 0.5  |
| Gateway Boulevard       | North of East Grand Avenue       | 65.2  | 65.5  | 0.3  |
| Gateway Boulevard       | South of East Grand Avenue       | 65.3  | 65.5  | 0.1  |
| East Grand Avenue       | East of Gateway Boulevard        | 68.8  | 68.8  | 0.0  |
| East Grand Avenue       | West of Gateway Boulevard        | 68.1  | 68.2  | 0.1  |
| Grand Avenue            | East of Airport Boulevard        | 67.1  | 67.2  | 0.1  |
| Grand Avenue            | West of Airport Boulevard        | 64.5  | 64.6  | 0.1  |
| Dubuque Avenue          | South of Oyster Point Boulevard  | 67.9  | 68.0  | 0.1  |
| Dubuque Avenue          | South of U.S. 101 Ramps          | 61.6  | 61.7  | 0.0  |

Source: Traffic volumes provided by Fehr & Peers. Modeling conducted using a spreadsheet based on the FHWA TNM version 2.5 at a fixed distance of 50 feet from the roadway centerline.

Notes:

bottom of the screen to allow for exhaust and ventilation. Noise from equipment located behind the rooftop screen may be reduced slightly by the screen; however, noise is not typically substantially reduced unless a screen is solid with no gaps or openings and is at least as tall as the equipment. Therefore, although some attenuation may be achieved from the rooftop screen, no noise attenuation is assumed in this analysis for noise sources located on the roof behind the rooftop equipment screen.

According to the project sponsor, custom air handling units, such as the four air handlers proposed for the project, can produce sound levels in the range of about 65 to 70 dBA at 50 feet, depending on the size of the unit. The proposed cooling towers would generate a noise level of approximately 78 dBA at 50 feet. The heat recovery chillers would generate a noise level of 65 dBA at 50 feet without accounting for any attenuation, a typical boiler generates a sound power level in the range of 96 to 99 dBA, 14 which equates to a noise level of 64 to 67 dBA at 50 feet.

Existing plus project values minus existing no project values.

<sup>&</sup>lt;sup>14</sup> Hoover and Keith. 2000. Noise Control for Buildings, Manufacturing Plants, Equipment, and Products. Houston, TX.

Pumps can generate noise levels at 50 feet of approximately 81 dBA, and the types of exhaust/ventilation fans proposed for the project can generate noise levels at 50 feet of approximately 77 dBA, according to the project sponsor. Based on these source noise levels, combined noise from three boilers, two chillers, and nine pumps located in a mechanical penthouse and two cooling towers, four air handling units, and six exhaust fans located behind a mechanical equipment screen at a distance of 50 feet could be up to approximately 88dBA, conservatively assuming all equipment was operational simultaneously and relatively close to one another.

The nearest existing land use to the proposed building is 701 Gateway Boulevard. The proposed building would be located approximately 100 feet from 701 Gateway Boulevard. Based on the source noise levels and operational assumptions described above, noise from the HVAC system and equipment at a distance of 100 feet is conservatively estimated to be approximately 84 dBA. The next closest land use, 901 Gateway boulevard, is located approximately 160 feet from the proposed building. Noise from the rooftop equipment at a distance of 160 feet would be approximately 80 dBA. As described previously, all land uses within the GSPD are governed by the same municipal code noise thresholds of 65 dBA during the daytime hours of 7:00 a.m. to 10:00 p.m. and 60 dBA during the nighttime hours of 10:00 p.m. to 7:00 a.m. with respect to noise generated by stationary sources. Thus, the proposed rooftop HVAC system and equipment noise may exceed the daytime and nighttime thresholds outlined in the South San Francisco Municipal Code and impacts from mechanical equipment noise would be *significant*. Therefore, Mitigation Measure NOI-2, Operational Noise Study to Determine Attenuation Measures to Reduce Noise from Project Mechanical Equipment, would ensure the project's mechanical equipment is selected and located to comply with the City's Noise Ordinance. Consequently, the noise impact from the mechanical equipment would be *less than significant with mitigation*.

# Mitigation Measure NOI-2: Operational Noise Study to Determine Attenuation Measures to Reduce Noise from Project Mechanical Equipment

Once equipment models and design features to attenuate noise have been selected, the project sponsor shall conduct a noise analysis to estimate actual noise levels of project-specific mechanical equipment, including heating and cooling equipment (such as boilers, chillers, cooling towers, and exhaust fans), to reduce potential noise impacts resulting from project mechanical equipment. Feasible methods to reduce noise below the significance threshold include, but are not limited to, selecting quieter equipment, siting equipment further from the roofline, and/or enclosing all equipment in a mechanical equipment room designed to reduce noise. This analysis shall be conducted, and its results and reduction methods provided to the City, prior to the issuance of building permits.

The analysis shall be prepared by persons qualified in acoustical analysis and/or engineering and shall demonstrate with reasonable certainty that the mechanical equipment selected for the project and the attenuation features incorporated into project design would ensure noise from these equipment do not result in noise at the nearest existing land use of 65 dBA  $L_{\rm eq}$  during the daytime and 60 dBA  $L_{\rm eq}$  during the nighttime. The project sponsor shall incorporate all recommendations from the acoustical analysis necessary to ensure that noise sources would meet applicable requirements of the noise ordinance into the building design and operations.

#### **Emergency Generator Noise**

The project proposes the installation of one diesel 1,250-kilowatt (kW) emergency generator in the project loading and service yard. The generator would be equipped with a level 3 enclosure, which would reduce noise levels somewhat from generator operations. Periodic testing of the generator would be completed; testing is anticipated to consist of one test per week for 30 to 45 minutes per test at a load of 100 percent for up to 50 hours per year maximum. Other than testing, the generator would only operate during emergencies. Typically, generator noise during emergencies is exempt from local noise standards. During testing, generator noise must comply with the local standards.

Section 8.32.030 of the City's Noise Ordinance specifies maximum permissible sound levels to be generated by any property within the City. The maximum allowable level is determined by the land use category of the receiving property and is measured on any receiving property. In the GSPD, noise generated during daytime hours is limited to 65 dBA and noise generated during nighttime hours is limited to 60 dBA at nearby receptors.

Operation of the proposed generator equipped with a level 3 enclosure could result in noise levels of 75 dBA at a distance of 7 meters, or approximately 23 feet. The nearest existing building to the proposed service yard, which is where the generator would be located, is the building at 701 Gateway, approximately 150 feet from the proposed generator location within the service yard. At a distance of 150 feet, noise from generator testing would be reduced to 59 dBA  $L_{\rm eq}$ . Noise from generator testing at other nearby buildings would be even lower because they are all located farther than 150 feet from the proposed generator location. Noise from generator testing would not result in noise levels of greater than the 65 dBA daytime and 60 dBA nighttime thresholds at the nearest receptors; thus, noise impacts from generator testing would be *less than significant*.

# Impact NOI-2: The proposed project would not generate excessive ground-borne vibration or ground-borne noise levels. (*Less than Significant*)

#### Damage to Structures

Construction of the proposed project would require equipment that could generate ground-borne vibration; however, most of the proposed equipment types generate relatively low vibration levels. Typical vibration levels associated with heavy-duty construction equipment at a reference distance of 50 feet are shown in Table 4.8-13. No pile drivers or hoe rams are proposed for project construction. The proposed pieces of equipment for project construction with the greatest potential to generate vibration are ground-disturbing equipment such as an excavator and a Gradall. These pieces of equipment typically generate vibration levels similar to that of a large bulldozer. A large bulldozer would generate vibration levels of approximately 0.037 PPV inches per second at a distance of 45 feet.

The existing structures located within and adjacent to the project site appear to be relatively modern and are not expected to be particularly susceptible to vibration-related damage. The nearest existing structures to project construction activities are the buildings at 701 Gateway Boulevard and 901 Gateway Boulevard; both buildings are located approximately 45 feet from the nearest project construction areas. These structures would likely be categorized as a modern industrial/commercial building, according to the Caltrans vibration damage criteria shown in Table 4.8-4. These types of buildings have a vibration threshold for continuous or frequent/intermittent vibration sources (such as construction) of 0.5 PPV inches per second.

Therefore, a large bulldozer would generate vibration over ten times below this level at a distance of 45 feet and potential vibration-related damage impacts from project construction would be *less than significant.* 

#### Annoyance-related Vibration Impacts

Regarding annoyance-related vibration impacts, a significant vibration impact related to sleep disturbance could occur when nighttime construction activities generate vibration levels that are strongly perceptible at locations where people sleep for a prolonged period of time. There are no residential land uses near the project site, so sleep-disturbance related vibration impacts would not occur. The nearest residential land uses are located over 1,200 feet from the project site, the nearest hotel (Larkspur Landing) is located approximately 600 feet from the main project construction areas, and 300 feet from the southern portion of the project site where paving, curb work and landscaping activities may occur. The nearest childcare use (Gateway Child Development Center Peninsula) is located approximately 670 feet from the nearest project construction area (the southern portion of the site where paving and landscaping work is proposed). Sleep disturbances from vibration only occur if residences are located very close to ground-disturbing construction activities that occur at night. For example, vibration levels may exceed Caltrans Vibration Annoyance Criteria's distinctly perceptible level of 0.04 PPV inches per second within 50 feet of an operating auger drill or large bulldozer, or the strongly perceptible criteria of 0.1 PPV inches per second at 25 feet for this equipment. Construction activity involving these types of equipment is not proposed for nighttime hours, and residences are located much farther than these distances from project construction areas. However, it is possible that construction vibration during daytime hours could result in disturbances to nearby office or research-related buildings. If vibration levels are in excess of the Caltrans Vibration Annoyance Criteria's distinctly perceptible level of 0.04 PPV inches per second, annoyance-related impacts could be significant.

The nearest existing structures to project construction activities are the buildings at 701 Gateway Boulevard and 901 Gateway Boulevard; both buildings are located approximately 45 feet from the nearest project construction areas. To provide a conservative assumption, vibration levels at a distance of 45 feet from construction activity were modeled to assess potential annoyance-related vibration impacts. As described above, the pieces of construction equipment likely to generate the most vibration are an excavator and a Gradall. These would generate vibration levels similar to that of a large bulldozer. At a distance of 45 feet, a large bulldozer would generate a vibration level of approximately 0.037 PPV inches per second. This is below the Caltrans vibration annoyance criteria's distinctly perceptible level of 0.04 PPV inches per second. In addition, the construction equipment would usually operate farther than 45 feet from the nearby occupied buildings. Therefore, annoyance-related vibration impacts would be *less than significant*.

Impact NOI-3: The proposed project would not expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an airport land use plan or, were such a plan has not been adopted, within two miles of a public airport or public use airport. (*No Impact*)

SFO is approximately 2 miles south of the project site. According to the 2012 SFO ALUCP, the project site is not located within the CNEL 65 decibel noise contour. <sup>15</sup> In addition, there are no private airstrips within the vicinity of the project site. For these reasons, there would be *no impact* related to aircraft activity noise from public airports and private airstrips.

<sup>&</sup>lt;sup>15</sup> Exhibit IV-5, *Noise Compatibility Zones* in the 2012 SFO ALUCP.

#### 4.8.4.4 Cumulative Impacts

Impact C-NOI-1: The proposed project would not result in a cumulatively considerable contribution to the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project site in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. (Less than Significant with Mitigation)

The cumulative geographic context for noise and vibration varies, depending on the source of the noise or vibration. Specifically, the geographic context for cumulative construction noise impacts typically encompasses cumulative projects within no more than 1,000 feet of the project site. Beyond 1,000 feet, the contributions of noise from the construction of other projects would be greatly attenuated through both distance and intervening structures, and their contribution would be expected to be minimal. The cumulative context for stationary-source noise impacts, such as noise effects from HVAC or other mechanical equipment, and for vibration effects from construction activities is generally smaller than this distance (a few hundred feet at most). Finally, cumulative impacts related to vehicular traffic noise are based on overall forecast average daily traffic along roadway segments near the project site, which includes traffic increases from all growth within the project area, as predicted in the traffic model. The cumulative projects within 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

#### **Construction Noise**

Construction noise is a localized impact that reduces as distance from the noise source increases. In addition, intervening features (e.g., buildings) between construction areas and nearby noise-sensitive land uses result in additional noise attenuation by providing barriers that break the line of sight between noise-generating equipment and sensitive receptors. These barriers can block sound wave propagation and somewhat reduce noise at a given receiver.

The only cumulative project located with 1,000 feet of the proposed project is 475 Eccles Avenue (Cumulative Project No. 16). The project was entitled in August of 2016. However, at this time, it is unknown when construction will begin. Construction activities for the project could coincide with construction activities for the 475 Eccles Avenue Project. The project site is located approximately 630 feet from the closest edge of the project site for the 475 Eccles Avenue Project. At this distance, construction noise would diminish substantially. For example, as shown in Table 4.8-10, worst-case project construction noise at a distance of 600 feet from the loudest proposed project construction activities would be approximately 64 dBA L<sub>eq</sub>. This noise level is typical of an urban area, such as the area where these two projects would be located.

Project construction would also occur mostly during the standard daytime hours for construction, as defined by the South San Francisco Municipal Code. During these hours, construction noise restrictions are less stringent, and nearby receptors are considered to be less sensitive to noise. In addition, there are no residences or land uses that are typically considered noise-sensitive located between the project site and the 475 Eccles Avenue Project. Furthermore, numerous buildings are located between the two sites, which would provide shielding and further attenuate noise from construction activities and would reduce the likelihood of construction noise from these two projects combining. Thus, it is unlikely that construction activities from these two projects would combine to expose the same receptors to excessive construction noise. For these reasons, the proposed project, in combination with other past,

present, and reasonably foreseeable future projects, would not result in a significant cumulative noise impact during construction. The cumulative impact would be *less than significant*. No mitigation is required.

#### **Operational Noise**

#### **Traffic Noise**

To determine the potential cumulative noise impacts in the project area, traffic volumes from the existing scenario were compared to the 2040 with-project scenario. If a cumulative traffic noise impact is anticipated along a given roadway segment (i.e., a 3 dB in increase between existing and cumulative no project conditions), then the proposed project's contribution to that impact must be assessed. If the project would contribute 3 dB to the overall increase, the project's cumulatively considerable contribution to the cumulative impact would be significant.

Table 4.8-13 shows cumulative traffic noise increases and includes an analysis of potential impacts along roadway segments near the project site. There were no segments identified where a 5 dB increase in noise would occur in areas where future noise levels would below the acceptable range. However, as shown in Table 4.8-13, significant cumulative impacts in areas where future noise levels are above the acceptable range (e.g., a 3 dB increase from existing to cumulative plus project conditions) were modeled to occur along seven modeled roadway segments. The cumulative impact would be *significant*. However, the proposed project's incremental increase to these potential cumulative impacts would be between 0 and 0.2 dB. Therefore, the proposed project's contribution to the cumulative impact would be *less than cumulatively considerable*.

#### **HVAC** Noise

In general, most operational sources of noise do not generate noise that is perceptible far beyond the edge of a project site. HVAC noise from the proposed project would be localized and would attenuate rapidly with distance. The nearest cumulative project, the project at 475 Eccles Avenue (Cumulative Project 16), is located approximately 630 feet east of the project site. There are no residences or land uses that are typically considered noise-sensitive located between the two projects. However, the applicable noise thresholds for all land uses in the GSPD are the same regardless of the type of use (i.e., 60 dBA during nighttime hours and 65 dBA during daytime hours). As described under Impact NOI-1, unattenuated noise from rooftop heating and cooling equipment could result in excessive noise levels in the project vicinity with an estimated combined noise level of 90 dBA at a distance of 50 feet from the proposed equipment. The approximate halfway distance between the two project sites is approximately 315 feet. An existing occupied office structure is at this location. At a distance of 315 feet, unattenuated HVAC noise from the project site would be in the range of approximately 74 dBA. Assuming the cumulative project at 475 Eccles Avenue uses similar heating and cooling equipment, noise from the cumulative project could also elevate ambient noise levels at this common receptor. Should both projects expose a single receptor to the same noise levels from heating and cooling equipment, the overall combined noise level would be approximately 3 dB higher than the HVAC noise from a single project. Although it is not easily perceptible, a 3 dB increase in noise is considered to be barely perceptible by the average healthy human ear. A perceptible increase in noise at a common receptor could occur if both projects had unattenuated HVAC noise; thus, the cumulative noise impact from HVAC equipment would be significant. With implementation of Mitigation Measure NOI-2, Operational Noise Study to Determine Attenuation Measures to

Reduce Noise from Project Mechanical Equipment, project-related impacts would be reduced to less-than-significant levels, and the contribution of the project to the potential cumulative impact would be *less than cumulatively considerable with mitigation*.

#### **Emergency Generator Noise**

The nearest cumulative project, the project at 475 Eccles Avenue (Cumulative Project No. 16), is located approximately 630 feet east of the project site. There are no residences or land uses that are typically considered noise-sensitive located between the two projects. As discussed under Impact NOI-1, noise from the testing of the emergency generator would not be expected to exceed the daytime or nighttime noise thresholds in the City at a distance of 150 feet (noise from project generator testing was estimated to be up to 59 dBA  $L_{eq}$  at this distance). Assuming the cumulative project at 475 Eccles Avenue includes an emergency generator, noise from the cumulative project could also elevate ambient noise levels at this common receptor. However, emergency generator testing typically occurs very intermittently (e.g., up to once per week for a period of 30 to 45 minutes for the proposed project) and, thus, it is unlikely that testing of the emergency generator for the proposed project would occur concurrently with the generator testing at 475 Eccles Avenue. Even if testing were to occur simultaneously, the distance between the two generators would be great enough ensure that noise levels would not combine to expose a given individual receptor to increased cumulative noise from generator testing. Thus, the cumulative noise impact related to emergency generator testing would be *less than significant*.

# Impact C-NOI-2: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not expose persons to or generate excessive ground-borne vibration or ground-borne noise levels. (Less than Significant)

Vibration impacts are based on instantaneous PPV levels. Thus, since impacts only consider the peak vibration levels, worst-case ground-borne vibration levels from construction are generally determined by whichever individual piece of equipment generates the highest peak vibration level. Unlike the analysis for average noise levels, in which noise levels of multiple pieces of equipment can be combined to generate a maximum combined noise level, instantaneous peak vibration levels do not combine in this way. Vibration from multiple construction sites, even if they are close to one another, would not be expected to combine to raise the maximum PPV level. For this reason, the cumulative impact of construction vibration from multiple construction projects near one another (or even adjacent to one another) would generally not combine to increase PPV vibration levels. Thus, the cumulative geographic context for vibration is highly localized. The cumulative projects within 0.5 mile of the project site are described in Section 4.1.5, Approach to Cumulative Impact Analysis, of this draft EIR and shown in Figure 4.1-1. The nearest cumulative project, the project at 475 Eccles Avenue (Cumulative Project No. 16), is located approximately 630 feet east of the project site. At this distance, peak vibration levels resulting from construction of the project would not be expected to combine with vibration effects from the construction of the 475 Eccles Avenue Project if they were to be under construction simultaneously. Therefore, cumulative ground-borne vibration impacts related to both potential damage and annoyance would be *less than significant*.

Table 4.8-13. Modeled Cumulative Traffic Noise Impacts

| Roadway   | Segment                          | Existing No Project<br>(dB Ldn) | Cumulative No Project<br>(dB Ldn) | Cumulative Plus Project<br>(dB Ldn) | Cumulative Plus Project<br>Minus Existing (dB) | Potential Cumulative<br>Impact? | Cumulative Plus Project<br>Minus Cumulative<br>No Project (dB) | Cumulatively<br>Considerable<br>Increase? |
|---|----------------------------------|---------------------------------|-----------------------------------|-------------------------------------|--|---------------------------------|--|---|
| Airport Boulevard   | North of Sister Cities Boulevard | 65.4                            | 67.0                              | 67.0                                | 1.6  | No                              | 0.0  | N/A                                       |
| Airport Boulevard   | South of Sister Cities Boulevard | 64.1                            | 65.2                              | 65.2                                | 1.1  | No                              | 0.0  | N/A                                       |
| Airport Boulevard   | North of Grand Avenue            | 65.3                            | 68.0                              | 68.0                                | 2.7  | No                              | 0.0  | N/A                                       |
| Airport Boulevard   | South of Grand Avenue            | 65.5                            | 67.2                              | 67.3                                | 1.8  | No                              | 0.0  | N/A                                       |
| Sister Cities Boulevard   | East of Airport Boulevard        | 69.3                            | 71.0                              | 71.1                                | 1.7  | No                              | 0.0  | N/A                                       |
| Sister Cities Boulevard   | West of Airport Boulevard        | 68.8                            | 69.4                              | 69.4                                | 0.6  | No                              | 0.0  | N/A                                       |
| Oyster Point Boulevard  | East of Dubuque Avenue           | 66.2                            | 67.3                              | 67.3                                | 1.1  | No                              | 0.0  | N/A                                       |
| Oyster Point Boulevard  | West of Dubuque Avenue           | 69.1                            | 70.8                              | 70.8                                | 1.7  | No                              | 0.0  | N/A                                       |
| Oyster Point Boulevard  | East of Gateway Boulevard        | 69.0                            | 72.4                              | 72.4                                | 3.4  | Yes                             | 0.0  | No  |
| Oyster Point Boulevard  | West of Gateway Boulevard        | 69.9                            | 73.0                              | 73.0                                | 3.2  | Yes                             | 0.1  | No  |
| Gateway Boulevard   | South of Oyster Point Boulevard  | 66.0                            | 69.4                              | 69.6                                | 3.6  | Yes                             | 0.2  | No  |
| Gateway Boulevard   | North of East Grand Avenue       | 65.2                            | 67.6                              | 67.7                                | 2.5  | No                              | 0.1  | N/A                                       |
| Gateway Boulevard   | South of East Grand Avenue       | 65.3                            | 69.3                              | 69.3                                | 4.0  | Yes                             | 0.1  | No  |
| East Grand Avenue   | East of Gateway Boulevard        | 68.8                            | 72.0                              | 72.0                                | 3.2  | Yes                             | 0.0  | No  |
| East Grand Avenue   | West of Gateway Boulevard        | 68.1                            | 71.5                              | 71.5                                | 3.3  | Yes                             | 0.0  | No  |
| Grand Avenue  | East of Airport Boulevard        | 67.1                            | 71.2                              | 71.2                                | 4.1  | Yes                             | 0.0  | No  |
| Grand Avenue  | West of Airport Boulevard        | 64.5                            | 66.1                              | 66.2                                | 1.7  | No                              | 0.0  | N/A                                       |
| Dubuque Avenue  | South of Oyster Point Boulevard  | 67.9                            | 69.6                              | 69.7                                | 1.8  | No                              | 0.1  | N/A                                       |
| Dubuque Avenue  | South of U.S. 101 Ramps          | 61.6                            | 61.8                              | 61.8                                | 0.2  | No                              | 0.0  | N/A                                       |
| Note: N/A indicates that there would be no potential cumulative impact and, thus, no cumulatively considerable increase attributable to the proposed project. |                                  |                                 |                                   |                                     |  |                                 |  |   |

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# 4.9 Transportation and Circulation

# 4.9.1 Introduction

This section describes the environmental and regulatory setting for transportation and circulation. It also describes impacts associated with transportation and circulation that would result from implementation of the proposed project and mitigation for significant impacts where feasible and appropriate.

The *Transportation Impact Analysis* (TIA) is provided in Appendix D of this draft environmental impact report (EIR).

# 4.9.2 Environmental Setting

## 4.9.2.1 Roadway Facilities

The project site is at the southwest corner of the Oyster Point Boulevard and Gateway Boulevard intersection in the City of South San Francisco's (City's) East of 101 employment area. Regional access to the project site is provided via U.S. Route 101 (U.S. 101) and Oyster Point Boulevard to the north and U.S. 101 and East Grand Avenue to the south. Relevant roadway plans and policies (i.e., the *South San Francisco General Plan*, the *Mobility 20/20 Plan*, and the Complete Streets Policy) are discussed in Appendix D. Figure 4.9-1 shows the project location, study intersections, and the surrounding roadway system. Project site vehicular access is provided via two two-way driveways that intersect Gateway Boulevard south of Oyster Point Boulevard. A dedicated pedestrian walkway parallels the driveway. Study intersections are listed below.

- Gateway Boulevard/Gateway Business Park Driveway
- Airport Boulevard/Grand Avenue
- Gateway Boulevard/East Grand Avenue
- Gateway Boulevard/Corporate Driveway
- Dubuque Avenue/Oyster Point Boulevard
- Gateway Boulevard/Oyster Point Boulevard
- Airport Boulevard/Sister Cities Boulevard
- Dubuque Avenue/U.S. 101 Off-ramp





Key local roadways in the vicinity of the project site are described below.

- U.S. 101 is an eight-lane freeway and principal north-south roadway connection between San Francisco, San José, and intermediate San Francisco Peninsula cities. In South San Francisco, U.S. 101 is located approximately 1 mile west of the project site and serves the East of 101 area with three primary access points. Near the project site, U.S. 101 carries about 220,000 vehicles per day and defines the East of 101 area's western edge and barrier to east-west bicycle and pedestrian connectivity. Access points are listed below.
  - o **Southern Access—Gateway Boulevard:** Northbound on- and off-ramps are at South Airport Boulevard/Wondercolor Lane; southbound on- and off-ramps are immediately south of the San Mateo Avenue/Produce Avenue/South Airport Boulevard intersection.
  - Central Access—East Grand Avenue: Northbound off-ramps are at East Grand Avenue/Poletti Way and on-ramps are to the west at Grand Avenue/Airport Boulevard. Southbound off-ramps are at Airport Boulevard/Miller Avenue. There is no southbound freeway access at this location.
  - Northern Access—Oyster Point Boulevard: Northbound on- and off-ramps intersect
    Dubuque Avenue at and immediately south of Oyster Point Boulevard. Southbound onramps are at Dubuque Avenue, adjacent to the northbound off-ramp. The southbound offramp intersects Gateway Boulevard/Oyster Point Boulevard as the intersection's fifth leg.
- East Grand Avenue is an east-west arterial street. It has six travel lanes west of Gateway Boulevard, four travel lanes east of Gateway Boulevard, and two travel lanes east of Haskins Way. U.S. 101 freeway ramps at East Grand Avenue enable project site access from the south. East Grand Avenue carries about 17,000 vehicles per day.
- Airport Boulevard runs roughly parallel to U.S. 101 in South San Francisco. Freeway ramps south of Grand Avenue provide alternate project site access from the south. Airport Boulevard carries approximately 24,000 vehicles per day.
- Gateway Boulevard is a four-lane north-south arterial connecting East Grand Avenue with South Airport Boulevard and Oyster Point Boulevard. Class II bicycle lanes exist between East Grand Avenue and South Airport Boulevard. The corridor provides project site access from the north via U.S. 101 ramps at Oyster Point Boulevard. Gateway Boulevard carries approximately 12,000 vehicles per day.

#### 4.9.2.2 Transit Facilities and Service

The project site is not served directly by regional rail, ferry, or bus transit services; however, regional rail service (via Caltrain), ferry service (via Water Emergency Transportation Authority [WETA]), and bus service (via San Mateo County Transit District [SamTrans]) is within walking distance of the project site. The San Bruno Bay Area Rapid Transit (BART) station is approximately 2 miles from the project site, the South San Francisco Caltrain station is approximately 0.75 mile from the project site, and the WETA ferry terminal is approximately 1 mile from the project site. No SamTrans bus service currently exists east of U.S. 101 in South San Francisco. The project site therefore relies on supplementary public shuttle services to connect employees with regional transit. Relevant transit plans and policies (i.e., the *South San Francisco General Plan*, the *East of 101 Mobility 20/20 Plan*, and the *Caltrain Business Plan*) are discussed in Appendix D. Existing transit services are shown in Figure 4.9-2.





## 4.9.2.3 Regional Transit Service

The following transit services operate within South San Francisco and are accessible from the project site using a bicycle or first- and last-mile shuttle connection provided by the Peninsula Traffic Congestion Relief Alliance (Commute.org).

- BART provides regional rail service between the East Bay, San Francisco, and San Mateo County, 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 South San Francisco Station is located approximately 3 miles west of the project site at Mission Road and McLellan Drive. The San Bruno Station is located approximately 2 miles southwest of the project site near The Shops at Tanforan. BART trains operate on 15-minute headways during peak hours, and 20-minute headways during off-peak hours.
- Caltrain provides passenger rail service on the Peninsula between San Francisco and San José, and limited service trains to Morgan Hill and Gilroy during weekday commute periods. The South San Francisco Caltrain station is currently located approximately 0.75 mile south of the project site at 590 Dubuque Avenue, on the east side of U.S. 101, immediately north of East Grand Avenue. By 2020, Caltrain plans to relocate the South San Francisco Caltrain station several hundred feet to the south near the East Grand Avenue/Airport Boulevard intersection, and provide more direct pedestrian access to the East of 101 area via a tunnel with access at East Grand Avenue and Poletti Way. The South San Francisco Caltrain Station serves local and limited trains, with 23 northbound and 23 southbound weekday trains. The South San Francisco Caltrain Station provides weekday service from 5:40 a.m. to 12:00 a.m., with approximately 30-minute headways during peak times and 60-minute headways during off-peak times.
- WETA provides weekday commuter ferry service between the Oakland/Alameda ferry terminals and the South San Francisco Ferry Terminal at Oyster Point. There are three morning departures from Oakland/Alameda to South San Francisco, and three evening departures from South San Francisco to Oakland/Alameda. The South San Francisco Ferry terminal is located approximately 1 mile from the project site.
- SamTrans provides bus and rail service (through Caltrain) in San Mateo County but does not serve the East of 101 employment area. The closest bus stops to the project site are approximately 0.6 mile to the northwest near the intersection of Airport Boulevard and Sister Cities Boulevard and are served by Routes 292 and 397.

#### East of 101 Commuter Shuttle Service

Commute.org shuttles provide weekday commute period first/last mile connections between BART and Caltrain stations and the WETA ferry terminal and local employers in the East of 101 area, including the project site. Six weekday peak period peak-direction routes serve the East of 101 area. Service is roughly distributed between the East of 101 area's north (i.e., the Oyster Point area) and south (i.e., the Utah/Grand area) geographic halves. Project shuttle access is provided by an existing stop 0.2 mile away at the intersection of Oyster Point and Gateway Boulevards, which is served by all Oyster Point area shuttles. These routes connect with Caltrain, BART, and the WETA ferry terminal.

#### 4.9.2.4 Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, trails, and pedestrian signals. In the project vicinity, continuous sidewalks exist along both sides of Gateway Boulevard except south of Larkspur Landing driveway, where continuous sidewalks exist on the east side of the roadway for intermittent sections to East Grand Avenue.

At the intersection of Oyster Point Boulevard and Gateway Boulevard (a signal-controlled intersection immediately adjacent to the project site), marked crosswalks are provided on two of the four intersection legs. Sidewalks exist on the north side of Oyster Point Boulevard, which provides continuous pedestrian connectivity between the project site and the nearest existing Commute.org shuttle stop.

A segment of the San Francisco Bay Trail (Bay Trail) runs along the shoreline in the East of 101 area, providing a continuous off-street shared-use trail connection between Brisbane's Sierra Point to the north and South Airport Boulevard at the San Bruno Canal to the south. The Bay Trail is a public pedestrian and bicycle trail that is planned to extend around the entire San Francisco Bay. To the north of the project site, the Bay Trail connects to the South San Francisco ferry terminal to Oyster Point Boulevard, allowing bicyclists and pedestrians to access the ferry terminal. Currently, there are gaps in the trail to the north of Brisbane, and just south of South San Francisco.

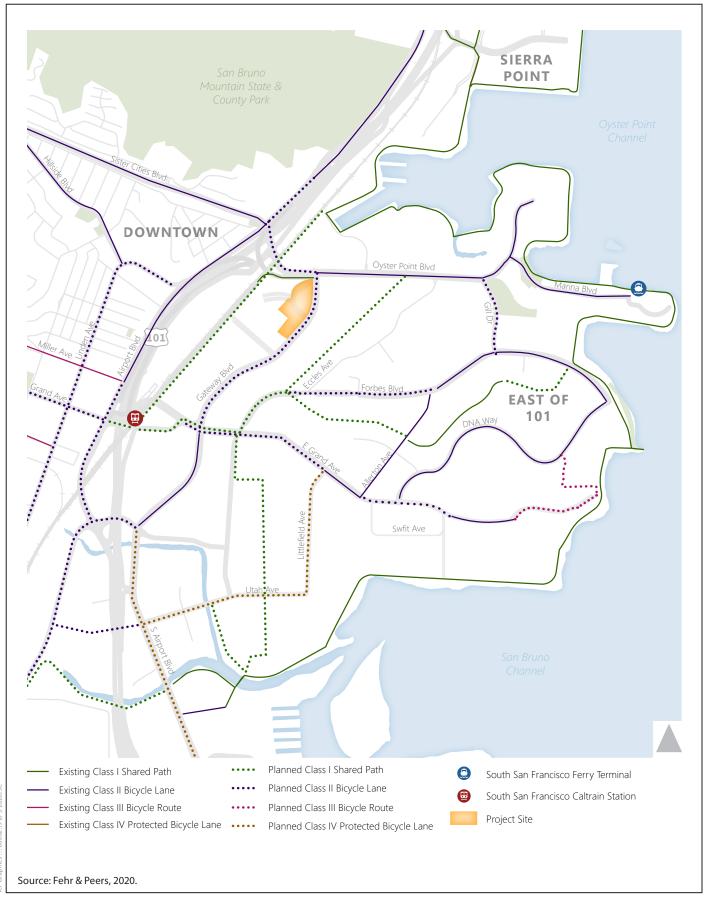
Relevant pedestrian plans and policies (i.e., the *South San Francisco General Plan*, the *Mobility 20/20 Plan*, and the *South San Francisco Pedestrian Master Plan*) are discussed in Appendix D.

# 4.9.2.5 Bicycle Facilities

Bicycle facilities consist of separated bikeways, bicycle lanes, routes, trails, and paths, as well as bicycle parking, bicycle lockers, and showers for cyclists. The California Department of Transportation (Caltrans) recognizes four classifications of bicycle facilities as described below.

- **Class I—Shared-Use Pathway:** Provides a completely separated right-of-way for the exclusive use of cyclists and pedestrians with crossflow minimized (e.g., off-street bicycle paths).
- Class II—Bicycle Lanes: Provides a striped lane for one-way travel on a street or highway. May include a "buffer" zone consisting of a striped portion of roadway between the bicycle lane and the nearest vehicle travel lane.
- **Class III—Bicycle Route:** Provides for shared use with motor vehicle traffic; however, are often signed or include a striped bicycle lane.
- Class IV—Separated Bikeway: Provides a right-of-way designated exclusively for bicycle travel adjacent to a roadway and which are protected from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

The area surrounding the project site has a partially complete bicycle network that provides first-and last-mile connectivity to the South San Francisco ferry terminal but lacks dedicated bicycle connections to the Caltrain station and residential and commercial uses west of U.S. 101. Current bicycle facilities in the project vicinity, as designated by the City's *Bicycle Master Plan* and the draft *Active South City: Bicycle and Pedestrian Master Plan* (ongoing), are shown in Figure 4.9-3 and discussed below.





- Gateway Boulevard has proposed Class II bicycle lanes between Oyster Point Boulevard and
  East Grand Avenue to connect to existing bicycle lanes on both roads; proposed bicycle lanes on
  Gateway Boulevard will provide direct access to the project site.
- Poletti Way has a short Class I mixed-use trail connection from the street's terminus to the
  Oyster Point Boulevard/Gateway Boulevard intersection; an extension of the trail is planned to
  the new Caltrain station to the south and the Bay Trail to the north (under the Oyster Point
  Boulevard overpass).
- Oyster Point Boulevard has Class II bicycle lanes between Gull Drive and Gateway Boulevard;
   Class II bicycle lanes are planned for the remainder of Oyster Point Boulevard to connect to existing bicycle lanes on Sister Cities Boulevard and Airport Boulevard.
- East Grand Avenue has intermittent Class II bicycle lanes in the East of 101 Area. A Class I trail is planned and will connect the new Caltrain station with planned trails near Forbes Boulevard, while Class II bicycle lanes are expected to be installed from Gateway Boulevard to DNA Way by summer 2020.
- The Bay Trail is a Class I mixed-use trail along the Oyster Point shoreline and Point San Bruno, part of a planned 400-mile regional trail system encircling the San Francisco Bay shoreline.

Bicyclists primarily access the project site via Gateway Boulevard, Poletti Way, Oyster Point Boulevard, East Grand Avenue, and/or the Bay Trail. Commute trip lengths, lack of continuous low stress bicycle facilities, lack of connectivity to residences and transit stations, and topography present barriers to bicycle commuting to the East of 101 area.

The reconstructed South San Francisco Caltrain station (currently under construction, with completion expected in late 2020) features a bicycle and pedestrian undercrossing that will connect the East of 101 area to the upgraded South San Francisco Caltrain station, Downtown South San Francisco, housing, and commercial services to the west. The undercrossing represents the first non-motorized connection spanning the Caltrain and U.S. 101 corridors, which are substantial barriers to east-west bicycle and pedestrian travel.

Additional relevant bicycle plans and policies (e.g., South San Francisco General Plan, East of 101 Mobility 20/20 Plan, South San Francisco Bicycle Master Plan) are discussed in Appendix D of this draft EIR.

# 4.9.2.6 Emergency Vehicle Access

Emergency vehicles typically use major streets through the study area when heading to and from an emergency and/or an emergency facility. Arterial roadways allow emergency vehicles to travel at higher speeds and provide enough clearance space to permit other traffic to maneuver out of the path of the emergency vehicle and yield the right-of-way. The nearest fire station to the project is Fire Station 62 at 249 Harbor Way, approximately 0.8 mile south of the project site. Emergency vehicle access to the project site is primarily from the two driveways on Gateway Boulevard, which have two travel lanes in each direction.

# 4.9.3 Regulatory Framework

## 4.9.3.1 State

#### Senate Bill 743

Senate Bill (SB) 743¹ is intended to better align California Environmental Quality Act (CEQA) transportation impact analysis practices and mitigation outcomes with the State's goals to reduce greenhouse gas (GHG) emissions, encourage infill development, and improve public health through more active transportation. SB 743 creates several key statewide changes to CEQA as described below.

First, SB 743 requires the Governor's Office of Planning and Research (OPR) to establish new metrics for determining the significance of transportation impacts of projects within transit priority areas (TPAs) and allows OPR to extend use of these metrics beyond TPAs. OPR selected vehicle miles traveled (VMT) as the preferred transportation impact metric and applied their discretion to require its use statewide.

Second, SB 743 establishes that aesthetic and parking impacts of a residential, mixed-use residential, or employment center projects on an infill site within a TPA shall not be considered significant impacts on the environment.

Third, the new CEQA Guidelines that implement SB 743 requirements state that vehicle level of service (LOS) and similar measures related to auto delay shall not be used as the sole basis for determining the significance of transportation impacts, and that as of July 1, 2020, this requirement shall apply statewide, but that until that date, lead agencies may elect to rely on VMT rather than LOS to analyze transportation impacts.

Finally, SB 743 establishes a new CEQA exemption for a residential, mixed-use, and employment center project that is a) within a transit priority area, b) consistent with a specific plan for which an EIR has been certified, and c) consistent with a Sustainable Communities Strategy (SCS). This exemption requires further review if the project or circumstances changes significantly.

To aid in SB 743 implementation, the following state guidance has been produced.

- OPR's Technical Advisory on Evaluating Transportation Impacts in CEQA<sup>2</sup>
- California Air Resources Board (CARB)'s 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals<sup>3</sup>
- Caltrans' Local Development–Intergovernmental Review Program Interim Guidance, Implementing Caltrans Strategic Management Plan 2015-2020 Consistent with SB 7434

<sup>&</sup>lt;sup>1</sup> Full text of SB 743: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\_id=201320140SB743

<sup>&</sup>lt;sup>2</sup> Governor's Office of Planning and Research. 2018. *Technical Advisory on Evaluating Transportation Impacts in CEQA*. December. Available: http://opr.ca.gov/docs/20190122-743\_Technical\_Advisory.pdf. Accessed: June 10, 2020.

<sup>&</sup>lt;sup>3</sup> California Air Resources Board. 2017. 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals. January. Available: https://ww2.arb.ca.gov/sites/default/files/2019-01/2017\_sp\_vmt\_reductions\_jan19.pdf. Accessed: June 10, 2020.

<sup>&</sup>lt;sup>4</sup> Caltrans. 2016. Local Development–Intergovernmental Review Program Interim Guidance, Implementing Caltrans Strategic Management Plan 2015-2020 Consistent with SB 743. November. Available: https://dot.ca.gov/programs/transportation-planning/office-of-smart-mobility-climate-change/sb-743. Accessed: June 10, 2020.

CARB's 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals provides recommendations for VMT reduction thresholds that would be necessary to achieve the State's GHG reduction goals. CARB finds per-capita light-duty vehicle travel would need to be approximately 16.8 percent lower than existing, and overall per-capita vehicle travel would need to be approximately 14.3 percent lower than existing levels under that scenario. CARB also acknowledges that the SCS targets are not sufficient to meet climate goals. As stated in the report, "...the full reduction needed to meet our climate goals is an approximately 25 percent reduction in statewide per capita on-road light-duty transportation-related GHG emissions by 2035 relative to 2005." This estimate was made with a model that does not fully capture emerging transportation trends such as a growing e-commerce market, greater use of ridesharing services such as Uber and Lyft, plus future transitions to autonomous vehicles. As such, the level of VMT reduction necessary to reach the State's GHG reduction goals may exceed 25 percent.

OPR considered this research when developing recommended VMT thresholds. In their *Technical Advisory on Evaluating Transportation Impacts in CEQA*, OPR recommends that a per-capita or peremployee VMT that is 15 percent below that of existing development may be a reasonable threshold. This threshold is based on the abovementioned research documents from CARB as well as evidence that suggests a 15 percent reduction in VMT is achievable at the project level in a variety of place types<sup>5</sup> and would help the State achieve its climate goals. However, each jurisdiction must apply the statewide VMT analysis guidance based on available travel data and tools.

As discussed below, the analysis of GHG reduction goals performed by CARB indicates that a reduction of at least 16.8 percent of light-duty vehicle VMT is necessary to reach statewide goals. Light-duty VMT is appropriate for the project because most project trips are expected to be light duty vehicles such as personal automobiles used for commuting. Therefore, 16.8 percent was applied as the VMT reduction factor for the proposed project.

#### 4.9.3.2 Regional

#### San Mateo City/County Association of Governments

The San Mateo City/County Association of Governments (C/CAG) is the Congestion Management Agency (CMA) for San Mateo County and is authorized to set State and federal funding priorities for improvements affecting the San Mateo County Congestion Management Program (CMP) roadway system. The C/CAG-designated CMP roadway system in South San Francisco includes State Route (SR) 82 (El Camino Real), U.S. 101, Interstate (I-)380, and I-280. C/CAG has set the LOS standards for U.S. 101 segments in the vicinity of the project site.

C/CAG has adopted guidelines to reduce the number of net new vehicle trips generated by new land development. These guidelines apply to all developments that generate 100 or more net new peak hour vehicular trips on the CMP network and are subject to CEQA review. The goal of these guidelines is that developers and/or tenants will reduce demand for all new peak hour trips (including the first 100 trips) projected to be generated by a development.

<sup>&</sup>lt;sup>5</sup> California Air Pollution Control Officers Association. 2010. *Quantifying Greenhouse Gas Mitigation Measures--A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures*. Available: http://www.capcoa.org/wpcontent/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf. Accessed: June 10, 2020.

C/CAG has adopted guidelines as a part of its CMP, which are intended to reduce the regional traffic impacts of substantive new developments. The guidelines apply to all projects in San Mateo County that will generate 100 or more net new peak-hour trips on the CMP network and are subject to CEQA review. C/CAG calls for projects that meet the criteria to determine if a combination of acceptable measures is possible that has the capacity to "fully reduce," through the use of a trip credit system, the demand for net new trips that the project is anticipated to generate on the CMP roadway network (including the first 100 trips). C/CAG has published a list of mitigation options in a memorandum. South San Francisco's TDM ordinance is consistent with CCAG's ordinance, so by adhering to the City's ordinance, the proposed project would also be compliant with CCAG's guidelines.

#### Commute.org

Commute.org is a joint powers authority dedicated to implementing transportation demand management programs in San Mateo County and providing alternatives to single-occupant auto travel, including both commuter and community shuttles. A Board of Directors consisting of elected officials from each of its 17 member cities, including the City of South San Francisco, and one representative from the County Board of Supervisors governs Commute.org. Commute.org manages 26 shuttle routes in San Mateo County. In South San Francisco, the Commute.org runs seven first-and last-mile weekday peak hour and direction commuter routes that connect the South San Francisco Caltrain and BART stations, and the WETA terminal within the East of 101 employment area.

#### **Caltrain Business Plan**

Caltrain is developing the *Caltrain Business Plan*<sup>6</sup> to guide the rail corridor's growth through year 2040. The *Business Plan* includes both policy and technical recommendations and will help define how Caltrain service should grow and evolve in the near-term and long-term to best serve existing and future passengers. The Peninsula Corridor Joint Powers Board, Caltrain's board of directors, adopted a *2040 Service Plan Vision*<sup>7</sup> in October 2019 that calls for increasing peak commute service to a minimum of eight trains per direction per hour and increased off-peak and weekend service.

#### 4.9.3.3 Local

#### South San Francisco General Plan

The 1999 South San Francisco General Plan (General Plan) provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Transportation Element, which includes policies, programs, and standards to enhance capacity and provide new linkages to provide "Complete Streets" that are safe, comfortable, and convenient routes for walking, bicycling, and public transportation to increase use of these modes of

<sup>&</sup>lt;sup>6</sup> Caltrain. Under development. Caltrain Business Plan. Available: https://caltrain2040.org/. Accessed: June 10, 2020.

Caltrain. 2019. 2040 Service Plan Vision. October. Available: https://caltrain2040.org/wp-content/uploads/Caltrain\_ServiceVisionFactSheet\_V12-1.pdf. Accessed: June 20, 2020.

transportation, enable active travel as part of daily activities, reduce pollution, help reduce transportation demand, and meet the needs of all users of the streets, including bicyclists, children, persons with disabilities, pedestrians, users of public transportation, seniors, youth, and families, while continuing to maintain a safe and effective transportation system for motorists and movers of commercial goods. The general plan includes the following policies that are applicable to transportation and circulation.

- Guiding Principle 4.2-G-1: Undertake efforts to enhance transportation capacity, especially in growth and emerging employment areas such as in the East of 101 area.
- Guiding Principle 4.2-G-10: 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.
- Implementing Policy 4.2-1-10: Design roadway improvements and evaluate development proposals based on LOS standards.
- Implementing Policy 4.3-I-16: Favor Transportation Systems Management programs that limit vehicle use over those that extend the commute hour.

On June 10, 2020 the City adopted a VMT threshold in accordance with the Office of Planning and Research (OPR)'s guidance in implementing Senate Bill 743; the threshold is effective July 1, 2020.

# East of 101 Mobility 20/20 Plan

The City's *Mobility 20/20* plan<sup>8</sup> analyzes existing and future land use in the East of 101 area, with the goal of providing a framework for multimodal improvements to the area's transportation network. *Mobility 20/20* findings and recommendations will be incorporated into the City's new *Shape SSF 2040 General Plan*.<sup>9</sup> This new general plan envisions reducing VMT and drive-alone mode share while expanding throughput capacity along major corridors serving core employment areas in the City.

Key project opportunities identified in the City's *Mobility 20/20* plan include U.S. 101 interchange improvements and secondary north-south arterial connections to Brisbane's Sierra Point to the north and the San Francisco International Airport area to the south via a new causeway spanning San Bruno Channel. The bicycle and pedestrian network would also be substantially upgraded with separated bikeways, expanded sidewalks, and new pedestrian crosswalks. *Mobility 20/20* transit enhancements include transit-only lanes along the Oyster Point Boulevard corridor complemented by new or upgraded direct service connections between job centers and regional transit stations.

## **South San Francisco Complete Streets Policy**

In 2012, the City adopted its Complete Streets Policy via Resolution 86-2012. The Complete Streets Policy's objective is to serve all street users as articulated in the resolution below.

 Resolution 86-2012: Create and maintain complete streets that provide safe, comfortable, and convenient travel along and across streets including streets, roads, highways, bridges, and other portions of the transportation system through a comprehensive, integrated transportation

<sup>8</sup> https://www.ssf.net/government/mobility-20-20

<sup>9</sup> https://shapessf.com/about/

network that serves all categories of users, including pedestrians, bicyclists, persons with disabilities, motorists, movers of commercial goods, users and operators of public transportation, seniors, children, youth, and families.

The Complete Streets Policy was incorporated into the City's amended general plan and includes the following policy related to the project.

Policy 4.2-I-11: In all street projects include infrastructure that improves transportation options
for pedestrians, bicyclists, and users of public transportation of all ages and abilities.
Incorporate this infrastructure into all construction, reconstruction, retrofit, maintenance,
alteration, and repair of streets, bridges, and other portions of the transportation network.

## South San Francisco Bicycle Master Plan

The City's *Bicycle Master Plan* identifies and prioritizes street improvements to enhance bicycle access. The plan analyzes bicycle demand and gaps in bicycle facilities and recommends improvements and programs for implementation as described in the policy below.

• Policy 3.2-1: All development projects shall be required to conform to the Bicycle Transportation Plan goals, policies and implementation measures.

The City's *Bicycle Master Plan* is currently being updated. The current *Bicycle Master Plan* remains active until completion and adoption of the new *Active South City: Bicycle and Pedestrian Master Plan*.

#### South San Francisco Pedestrian Master Plan

The City's *Pedestrian Master Plan*<sup>10</sup> identifies and prioritizes street improvements to enhance pedestrian access. The plan analyzes pedestrian demand and gaps in pedestrian facilities and recommends improvements and programs for implementation. The Pedestrian Master Plan establishes the following policy related to the Project:

 Policy 3.2: Pedestrian facilities and amenities should be provided at schools, parks, and transit stops, and shall be required to be provided at private developments, including places of work, commercial shopping establishments, parks, community facilities and other pedestrian destinations.

#### **South San Francisco Transportation Demand Management Ordinance**

The City's Transportation Demand Management (TDM) Ordinance, which is specified in Title 20 of the City's Municipal Code in Chapter 20.400, *Transportation Demand Management* seeks to reduce the amount of traffic generated by nonresidential development and minimize drive-alone commute trips. The ordinance establishes a performance target of 28 percent minimum alternative mode share for all nonresidential projects resulting in more than 100 average daily trips and identifies higher thresholds for projects requesting a floor area ratio (FAR) bonus.

<sup>&</sup>lt;sup>10</sup> City of South San Francisco. 2011. *South San Francisco Pedestrian Master Plan.* Available: https://www.ssf.net/Home/ShowDocument?id=516. Accessed: June 10, 2020.

Per the ordinance, all projects are required to submit annual mode share surveys. Project sponsors seeking an FAR bonus are required to submit triennial reports assessing project compliance with the required alternative mode share target. Where targets are not achieved, the report must include program modification recommendations and City officials may impose administrative penalties should subsequent triennial reports indicate mode share targets remain unachieved.

# 4.9.4 Impacts and Mitigation Measures

# 4.9.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a transportation and circulation impact if it would do any of the following.

- Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities
- Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b) related to VMT;
- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible land uses (e.g., farm equipment); or
- Result in inadequate emergency access.

In addition to the Appendix G thresholds, City and C/CAG guidance was used to identify the following relevant thresholds of significance. Under these additional thresholds, the proposed project would have a transportation and circulation impact if it would do any of the following.

- Cause vehicle queues approaching a given movement downstream of Caltrans freeway facilities to
  exceed existing storage space for that movement, or considerably contribute to baseline vehicle
  queues that exceed storage space for that movement, resulting in a hazardous condition<sup>11</sup>
- Produce a detrimental impact to existing bicycle facilities, pedestrian facilities, or local transit or shuttle service

# 4.9.4.2 Approach to Analysis

Potential project impacts to the surrounding transportation system were evaluated for the four scenarios listed below.

- **Scenario 1: Existing Conditions**—Existing conditions represent the baseline condition upon which project impacts are measured. The baseline condition represents existing conditions as of 2019.
- Scenario 2: Existing Plus Project Conditions—Existing plus project conditions represent the baseline condition with the addition of the project. Traffic volumes for existing plus project conditions include existing traffic volumes plus traffic generated by the project. Existing plus project conditions were compared to existing conditions to determine potential immediate project impacts.

While SB 743 notes that "traffic congestion shall not be considered a significant impact on the environment" the freeway on- and off-ramp vehicle queuing criteria was retained to assess potential hazards from project traffic exceeding ramp storage capacities. Traffic in queue represents congested, stop-and-go conditions; if queues interfere with through, or free-moving traffic streams on a freeway mainline, hazards could arise due to the differences in speed.

- Scenario 3: Cumulative Conditions—Cumulative conditions include transportation demand resulting from reasonably foreseeable land use changes and conditions associated with funded transportation projects by 2040. Cumulative conditions are based on land use and transportation conditions included in *Plan Bay Area 2040*,<sup>12</sup> as represented in the C/CAG-VTA Bi-County Transportation Demand Model (C/CAG model). The C/CAG model is a four-step trip-based travel demand model designed to forecast how land uses and transportation interact within San Mateo and Santa Clara Counties.
- Scenario 4: Cumulative Plus Project Conditions—Cumulative plus project conditions
  represent the cumulative condition with the addition of the project to determine the extent to
  which the project would contribute to long-term cumulative transportation impacts.

A description of the methods used to develop the VMT threshold and estimate the amount of traffic and VMT generated by the project is provided below.

#### Vehicle Miles Traveled

#### **VMT Threshold**

As a part of the *Shape SSF 2040 General Plan*, the City is updating its transportation impact thresholds. On June 10<sup>th</sup>, 2002, the City adopted a VMT threshold in accordance with OPR's guidance for implementing SB 743 requirements, which has become effective on July 1, 2020. The adopted VMT threshold for land use projects determines that a project would have a significant transportation impact if the VMT for the project would be 15 percent below the applicable baseline VMT.

At the time of this project analysis, the City had not yet adopted a VMT threshold. In accordance with OPR guidance, an interim threshold was developed for this project based on the metrics and methods described in detail in Appendix D and summarized here.

As discussed above, analysis of GHG reduction goals performed by CARB indicates that a reduction of at least 16.8 percent of light-duty vehicle VMT is necessary to reach statewide goals. Light-duty VMT is appropriate for the project because most project trips are expected to be light duty vehicles such as personal automobiles used for commuting. Therefore, 16.8 percent was applied as the VMT reduction factor. This threshold is more stringent than the City's recently adopted threshold of 15 percent below baseline VMT.

Home-based work (HBW) VMT per employee was identified as the project analysis metric. This metric follows OPR guidance for measuring office project VMT and helps compare the project's relative transportation efficiency to the regional average. OPR recommends using a regional geography for office projects. Neither the local City or county level geographic area is robust enough to capture the full length of most trips or evaluate the interaction of the project in a regional setting, as many commute trips exceed the City and county borders. As a result, the nine-county Bay Area region was selected as the geographic boundary for the assessment as shown in Table 4.9-1.

<sup>&</sup>lt;sup>12</sup> Metropolitan Transportation Commission and Association of Bay Area Governments. 2019. *Plan Bay Area 2040 Final Plan*. Available: http://2040.planbayarea.org/. Accessed: June 10, 2020.

Table 4.9-1. Home-Based Work Vehicle Miles Traveled Per Employee Thresholds

| Location                             | Total HBW VMT (a) | Total Employees (b)    | HBW VMT per<br>Employee<br>(a)/(b) |
|--------------------------------------|-------------------|------------------------|------------------------------------|
| Bay Area Region<br>(Existing)        | 63,336,200        | 4,461,670              | 14.2                               |
|                                      |                   | VMT Reduction Factor   | (16.8%)                            |
|                                      | HBW VMT           | Per Employee Threshold | 11.8                               |
| Bay Area Region<br>(2040 Cumulative) | 78,980,240        | 5,406,190              | 14.6                               |
|                                      |                   | VMT Reduction Factor   | (16.8%)                            |
|                                      | HBW VMT           | Per Employee Threshold | 12.1                               |

 $Source: Fehr \& Peers \ 2020; \ C/CAG-VTA \ Bi-County \ Transportation \ Demand \ Model, \ 2019.$ 

Notes: HBW = home-based work; VMT = vehicle miles traveled

Based on these factors, a significant impact would occur if existing HBW VMT per employee in the travel demand model's transportation analysis zone (TAZ) results in greater than 11.8 HBW VMT per employee under existing conditions. This is based on a reduction of 16.8 percent below the existing regional average of 14.2 HBW VMT per employee as shown in Table 4.9-1. A TAZ is the smallest resolution available in the C/CAG model, and represents a scale somewhere between a census block group and a census tract. Each TAZ included in the model contains information related to the existing and proposed land uses and transportation options for zone. Therefore, the transportation properties of the project's TAZ are an appropriate proxy for transportation properties of the project itself.

#### **Project VMT Generation**

Project-generated HBW VMT per employee is calculated based on the average HBW VMT generated by employees working in the C/CAG travel demand model TAZ where the project is located divided by the number of jobs within the TAZ as described in Appendix D. Based on this methodology, the project would generate 16.2 HBW VMT per employee under existing conditions. The C/CAG model variables are presented in Table 4.9-2.

Table 4.9-2. Home-Based Work Vehicle Miles Traveled per Employee

| Location         | Total HBW VMT (a) | Total Employment (b)     | HBW VMT per Employee<br>(a)/(b) |
|------------------|-------------------|--------------------------|---------------------------------|
| East of 101 Area | 581,977           | 35,831                   | 16.2                            |
| Bay Area Region  | 63,336,203        | 4,461,670                | 14.2                            |
|                  |                   | VMT Reduction Factor     | (16.8%)                         |
|                  | VM                | Γ Per Employee Threshold | 11.8                            |

Source: Fehr & Peers 2020; C/CAG-VTA Bi-County Transportation Demand Model, 2019.

Notes: HBW = home-based work; VMT = vehicle miles traveled

As discussed in Chapter 3, Project Description, the project is required to implement a TDM program. While SSFCM Section 20.400 does not call out a specific alternate mode-share (AMS) requirement for the Gateway Specific Plan District, similar zoning districts, and General Plan requirements in the East of 101 area require an AMS of 35 - 40 percent for development of a Floor Area Ratio of 1.0 - 1.25, and this standard would be applied to the 751 Gateway project, consistent with the City's requirements, and policies to increase AMS and decrease single occupancy vehicle traffic. While the City interprets the regulatory TDM requirements to require a 35 – 40 percent AMS, the CEQA analysis assumes a higher and more conservative drive-alone share (AMS of 26 percent), consistent with the City/County Association of Governments of San Mateo County (C/CAG) model, and analysis for other similar projects within the City and the region. The proposed project would include a flexible TDM plan to achieve an alternative mode use goal<sup>13</sup> of 35 percent for the proposed project within the first three years of reporting, with an increase to 40 percent in the fourth year of reporting.<sup>14</sup> However, reductions in non-drive alone mode share are not necessarily interchangeable with VMT reductions on a percentage-point-for-percentage-point basis. First, mode share targets do not necessarily correlate with trip generation and trip length; although many East of 101 employers meet their non-drive alone mode share targets, vehicle trip generation and trip lengths are similar (if not higher than) regional averages based on the C/CAG travel demand model outputs. Second, a non-drive alone mode share target includes passenger vehicle-based modes such as vanpools and carpools, which may dilute its effectiveness for VMT reductions. Third, VMT is a measure of daily activity for all trips, whereas accounting for nondrive alone mode share targets focuses only on commute trips. Therefore, project HBW VMT per employee was not adjusted based on the project TDM program's plan. This analysis therefore represents a conservatively high estimate of project VMT, because it does not fully account for the VMT reductions that may occur as a result of the project's TDM program.

The project's effect on VMT describes changes in VMT generation from neighboring land uses by comparing area VMT for "no project" and "plus project" scenarios. Given the similarities in the project land uses to those of the surrounding land uses (e.g., location that generates higher than average VMT for the region, single-use employment centers, and limited non-auto access), the analysis of project-generated HBW VMT per employee based on East of 101 Area VMT provides a reasonable estimation of the environmental consequences associated with the project's effect on VMT.

While land use changes are currently under consideration for the *Shape SSF 2040 General Plan*, the current general plan and the current City land use policy envisions continued single-use employment within the East of 101 area; therefore, VMT is unlikely to be substantially reduced from existing conditions, although implementation of programmatic TDM measures and improving first- and last-mile transit connections can help to increase transit use, and reduce single-occupancy vehicle trips.

<sup>&</sup>lt;sup>13</sup> The alternative mode use goal indicates the percentage of total trips that would use alternative transportation modes rather than single-occupancy vehicle trips.

<sup>&</sup>lt;sup>14</sup> Silvani Transportation Consulting. 2019. *Proposed Transportation Management Plan: 751 Gateway Blvd., South San Francisco CA.* December.

Overall, the existing land use and transportation characteristics of the East of 101 area contribute to the East of 101 area's higher-than-average VMT per employee. As a single-use employment center, all home-based trips begin or end outside the East of 101 area, requiring longer travel along auto-oriented roadways or via transit service that is currently not competitive with the automobile. In contrast, mixed-use settings near transit can further reduce trip generation and trip lengths while increasing the use of non-auto modes.

### Trip Generation, Distribution, and Assignment

The amount of traffic added to the roadway system by the project was estimated using a three-step process: trip generation, trip distribution, and trip assignment. The first step estimates the amount of traffic that would be generated once the project was built and fully occupied. The second step estimates the direction of travel to and from the project site. The third step assigns project trips to specific street segments and intersection turning movements. Analysis results are described below.

#### **Project Trip Generation**

Project traffic added to the surrounding roadway system was estimated using data collected in fall 2019 for the existing office and research and development (R&D) campus adjacent to the project site. Local travel demand data were used instead of national averages because of the unique conditions in the East of 101 area, including peak period spreading, employment land use mix, and higher rates of participation in TDM programs. In contrast, national trip generation databases such as the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th edition<sup>15</sup> is generally collected at suburban sites with limited non-auto access and less congestion.

Driveway count data were collected at nine driveways at the surrounding office/R&D campus representing trip generation for nine existing buildings and 1.4 million square feet. A trip generation rate for existing uses was developed and applied to the project square footage to calculate project travel demand. The sample site driveway traffic data are presented in Appendix D.

The project trip generation rate was derived from the site-specific data and was multiplied by the size of the project in gross square feet to determine daily, weekday morning, evening peak hour vehicle trip generation volume (Table 4.9-3). Vehicle trips are summarized for the entire project site (including both the existing 701 Gateway building, which would remain, and the proposed 751 Gateway building), and for each building individually. The net new project trips are for the proposed 751 Gateway only, and the trip generation analysis subtracted existing trips associated with the existing 701 Gateway building from the project site trips. According to this trip generation analysis, the new 208,800 square foot office building would generate approximately 1,784 daily, 206 morning peak hour (i.e., 143 inbound and 64 outbound), and 172 evening peak hour (i.e., 45 inbound and 127 outbound) net new trips.

<sup>&</sup>lt;sup>15</sup> Institute of Transportation Engineers. 2017. *Trip Generation Manual*. 10th edition. September. Available: https://www.ite.org/technical-resources/topics/trip-and-parking-generation/trip-generation-10th-edition-formats/. Accessed: June 10, 2020.

**Table 4.9-3. Project Trip Generation** 

|  |            | Da    | ily  |     | A.M. P | eak Hou | r    |    | P.M. I | Peak Hou | ır   |
|--|------------|-------|------|-----|--------|---------|------|----|--------|----------|------|
| Land Use   | Size (KSF) | Total | Rate | In  | Out    | Total   | Rate | In | Out    | Total    | Rate |
| Total Trips for the project site (701 and 751 Gateway Boulevard buildings) | 382.3      | 3,267 | 8.6  | 262 | 116    | 378     | 0.99 | 82 | 232    | 315      | 0.82 |
| Existing Trips for the 701 Gateway Boulevard building, which would remain  | 173.5      | 1,483 |      | 119 | 53     | 172     |      | 37 | 105    | 143      |      |
| Net New Trips for the proposed<br>751 Gateway Boulevard building           | 208.8      | 1,784 |      | 143 | 64     | 206     | -    | 45 | 127    | 172      |      |

Source: Fehr & Peers 2020.

Notes: Trip generation rates based on 2019 driveway count data collected at the Gateway Campus in the East of 101 area.

#### **Project Trip Distribution**

The directions of approach and departure for the project traffic were estimated based on C/CAG's travel demand model and the City' travel demand model, which has greater sensitivity to local travel patterns. Figure 4.9-4 shows the general trip distribution pattern for the project. Most of the project traffic is split between the north (33 percent) and south (49 percent) U.S. 101 approaches to the East of 101 area. Within South San Francisco, approximately 16 percent of project traffic is projected to come from west of U.S. 101, while 2 percent is expected to come from within the East of 101 area.

#### **Project Trip Assignment**

Project trips were assigned to the roadway system based on the directions of approach and departure discussed above. The locations of complementary land uses and local knowledge of the study area determined specific trip routes. Figure 4.9-5 shows the expected increases in peak hour intersection turning movement volume due to the project.

Project traffic would access the roadway network via two driveways along the Gateway Boulevard frontage, to the south of Oyster Point Boulevard. Inbound vehicular traffic accesses the project site via Gateway Boulevard from both sides and outbound traffic departs via Gateway Boulevard in the opposite direction.

#### **Unsignalized Intersections**

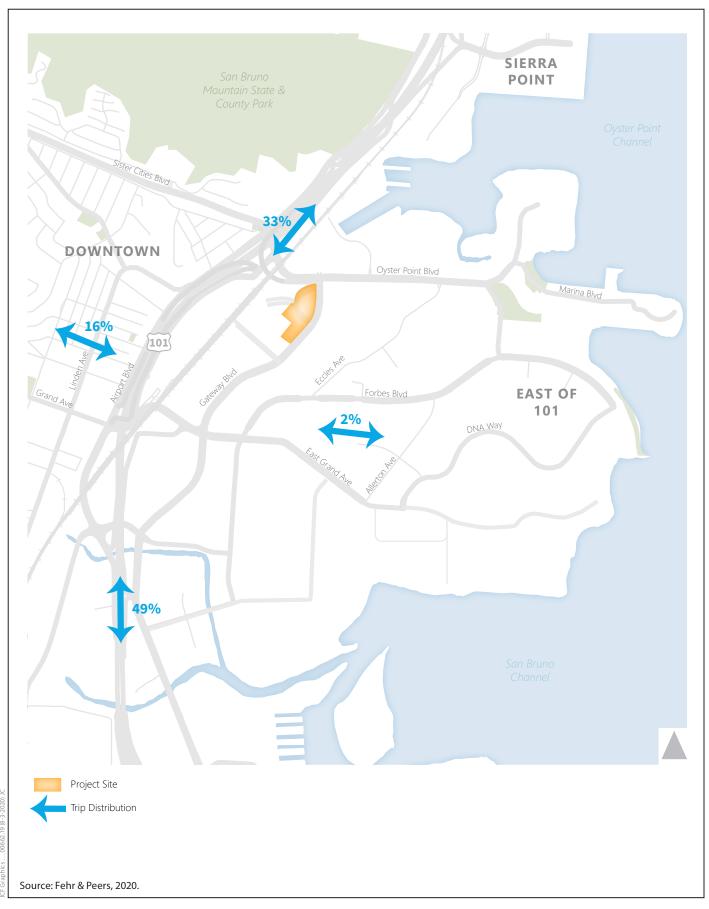
Traffic conditions at the unsignalized study intersections (stop sign and yield sign-controlled intersections) were evaluated using the method from Chapter 17 of the Highway Capacity Manual. With this method, operations are defined by the average control delay per vehicle (measured in seconds) for each stop-controlled approach 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.

## **Freeway Ramp Queuing Analysis**

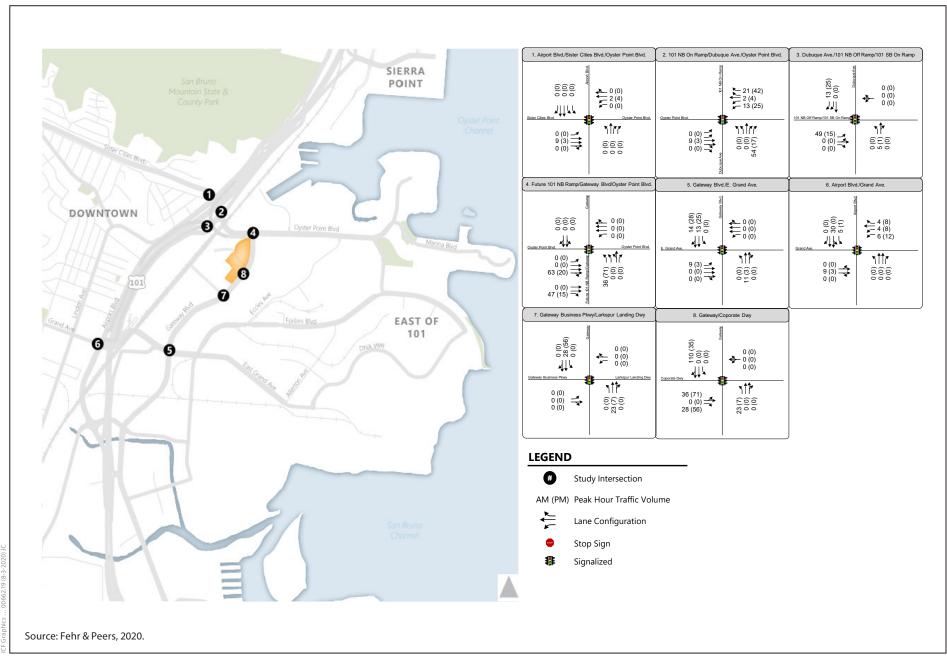
Three freeway off-ramps were selected for analysis based on local traffic patterns, project trip assignment forecasts, input from the City, and engineering judgment to assess conditions where the addition of project trips may result in hazards to road users. The study locations are listed below.

- U.S. 101 southbound off-ramp at Oyster Point Boulevard
- U.S. 101 northbound off-ramp at East Grand Avenue
- U.S. 101 northbound off-ramp at Dubuque Avenue

In November 2019, traffic counts were collected at the approaches and departures to the three freeway off-ramps during the morning (i.e., from 7:00 to 9:00 a.m.) and evening (i.e., from 4:00 to 6:00 p.m.) peak periods. During all counts, weather conditions were generally dry, no unusual traffic patterns were observed, and the South San Francisco Unified School District was in regular session.









The morning peak hour was selected as the analysis period since the project, and the East of 101 area generally generate the majority of inbound trips during the morning peak period where inbound trips would be using the freeway off-ramps. Conversely, during the evening peak period, the study off-ramps have significantly lower volumes, and few project trips would use the off-ramps. Therefore, the off-ramps queuing analysis performed for the morning peak hour is expected to encompass all potential impacts.

### 4.9.4.3 Impact Evaluation

Impact TR-1: Existing HBW VMT per employee in the travel demand model TAZ that encompasses the project result in greater than 16.8 percent below the regional average HBW VMT per employee under existing plus project and cumulative plus project conditions. (Significant and Unavoidable with Mitigation)

As shown in Table 4.9-4, using the average VMT in the East of 101 area, the project would generate approximately 16.2 HBW VMT per employee under existing conditions, which is greater than the regional average total of 14.2 HBW VMT per employee and the per-employee significance threshold of 11.8 HBW VMT (based on a VMT rate of a reduction of 16.8 percent below the regional average). Therefore, the project would have a *significant* impact on VMT under existing plus project conditions.

Under cumulative conditions, the project would generate approximately 14.0 HBW VMT per employee, which is similar to the cumulative regional average total of 14.6 HBW VMT per employee but greater than the per-employee significance threshold of 12.1 HBW VMT per employee (based on a reduction of 16.8 percent below the cumulative regional average HBW VMT per employee). Therefore, the project would be a cumulatively considerable contributor to a cumulatively *significant* impact on VMT under cumulative plus project conditions. A comparison between the Bay Area region and East of 101 per-employee VMT averages under Existing and Cumulative conditions is presented in Table 4.9-4.

Table 4.9-4. VMT Impact Determination

| Location          | Total HBW VMT (a)               | Total Employment (b)          | HBW VMT<br>per Employee<br>(a)/(b) |
|-------------------|---------------------------------|-------------------------------|------------------------------------|
| Bay Area          | 63,336,203                      | 4,461,670                     | 14.2                               |
| East of 101 Area  | 581,997                         | 35,831                        | 16.2                               |
| V                 | MT Per Employee Threshold (1    | 16.8% below regional average) | 11.8                               |
|                   |                                 | Project VMT Impact?           | Yes                                |
| Bay Area          | 78,980,239                      | 5,406,188                     | 14.6                               |
| East of 101 Area  | 736,810                         | 52,660                        | 14.0                               |
| V.                | MT Per Employee Threshold (1    | 16.8% below regional average) | 12.1                               |
| Cumulatively Cons | siderable Contributor to Signij | ficant Cumulative VMT Impact? | Yes                                |

First- and last-mile transit connections and active transportation improvements would likely yield the greatest project VMT reductions. Mitigation Measure TR-1, First- and Last-mile Strategies, would support and enhance the effectiveness of the project's last-mile transit connection strategies, and decrease use of single-occupancy vehicles. Mitigation Measure TR-1 would be unlikely to substantially reduce HBW VMT per-employee, but would aid in reducing project auto travel demand. The components of Mitigation Measure TR-1 are shown in Figure 4.9-6. Mitigation Measure TR-1 includes some improvements that are not fully funded; as a result their implementation timeline is uncertain in regard to the project's construction timeline. Additionally, the mitigation measure is unlikely to reduce the project's HBW VMT by 27 percent (i.e., the amount needed to reduce the project's HBW VMT per employee to below the applicable thresholds, as shown in Table 4.9-4). Therefore, this impact would be *significant and unavoidable with mitigation*.

For the off-site improvements where a fair-share contribution is identified, the City would collect payment from the project sponsor and would allocate those funds for the specific improvements identified. Specific details of the fair-share contributions would be addressed in the project's conditions of approval, but in any case would comply with the Mitigation Fee Act. Specific right-ofway needs for Mitigation Measure TR-1 are described as part of each off-site improvement, if applicable. The potential environmental impacts of the first two strategies under Mitigation Measure TR-1, the upgrades to the Poletti Way sidewalk and the extension of the Class II bicycle lanes on Gateway Boulevard, would be analyzed under the CEQA review prepared for the Active South City: Bicycle and Pedestrian Master Plan. Any impacts associated with the construction of upgrades to the Poletti Way sidewalk and the extension of the Class II bicycle lanes on Gateway Boulevard would be temporary and minor in nature (e.g., short-term construction impacts related to air quality, noise, and traffic), and would not result in a substantial adverse impact on the environment. The third strategy, participation in first-/last-mile shuttle program(s), would not increase the number or frequency of shuttles operating, and as such would not result in long-term air quality, GHG, or noise impacts. If existing shuttle stops are used as part of this strategy, existing conditions would not change and there would be no effect on the environment. If new shuttle stops are used, shuttles may need to be re-routed and additional shuttle trips may be required, but VMT would likely still be reduced because the additional shuttle activity would replace singleoccupancy vehicle trips. Any impacts associated with the construction of new shuttle stops would be temporary and minor in nature (e.g., short-term construction impacts related to air quality, noise, and traffic), and would not result in a substantial adverse impact on the environment. The last strategy, adding directional curb ramps and high visibility crosswalks, would not increase the number or frequency of shuttles operating, and as such would not result in long-term air quality, GHG, or noise impacts. Any impacts associated with this strategy would occur during construction and would be temporary and minor in nature. Thus, no adverse secondary impacts on the environment would occur with implementation of Mitigation Measure TR-1.



#### Mitigation Measure TR-1: First- and Last-mile Strategies

The project sponsor shall fund the design and construction of the following off-site improvements to support the project's first- and last-mile strategies necessary to support auto trip reduction measures.

- The project shall provide a fair-share contribution towards the City's cost of facilities and improvements identified below for the purposes of upgrading Poletti Way sidewalk to a Class I shared-use bicycle and pedestrian pathway between the Caltrain Station at East Grand Avenue, and the street's northern terminus as identified in the Active South City: Bicycle and Pedestrian Master Plan (currently in draft form), or if said Master Plan is in the process of being amended or updated at the time of the first building permit for the project, then the project shall instead provide a fair-share contribution in an equivalent amount towards improvements and upgrades of equivalent design and purpose, as determined by the City's Chief Planner in his reasonable discretion. The Gateway Property Owners Association is currently in the process of dedicating the Poletti Way right-of-way to the City and the dedication is expected to be completed by the end of 2020. The improvement will include curb ramps, curb and gutter, signage, markings, and other changes necessary to meet Caltrans and City of South San Francisco Class I bikeway standards. Specific improvements will include upgrades at vehicular crossings (such as driveways and minor streets) to provide 10-foot minimum wide barrier-free accessible ramps that permit direct, two-way bicycle and pedestrian travel. Adequate warning and regulatory signage and markings will be provided to alert road users of potential conflicts per the California Manual on Uniform Traffic Control Devices (CAMUTCD). Existing pavement conditions will be assessed and reconstructed if necessary, per City of South San Francisco standards. The project's obligation to pay a fair share contribution toward this improvement is contingent upon the City (i) adopting a final Active South City Bicycle and Pedestrian Master Plan that includes the improvement, or City approval of a plan for improvements of equivalent design and purpose; (ii) acquiring any necessary right of way; and (iii) implementing a program that will require fair share contributions from other developments in the East of 101 area that will benefit from the improvement.
- The project shall provide a fair share contribution toward the City's cost of facilities and improvements identified below for the purposes of extending Class II bicycle lanes on Gateway Boulevard between East Grand Avenue and Oyster Point Boulevard, assuming 1,100 linear feet of frontage. This improvement will include striping new bicycle lanes and restriping existing lanes. Extending bicycle lanes will support enhanced bicycle access from south of the project site as identified in the *Active South City: Bicycle and Pedestrian Master Plan* (currently in draft form). If said Master Plan is in the process of being amended or updated at the time of the first building permit for the project, then the project shall instead provide a fair-share contribution in an equivalent amount towards improvements and upgrades of equivalent design and purpose, as determined by the City's Chief Planner in his reasonable discretion.
- The project shall participate in first-/last-mile shuttle program(s) to Caltrain, BART, and the ferry terminal. Shuttles may be operated by Commute.org and/or a future East of 101 transportation management agency. The project may provide an on-site loading zone for potential future private shuttles or pick-up/drop-off operations; however, public shuttle shall utilize on-street shuttle stops located adjacent to the project site in order to minimize additional travel time for shuttles. Southbound shuttles on Gateway Boulevard shall use the existing shuttle stop at the intersection of Gateway Boulevard and the

Gateway Business Park driveway (approximately 500 feet south of the project site) or the project may construct a new southbound shuttle stop along the project frontage on Gateway Boulevard. A new shuttle stop shall accommodate small shuttles and larger buses and shall be designed in close coordination with the City and the shuttle operators taking into consideration planned roadway improvements, other new developments, and rider needs. Northbound shuttles on Gateway Boulevard shall use the future shuttle stop at the Gateway Business Park driveway (directly across the street from the project site) as proposed as part of the Gateway of Pacific project.

• The project shall provide a more direct connection to on-street shuttle stops by adding directional curb ramps and high visibility crosswalks at the northern leg of the Gateway Boulevard/Gateway Business Park driveway/Project driveway intersection. Since no crosswalk currently existing across the northern leg of this intersection, the project shall review existing intersection signal timing and adjust if necessary, to accommodate the new pedestrian phase. Add high-visibility crosswalks on the south side of the Oyster Point Boulevard/Gateway Boulevard intersection (southern and eastern legs of the intersection) to improve access to shuttle stops on Oyster Point Boulevard.

Impact TR-2: The proposed project would not cause vehicle queues approaching a given movement downstream of Caltrans freeway facilities to exceed existing storage space for that movement or add vehicle trips to existing freeway off-ramp vehicle queues that exceed storage capacity resulting in a potentially hazardous condition. (*Less than Significant*)

Table 4.9-5 presents existing weekday morning peak hour vehicle queues at the three U.S. 101 off-ramp study locations. The project would extend or contribute to queues longer than storage distances at the U.S. 101 southbound off-ramp at Oyster Point Boulevard. Specifically, the queue would spill back from the eastbound right turn lane approaching the Oyster Point Boulevard/Gateway Boulevard intersection. However, the queue would not interfere with the U.S. 101 freeway mainline as the combined right turn and through queue lengths are less than the overall 3,100-foot ramp storage distance. The project therefore would not result in a hazardous condition at this location.

Table 4.9-5. Existing Weekday Morning Peak Hour 95<sup>th</sup> Percentile Queues

| Approach   | Storage _ | Ex     | isting              | Existing Plus Project |              |  |  |
|--|-----------|--------|---------------------|-----------------------|--------------|--|--|
| Lanes Distance   |           | Volume | <b>Queue Length</b> | Volume                | Queue Length |  |  |
| U.S. 101 Southbound Off-Ramp at Oyster Point Boulevard (A.M. Peak) |           |        |                     |                       |              |  |  |
| Through  | 3,100     | 704    | 513                 | 704                   | 513          |  |  |
| Right  | 350       | 319    | 547                 | 366                   | 650          |  |  |
| U.S. 101 Northbound Off-Ramp at East Grand Avenue (A.M. Peak)      |           |        |                     |                       |              |  |  |
| Left   | 1,775     | 131    | 200                 | 131                   | 200          |  |  |
| Right  | 1,775     | 639    | 1,020               | 639                   | 1,020        |  |  |
| U.S. 101 Northbound Off-Ramp at Dubuque Avenue (A.M. Peak)         |           |        |                     |                       |              |  |  |
| Left/Through   | 1,000     | 891    | 365                 | 940                   | 386          |  |  |
| Right  | 300       | 74     | 27                  | 74                    | 27           |  |  |

Notes: **Bold type** indicates conditions where queue length exceeds intersection movement capacity. Queues do not take into account downstream spillover from adjacent intersections. Storage distance and queues in feet per lane. Source: Fehr & Peers, 2020.

Table 4.9-6 presents cumulative weekday morning peak hour vehicle queues at the three U.S. 101 off-ramp study locations. The project would extend or contribute to queues longer than storage distances at the U.S. 101 southbound off-ramp at Oyster Point Boulevard. Specifically, the queue would spill back from the eastbound right turn lane approaching the Oyster Point Boulevard/Gateway Boulevard intersection. However, similar to existing plus project conditions, the queue would not interfere with the U.S. 101 freeway mainline as the combined right turn, and through queue lengths are less than the overall 3,100-foot ramp storage distance. Cumulative plus project traffic therefore would not result in a hazardous condition at this location.

The analysis shows that Project vehicle trips that could interfere with the freeway mainline are concentrated at the U.S. 101 southbound off-ramp at Oyster Point Boulevard and the U.S. 101 northbound off-ramps at East Grand Avenue and Dubuque Avenue, but project trips would not exceed ramp storage capacities and interfere with the freeway mainline. Therefore, the project would have a *less-than-significant* impact on freeway ramp queuing under existing plus project conditions and a *less than cumulatively considerable* impact under cumulative plus project conditions. No mitigation is required.

Table 4.9-6. Cumulative Weekday Morning Peak Hour 95<sup>th</sup> Percentile Queues

|  | Storage _ | Cum                 | ulative | <b>Cumulative Plus Project</b> |              |  |  |
|--|-----------|---------------------|---------|--------------------------------|--------------|--|--|
| <b>Approach Lanes</b>  | Distance  | Volume Queue Length |         | Volume                         | Queue Length |  |  |
| U.S. 101 Southbound Off-Ramp at Oyster Point Boulevard (A.M. Peak) |           |                     |         |                                |              |  |  |
| Through  | 3,100     | 1,813               | 1,553   | 1,813                          | 1,553        |  |  |
| Right  | 350       | 654                 | 1,162   | 701                            | 1,255        |  |  |
| U.S. 101 Northbound Off-Ramp at East Grand Avenue (A.M. Peak)      |           |                     |         |                                |              |  |  |
| Left   | 1,775     | 216                 | 330     | 216                            | 330          |  |  |
| Right  | 1,775     | 683                 | 1,090   | 683                            | 1,090        |  |  |
| U.S. 101 Northbound Off-Ramp at Dubuque Avenue (A.M. Peak)         |           |                     |         |                                |              |  |  |
| Left/Through   | 1,000     | 425                 | 1,317   | 1,366                          | 442          |  |  |
| Right  | 300       | 22                  | 374     | 74                             | 321          |  |  |

Notes: **Bold type** indicates conditions where queue length exceeds intersection movement capacity. Queues do not take into account downstream spillover from adjacent intersections. Storage distance and queues in feet per lane. Source: Fehr & Peers, 2020.

Impact TR-3: The proposed project would not produce a detrimental impact to existing bicycle or pedestrian facilities, or conflict with adopted plans and programs. (*Less than Significant*)

#### Construction

Construction activities could potentially interfere with programs, plans, ordinances, or policies if temporary closures impede roadways, bikeways, or pedestrian paths in a way that prohibits the achievement of identified goals. Similarly, construction activities could have a detrimental impact on existing bicycle and pedestrian facilities if temporary closures impede the use of these facilities. However, no temporary road closures that would affect the public right-of-way would be required during project construction. While temporary sidewalk rerouting on Gateway Boulevard is expected and roadway traffic control would be used as needed during construction, both detours would be

temporary in nature and would not fully impede movement or have a sustained detrimental impact on existing bicycle and pedestrian facilities. Therefore, the project would not produce a detrimental impact on existing bicycle and pedestrian facilities during construction and construction-related conflicts with programs, plans, ordinances, or policies addressing the circulation system would be *less than significant*. No mitigation is required.

#### Operation

The project would generate additional vehicle trips adjacent to existing sidewalks and bicycle facilities and would generate some new walking and bicycling trips. However, the project would not worsen existing or planned bicycle or pedestrian facilities. The project includes both long-term protected (i.e., Class I) and short-term (Class II) bicycle parking spaces in compliance with the City's code requirements. Class I bicycle parking spaces are typically lockers or restricted access parking rooms and are intended for employees. Class II bicycle parking spaces are standard bicycle racks and are mostly intended for visitors. Bicycle racks should be located near entrances where they are highly visible.

The project would not produce a detrimental impact to existing bicycle or pedestrian facilities or conflict with adopted policies in adopted City plans summarized in Appendices B through Appendix D. Therefore, the project's impacts to walking and bicycling would be *less than significant* under existing plus project and *less than cumulatively considerable* under cumulative plus project conditions. In addition, operation-related conflicts with programs, plans, ordinances, or policies addressing the circulation system would be *less than significant* under existing plus project conditions and *less than cumulatively considerable* under cumulative plus project conditions. No mitigation is required.

# Impact TR-4: The proposed project would not produce a detrimental impact to local transit or shuttle service, or conflict with adopted plans and programs. (*Less than Significant with Mitigation*)

The project would generate vehicle trips in the vicinity of existing transit services and would generate some new transit trips to existing routes. Commute.org shuttles travel along the project's frontage on Gateway Boulevard and Caltrain operates less than 1 mile from the project site. The addition of 206 vehicle trips during the morning peak hour, or three to four new vehicles per minute, would not create a disruption to transit service surrounding the project site. Project-added vehicle trips represent approximately 3 percent of entering volumes at study intersections during the morning and evening peak hours. The project may add net new transit trips to both Caltrain and Commute.org shuttles, but both operators are expected to be able to handle the additional ridership either through existing available capacity or additional service.

Other than the proposed on-site shuttle stop (discussed below), the project would not include features (including the proposed driveways) that would cause disruptions to existing or planned transit service or transit stops. The project would not conflict with any adopted transit system plans, guidelines, policies, or standards, as described in Appendix D.

As shown in Figure 3-4 in Chapter 3, *Project Description*, the project's site plan identifies an on-site shuttle stop intended for use by private Gateway shuttles and public Commute.org shuttles. The on-site shuttle stop placement and access constraints has the potential to add several minutes to existing Commute.org shuttle routes as described below.

- The current Oyster Point BART shuttle and Oyster Point ferry shuttle would need to divert from its route in a 0.25 mile loop, which would include two new traffic light cycles at the Oyster Point Boulevard/Gateway Boulevard intersection and the Gateway Boulevard/Gateway Business Park driveway entrance. The Oyster Point Boulevard/Gateway Boulevard intersection experiences congested traffic conditions, operating at LOS F in the existing morning peak hour and LOS F in the cumulative morning and evening peak hours, suggesting these shuttles may experience substantial delays. New routing and/or additional route creation for both routes are likely as public and private services consolidate to improve overall frequency and other efficiencies. New signal timing, new turn lanes and other street improvements planned may also improve conditions.
- The current Oyster Point Caltrain shuttle would require an extensive route diversion for northbound shuttles since no access is provided via Gateway Boulevard, forcing shuttles to navigate through parking lots accessed via Poletti Way to access the shuttle stop. This diversion would be approximately 0.5 mile via slow speed parking aisles, suggesting this shuttle may also experience noticeably longer run times. Again, the potential new routing, new stop locations, and new routes are likely to minimize these additional delays.

Commute.org's existing shuttle routes already include numerous route diversions, the sum of these diversions results in longer travel times and wait times, which ultimately discourages transit ridership. Adding new such diversions should be avoided. The project's site plan therefore may pose a *significant* impact to public shuttle operations. The project sponsor should coordinate closely with shuttle operators.

Enhanced shuttle routes and stops could potentially look different than the existing Commute.org network with the consolidation of private and public services. Implementation of Mitigation Measure TR-1, First- and Last-mile Strategies Improvements, would improve pedestrian connections with existing and/or new public shuttle stops and enable the project to limit travel time effects on existing shuttle routes by eliminating additional route diversions. By providing on-street rather than on-site shuttle stops, Mitigation Measure TR-1 would accommodate first- and last-mile connections without causing diversions to existing transit routes, which would limit the project's effect on travel time for existing shuttles.

The project's effects under cumulative 2040 conditions would be similar to that of existing conditions. Improvements to Caltrain via the Peninsula Corridor Electrification Project and the South San Francisco Station Improvement Project would provide enhanced connectivity and capacity to accommodate project trips. There are no fully funded changes to bicycle, pedestrian, or transit conditions adjacent to the project site.

Therefore, project transit impact impacts would be *less than significant with mitigation* under existing plus project conditions and *less than cumulatively considerable* under cumulative plus project conditions.

# Impact TR-5: The proposed project would not substantially increase hazards due to a geometric design feature or incompatible uses. (Less than Significant)

The proposed project would not create any new or worsen any existing geometric design features that cause hazards. The project would use two existing driveways off Gateway Boulevard (one is right-in right-out only and the other is signalized and full access), but would not change the geometry of the adjacent roadways. Sight distance at the driveways is not expected to change from

what is available under existing conditions and is expected to be adequate for drivers exiting the project site and for pedestrians crossing the driveways. Any future vegetation located in the sight triangles at driveways would be maintained to prevent restricting drivers' sight distance when exiting the driveways. The project would not include any uses that are incompatible with the surrounding land use or the existing roadway system. Therefore, the project is not expected to result in a substantial increase to hazards, and the project's impacts to hazards would be *less than significant* under existing plus project conditions and *less than cumulatively considerable* under cumulative plus project conditions. No mitigation is required.

# Impact TR-6: The proposed project would not result in inadequate emergency access. (*Less than Significant*)

Vehicle trips generated by the project would represent a small percentage of overall daily and peak hour traffic on roadways and freeways in the study area. The project would generate 206 morning peak hour and 172 evening peak hour net new vehicle trips, which are distributed to study intersections. Project-added vehicle trips represent approximately 3 percent of entering volumes at study intersections during peak hours. The project would not include features that would alter emergency vehicle access routes or roadway facilities; fire and police vehicles would continue to have access to all facilities around the entire City. Upon construction, emergency vehicles would have full access to the project site. Therefore, the project would result in adequate emergency access, and the project's impacts to emergency access would be *less than significant* under existing plus project conditions and *less than cumulatively considerable* under cumulative plus project conditions. No mitigation is required.

# 4.9.4.4 Cumulative Impacts

The impact evaluation above considered cumulative plus project conditions; as a result, the analysis above considers cumulative impacts.

# 4.10 Less-than-Significant Impacts

In the course of evaluating certain topics included in the California Environmental Quality Act (CEQA) Guidelines Appendix G checklist, the proposed 751 Gateway Boulevard Project (proposed project) was found to have less-than-significant impacts or no impacts due to the project type and location. This section briefly describes these effects, pursuant to CEQA Guidelines section 15128. Note that some of the topics in which the proposed project was determined to have no impact or a less-than-significant impact are addressed in the various draft environmental impact report (EIR) sections (Sections 4.2 through 4.10) to provide a more comprehensive discussion as to why impacts would be less than significant and provide more detail for decision makers and the general public.

Each topic includes a brief description of the regulatory framework, significance criteria, approach to analysis, and impact evaluation. Information about the environmental setting of the proposed project is incorporated within the impact analysis discussions for the impact areas below, where necessary, to provide a baseline context for the impact analysis.

### 4.10.1 Aesthetics

# 4.10.1.1 Regulatory Framework

#### Local

#### **South San Francisco General Plan**

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Parks, Public Facilities, and Services Element, which outlines policies relating to parks and recreation, educational facilities, and public facilities. The General Plan includes the following policy applicable to aesthetics:

Policy 5.1-I-9: Improve the accessibility and visibility of Sign Hill Park and the bayfront.
 Appropriate departments of the City should study issues of access, safety, and protection of surrounding neighborhoods in conjunction with enhanced access programs to ensure that greater use of Sign Hill Park does not create unacceptable impacts on surrounding areas.

#### East of 101 Area Plan

The East of 101 Area Plan, which was adopted in 1994 and most recently amended in 2016, sets forth specific land use policies for the East of 101 Area. The East of 101 Area Plan provides that the "land use and entitlement limitations (including, but not limited to, permitted uses and Floor Area Ratios) of the Gateway Specific Plan are not affected by the Area Plan, and will continue in force in the Gateway Area. ... Developments on the Gateway site should conform to other polices of [the East of 101 Area ] Plan, including the Design Guidelines in the Design Element ..." As described in Chapter 3, Project Description, applicable design-level policies of the Plan include all policies of the design element, as well as Land Use Element policies LU-8a (Gateway Specific Plan uses), and LU-8b (Gateway Specific Plan FAR), Specifically, Policy LU-8a states that the uses allowed in the Gateway Specific Plan Area are those specified in the Gateway Specific Plan. In addition, Policy LU-

8b provides that the maximum FAR in the Gateway Specific Plan Area is that specified in the Gateway Specific Plan. Per Policy IM-5, the *Gateway Specific Plan* is not affected by the land use regulations of the *East of 101 Area Plan*.

#### **Gateway Specific Plan**

The Gateway Specific Plan covers the portion of the East of 101 Area from east of the Caltrain right-of-way to the eastern boundary of the parcels along the east side of Gateway Boulevard and the area between Oyster Point Boulevard and Grand Avenue on the northern and southern boundaries. The Specific Plan is "intended to provide for various commercial and research and development land uses integrated by consistent development standards." According to SSFMC Table 20.220.003 (Land Use Regulations – Gateway Specific Plan District), office for professional or business purposes is permitted within all districts within the Gateway Specific Plan Area (districts I, II, III, IV, and V). Research and development is permitted in GSPD districts II, III, IV, and V.IV. The project site is within District IV. The Gateway Specific Plan provides development policies which outline limitations on the type, size, and height of the buildings developed within the Gateway Specific Plan Area. In addition, the Gateway Specific Plan incorporates specific policies for signage, open space, landscaping, and lighting requirements to ensure that buildings developed within the Specific Plan area adhere to the same development policies and are generally similar in appearance, size, and structure.

#### **South San Francisco Zoning Ordinance**

The City's zoning ordinance prescribes development and site regulations that apply to development in all districts. Brief descriptions of applicable sections of the zoning ordinance related to aesthetics are provided below:

- Municipal Code Section 20.220, Gateway Specific Plan District: The standards of this section
  apply to all new development within the Gateway Specific Plan area. The section establishes
  the type, location, intensity and character of development that is permitted to take place
  within the plan area, while allowing for creative and imaginative design concepts. The section
  provides specific requirements regarding exterior building design, tree protection,
  landscaping, as well as guidelines for project review, among many other aspects of
  development.
- Municipal Code Section 20.300.008, Lighting and Illumination: The standards of this section apply to all new development and additions that expand the existing floor area by 10 percent or more. All exterior doors during the hours of darkness shall be illuminated with a minimum of 1 foot candle of light for all nonresidential buildings. The standards also limit the maximum height of a lighting fixture to 20 feet within 100 feet of any street frontage or 25 feet in any other location for districts with the Business Commercial designation. In addition, all lighting fixtures shall be shielded so as to not produce obtrusive glare on the public right-of-way or adjoining properties.
- *Municipal Code Section 20.480.002, Design Review—Applicability*: Design review is required for all projects that require a building permit that involve construction, reconstruction, rehabilitation, alteration, or other improvements to the exterior of a structure or parking area, except for projects developed in compliance with a previous design review approval.
- Municipal Code Section 20.480.003, Assignment of Design Review Responsibilities—Planning Commission: The Planning Commission has design review authority for all projects requiring Planning Commission approval and all new commercial, downtown, employment, mixed-use,

office, and multifamily developments. The Planning Commission shall also consider the Design Review Board's recommendations and shall approve, conditionally approve, or deny the design review application.

- Municipal Code Section 20.480.006, Design Review Criteria: When conducting design review, the Design Review Board, Chief Planner, Planning Commission, or City Council shall evaluate applications to ensure that they conform to the policies of the General Plan and any applicable specific plan, are consistent with any other policies or guidelines the City Council may adopt, and satisfy specific criteria outlined in this code, such as those related to a building, structure or signage; parking areas; open space, and pedestrian areas; and electrical and mechanical equipment or works, among other criteria. Ultimately, the code states that a project's design features are reviewed in consideration of achieving a safe, efficient, and harmonious development, and shadow patterns, and that components considered in design review shall include safety.
- Municipal Code Section 20.480.010, Appeals; Expiration, Extensions, and Modifications: A decision made by the Chief Planner on a project shall be subject to review by the Planning Commission either on appeal by the applicant or upon motion of the Planning Commission. If the Planning Commission fails to make an order to review the Chief Planner's determination at its next regular meeting after the determination, then the Chief Planner's determination shall be final. In addition, for expirations, extension, and modifications, design review approval is effective and may only be extended or modified as detailed in Chapter 20.450, Common Procedures.

# 4.10.1.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant aesthetics impact 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;
- Conflict with applicable zoning and other regulations governing scenic quality; or
- Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area.

# 4.10.1.3 Approach to Analysis

Evaluation of the proposed project is based on aerial imagery from Google Earth and the *List of Eligible and Officially Designated State Scenic Highways*. The proposed project was also evaluated based on the potential impact to scenic vistas defined in the General Plan (i.e., Sign Hill Park and the bayfront). In addition, existing sources of existing visual character and light and glare in the vicinity of the project site were described and applicable regulations were reviewed.

<sup>&</sup>lt;sup>1</sup> California Department of Transportation. 2019. *Scenic Highway System Lists—List of Eligible and Officially Designated State Scenic Highways*. Available: https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways. Accessed: February 27, 2020.

#### 4.10.1.4 **Impact Evaluation**

# Impact AES-1: The proposed project would not have a substantial adverse effect on a scenic vista. (Less than Significant)

The project site is not within a locally or state-designated scenic vista. The project site is not on or near a designated vista point. The General Plan has identified Sign Hill Park (located 1 mile west of the project site) and the bayfront (0.2 mile north of the project site) as resources within the City where accessibility and visibility should be improved.

The project site is in a developed urban area consisting of commercial and office uses. San Bruno Mountain, which contains Sign Hill Park, is a prominent visual landmark in South San Francisco. The mountain can be seen from many locations throughout the City, including many portions of the East of 101 Area. There are no designated scenic overlooks of the mountain in the vicinity of the project site. The General Plan specifically states that the "accessibility and visibility of Sign Hill Park" should be improved as part of Policy 5.1-I-9. The proposed project involves construction of a 148-foot-tall, seven-story building, which would partially obscure existing views of Sign Hill Park and San Bruno Mountain as seen from the project site and vicinity. However, existing views of the park and the mountain are partially obscured by existing buildings, trees, and topography. The proposed project would not substantially worsen the existing partially obstructed views of the park and mountain. Furthermore, the areas from which views of the park and the mountain may be blocked by the proposed building are not prominent places where people gather to view the park and the mountain. The General Plan specifically states that the "accessibility and visibility of Sign Hill Park" should be improved as part of an implementing policy. Development of the proposed project would be subject to design review to ensure that development of the project supports General Plan policies. Therefore, effects on existing scenic vistas under the proposed project would *be less than significant*. No mitigation is required.

# Impact AES-2: 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. (No Impact)

U.S. 101 is approximately 0.2 mile west of the project site and this segment of U.S. 101 is not an officially designated or eligible State Scenic Highway.<sup>2</sup> I-280 is the nearest officially designated state scenic highway to the project site. I-280 is approximately 3 miles west of the project site; therefore, the project site is not within the I-280 viewshed.

As such, the proposed project would have **no impact** on scenic resources within a state scenic highway. No mitigation is required.

# Impact AES-3: The proposed project would not conflict with applicable zoning and other regulations governing scenic quality. (Less than Significant)

Project construction would involve demolition work, earthmoving, grading, and tree removal. As a result, construction equipment and vehicles, fencing, construction staging areas, and associated debris would be present and visible on the project site in varying degrees, depending on the construction phase and equipment being used over the duration of project construction

Ibid.

(approximately 18 months). This would temporarily change the visual character of the project site; however, the visual effects of construction activities would be temporary and similar in nature to the visual effects of other types of construction that occurs in the City. Therefore, the project would not conflict with applicable zoning and other regulations governing scenic quality during construction and this impact would be *less than significant*. No mitigation is required.

The proposed project would include a total of 164 trees, accounting for the 175 existing trees to be removed (including three heritage trees and one protected tree), the 52 existing trees to remain, and the additional 112 trees to be planted. As discussed in Section 4.3, *Biological Resources*, of this draft EIR, the proposed project would comply with the City Municipal Code chapter 13.30 which includes conditions applicable to protected trees. Therefore, the project would not result in adverse aesthetic impacts related to tree or landscape removal. In addition, the proposed project would include approximately 59,800 square feet of planted landscaped areas (not accounting for the proposed biotreatment areas, discussed below) and approximately 53,700 square feet of hardscape landscaped areas, for a total of 58,100 square feet of landscaped areas. For a discussion of potential biological resource impacts associated with proposed tree removal and new landscaping, refer to Section 4.3, *Biological Resources*, of this draft EIR.

The project site is within the Gateway Campus, which is composed of three- to 16-story office and R&D buildings in a heavily urbanized area. The project would increase the height and density of development on the project site. The project site consists of an approximately 97-foot-tall, six-story building at 701 Gateway Boulevard that would remain under the proposed project. The proposed project involves construction of a 148-foot-tall, seven-story building on the same site. The proposed building would be constructed of contemporary materials and detailing, including white, light-blue, and dark-blue vision glass; solid aluminum panels; perforated aluminum panels; and metal railings and columns. Refer to Figure 3-7, Conceptual Elevations (North and South), and Figure 3-8, Conceptual Elevations (East and West), in Chapter 3, Project Description, for elevations for the proposed building. As discussed in Section 4.10.5, Land Use, of this draft EIR, the proposed project would maintain the existing zoning designation of Zone IV under the Gateway Specific Plan District (GSPD). The existing zoning allows for development at a maximum floor area ratio (FAR) of 1.25, or a maximum of 402,930 total square feet, within the project site. The existing building at 701 Gateway Boulevard is approximately 170,235 square feet. Based on the zoning, 232,695 square feet of unrealized FAR remains available for the project site, and the proposed project would utilize a portion of that unrealized FAR. The total proposed FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18. From a visual perspective, the increased FAR would not result in a significant aesthetic impact because the proposed project would be within the 1.25 maximum allowable FAR. No substantial change to the existing visual character on the project site or within the surrounding area would occur. In addition, the project, as proposed, is generally consistent with the General Plan (refer to Section 4.10.5, Land Use, of this draft EIR). Development within the project site would also be required to conform with applicable design guidelines in the East of 101 Area Plan, such as those described above in Section 4.10.1.1, Regulatory Framework, and would be subject to the City's design review process, ensuring that the project would not adversely affect the visual quality of the area. Furthermore, the proposed project would be required to comply with the City's standard conditions, which will be attached to the entitlements for the proposed project, including Condition No. 21, which requires screening HVAC equipment from public view, and Condition No. 22, which requires permanent maintenance of facilities (e.g., structures, paving, landscaping, etc.). In addition, the proposed project would be required to comply with any project-specific conditions of approval.

Therefore, the project would not conflict with applicable zoning and other regulations governing scenic quality during operation and this impact would be *less than significant*. No mitigation is required.

# Impact AES-4: The proposed project would not create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area. (*Less than Significant*)

The project site is in an office, R&D, and industrial area with no adjacent residential uses. Residential uses are sensitive to light and glare impacts, particularly from nearby non-residential sources. Existing sources of light and glare in the area are typical of those in the urban environment including, but not limited to, interior and exterior building lights, streetlights, parking lot lights, security lights, vehicular headlights, and reflective building surfaces and windows. The proposed project would increase the active building area within the project site and would increase the amount of nighttime lighting and glare. Specifically, the proposed project would include wayfinding lighting on the project site (e.g., along walkways and driveways, at entrances, in surface parking areas). Outside lighting would be comparable in brightness to ambient lighting in the surrounding area. Increased lighting on the project site, relative to the existing outdoor lighting, would increase overall illumination in the area. Exterior building materials would consist primarily of contemporary materials and detailing, including white, light-blue, and dark-blue vision glass; solid aluminum panels; perforated aluminum panels; and metal railings and columns. However, the proposed project would be consistent with existing office and R&D uses in the vicinity as well as the East of 101 Area Plan and would not substantially affect overall ambient light levels in the alreadyexisting urban context of the project site. In addition, the proposed project would be required to comply with the City's standard conditions, which will be attached to the entitlements for the proposed project, including Condition No. 28, which requires compliance with the South San Francisco Municipal Code chapter 20.300.008 (Lighting and Illumination) and requires that there be no objectionable or hazardous illumination of adjacent properties or streets. The proposed project would also be required to comply with any project-specific conditions of approval. Furthermore, the design of the exterior façade of the proposed building would be subject to the City's design review process, ensuring that the project would not create a substantial new source of light or glare in the area surrounding the project site. All project signage would be subject to receipt of a sign permit (as well as design review for signs of 25 square feet or more), including review of any illuminated signs for compliance with the applicable requirements of Chapter 20.360 of the City's Municipal Code governing light, glare, and shielding for illuminated signs. Therefore, the project would not create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area. Given the densely developed nature of the project vicinity, and the fact that light and glare introduced by the proposed project would be negligible relative to existing conditions, the impact would be *less than significant*. No mitigation is required.

# Impact C-AES-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on aesthetics. (Less than Significant)

Aesthetics are dependent upon the location of users, the breadth of the viewshed, and the contiguousness of scenic vistas and views. The cumulative geographic context for aesthetics is the immediate vicinity of the project site (i.e., the parcels adjacent to the project site). The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

The nearest cumulative project, the project at 475 Eccles Avenue (Cumulative Project No. 16), is located approximately 630 feet east of the project site. The project at 475 Eccles Avenue would involve new office/R&D buildings consistent with the existing character of the surrounding area. The remaining cumulative projects would also involve new office, R&D, and hotel uses that would be consistent with the existing character of the overall surrounding area and the East of 101 Area. Many of the cumulative projects would include visual enhancements of their own, such as new pedestrian and bicycle improvements, as well as open space and landscape improvements. In addition, the cumulative projects would be subject to the same South San Francisco Municipal Code compliance and City design review processes as the project, thereby ensuring that no, or limited, light and glare impacts would result from development. Furthermore, no designated historic districts or neighborhoods are present that would be affected by the development of the cumulative projects. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative aesthetics impact. The cumulative impact would be *less than significant*. No mitigation is required.

# 4.10.2 Agricultural and Forest Resources

# 4.10.2.1 Regulatory Framework

There are no federal, state, regional, or local laws, regulations, plans, or policies related to agricultural and forest resources in connection with implementation of the proposed project.

# 4.10.2.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant agricultural and forest resources impact if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- Conflict with existing zoning for agricultural use, or a Williamson Act contract;
- Conflict with existing zoning for, or cause rezoning of, forestland (as defined in Public Resources Code section 12220[g]), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104[g]).
- Result in a loss of forestland or conversion of forestland to non-forest use; or
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forestland to non-forest use.

# 4.10.2.3 Approach to Analysis

Evaluation of the proposed project is based on the San Mateo County Important Farmland map generated by the California Department of Conservation Farmland Mapping and Monitoring Program,<sup>3</sup> the San Mateo County Williamson Act Parcels GIS data,<sup>4</sup> the General Plan, and aerial imagery from Google Earth.

## 4.10.2.4 Impact Evaluation

Impact AG-1: The proposed project would not convert designated Farmland under the Farmland Mapping and Monitoring Program, nor would it conflict with any existing agricultural zoning or a Williamson Act contract, nor would it involve any changes to the environment that would result in the conversion of designated Farmland. (*No Impact*)

The California Department of Conservation, Division of Land Resource Protection, maps important farmland, including Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, and Grazing Land. Agricultural land is rated according to soil quality and irrigation status; the best quality land is called Prime Farmland. The California Department of Conservation's Farmland Mapping and Monitoring Program identifies the project site as "Urban and Built-up." The project site does not contain any designated Farmland. Thus, the proposed project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use. The project site is in the Gateway Specific Plan Area, which includes a variety of commercial and R&D land uses, and is zoned GSPD, which is not for agricultural use. Thus, the proposed project would not conflict with any agricultural zoning. In addition, no land adjacent to or in the vicinity of the project site is zoned for or used as agriculture. There are no Williamson Act contracts for land within the East of 101 Area. Thus, the proposed project would not conflict with a Williamson Act contract or involve other changes in the existing environment, which, due to their location or nature, could result in the conversion of farmland to non-agricultural use. Based on the analysis above, the proposed project would have **no** *impact* on agricultural resources. No mitigation is required.

<sup>&</sup>lt;sup>3</sup> California Department of Conservation. 2019. San Mateo County Important Farmland. Available: https://www.conservation.ca.gov/dlrp/fmmp/Pages/SanMateo.aspx. Accessed: February 18, 2020.

<sup>&</sup>lt;sup>4</sup> San Mateo County Open GIS Data. 2016. *Williamson Act Parcels*. Available: https://data-smcmaps.opendata.arcgis.com/datasets/williamson-act-parcels?geometry=-122.772%2C37.513%2C-121.905%2C37.704. Accessed: April 24, 2020.

Urban and Built-up land is defined as land with a building density of at least one unit to 1.5 acres or six structures per 10 acres on the 2018 San Mateo County Important Farmland map as well as land used for residential, industrial, and commercial purposes; institutional facilities; cemeteries; airports; golf courses; sanitary landfills; sewage treatment; and water control structures.

The Williamson Act is a California law enacted in 1965 that provides property tax relief to owners of farmland and open space land in exchange for a 10-year agreement that the land will not be developed or converted into another use.

# Impact AG-2: The proposed project would not conflict with existing zoning for, or cause rezoning of, forestland, timberland, or timberland zoned Timberland Production, nor would it result in the loss or conversion of forestland to non-forest uses. (*No Impact*)

There is no timberland or timberland zoned Timberland Production on the project site.<sup>7</sup> None of the trees currently growing on or adjacent to the project site are managed for a public benefit, and therefore the project site is not "forestland." Thus, the proposed project would not result in the loss of forest land or the conversion of forest land to non-forest use. Furthermore, the project would not conflict with any existing zoning or forestland or timberland use or involve any changes to the environment that could result in the conversion of forestland or timberland. Thus, there would be *no impact* with respect to forest land or timberland. No mitigation is required.

# Impact C-AG-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on agricultural or forest resources. (*No Impact*)

The cumulative geographic context for agricultural resources is the immediate vicinity of the project site (i.e., the parcels adjacent to the project site). The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

The immediate vicinity of the project site is mapped as "Urban and Built Up Land" by the California Department of Conservation. There are no parcels in the East of 101 Area or the Gateway Specific Plan planning area designated as Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance, nor are there parcels under Williamson Act contract. There is no timberland or timberland zoned Timberland Production in the East of 101 Area or the Gateway Specific Plan planning area where most of the cumulative projects are located. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative agricultural and forest resources impact. There would be *no cumulative impact* on agricultural and forest resources. No mitigation is required.

According to Public Resources Code section 4526 and California Government Code section 51104(g), "timberland" is defined as land, other than that owned by the federal government or designated by the State Board of Forestry and Fire Protection as Experimental Forestland, that is available for and capable of growing a crop of trees of any commercial species to produce lumber and other forest products, including Christmas trees.

According to Public Resources Code section 12220[g], "forestland" is land that can support a 10 percent native tree cover of any species, including hardwoods, under natural conditions and allow management of one or more forest resources, including resources with timber, aesthetic, fish and wildlife, biodiversity, water quality, recreational, or other public benefits.

# 4.10.3 Hazards and Hazardous Materials

# 4.10.3.1 Regulatory Framework

#### **Federal**

# Federal Toxic Substances Control Act/Resource Conservation and Recovery Act/Hazardous and Solid Waste Act

The federal Toxic Substances Control Act and the Resource Conservation and Recovery Act (RCRA) established an EPA-administered program to regulate the generation, transport, treatment, storage, and disposal of hazardous waste. The RCRA was amended in 1984 by the Hazardous and Solid Waste Act, which affirmed and extended the "cradle to grave" system of regulating hazardous wastes.

#### Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as "Superfund," was enacted by Congress on December 11, 1980. This law (42 USC 103) provides broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA establishes requirements concerning closed and abandoned hazardous waste sites, provides for liability of persons responsible for releases of hazardous waste at these sites, and establishes a trust fund to provide for cleanup when no responsible party can be identified. CERCLA also enabled revision of the *National Contingency Plan* (NCP). The NCP (CFR title 40, part 300) provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants. The NCP also established the National Priorities List. CERCLA was amended by the Superfund Amendments and Reauthorization Act on October 17, 1986.

#### **Occupational Safety and Health Administration**

The Occupational Safety and Health Administration's (OSHA's) mission is to ensure the safety and health of American workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. OSHA establishes and enforces protective standards and reaches out to employers and employees through technical assistance and consultation programs. OSHA standards are listed in 29 CFR 1910.

#### **Toxic Substances Control Act**

The Toxic Substances Control Act, which came into law on October 11, 1976, authorized the EPA to secure information on all new and existing chemical substances and control those substances with unreasonable risks related to public health and the environment.

#### U.S. Department of Transportation Hazardous Materials Regulations (49 CFR 100-185)

The U.S. Department of Transportation regulations cover all aspects of hazardous materials packaging, handling, and transportation. Some of the topics covered include parts 107 (Hazard Materials Program), 130 (Oil Spill Prevention and Response), 172 (Emergency Response), 173 (Packaging Requirements), 174 (Rail Transportation), 176 (Vessel Transportation), 177 (Highway Transportation), 178 (Packaging Specifications), and 180 (Packaging Maintenance).

#### State

# **California Environmental Protection Agency**

The California Environmental Protection Agency (CalEPA) was created in 1991. It unified California's environmental authority in a single cabinet-level agency and brought the California Air Resources Board, State Water Resources Control Board, Regional Water Quality Control Board (RWQCB), California Department of Resources Recycling and Recovery (CalRecycle), Department of Toxic Substances Control (DTSC), Office of Environmental Health Hazard Assessment, and Department of Pesticide Regulation under one agency. These agencies were placed under the CalEPA "umbrella" for the protection of human health and the environment to ensure the coordinated deployment of state resources. Their mission is to restore, protect, and enhance the environment and ensure public health, environmental quality, and economic vitality.

# **Department of Toxic Substances Control**

DTSC, a department of CalEPA, is the primary agency in California for regulating hazardous waste, cleaning up existing contamination, and finding ways to reduce the amount of hazardous waste produced in California. DTSC regulates hazardous waste primarily under the authority of the federal RCRA and the California Health and Safety Code (primarily division 20, chapters 6.5 through 10.6, and title 22, division 4.5). Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning.

USC 65962.5 (commonly referred to as the Cortese List) includes DTSC-listed hazardous waste facilities and sites, Department of Health Services lists of contaminated drinking water wells, sites listed by the State Water Resources Control Board as having underground storage tank leaks or a discharge of hazardous wastes or materials into the water or groundwater, and lists from local regulatory agencies of sites with a known migration of hazardous waste/material.

### Hazardous Waste Control Act (section 25100 et seq.)

DTSC is responsible for enforcing the Hazardous Waste Control Act (California Health and Safety Code section 25100 et seq.), a framework under which hazardous wastes are managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA cradle-to-grave waste management system in California. It also provides for the designation of California-only hazardous waste and development of standards that are equal to or, in some cases, more stringent than federal requirements.

# **Unified Hazardous Waste and Hazardous Materials Management Regulatory Program**

The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (California Health and Safety Code, chapter 6.11, sections 25404–25404.9) provides authority to the Certified Unified Program Agency. The Certified Unified Program Agency for the project area is the San Mateo County Health.<sup>9</sup>

The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of hazardous materials programs, including the HazMat

<sup>&</sup>lt;sup>9</sup> San Mateo County Health. 2020. *Certified Unified Program Agency (CUPA)*. Available: https://www.smchealth.org/hazardous-materials-cupa. Accessed: April 27, 2020.

Business Plan Program, California Accidental Release Prevention Program, Underground Storage Tank Program, Aboveground Storage Tank Program, and Hazardous Waste Generator Program, and incident response.

### California Code of Regulations, Title 8—Industrial Relations

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the workplace. The California Division of Occupational Safety and Health (known as Cal/OSHA) and the federal OSHA are the agencies responsible for ensuring worker safety in the workplace. Cal/OSHA assumes primary responsibility for developing and enforcing standards for safe workplaces and work practices. These standards would apply to construction activities.

### California Labor Code (division 5, parts 1, 6, 7, and 7.5)

The California Labor Code is a collection of regulations for the workplace that ensure appropriate training on the use and handling of hazardous materials as well as the operation of equipment and machines that use, store, transport, or dispose of hazardous materials. Division 5, part 1, chapter 2.5, ensures that employees who are in charge of handling hazardous materials are appropriately trained and informed with respect to the materials they handle. Division 5, part 7, ensures that employees who work with volatile flammable liquids are outfitted with appropriate safety gear and clothing.

# Regional

### **County of San Mateo Emergency Operations Plan**

The 2015 County of San Mateo Emergency Operations Plan establishes policies and procedures and assigns responsibilities to ensure effective management of emergency response operations within the San Mateo County Operational Area. The emergency management organization in San Mateo County will identify potential threats to life, property and the environment, and develop plans and procedures to protect, prevent and mitigate those assets from potential hazards (e.g., hazardous materials spills).

### **Comprehensive Airport Land Use Compatibility Plan**

State law requires Airport Land Use Commissions (ALUCs) to prepare and adopt an Airport Land Use Compatibility Plan (ALUCP) for each public use and military airport within their jurisdiction. Further, ALUCs are required to review the plans, regulations, and other actions of local agencies and airport operators within each Commission's jurisdiction. SFO is located 2 miles south of the project site. The 2012 Comprehensive Airport Land Use Compatibility Plan prepared for SFO has four primary areas of concern:

- Aircraft Noise Impact Reduction To reduce the potential number of future airport area residents who could be exposed to noise impacts from airport and aircraft operations.
- Safety of Persons on the Ground and in Aircraft in Flight To minimize the potential number of future residents and land use occupants exposed to hazards related to aircraft operations and accidents.
- Height Restrictions/Airspace Protection To protect the navigable airspace around the Airport for the safe and efficient operation of aircraft in flight.

• Overflight Notification – To establish an area within which aircraft flights to and from the Airport occur frequently enough and at a low enough altitude to be noticeable by sensitive residents. Within this area, real estate disclosure notices shall be required, pursuant to state law.

The 2012 SFO ALUCP contains airport/land use compatibility policies and criteria that apply to all land uses except those considered as existing land uses. ALUCs were given authority to: (1) specify how land near airports is to be used, based on safety and noise compatibility considerations; (2) develop height restrictions for new development to protect airspace in the vicinity of the airport; and (3) establish construction standards for new buildings near airports, including sound insulation requirements. As identified in the 2012 SFO ALUCP, the project site is located within the Federal Aviation Regulation Part 77 sphere of influence, which is the boundary established to regulate obstructions to airspace navigation, including building heights.

## Local

#### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Health and Safety Element, which acknowledges and mitigates the risks posed by hazards (e.g., hazardous materials and waste). The General Plan includes the following policies applicable to hazards and hazardous materials:

- Policy 8.3-G-1: 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.
- Policy 8.3-G-2: Minimize the risk to life and property from the generation, storage, and transportation of hazardous materials and waste in South San Francisco. Comply with all applicable regulations and provisions for the storage, use, and handling of hazardous substances, as established by federal (EPA), state (DTSC, RWQCB, Cal/OSHA, CalEPA), and local (County of San Mateo, City of South San Francisco) regulations.
- Policy 8.3-I-2: Continue to maintain hazardous waste regulations in the City's zoning ordinance.
   The existing zoning ordinance and General Plan prohibits intensive industrial facilities and industries that produce substantial amounts of hazardous waste, prohibits industrial uses involving the permanent storage of hazardous materials, and limits lighter industrial uses that produce hazardous waste, such as auto repair and auto painting businesses, to the Light Industrial land use classification.
- Policy 8.3-I-4: Establish an ordinance specifying routes for transporting hazardous materials. These routes should not pass through residential areas or other sensitive areas. Specific time periods for transport should be established to reduce the impact and accident risk during peak travel periods.
- Policy 8.6-G-1: Use the City's *Emergency Response Plan* as the guide for emergency management in South San Francisco.

# 4.10.3.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant hazards and hazardous materials impact if it would:

- Create a significant hazard for the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard for the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school;
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, create a significant hazard for the public or the environment;
- For a project 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 a safety hazard for people residing or working in the project area;
- Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

# 4.10.3.3 Approach to Analysis

Evaluation of the proposed project is based on the phase I environmental site assessment prepared for the project site, unless otherwise noted. The scope of the phase I environmental site assessment included reviewing and analyzing project site conditions to identify any recognized environmental conditions (RECs). Database information is dynamic and can change over time, including changes in site status and new sites can be added to databases. As database information in the phase I environmental site assessment is from 2017, a supplemental environmental database search was also conducted in 2020 by Environmental Data Resources to support the hazards and hazardous materials analysis. 11

Ramboll Environ US Corporation. 2017. *Phase I Environmental Site Assessment 701 Gateway Boulevard*. Final. 1690006158. South San Francisco, CA. Prepared for: Alexandria Real Estate Equities, Inc.

Environmental Data Resources, Inc. (EDR). 2020. The EDR Radius Map with GeoCheck. Inquiry Number 6007239.2s, dated March 12, 2020.

# 4.10.3.4 Impact Evaluation

Impact HAZ-1: The proposed project would not create a significant hazard for the public or the environment through the routine transport, use, or disposal of hazardous materials. (*Less than Significant*)

#### Construction

Project construction would involve routine transport, use, and disposal of hazardous materials such as solvents, paints, oils, grease, and caulking. Such transport, use, and disposal must be compliant with applicable regulations, such as the U.S. Department of Transportation regulations. Although small amounts of solvents, paints, oils, grease, and caulking would be transported, used, and disposed of during the construction phase, these materials are typically used in construction projects and would not represent the transport, use, and disposal of acutely hazardous materials. Therefore, the proposed project would not create a significant hazard for the public or the environment through the routine transport, use, or disposal of hazardous materials during construction and this impact would be *less than significant*. No mitigation is required.

### Operation

The proposed project would include operation of an office and R&D building. Depending on the nature of the proposed R&D uses, the possibility exists for hazards related to the handling of biomedical wastes and hazardous chemicals to occur. R&D tenants that would handle these types of materials would be required to refer to the state and federal lists of regulated substances available through the San Mateo County Environmental Health Department (SMCEHD). Chemicals on the list pose a threat to public health and safety or the environment because they are highly toxic, flammable, or explosive. If the handling of hazardous materials would be required during R&D uses, the facility would be required to adhere to all applicable state and local regulations, seek consultation with the SMCEHD, and apply for applicable permits. In addition, registration of the materials through the SMCEHD Hazardous Material Business Plan Program would be required to ensure safe and responsible handling. The proposed office uses would involve the use of hazardous chemicals that are typical in office settings (e.g., toners, paints, kitchen and restroom cleaners, other maintenance materials). Landscape maintenance on the project site would require the use a wide variety of commercial products that are formulated with hazardous materials (e.g., fuels, cleaners and degreasers, solvents, paints, lubricants, adhesives, sealers, and pesticides/herbicides). Such materials are considered common and are unlikely to be stored or used in large quantities. Any spills involving these materials would be small and localized and would be cleaned up as they occur.

The City requires that building spaces be designed to handle the intended office and R&D uses, with sprinklers, alarms, vents, and secondary containment structures, in accordance with the guidelines laid out in the City's Fire Code. Compliance with state and local regulations would ensure that buildings are equipped with safety measures including sprinklers, alarms, etc., to minimize potential impacts of the presence of hazardous materials. The City further requires that upon completion of the proposed building, occupancy is not allowed until a final inspection is made by the South San Francisco Fire Department (SSFFD) for conformance of all building systems with the City's Fire Code and National Fire Protection Association requirements. The inspection includes a review of the emergency evacuation plans. Finally, compliance with the California Department of Transportation regulations would ensure that all necessary safety

precautions would be taken during transport of hazardous materials during all phases of the project. Therefore, the proposed project would not create a significant hazard for the public or the environment through the routine transport, use, or disposal of hazardous materials during operation and this impact would be *less than significant*. No mitigation is required.

Impact HAZ-2: The proposed project would not create a significant hazard for the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. (*Less than Significant*)

The following is a summary of the findings of the phase I environmental site assessment:

- Residual heavy metal contamination in soil was identified at the 701 Gateway Boulevard site
  and characterized as a controlled REC<sup>12</sup> in the phase I environmental site assessment. However,
  because a "no further action" finding (subject to controls) was granted for the site, the
  controlled REC is not considered to be an ongoing contamination concern at the project site.
  Additional details (identified in the 2020 EDR) are provided under Homart Development
  Corporation/Edwards Wire and Rope/Bethlehem Steel in Table 4.10-1.
- No other RECs were identified within the project site.
- Asbestos-containing materials, lead-based paint, mold, and radon were not identified as significant concerns.

The 2020 supplemental database search identified multiple listings associated with the project site, including Solstice Neurosciences on the Facility Index System/Facility Registry System and Emissions Inventory Data databases, Broadway Real Estate Services on the Facility Index System/Facility Registry System database, and Divco West Real Estate Services on the San Mateo County Business Inventory database. The project site was identified in the listings as having a history of hazardous materials handling and being part of a Hazardous Material Business Plan Program in the San Mateo County Business Inventory database and permitted for air emissions by the Bay Area Air Quality Management District in the Emissions Inventory database. No violations or releases are associated with any of the listings within the project site.

The 2020 supplemental database search also identified listings associated with multiple off-site properties. Table 4.10-1 identifies hazardous materials sites within 0.25 mile of the project site with a history of releases.

The American Society for Testing and Materials defines a controlled REC as the result of a "past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (e.g., as evidenced by the issuance of a "no further action" letter or equivalent or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (e.g., property use restrictions, activity and use limitations, institutional controls, or engineering controls)…"

Table 4.10-1. Hazardous Materials Sites within 0.25 Mile of the Project Site

|  |   | Distance                      |   |  |
|--|---|-------------------------------|---|--|
| Site   | Address   | from the Project <sup>1</sup> | Database(s) <sup>2</sup>                          | Site Status Summary  |
| Gateway of<br>Pacific, Elan<br>Pharmaceutical,<br>Aesculap             | 1000<br>Gateway<br>Boulevard  | 0.03 mile<br>to the NE        | CPS-SLIC, CERS,<br>RCRA-LQG, FINDS,<br>ECHO, LUST | Leaking Underground Storage Tank Site. Status listed as open and undergoing site assessment activities. Tetrachloroethylene listed as contaminant of concern. Soil and groundwater impacts. Currently undergoing soil vapor extraction. According to a 2017 soil and groundwater management plan, "Based on the analytical results (sample results did not exceed applicable thresholds), site groundwater would very likely be able to be discharge to a sanitary sewer system during construction." Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment.  |
| Homart Development Corporation/ Edwards Wire and Rope/ Bethlehem Steel | 480<br>Industrial<br>Way<br>(address<br>no longer<br>exists) and<br>801<br>Gateway<br>Boulevard | 0.04 mile<br>to the<br>WNW    |   | Voluntary Cleanup Site. Investigation and remediation activities occurred at the Homart property at the intersection of Gateway Boulevard and Oyster Point Boulevard. An unspecified quantity of contaminated soil was removed and the site was certified in November of 1983. Later classified as an operation and maintenance site. Site contaminants included polychlorinated biphenyls (PCBs) and lead in soil and groundwater. After a 1988 investigation, the site was considered a "no further action" site. Although soil contamination remains onsite, the 2017 phase I environmental site assessment considered the site a controlled REC. The site was not considered an ongoing contamination concern (assuming the current land use does not change). Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment. |

| Site   | Address                                     | Distance<br>from the<br>Project <sup>1</sup> | Database(s) <sup>2</sup>  | Site Status Summary   |
|--|---|--|---|---|
| U.S. Steel<br>Corporation  | 105 Oyster<br>Point<br>Boulevard            | 0.06 mile<br>to the<br>NNE                   | ENVIROSTOR, SAN<br>MATEO CO. BI,<br>HIST CORTESE,<br>RCRA<br>NONGEN/NLR | Historical DTSC Site. Site listed with organic liquid (containing metals), affected soil, and asbestos-containing materials. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment.  |
| U.S. 101/Oyster<br>Point Boulevard                                     | U.S. 101 at<br>Oyster<br>Point<br>Boulevard | 0.11 mile<br>to the<br>WNW                   | ENVIROSTOR  | "No Further Action" Site. Lead and total petroleum hydrocarbons above applicable screening levels in the stored soil. The California Department of Transportation, in preparation for construction of the Oyster Point Boulevard overcrossing, removed lead-contaminated soil from a ditch draining to San Francisco Bay. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment.   |
| Thermo Fisher<br>Scientific  | 180 Oyster<br>Point<br>Boulevard            | 0.14 mile<br>to the<br>ENE                   | LUST, SWEEPS<br>UST, SAN MATEO<br>CO. BI, EMI,<br>HAZNET, CERS,<br>HWTS | Leaking Underground Storage Tank Site. The site had gasoline-impacted groundwater. Case closed by San Mateo County Local Oversight Program in 2009. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment.   |
| Oyster Point<br>(former U.S. Steel<br>facility) – The<br>Cove Property | Cross<br>Oyster<br>Point at<br>U.S. 101     | 0.16 mile<br>to the<br>NNE                   | CPS-SLIC, CERS  | Site listed as open; undergoing long-term management. Site listed as containing diesel, lead, PCBs, polynuclear aromatic hydrocarbons, waste oil-affected groundwater, sediments, and soils. Contaminated sediments in San Francisco Bay have been remediated/capped. In 2009, the RWQCB adopted Order No. R2-2009-0063, which rescinded Site Cleanup Requirements Order No. 00-125. Although remediation is complete, the case remains open to address soil management during redevelopment. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment. |

| Site                               | Address                          | Distance<br>from the<br>Project <sup>1</sup> | Database(s) <sup>2</sup>   | Site Status Summary  |
|------------------------------------|----------------------------------|--|--|--|
| Federal Express                    | 900<br>Gateway<br>Boulevard      | 0.17 mile<br>to the E                        | LUST, HIST CORTESE, WDS, CERS, SAN MATEO CO. BI, HAZNET, NPDES, CIWQS, HWTS, RCRA-SQG, FINDS, ECHO, RCRA NONGEN/NLR, UST, SWEEPS UST | Leaking Underground Storage Tank Site. The site had gasoline-impacted groundwater. Case closed by San Mateo County Local Oversight Program in 2004. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment.                            |
| Malcolm Drilling                   | 200 Oyster<br>Point<br>Boulevard | 0.2 mile<br>to the<br>ENE                    | LUST, CPS-SLIC,<br>EMI, SWEEPS UST,<br>DEED, SAN MATEO<br>CO. BI, CERS   | Leaking Underground Storage Tank Site. The site featured chromium- affected groundwater. Case closed by San Mateo County Local Oversight Program in 2006. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment.                      |
| Levitz Furniture<br>(former)       | 900<br>Dubuque<br>Avenue         | 0.2 mile<br>to the<br>WNW                    | CPS-SLIC, CERS   | Cleanup Program Site. The site had lead, nickel, gasoline, heating oil/fuel oil impacts. Media not disclosed. Case closed by San Mateo County Local Oversight Program in 2018. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment. |
| Grand Roebling<br>Property/Tularik | 317<br>Roebling<br>Road          | 0.2 mile<br>to the S                         | LUST, CPS-SLIC,<br>RCRA-SQG, SAN<br>MATEO CO. BI   | Leaking Underground Storage Tank Site. The site featured perchloroethylene-affected groundwater. Case closed by San Mateo County Local Oversight Program in 2019. Based on a review of the site status, the site is not considered to pose a significant potential impact on the environment.              |

Source: Environmental Data Resources, Inc. (EDR). 2020. The EDR Radius Map with GeoCheck. Inquiry Number 6007239.2s, dated March 12, 2020.

#### Notes:

<sup>&</sup>lt;sup>1</sup> NE = northeast; WNW = west, northwest; NNE = north, northeast; ENE = east, northeast; E = east; and S = south.

<sup>&</sup>lt;sup>2</sup> CPS-SLIC = Cleanup Program Sites - Spills Leaks Investigations and Cleanups; CERS = California Environmental Reporting System; RCRA-LQG = Resource Conservation and Recovery Act - Large Quantity Generator; RCRA-SQG = RCRA - Small Quantity Generators; LUST = Leaking Underground Fuel Tank Report; ENVIROSTOR = EnviroStor Database; SAN MATEO CO. BI = San Mateo County Business Inventory; SEMS-ARCHIVE = Superfund Enterprise Management System Archive; VCP = Voluntary Cleanup Program Properties; HIST CAL-SITES = Calsites Database; SWEEPS UST = Statewide Environmental Evaluation and Planning System; RCRA NonGen / NLR = RCRA - Non Generators / No Longer Regulated; FINDS: Facility Index System/Facility Registry System; ECHO = Enforcement & Compliance History Information; CA BOND EXP. PLAN = Bond Expenditure Plan; EMI = Emissions Inventory Data; HAZNET = Facility and Manifest Data; HIST CORTESE = Hazardous Waste & Substance Site List; NPDES: NPDES Permits Listing; CIWQS = California Integrated Water Quality System; HWTS = Hazardous Waste Tracking System; and DEED = Deed Restriction Listing.

## **Development on or near Former Hazardous Materials Handling Facilities**

No RECs other than the controlled REC have been identified within the project site. As part of the regulatory controls for the controlled REC, the contaminated area was capped. No construction activity would occur in the portion of the project site impacted by the controlled REC other than landscaping installation. This work would not penetrate the cap. The contractor would conduct verification boring before starting construction to confirm the depth where REC is capped.

In addition, due to environmental conditions (as described in the Site Status Summary column of Table 4.10-1), the proposed project would not have the potential to exacerbate potential risks to the environment associated with previously identified hazardous materials sites within 0.25 mile of the project site. Therefore, potential impacts associated with reasonably foreseeable upset and accident conditions involving releases of hazardous materials into the environment would be *less than significant*. No mitigation is required.

# **Hazardous Building Materials**

The existing office building at 701 Gateway Boulevard would remain under the proposed project. The proposed project would not include the demolition of any existing buildings and would only require demolition of an existing surface parking lot. Therefore, demolition activities would not likely expose workers and surrounding receptors to asbestos, lead, mercury, or PCBs. In the unlikely event that these hazardous materials are exposed, the handling of PCBs is regulated under 24 CFR and handling of PCBs, asbestos, lead, and mercury is regulated under 22 CCR. With compliance with standard local, state, and federal regulatory requirements, impacts related to the accidental release of hazardous materials during demolition would be *less than significant*. No mitigation is required.

# **Contaminated Groundwater**

No dewatering would be required during project construction. Therefore, construction activities would not have the potential to result in the release of contaminated groundwater and this impact would be *less than significant*. No mitigation is required.

# Impact HAZ-3: The proposed project would not emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school. (Less than Significant)

There are no existing schools within 0.25 mile of the project site. The nearest school is Martin Elementary School, approximately 0.8 mile west of the project site. Two existing day care centers are within 0.25 mile of the project site: a day care center at the One and Two Tower Place Project and the Gateway Child Development Center Peninsula. The day care center at One and Two Tower Place Project is approximately 0.25 mile north of the project site and is part of a baseline project (Cumulative Project No. 6) discussed in Section 4.1.4, Approach to Baseline Setting, of this draft EIR and shown in Figure 4.1-1. The Gateway Child Development Center Peninsula is approximately 1,000 feet (0.19 mile) from the main project construction areas and 670 feet (0.13 mile) from the nearest project construction area, which would be at the southern terminus of the site and include repaving and curb work, as well as some landscaping activities. The proposed project would include operation of an office and R&D building. As discussed under Impact HAZ-1, depending on the nature of the proposed R&D uses, the possibility exists for hazardous emissions related to biomedical wastes and hazardous chemicals. The facility would be required to adhere to all applicable state and local regulations, seek consultation with the SMCEHD, and apply for

applicable permits. In addition, registration of the materials through the SMCEHD Hazardous Material Business Plan Program would be required to ensure safe and responsible handling. The proposed project would not involve any other uses that would involve hazardous emissions (e.g., heavy industrial uses). Therefore, the project may emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school or day care centers, but would be required to adhere to all applicable state and local regulations and this impact would be *less than significant*. No mitigation is required.

# Impact HAZ-4: The proposed project would not be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, create a significant hazard for the public or the environment. (*Less than Significant*)

As discussed under Impact HAZ-2, the project site is listed on the following databases: Facility Index System/Facility Registry System, Emissions Inventory Data, and the San Mateo County Business Inventory database. The project site was identified in the listings as having a history of hazardous materials handling and being part of a Hazardous Material Business Plan Program in the San Mateo County Business Inventory database and permitted for air emissions by the Bay Area Air Quality Management District in the Emissions Inventory database. However, the project site is not included on the Government Code section 65962.5 hazardous materials sites list (known as the *Cortese* list) and was not identified with a history of releases or violations with potential to impact the project. The project site is located near multiple closed cleanup sites. However, no active cleanup sites are located within the project site or within 0.25 mile of the project site. Nonetheless, as described under Impact HAZ-2, exposure of known or unknown subsurface conditions could occur, but with implementation of standard local, state, and federal regulatory requirements that would ensure the proper handling of potentially hazardous subsurface soils and groundwater, this impact would be *less than significant*. No mitigation is required.

# Impact HAZ-5: The proposed project would not result in a safety hazard or excessive noise for people residing or working in the project area. (Less than Significant)

SFO is approximately 2 miles south of the project site. The project site is located within the Federal Aviation Regulation Part 77 sphere of influence and within the boundaries of Airport Influence Area (AIA) A and B of the SFO ALUCP. In general, height limitations and restrictions in the East of 101 Area are defined by the SFO Airport AIA. Development on the project site is limited to 300 feet in height by elevation, according to the 2012 SFO ALUCP, 13 but may be further restricted after notification and consultation with the Federal Aviation Administration (FAA) under CFR part 77.9. The proposed project would involve construction of a 148-foot-tall, seven-story building. After consultation with the FAA, it is expected that the proposed project would be compatible with the SFO ALUCP. The proposed building would be below the established height limits and would not pose a safety hazard or generate excessive noise for people working in the project area. Therefore, this impact would be *less than significant*. No mitigation is required.

<sup>&</sup>lt;sup>13</sup> City/County Association of Governments of San Mateo County. 2012. *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*. Available: https://ccag.ca.gov/wp-content/uploads/2014/10/Consolidated\_CCAG\_ALUCP\_November-20121.pdf. Accessed: March 27, 2020.

# Impact HAZ-6: The proposed project would not impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan. (*Less than Significant*)

The project would not include any changes to existing public roadways that provide emergency access to the site or surrounding area. The project would demolish a surface parking lot and construct a seven-story office and R&D building with parking. The existing access to the project site (two driveways on Gateway Boulevard, one driveway from the internal access drive south of the building at 951 Gateway Boulevard, and one driveway on an unnamed street that connects Poletti Way to Gateway Boulevard) would be retained under the proposed project. Emergency vehicle access to the project site would be provided by Gateway Boulevard and the parking lot to be constructed north of the proposed building. In addition, the proposed project would be designed to comply with the California Fire Code and the City Fire Marshal's code requirements that require on site access for emergency vehicles, a standard condition for any new project approval.

During project construction, traffic levels would increase minimally, which is not expected to degrade traffic operations. Furthermore, emergency response access during the construction period would not be impeded significantly. The project would not involve development of a structure that would impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan. No streets would be closed, rerouted, or altered substantially. The 731 net new employees (refer to Section 4.10.7, *Population and Housing*, of this draft EIR) may slightly increase demand during an evacuation. Therefore, the project would not interfere with the County of San Mateo's Emergency Operations Plan or any evacuation route. Adequate access to the project site and surrounding area would be maintained. The City further requires that upon completion of the proposed building, occupancy is not allowed until a final inspection is made by the SSFFD, which includes a review of the emergency evacuation plans. Therefore, the proposed project would not impair implementation of or interfere with an adopted emergency response plan or emergency evacuation plan and this impact would be *less than significant*. No mitigation is required.

# Impact HAZ-7: The proposed project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires. (*No Impact*)

According to the California Department of Forestry and Fire Protection (CAL FIRE), the City, including the project site, is in a non-Very High Fire Hazard Severity Zone (non-VHFHSZ). Because the project site is in a developed urban area with no nearby wildland areas, there would be **no** *impact*. No mitigation is required.

# Impact C-HAZ-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on hazards and hazardous materials. (*Less than Significant*)

The cumulative geographic context for hazards and hazardous materials is the project site and its immediate vicinity (i.e., the parcels adjacent to the project site). The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

<sup>&</sup>lt;sup>14</sup> California Department of Forestry and Fire Protection. 2007. *San Mateo County Fire Hazard Severity Zones in SRA*. Available: https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/. Accessed: February 19, 2020.

Cumulative development in the immediate vicinity of the project site would be required to comply with all regulations related to hazardous materials and, thus, the project, in combination with related development, would not result in significant cumulative hazards or hazardous materials impacts. In addition, development of cumulative projects in contaminated areas would require remediation in compliance with state and federal environmental regulations, consequently improving overall environmental quality. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative hazards or hazardous materials impact. The cumulative impact would be *less than significant*. No mitigation is required.

# 4.10.4 Hydrology and Water Quality

# 4.10.4.1 Regulatory Framework

### **Federal**

#### Clean Water Act

Several sections of the Clean Water Act (CWA) pertain to regulating waters of the United States. The CWA is the primary federal law for regulating water quality in the United States and the basis for several state and local laws in the country. Its objective is to reduce or eliminate water pollution in the nation's rivers, streams, lakes, and coastal waters. The CWA regulates discharges of pollutants and sets minimum water quality standards for all waters of the United States. Several mechanisms are used to control domestic, industrial, and agricultural pollution under the CWA.

The EPA is the overarching authority for protecting the quality of waters of the United States. However, the EPA has delegated administration and enforcement of certain aspects of the CWA in California to the State Water Resources Control Board (SWRCB) and the RWQCBs. The State of California has developed a number of water quality laws, rules, and regulations and adopted water quality standards to protect beneficial uses of waters of the state, as required by section 303(d) of the CWA. CWA requirements are addressed through development of a 303(d)/305(b) integrated report, which addresses both an update to the 303(d) list and a 305(b) assessment of statewide water quality. The 2014/2016 *California Integrated Report* was approved by EPA on April 6, 2018.

### **Executive Order 11988**

The Federal Emergency Management Agency (FEMA) is responsible for managing the 100-year floodplain (i.e., areas subject to a 1 percent or greater chance of flooding in any given year). A flood insurance rate map is an official FEMA map that can be used to delineate both Special Flood Hazard Areas (the 100-year floodplain) and Flood Risk Premium Zones in a community. Under Executive Order 11988, FEMA requires local governments that are covered by the National Flood Insurance Program to pass and enforce a floodplain management ordinance that specifies minimum requirements for any construction within the 100-year floodplain. FEMA administers the National Flood Insurance Program, which includes floodplain management as well as flood hazard mapping functions and provides subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains.

#### **State**

# **Porter-Cologne Water Quality Control Act**

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) was established and implemented by the SWRCB, the primary state agency with responsibility for protecting the quality of the state's surface and groundwater supplies, or *waters of the state*. Waters of the state are defined more broadly than waters of the United States (i.e., any surface water or groundwater, including saline waters, within the boundaries of the state). This includes waters in both natural and artificial channels. It also includes all surface waters that are not waters of the United States or non-jurisdictional wetlands, which are essentially distinguished by whether they are navigable or have a direct hydrologic surface connection to navigable waters. Non-navigable, isolated, and intrastate waters fall under the jurisdiction of only the Porter-Cologne Act and not the CWA.

The Porter-Cologne Act authorizes the SWRCB to draft state policies regarding water quality. The act requires projects that discharge, or propose to discharge, wastes that could affect water quality to file a Report of Waste Discharge with the appropriate RWQCB. The Porter-Cologne Act also requires the SWRCB or a RWQCB to adopt basin plans for the protection of water quality.

# **NPDES Permit Requirements**

The 1972 amendments to the federal Water Pollution Control Act established the NPDES permit program to control discharges of pollutants from any point source. The 1987 amendments to the CWA created a new section that was devoted to stormwater permitting (section 402). The phase I NPDES stormwater program regulates stormwater discharges from industrial facilities, large- and medium-sized municipal separate storm sewer systems (MS4s) (i.e., those serving more than 100,000 persons), and construction sites that disturb 5 or more acres of land. CWA section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for MS4s. The discharge of stormwater runoff from the MS4 in San Mateo County is permitted under the San Francisco Bay MRP (Order No. R2-2015-0049; NPDES Permit No. CAS612008), which is discussed further below.

# **NPDES General Construction Stormwater Permit**

Most construction activities that disturb 1 acre of land or more are required to obtain coverage under the NPDES General Permit for Construction Activities (Construction General Permit). The SWRCB has issued a statewide Construction General Permit (Order No. 2009-0009-DWQ, NPDES No. CAR000002, as amended by 2010-0014-DWQ and 2012-0006-DWQ). Construction activities subject to the Construction General Permit include clearing, grading, and disturbances to the ground, such as stockpiling or excavation, that result in soil disturbances of at least 1 acre of total land area. The Construction General Permit requires the applicant to file a notice of intent to discharge stormwater and prepare and implement the SWPPP, which includes a site map and a description of proposed construction activities, along with a demonstration of compliance with relevant local ordinances and regulations, and an overview of the BMPs that would be implemented to prevent soil erosion and discharges of other construction-related pollutants that could contaminate nearby water resources.

# Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act of 2014 (SGMA) is a comprehensive three-bill package that Governor Jerry Brown signed into California state law in September 2014. The Sustainable Groundwater Management Act provides a framework for sustainable management of

groundwater supplies by local authorities, with a limited role for state intervention only if necessary to protect the resource. The plan is intended to ensure a reliable groundwater water supply for California for years to come. SGMA requires the formation of local Groundwater Sustainability Agencies (GSA), which are required to adopt groundwater sustainability plans (GSPs) to manage the sustainability of groundwater basins. The adoption of a GSP is required for all high- and medium-priority basins as identified by DWR or submit an alternative to a GSP. SGMA also requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge.

### **California Safe Drinking Water Act**

The California Safe Drinking Water Act, requires the State Water Resources Control Board to administer provisions relating to the regulation of drinking water to protect public health, including, but not limited to, conducting research, studies, and demonstration programs relating to the provision of a dependable, safe supply of drinking water, enforcing the federal Safe Drinking Water Act, adopting implementing regulations, and conducting studies and investigations to assess the quality of water in private domestic water supplies. Under the act, the implementing regulations are required to include, but are not limited to, monitoring of contaminants and requirements for notifying the public of the quality of the water delivered to customers.

The bill requires the State Water Resources Control Board, on or before July 1, 2020, to adopt a definition of microplastics in drinking water, and on or before July 1, 2021, to adopt a standard methodology to be used in the testing of drinking water for microplastics and requirements for 4 years of testing and reporting of microplastics in drinking water, including public disclosure of those results.

#### Sea-level Rise and Executive Order S-13-08

In November 2008, Governor Arnold Schwarzenegger issued Executive Order S-13-08. The order indicates that future potential sea level rise associated with climate change may have a substantial effect on coastal development, and provided for the formation of an independent panel to complete a California Sea Level Rise Assessment Report by December 1, 2010. This panel, the California Adaptation Advisory Panel to the State of California, published the required report in November 2010 titled Preparing for the Effects of Climate Change – A Strategy for California. This study noted that the state requested an assessment of defensible sea level projections for the West Coast from the NRC, which was published in 2012.

# State Lands and Sea-level Rise and California AB 691

California Assembly Bill (AB) 691 was signed by Governor Brown on October 5, 2013. Effective January 1, 2014, this law prepares for the impacts of sea level rise by requiring holders of public trust lands to assess the impacts and report the results to the State Lands Commission. The law requires a local trustee whose gross public trust revenues average over \$250,000 annually between January 1, 2009, and January 1, 2014, to prepare and submit, no later than July 1, 2019, an assessment of how it proposes to address sea level rise. The law requires a local trustee to consider and use relevant information from specified sea level rise reports in preparing the assessment.

# **California Ocean Protection Council Strategic Plan**

The California Ocean Protection Council 2020–2025 Strategic Plan provides a roadmap for the continued progress to protect California's coast and ocean. Collaborative partnerships among state agencies is essential for regulating, funding, and developing policy that guide coastal and ocean actions to achieve the plans goals. The Strategic Plan includes the following policies applicable to sea level rise:

- Objective 1.1 Build Resiliency to Sea-Level Rise, Coastal Storms, Erosion, and Flooding
- Target 1.1.1: Ensure California's coast is resilient to at least 3.5 feet of sea-level rise by 2050, as consistent with the State's Sea-Level Rise Guidance Document as appropriate for a given location or project. This target will be modified periodically based on the best available science and updates to the State's Sea-Level Rise Guidance Document.
- Target 1.1.3: Starting in 2020, provide scientific guidance to partner agencies on the potential impacts of sea-level rise on contaminated sites and how current models could be used to inform site-specific decision making.
- Target 1.1.4: Identify pilot projects across the state that represent a diversity of locations, with
  variable size and scale, and demonstrate the efficacy of various sea-level rise and extreme event
  adaptation strategies by 2021 and begin project implementation immediately thereafter,
  consistent with existing laws and policies.
- Target 1.1.5: Build on existing planning efforts to ensure adoption of a requirement that, at a
  minimum, all coastal counties will develop a coastal adaptation plan or element and integrate
  adaptation approaches into existing planning frameworks (e.g., General Plans, Local Coastal
  Programs, Local Hazard Mitigation Programs) by 2023. Develop templates and minimum
  standards for adaptation plans or elements by 2021.
- Target 1.1.6: Update the State of California's Sea-Level Rise Guidance in 2023 and every five years
  thereafter to incorporate best available science and projections, and continually improve
  integration of changing ocean conditions into California's state government policies, planning, and
  operations (OPC Lead).

### Regional

# San Francisco Bay Water Quality Control Plan

San Francisco Bay waters are under the jurisdiction of the San Francisco Bay RWQCB, which established regulatory standards and objectives for water quality in San Francisco Bay in its *Water Quality Control Plan for the San Francisco Bay Basin*, commonly referred to as the Basin Plan. Basin plans are updated and reviewed every three years. They provide the technical basis for determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals. Each RWQCB has region-wide and water body–specific beneficial uses and sets numeric and narrative water quality objectives for several substances and parameters in numerous surface waters in its region. A basin plan must include (1) a statement of beneficial water uses that the RWQCB will protect, (2) the water quality objectives needed to protect the designated beneficial water uses, and (3) strategies to be implemented, with time schedules for achieving the water quality objectives. The San Francisco Bay Basin Plan was last updated in 2017.<sup>15</sup>

<sup>&</sup>lt;sup>15</sup> San Francisco Bay Regional Water Quality Control Board. 2017. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*. Last updated: May 2017. Available: http://www.waterboards.ca.gov/rwqcb2/basin\_planning.shtml. Accessed: February 19, 2020.

# Municipal Stormwater Pollution Prevention Program – Municipal Regional Stormwater NPDES Permit

The San Francisco Bay RWQCB issued the most-recent MS4 phase I San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (San Francisco Bay MS4 Permit), No. CAS029718 (Order No. R2-2015-0049 NPDES Permit No. CAS612008, as amended by Order No. R2-2019-0004), on November 19, 2015. Several cities and counties, including the City, are covered as permittees under this permit and required to address the protection of stormwater quality in their jurisdictions through the implementation of stormwater programs. The City is a permittee under the San Francisco Bay MS4 Permit for the discharge of stormwater runoff from the MS4s.

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) is a partnership of the City/County Association of Governments of San Mateo County (C/CAG), each incorporated City and town in the county, and the County of San Mateo, which share a common NPDES permit. The project would be required to comply with San Francisco Bay MS4 Permit Provision C.3 Stormwater Technical Guidance. Municipalities apply standard stormwater conditions of approval for projects that receive development permits. The SMCWPPP prepared Provision C.3 Stormwater Technical Guidance to assist projects in designing appropriate post-construction stormwater controls that meet local jurisdictional requirements and the requirements of the San Francisco Bay MS4 Permit. This goal is accomplished through low-impact development (LID) techniques, including infiltration and biotreatment.

### San Francisco Bay Conservation and Development Commission

San Francisco Bay Conservation and Development Commission (BCDC) has regulatory responsibility over development in San Francisco Bay and along the Bay's nine-county shoreline. BCDC is guided in its decisions by the McAteer-Petris Act, the San Francisco Bay Plan, and other plans for specific areas around the Bay. BCDC, in partnership with state and federal agencies, is developing a regional sediment management plan that builds on the successful long term management strategy program and seeks to incorporate flood protection, habitat restoration, sand mining and shoreline erosion in the overall management of sediments in the Bay.

### Local

### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains an Open Space and Conservation Element, which outlines policies relating to habitat and biological resources, water quality, air quality, greenhouse gas emissions and historic and cultural resources conservation. The General Plan contains a Health and Safety Element, which acknowledges and mitigates the risks posed by hazards (e.g., flooding) and ensures adequate police service. The General Plan includes the following policies applicable to hydrology and water quality:

- Policy 7.2-G-1: Comply with the San Francisco Bay RWQCB regulations and standards to maintain and improve the quality of both surface water and groundwater resources.
- Policy 7.2-G-2: Enhance the quality of surface water resources and prevent their contamination.
- Policy 7.2-G-3: Discourage the use of insecticides, herbicides, or toxic chemical substances within the City.

- Policy 7.2-I-1: Continue working with the San Francisco Bay RWQCB in the implementation of NPDES and continue participation in STOPPP for the protection of surface water and groundwater quality.
- Policy 8.2-G-1: Minimize the risk to life and property from flooding in South San Francisco.
- Policy 8.2-I-1: Continue working with the RWQCB in the implementation of the San Mateo Countywide Stormwater Pollution Prevention Program.
- Policy 8.2-I-2: Use the City's development review process to ensure that proposed development subject to the 100-year flood provides adequate protection from flood hazards.

## South San Francisco Municipal Code

Chapter 14.04, Stormwater Management and Discharge Control, is applicable to hydrology and water quality. The purpose of the chapter is to ensure the future health, safety and general welfare of the City of South San Francisco by:

- a) Eliminating non-stormwater discharges to the municipal separate storm sewer;
- b) Controlling the discharge to municipal separate storm sewers from spills, dumping or disposal of materials other than stormwater:
- c) Reducing pollutants in stormwater discharges to the maximum extent practicable.

The intent of Chapter 14.04 is to protect and enhance the water quality of the City's watercourses, water bodies and wetlands in a manner pursuant to and consistent with the Clean Water Act. The chapter includes a section related to low impact development (LID), to reduce runoff and mimic a site's predevelopment hydrology by implementing specific practices to control sources of potential pollution and site design strategies to treat stormwater.

In addition, Chapter 15.56, Flood Damage Prevention, is applicable to hydrology and water quality. The purpose of Chapter 15.56 is to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions.

# 4.10.4.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a hydrology or water quality impact if it would:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water or groundwater quality;
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project would impede sustainable groundwater management of the basin;
- Substantially alter the existing drainage pattern of the site or area, including through the
  alteration of the course of a stream or river or the addition of impervious surfaces, in a manner
  that would:
  - o Result in substantial erosion or siltation onsite or offsite;
  - Substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite;

- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
- o Impede or redirect floodflows;
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation; or
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

# 4.10.4.3 Approach to Analysis

Evaluation of the proposed project is based on the geotechnical investigation prepared for the proposed project, unless otherwise noted. The scope of the geotechnical investigation included a review of available subsurface information and exploration of the subsurface conditions at the site regarding, among other topics, groundwater conditions and hydrologic classification of site soils. Evaluation of the proposed project is also based on the phase I environmental site assessment prepared for the project site, unless otherwise noted. The scope of the phase I environmental site assessment included reviewing and analyzing project site conditions, including surface water hydrology and groundwater at the project site. In addition, evaluation of the proposed project is also based on a review of the Sustainable Groundwater Management Act's Basin Prioritization Dashboard and FEMA's National Flood Hazard data.

# 4.10.4.4 Impact Evaluation

Impact HY-1: The proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water or groundwater quality. (Less than Significant)

#### Construction

Project construction activities (e.g., grading, spoil stockpiling, and other earth-disturbing activities) could result in short-term water quality impacts associated with soil erosion and subsequent sediment transport to adjacent properties, roadways, and watercourses through storm drains. A number of different industrial activities have occurred within the project site. Contaminated areas include heavy metal contaminated soil and slag areas, oil shed areas, oil tanks, acid sewage basin, acid sewage pond, and railroad use. The contaminated areas pose a potential risk to water quality during ground disturbing activities. However, contamination that could pose a risk during ground disturbing activities during construction of the proposed project have been addressed through compliance with an approved Soil Management Plan during the redevelopment of the site with the existing office buildings, and remedial action at areas of known contamination. Hazards that pose a risk to water quality have been mitigated, and heavy metal

Langan Engineering and Environmental Services, Inc. 2019. Geotechnical Investigation, 751 Gateway Boulevard, South San Francisco, CA 75065-1501. November. Oakland, CA.

<sup>&</sup>lt;sup>17</sup> Ramboll Environ US Corporation. 2017. Phase I Environmental Site Assessment 701 Gateway Boulevard. Final. 1690006158. South San Francisco, CA. Prepared for: Alexandria Real Estate Equities, Inc.

contamination at these sites have been cleaned. <sup>18</sup> In the event contaminates are found during project construction and demolition activities, the project would comply with NPDES regional permit requirements and Regional Water Board requirements to prevent potential water quality impacts on surface and groundwater.

Other potential water quality impacts include chemical spills into storm drains or groundwater aquifers if proper minimization measures are not implemented. Construction activities must comply with the Construction General Permit, the MRP, and City's General Plan and Municipal Code, which contain standards to ensure that water quality is not degraded. As part of the Construction General Permit, standard erosion control measures and BMPs would be identified in a SWPPP and implemented during construction. Implementation of BMPs would control erosion, restrict non-stormwater discharges, and protect water quality from potential contaminants in stormwater runoff originating from the construction site. BMPs can include the installation of erosion control measures (e.g., silt fences, staked straw bales/wattles, silt/sediment basins or traps), geofabric, sandbag dikes, covers for stockpiles, or storage precautions for outdoor material storage areas. Such BMPs would help to protect surface water and groundwater quality. In addition, the proposed project would be required to comply with the City's standard conditions, which will be attached to the entitlements for the proposed project, including Condition No. 15, which requires a grading permit prior to any onsite grading to minimize water quality impacts associated with mobilization of sediment and erosion. The proposed project would also be required to comply with any project-specific conditions of approval. Therefore, the proposed project would not violate water quality standards or waste discharge requirements during construction and this impact would be *less than significant*. No mitigation is required.

### Operation

Under existing conditions, approximately 19 percent of the project site is covered with pervious surfaces, and 81 percent of the project site is covered with impervious surfaces. Upon project completion, approximately 26 percent of the project site would be covered with pervious surfaces, and 74 percent of the project site would be covered with impervious surfaces, resulting in a slight decrease in impervious cover. Therefore, water quality associated with stormwater runoff would be similar to water quality under existing conditions. In addition, the proposed project would also include three biotreatment areas (e.g., planting areas), one near the entry plaza, one between the lot north of the proposed building and the Gateway pedestrian connection, and one immediately east of the proposed building. The biotreatment areas would total approximately 5,500 square feet and would treat runoff. Stormwater runoff from the project would comply with MRP and SMCWPPP requirements. The project sponsor would be required to submit the SMCWPPP checklist to the City to show compliance with NPDES regional permit requirements. BMPs included in site designs and plans for the project would be reviewed by the City's engineering staff to ensure appropriate and adequate design capacity prior to permit issuance. The San Francisco Bay RWQCB, which has incorporated requirements in the MRP to protect water quality, approved the SMCWPPP, which is in compliance with the municipal stormwater NPDES permit. The City's review and permitting process would ensure that the permit's waste discharge requirements would not be violated by the project. Stormwater would be treated per San Mateo County Provision C.3 requirements prior to discharge to the storm drain system.

<sup>&</sup>lt;sup>18</sup> Environmental Data Resources, Inc. 2020. *751 Gateway Boulevard Project The EDR Radius Map™ Report with GeoCheck.* Inquiry Number: 6007239.2s. March 12.

According to the phase I environmental site assessment prepared for the proposed project, downgradient groundwater contamination has been observed in the vicinity of the project site. However, contamination cleanup included capping with clean soil and asphalt pavement and a deed restriction to prohibit residential and other uses (e.g., hospitals, day-care facilities) at the site to reduce groundwater quality impacts. Therefore, the proposed project would not violate water quality standards or waste discharge requirements during operation and this impact would be *less than significant*. No mitigation is required.

# Impact HY-2: The proposed project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project would impede sustainable groundwater management of the basin. (*Less than Significant*)

According to the phase I environmental site assessment prepared for the proposed project site, groundwater was encountered at 14 to 24 feet below ground surface. However, to account for seasonal fluctuations, the design groundwater level is approximately 7.5 to 18.5 feet below ground surface. To accommodate utility trenches, the project would require a maximum depth of excavation reaching approximately 9 feet below ground surface. However, no dewatering would be required during project construction. In the event that groundwater is encountered during construction, dewatering would be conducted on a one-time or temporary basis during the construction phase and would not result in a loss of water that would substantially deplete groundwater supplies. Project construction would use water from a metered hydrant. The project site is within the Visitacion Valley Groundwater Basin, which is classified as a very low-priority basin; groundwater in the basin is not a source of supply or recharge. Potable water for the project would be provided via pipe by the California Water Service Company, which purchases most of its water from the San Francisco Public Utilities Commission. Therefore, the proposed project would not use groundwater during construction or operation.

Upon project completion, approximately 26 percent of the project site would be covered with pervious surfaces, and 74 percent of the project site would be covered with impervious surfaces. The proposed project would include approximately 59,800 square feet of planted landscaped areas (not accounting for the proposed biotreatment areas). The proposed project would also include three biotreatment areas (e.g., planting areas), one near the entry plaza, one between the lot north of the proposed building and the Gateway pedestrian connection, and one immediately east of the proposed building. The biotreatment areas would total approximately 5,500 square feet. Under existing conditions, approximately 81 percent of the project site is covered with impervious surfaces, compared to 74 percent after project completion. With implementation of the project, the impervious surface area within the project site would decrease.<sup>19</sup> The proposed biotreatment areas would slow water, allowing it to percolate into the ground and providing increased benefits related to groundwater recharge. The proposed project would increase groundwater recharge potential within the project site. Therefore, the project would not substantially decrease groundwater supplies and would not impede sustainable groundwater management of the Visitacion Valley Groundwater Basin. Therefore, the project's groundwater impact would be *less than significant*. No mitigation is required.

<sup>&</sup>lt;sup>19</sup> BKF. 2020. 701 and 751 Gateway Boulevard, South San Francisco Wet Utilities. March 5.

Impact HY-3: The proposed project would not substantially alter the existing drainage pattern of the site or area in a manner that would result in substantial erosion or siltation onsite or offsite; substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite; create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect floodflows. (Less than Significant)

The project site does not include any existing streams or watercourses that could be altered or diverted. In addition, the project would decrease impervious surfaces by 7 percent on the project site. Therefore, the proposed project would have *no impact* related to alteration of existing drainage patters, including alteration of the course of a stream or river or through the addition of impervious surfaces. During construction, stormwater drainage patterns could be temporarily altered. However, the project would implement BMPs, as required in the project SWPPP, to minimize the potential for erosion or siltation in nearby storm drains and temporary changes in drainage patterns during construction. Construction BMPs would capture and infiltrate small amounts of sheetflow into the ground so that offsite runoff from the construction site would not increase, thereby ensuring that drainage patterns would not be significantly altered. Measures required by the Construction General Permit would also limit site runoff during construction; such measures would not alter stormwater drainage patterns. BMPs would be implemented to control construction site runoff, ensure proper stormwater control and treatment, and reduce the discharge of pollution to the storm drain system. Therefore, construction of the project would not substantially alter the existing drainage pattern of the site in a manner that would result in substantial erosion or siltation or increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite.

The existing 18-inch storm pipe on the project site would be relocated to accommodate the location of the proposed building and service and loading yard. New storm drain collector pipes and biotreatment areas (discussed above) would be constructed within the project site to drain to an existing 18-inch storm drain line in Gateway Boulevard. With implementation of the project, the impervious surface area within the project site would decrease by 7 percent.<sup>20</sup> The proposed project would also include three biotreatment areas (e.g., planting areas), one near the entry plaza, one between the lot north of the proposed building and the Gateway pedestrian connection, and one immediately east of the proposed building. The biotreatment areas would total approximately 5,500 square feet.

In response to the NOP comment from the County of San Mateo Public Works Department, this analysis considers the Colma Creek Flood Control Zone. Assessor's parcel number 015-024-290 is outside the Colma Creek Flood Control Zone. Therefore, stormwater runoff from the parcel would not be directed into the City storm drain system, which is ultimately conveyed to the San Mateo County Flood and Sea-Level Rise Resiliency District's flood control channel. A copy of the "as built" drawings would be submited to the San Mateo County Flood and Sea-Level Rise Resiliency District. Assessor's parcel number 015-024-360 is within the Colma Creek Flood Control Zone. Discharge rates from the parcel would not be allowed to exceed existing flow rates with implementation of the proposed project, in compliance with NPDES regional permit requirements. Drainage analyses concerning existing and planned discharge flow rates would be submitted to the City for review and approval. If planned discharge rates exceed existing flow rates, an onsite stormwater detention system would be implemented. The proposed stormwater detention system would be designed to release surface runoff at a rate similar to existing conditions.

<sup>&</sup>lt;sup>20</sup> Ibid.

To meet local, state, and federal requirements regarding water quality treatment as well as flood control, stormwater management facilities would be incorporated into the project. The proposed project would be designed to conserve resources and protect water quality through the management of stormwater runoff with green infrastructure and low impact development (LID). This approach implements engineered controls for stormwater filtering, storage, and flood control. Post-construction water quality treatment measures, as required by Provision C.3 regulations, such as biotreatment planting areas that drain to native soil, will be implemented as part of the project. Stormwater runoff would infiltrate into native soil to recharge groundwater via the proposed biotreatment areas. To reduce water quality impacts from stormwater runoff, a description of site design and source control measures, and stormwater treatment measure sizing calculations would be submitted to the City with the final design plans, as required by the NPDES regional permit. Furthermore, the proposed project would be required to comply with the City's standard conditions, which will be attached to the entitlements for the proposed project, including Condition No. 13, which requires submitting a plan that indicates the location of all storm drains; Condition No. 23, which requires that all parking spaces, driveways, maneuvering aisles, and turnaround areas drain to the sanitary sewer; and Condition No. 24, which requires that onsite stormwater catch basins drain to San Francisco Bay and be labeled accordingly. In addition, the proposed project would be required to comply with any project-specific conditions of approval. Therefore, the project would not exceed the capacity of stormwater drainage systems or provide substantial additional sources of polluted runoff and this impact would be less than significant. No mitigation is required.

# Impact HY-4: In flood hazard, tsunami, or seiche zones, the proposed project would not risk release of pollutants due to project inundation. (*Less than Significant*)

The project site is within FEMA Zone X (unshaded), an area of minimal flood hazard, and outside the FEMA 100-year floodplain.<sup>21</sup> Therefore, the project site would not be subject to inundation by a flood.

Tsunamis, or tidal waves, are huge sea waves that are caused by seismic activity or other disturbance of the ocean floor. According to the phase I environmental site assessment prepared for the proposed project, the project site is not within a tsunami inundation area. Therefore, the project site is not subject to inundation by a tsunami.

A seiche is a tide-like rise and drop of the surface of a landlocked body of water (e.g., a lake); its period can vary from a few minutes to several hours. There are no reservoirs adjacent to the project site. In addition, San Francisco Bay is a large and open body of water with no immediate risk of seiche. Therefore, the project site would not be prone to inundation by a seiche.

As discussed under Impact HY-1 and Impact HY-3, stormwater BMPs would be implemented, as required by federal, county, and local policies, to minimize degradation of water quality associated with stormwater runoff or construction-related pollutants. In addition, construction activities would comply with local stormwater ordinances, stormwater requirements established by San Mateo County's MS4 requirements, and regional waste discharge requirements. Project operation would comply with requirements in the MRP to protect water quality as well as the approved SMCWPPP,

Federal Emergency Management Agency. 2019. *FEMA Flood Insurance Rate Map*. Map Number 06081C0042F, dated April 5, 2019. Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

which is in compliance with the municipal stormwater NPDES permit, stormwater requirements established by San Mateo County's MS4 requirements, and regional waste discharge requirements. Post-construction water quality treatment measures, as required by Provision C.3 regulations, such as biotreatment areas, would be implemented as part of the project and would reduce the risk of pollutant release due to project inundation.

Based on the analysis above, impacts related to a release of pollutants due to project inundation in a flood hazard, tsunami, or seiche zone would not occur and this impact would be *less than significant*. No mitigation is required.

# Impact HY-5: The proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. (*Less than Significant*)

Commonly practiced BMPs would be implemented to control construction site runoff and reduce the discharge of pollutants to storm drain systems from stormwater and other nonpoint-source runoff. As part of compliance with permit requirements during ground-disturbing or other construction activities, water quality control measures and BMPs, such as silt fences, fiber rolls, and sediment traps, would be implemented to ensure that water quality standards would be achieved, including the water quality objectives that protect designated beneficial uses of surface and groundwater, as defined in the San Francisco Basin Plan. Releases of construction runoff would comply with the appropriate water quality objectives for the region. The Construction General Permit requires stormwater discharges to be free of pollutants that cause, or contribute to, an exceedance of applicable water quality objectives or water quality standards, including designated beneficial uses. Therefore, the proposed project would not obstruct implementation of a water quality control plan. No dewatering would be required during project construction. In addition, as discussed under Impact HY-2, groundwater would not be used during construction or operation and groundwater recharge would increase with implementation of the proposed project. Based on the analysis above, the project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan and this impact would be less than significant. No mitigation is required.

# Impact C-HY-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on hydrology and water quality. (*Less than Significant*)

The geographic context for the analysis of cumulative impacts associated with surface hydrology and water quality is the San Mateo Creek-Frontal San Francisco Bay Estuaries sub-watershed. The context for groundwater hydrology is the Visitacion Valley Groundwater Basin of the larger San Francisco Bay Hydrologic Region. The San Mateo Creek-Frontal San Francisco Bay Estuaries sub-watershed is considered already built out. Consequently, potential growth would most likely occur as redevelopment and not extensive new development on vacant land or open space. The context for cumulative hydrology and water quality impacts is geographic and a function of whether impacts could affect surface water features/watersheds, the City's storm drainage system, or groundwater, each of which has its own physical boundary. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1. Additional cumulative development could occur within the San Mateo Creek-Frontal San Francisco Bay Estuaries sub-watershed and the Visitacion Valley Groundwater Basin.

The cumulative projects in the vicinity of the project site (i.e., within 0.5 mile of the project site) and within the San Mateo Creek-Frontal San Francisco Bay Estuaries sub-watershed would be constructed on infill sites in highly urbanized areas where there is a substantial amount of existing impervious surface area. All new development is required to handle stormwater in a manner that ensures that floodflows will not increase or be redirected to other areas. Similar to the proposed project, all cumulative projects would be required to include post-construction stormwater management features, such as LID measures, to reduce flows to pre-project conditions. The cumulative projects would be subject to the requirements of the San Francisco Bay MS4 Permit, the Construction General Permit, and the City's General Plan and Municipal Code related to protecting water resources. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative hydrology and water quality impact. This impact would be *less than significant*. No mitigation is required.

# 4.10.5 Land Use

# 4.10.5.1 Regulatory Framework

# Regional

# Comprehensive Airport Land Use Compatibility Plan<sup>22</sup>

Refer to Section 4.10.3, *Hazards and Hazardous Materials*, of this draft EIR for a discussion of the 2012 SFO ALUCP. After an ALUC has adopted its ALUCP, affected local governments must update their general plans, specific plans, and land use regulations to be consistent with the ALUCP. Even if the local government has amended its plans to be consistent with the ALUCP, it must still submit proposed new and amended general plans, specific plans, land use ordinances (including rezoning), regulations, and facility master plans to the ALUC for review. The City/County Association of Governments of San Mateo County (C/CAG) ALUC reviews local land use policy actions and administrates consistency review and submits recommendations to the C/CAG Commission.

According to the ALUCP, the Airport Influence Area (AIA), which is the geographic area that is subject to the land use compatibility considerations identified in the ALUCP, is divided into two areas: Area A and Area B. Area A encompasses all of San Mateo County and the incorporated cities within it. Area B roughly follows the noise compatibility and safety zone contours. Consistent with CFR part 77, the ALUCP establishes height restrictions within specific contours of airport facilities throughout Area A and Area B. The project site is located within both Area A and Area B.

The ALUCP identifies specific safety compatibility policies to guide safe development and land use decisions within the airport vicinity. Policy SP-1 identifies Safety Compatibility Zones within certain distances from the airport to minimize potential hazards and improve public safety. These zones range from Zone 1, which is a broad area surrounding airport facilities, to Zone 5, which is the area immediately surrounding airport runways. Policy SP-2 defines incompatible land uses within each Safety Compatibility Zone. In accordance with Policy SP-2, any new development or potentially hazardous uses are considered incompatible land uses within Zone 1, and high-intensity facilities such

<sup>&</sup>lt;sup>22</sup> City/County Association of Governments of San Mateo County. 2012. Comprehensive Airport Land Use Compatibility for the Environs of San Francisco International Airport. Available: https://ccag.ca.gov/wp-content/uploads/2014/10/Consolidated\_CCAG\_ALUCP\_November-20121.pdf. Accessed: March 27, 2020.

as schools, hospitals, and stadiums, as well as specifically defined hazardous uses, are incompatible land uses within Zone 5. Policy SP-3 identifies the hazardous uses prohibited within Zone 5, including aboveground fuel storage tanks, toxic chemical or fireworks manufacturing facilities, and medical or biological research facilities that use utilize hazardous and/or infectious agents. The project site is not located in any of the Safety Compatibility Zones.

#### Local

# South San Francisco General Plan<sup>23</sup>

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains the following chapters:

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

The General Plan chapters above cover six of the seven elements required by state law (land use, open space, conservation, housing, circulation, noise, and safety) and optional elements (Planning Sub-Areas and Economic Development) 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. Policies in this element complement citywide policies included in the Land Use and other elements. Some of these sub-areas have detailed area plans, specific plans, or redevelopment 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 sub-areas, 14 in all, were collectively derived from analysis of land use and urban design patterns and existing and needed planning efforts and activities. The project site is located within the East of 101 Sub-Area of the Planning Sub-Areas Element.

<sup>&</sup>lt;sup>23</sup> City of South San Francisco. 1999. South San Francisco General Plan. Available: https://www.ssf.net/departments/economic-community-development/planning-division/general-plan. Accessed: May 8, 2020.

The General Plan governs the amount and intensity of development within the East of 101 Sub-Area and establishes specific policies and goals for the area, including the project site. The project site is identified in the 1999 General Plan as Business Commercial (BC). Permitted uses in the BC designation include "administrative, financial, business, professional, medical and public offices, research and development facilities, and visitor-oriented and regional commercial activities." As shown in Figure 3-3 in Chapter 3, *Project Description*, of this EIR, designations surrounding the project site are BC and Business Technology Park (BTP).

The General Plan contains a Land Use Element,<sup>24</sup> which provides a framework to guide land use decision making citywide. The General Plan includes the following policies applicable to land use from the Land Use Element:

- 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-I-22: Require that all future development conforms with the relevant height, aircraft
  noise, and safety policies and compatibility criteria contained in the most recently adopted
  version of the San Mateo County Comprehensive Airport Land Use Plan for the environs of San
  Francisco International Airport. (Amended by Resolution 19-2010, adopted February 10, 2010)

The General Plan contains a Planning Sub-Areas Element, which establishes policies specific to individual planning sub-areas in the City. The General Plan includes the following policies applicable to land use from the Planning Sub-Areas Element:

- Policy 3.5-G-3: Promote campus-style biotechnology, high-technology, and research and development 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.
- Policy 3.5-I-5: Do not vary permitted maximum development intensities based on lot-size.
- Policy 3.5-I-7: Prepare signage and streetscape plan for the areas designated as Business Commercial and Business and Technology Park on the General Plan Diagram, treating the entire area as one large campus, with unified signage and orchestrated streetscapes that make wayfinding easy and pleasant.
- Policy 3.5-I-8: Encourage the development of employee-serving amenities with restaurants, cafes, support commercial establishments such as dry-cleaners, to meet the needs of the employees in the East of 101 area. Such uses could be located in independent centers or integrated into office parks [o]r technology campuses.
- Policy 3.5-I-11: Do not permit any new warehousing and distribution north of East Grand Avenue or in areas designated Business Commercial.

<sup>&</sup>lt;sup>24</sup> City of South San Francisco. 1999. *City of South San Francisco General Plan. Land Use Element.* Available: https://www.ssf.net/home/showdocument?id=15526. Accessed: May 8, 2020.

The General Plan contains a Transportation Element, which includes policies, programs, and standards to enhance capacity and provide new linkages. The General Plan includes the following policies applicable to land use from the Transportation Element:

- Policy 4.2-G-13: Integrate Complete Streets infrastructure and design features into street design and construction to create safe and inviting environments for people to walk, bicycle, and use public transportation. (Amended by Resolution 136-2014, adopted December 10, 2014)
- Policy 4.2-G-14: Make Complete Streets practice a routine part of South San Francisco's everyday operations. (Amended by Resolution 136-2014, adopted December 10, 2014)

The base maximum permitted FAR in the BC land use designation is 0.5, but increases may be permitted up to a total FAR of 1.0 for uses such as R&D facilities, or for development meeting specific TDM, off-site improvement, or specific design standards. In addition, the General Plan provides that the zoning ordinance can provide specific exceptions to FAR limitations for uses with low employment densities.

Other applicable General Plan policies are discussed in their respective sections of this draft EIR.

The 1999 General Plan is currently being updated as part of the *Shape SSF 2040 General Plan*.<sup>25</sup> The 1999 General Plan remains active until completion and adoption of the new general plan.

# East of 101 Area Plan<sup>26</sup>

The *East of 101 Area Plan*, which was adopted in 1994 and most recently amended in 2016, sets forth specific land use policies for the East of 101 Area. The City interprets the *East of 101 Area Plan* as a design-level document. Applicable policies from the East of 101 Area Plan Land Use Element are as follows:

- Policy LU-8a: Uses allowed in the Gateway Specific Plan Area shall be those specified in the Gateway Specific Plan.
- Policy LU-8b: The maximum allowed Floor Area Ratio in the Gateway Specific Plan Area shall be that specified in the Gateway Specific Plan.
- Policy IM-5: The Gateway Specific Plan is not affected by the land use regulations of the East of 101 Area Plan. Developments on the Gateway site should conform to other policies of this plan including the Design Guidelines in the Design Element and shall be subjected to City design review. In the event of a conflict between this Area Plan and the Gateway Specific Plan the Gateway Specific Plan will prevail.

Per Policy IM-5, the *Gateway Specific Plan* is not affected by the land use regulations of the *East of 101 Area Plan*. Therefore, the policies in the General Plan are the guiding policies and supersede all Land Use Element policies set forth in Chapter 4 of the *East of 101 Area Plan*.

# **Gateway Specific Plan**

The Gateway Specific Plan covers the portion of the East of 101 Area Plan from east of the Caltrain tracks to the eastern boundary of the parcels along the east side of Gateway Boulevard and the area between Oyster Point Boulevard and Grand Avenue on the northern and southern boundaries. The

<sup>25</sup> City of South San Francisco. 2020. Shape SSF 2040 General Plan. Available: https://shapessf.com/. Accessed: May 8, 2020.

<sup>&</sup>lt;sup>26</sup> City of South San Francisco. 1994. East of 101 Area Plan. Prepared by Brady and Associates. Available: https://www.ssf.net/home/showdocument?id=508. Accessed: May 8, 2020.

Specific Plan is "intended to provide for various commercial and research and development land uses integrated by consistent development standards. Office for professional or business purposes is permitted on all parcels within the Plan Area. Research and development is permitted on Parcels A and F. The project site is Parcel F. A FAR of up to 1.25 is permitted in the Gateway Specific Plan area. Buildings in the Specific Plan area may not exceed 250 feet in height.

# South San Francisco Zoning Ordinance<sup>27</sup>

The City of South San Francisco Zoning provides a means by which the City can implement its General Plan. As shown in Figure 3-3 in Chapter 3, *Project Description*, of this EIR, the project site is zoned as Gateway Specific Plan District (GSPD). The GSPD is divided into five individual zones with specifically defined permitted land uses. The project area is within Zone IV. Permitted uses within Zone IV include office, research and development, personal service, and retail sales. The maximum permitted FAR in the GSPD is 1.25. Buildings in the GSPD may have a maximum height of 250 feet.

### Climate Action Plan<sup>28</sup>

The Climate Action Plan (CAP), adopted in 2014 and discussed in greater detail in Section 4.7, *Greenhouse Gas Emissions*, of this draft EIR, includes goals, policies, and strategies to reduce the City's greenhouse gas (GHG) emissions, in compliance with Assembly Bill (AB) 32 and Senate Bill (SB) 375. GHG reduction strategies identified in the CAP include a development checklist to identify applicable plan measures for discretionary projects. Measures identified in the plan, which include bike-share programs or facilities for employees, renewable energy feasibility, Leadership in Energy and Environmental Design (LEED) certification, and more, can be considered mandatory conditions of approval or may be adopted as mitigation.

The City's CAP is currently being updated, as part of the General Plan Update. The 2014 CAP remains active until completion and adoption of the new CAP.

# 4.10.5.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant land use impact if it would:

- · Physically divide an established community, or
- Result in a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

# 4.10.5.3 Approach to Analysis

Evaluation of the proposed project is based on a review of the applicable land use plans and policies described in the *Regulatory Framework* section, above.

A project that involves a change or intensification in land use would not be considered to have a significant impact related to the topic of Land Use and Planning unless the project would physically divide an established community.

<sup>&</sup>lt;sup>27</sup> City of South San Francisco. 2020. South San Francisco Municipal Code. Title 20: Zoning. Available: http://gcode.us/codes/southsanfrancisco/view.php?topic=20. Accessed: May 8, 2020.

<sup>&</sup>lt;sup>28</sup> City of South San Francisco. 2014. City of South San Francisco Climate Action Plan. Prepared by PMC. Available: https://www.ssf.net/home/showdocument?id=5640. Accessed: May 8, 2020.

Conflicts with existing plans and policies do not, in themselves, indicate a significant environmental effect related to the topic of land use and planning within the meaning of CEQA, unless the project substantially conflicts with a land use plan/policy that was adopted for the purpose of avoiding or mitigating an environmental effect. The focus of the analysis under Impact LU-2 is on the proposed project's potential conflicts with applicable land use plans and policies.

To the extent that physical environmental impacts may result from such conflicts, the EIR discloses and analyzes these physical impacts under the specific environmental topic sections in Chapter 4, *Environmental Setting, Impacts, and Mitigation*, of this draft EIR. Impacts resulting from a change or intensification of employment on the project site are embodied in environmental impacts related to the capacity of existing facilities and services to adequately serve the area, such as those described in Transportation and Circulation, Population and Housing, Public Services, Recreation, and Utilities and Service Systems. Physical impacts of construction and/or operation of the proposed project on the environment are embodied in physical impacts related to environmental topics such as Cultural Resources, Noise, Air Quality, Greenhouse Gas Emissions, Hydrology and Water Quality, and Hazards and Hazardous Materials, Energy, and Tribal Cultural Resources.

# 4.10.5.4 Impact Evaluation

# Impact LU-1: The proposed project would not physically divide an established community. (Less than Significant)

The project site consists of a six-story, approximately 170,235-square-foot office building at 701 Gateway Boulevard and surface parking lots. The project site is in an area referred to as the Gateway Campus. The project site is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west. The proposed project would not introduce new uses to the project vicinity in a manner that would physically divide the existing uses.

A pedestrian walkway, the Gateway pedestrian connection, would be constructed along Gateway Boulevard in the portion of the project site. The approximately 470-foot landscaped walkway would run parallel to the sidewalk and would connect pedestrians from the northern portion of the project site to the proposed building. In addition, pedestrian walkways would be constructed along the existing internal access drive to connect the proposed building to the rest of the Gateway Campus. The proposed project would also include a widened sidewalk and landscaping on the west side of Gateway Boulevard along the project frontage. The proposed pedestrian walkways would improve accessibility between the project site and surrounding uses, and would not create a physical barrier between existing uses. Therefore, the proposed project would not physically divide an established community and this impact would be *less than significant*. No mitigation is required.

Impact LU-2: The proposed project would not result in a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. (Less than Significant)

## Comprehensive Airport Land Use Compatibility Plan (ALUCP)

The project site is located within both Airport Influence Areas A and B. However, according to the 2012 SFO ALUCP, the project site is not located within the Community Noise Equivalent Level 65 decibel noise contour<sup>29</sup> or any safety zones.<sup>30</sup> In general, height limitations and restrictions in the East of 101 Area are defined by the SFO Airport Influence Area (AIA). Development on the project site is limited to a height of 300 feet, according to the 2012 SFO ALUCP,<sup>31</sup> but may be further restricted after notification and consultation with the FAA under CFR part 77.9. In addition, as noted above, the Gateway Specific Plan and GSPD limit building heights to 250 feet. The proposed project would involve construction of a 148-foot-tall, seven-story building. It is expected that the proposed project would be compatible with the height restrictions identified in the SFO ALUCP pursuant to consultation with the FAA. Under federal law, the project sponsor is required to comply with all notifications and other requirements described in 14 CFR Part 77. The project sponsor would be required to file Form 7460-1, Notice of Proposed Construction or Alteration, with the FAA to determine whether the project would constitute a hazard to air navigation, and if any airspace safety design features (e.g., lighting) would be necessary. The project site is not located in a Safety Compatibility Zone;<sup>32</sup> Policies SP-1, SP-2, and SP-3 are not applicable to the proposed project. Therefore, the project would be generally consistent with the SFO ALUCP. Refer to Section 4.8, Noise and Vibration, of this draft EIR, for an analysis of the project's consistency with SFO ALUCP noise policies.

#### South San Francisco General Plan

The South San Francisco General Plan Land Use Element identifies policies intended to shape future development within the City and its respective planning areas and districts.

As discussed under Impact AES-3, no substantial change to the existing visual character on the project site or within the surrounding area would occur under the proposed project. As discussed above, the project would be generally consistent with the SFO ALUCP. Therefore, the proposed project would not conflict with Land Use Element Policies 2-G-1, 2-G-2, and 2-I-22.

The proposed project would involve new office and R&D uses under the existing BC land use designation. The total proposed FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18, which reflects the City's prominent inner bay location and regional access. The base maximum permitted FAR in the BC land use designation is 0.5, but increases may be permitted up to a total FAR of 1.0 for uses such as R&D facilities, or for development meeting specific TDM, off-site improvement, or specific design standards. In addition, the General Plan provides that the zoning ordinance can provide specific exceptions to FAR limitations for uses with low employment densities. A maximum FAR of 1.25 is permitted in the GSPD. The proposed project is consistent with previous and ongoing expansion of

<sup>&</sup>lt;sup>29</sup> Exhibit IV-5, *Noise Compatibility Zones* in the SFO ALUCP.

<sup>&</sup>lt;sup>30</sup> Exhibit IV-2, Airport Influence Area B – Land Use Policy Action/Project Referral Area in the SFO ALUCP.

<sup>&</sup>lt;sup>31</sup> City/County Association of Governments of San Mateo County. 2012. *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*. Available: https://ccag.ca.gov/wp-content/uploads/2014/10/Consolidated\_CCAG\_ALUCP\_November-20121.pdf. Accessed: March 27, 2020.

<sup>32</sup> Exhibit IV-8, Safety Compatibility Zones in the Cities of South San Francisco and San Bruno in the SFO ALUCP.

R&D uses in the East of 101 Area, including the Gateway Campus as well as other biotechnology campus sites. In addition, the proposed project would provide employee-serving retail amenities, including a café and fitness center. Signage would be included at site entrances, along walkways, and in parking lots, consistent with the signage throughout the Gateway Campus. Similarly, the project would include streetscape improvements that would complement the existing streetscape design of the Gateway Campus. In addition, the proposed project would not construct new warehousing or distribution uses. Therefore, the proposed project would not conflict with Planning Sub-Areas Element Policies 3.5-G-3, 3.5-1-5, 3.5-I-7, 3.5-I-8, or 3.5-I-11.

As described in Section 4.9, *Transportation and Circulation*, of this draft EIR, Transportation Element Policy 4.2-G-13 directs the City to strive to maintain Level of Service (LOS) D or better on arterial and collector streets, at all intersections, and on principal arterials in the Congestion Management Program (CMP) during peak hours. Nonetheless, Transportation Element Policy 4.2-G-14 permits the City to accept LOS E or F after finding that: (1) there is no practical and feasible way to mitigate the lower LOS; and (2) the uses resulting in the lower LOS are of clear, overall public benefit. Senate Bill 743 amended CEQA to establish that automobile delay as described solely by level of service shall not be considered a significant impact on the environment. On June 10, 2020 the City adopted a vehicle miles traveled (VMT) threshold in accordance with the Office of Planning and Research's guidance in implementing Senate Bill 743; the threshold is effective July 1, 2020. Thus, for CEQA purposes, LOS is no longer a threshold and this analysis considers the appropriate VMT threshold. Therefore, Policies 4.2-G-13 and 4.2-G-14 are not applicable to the CEQA analysis of the proposed project. A discussion of the project's VMT impacts, among other transportation impacts, is provided below.

As described in Section 4.9, Transportation and Circulation, the project would generate approximately 16.2 home-based work (HBW) VMT per employee under existing conditions, which is greater than the regional average total of 14.2 HBW VMT per employee and the per-employee significance threshold of 11.8 HBW VMT. First- and last-mile transit connections and active transportation improvements would likely yield the greatest project VMT reductions. Mitigation Measure TR-1, First- and Last-mile Strategies, would support and enhance the effectiveness of the project's TDM program strategies. Mitigation Measure TR-1 would be unlikely to substantially reduce HBW VMT per-employee, but would aid in reducing project auto travel demand. In addition, implementation of Mitigation Measure TR-1 would improve pedestrian connections with existing and/or new public shuttle stops and enable the project to limit travel time effects on existing shuttle routes by eliminating additional route divisions. Therefore, the project would not produce a detrimental impact to local transit or shuttle service, nor would it conflict with adopted plans and programs. Project vehicle trips would not exceed ramp storage capacities nor would the trips interfere with the freeway mainline, specifically at the U.S. 101 southbound off-ramp at Oyster Point Boulevard and U.S. 101 northbound off-ramps at East Grand Avenue and Dubuque Avenue, and therefore, the project would have a less than significant impact on freeway ramp queuing. Furthermore, the project site and proposed building would be designed to ensure that emergency vehicles would have full access to the project site to provide adequate emergency access. Therefore, the proposed project would not conflict with transportation-related land use policies adopted for the purpose of mitigating an environmental effect.

Based on the analysis above, the project would be generally consistent with the General Plan.

### East of 101 Area Plan

The *East of 101 Area Plan* establishes specific land use policies for the East of 101 Area, inclusive of the Gateway Specific Plan area. The proposed project is consistent with previous and ongoing expansion of R&D uses in the East of 101 Area. As mentioned above, per Policy IM-5, the *Gateway Specific Plan* is not

affected by the land use regulations of the *East of 101 Area Plan*. Therefore, the policies set forth in the General Plan are the guiding policies and supersede all Land Use Element policies set forth in Chapter 4 of the *East of 101 Area Plan*.

The project site is designated as Gateway Specific Plan Area in the *East of 101 Area Plan*. <sup>33</sup> The City interprets the *East of 101 Area Plan* as a design-level document. Development standards and density determinations, including FAR, are established in the General Plan, which was updated after the adoption of, and takes precedence over, the *East of 101 Area Plan*. Moreover, per Policy IM-5, when *East of 101 Area Plan* policies are in conflict with or inconsistent with the General Plan, the General Plan policies supersede requirements outlined in the *East of 101 Area Plan*. Policies from the *East of 101 Area Plan* that are applicable to land use are discussed in *Regulatory Framework*, above.

The proposed project would maintain the existing zoning designation of Zone IV under the GSPD. Based on the zoning, 232,695 square feet of unrealized FAR remains available for the project site, and the proposed project would utilize a portion of that unrealized FAR. The proposed total FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18. Therefore, the proposed project would not conflict with Policy LU-8a or Policy LU-8b.

The proposed project site plan (refer to Figure 3-4 in Chapter 3, *Project Description*, of this draft EIR) was designed in accordance with the applicable design guidelines in the *East of 101 Area Plan*. The guidelines are interpreted during the design review process, which would involve iterative revisions up until project approval. City staff are responsible for determining final consistency under that process, and the project is subject to Design Review by the City's Design Review Board and Planning Commission. No substantive conflicts have been identified for the proposed project. Based on the analysis above, the project would be generally consistent with the *East of Area 101 Area Plan* and would not result in a significant impact on the environment.

#### **South San Francisco Zoning Ordinance**

The South San Francisco Zoning Ordinance identifies the project site as Gateway Specific Plan District (GSPD). The GSPD is divided into five individual zones with specifically defined permitted land uses. The project area is within Zone IV. Permitted uses within Zone IV include office, research and development, personal service, and retail sales. The maximum permitted FAR in the GSPD is 1.25. Buildings in the GSPD may have a maximum height of 250 feet. The project proposes office and R&D uses. The total proposed FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18. The project would be 148 feet in height. In addition, the project would require a Conditional Use Permit for a parking reduction. Because the project would be consistent with land uses permitted under the GSPD zoning district and there would be no FAR or height exceedances, the project would be consistent with the Zoning Ordinance.

The land use entitlements of the Gateway Specific Plan are not affected by the *East of 101 Area Plan* and supersede any standards or entitlements set forth in the *East of 101 Area Plan*. However, development within the project site would be required to conform with other policies of the *East of 101 Area Plan*, such as design guidelines.

### **Climate Action Plan**

The proposed project would include a flexible TDM plan, which would include a range of required and optional alternative transportation-related requirements (e.g., carpool and vanpool ride-matching services, showers and clothes lockers, shuttle program, short- and long-term bicycle parking, etc.). The proposed project would also include payment of the City's East of 101 traffic impact fee. In addition, the project would be designed to meet LEED Gold certification as well as International WELL and Fitwel Building Institute Standards. The proposed project would include construction of rooftop solar photovoltaic panel-ready connectivity to allow for the potential future installation of solar panels. The project sponsor, in coordination with City staff, would perform ongoing review and identification of applicable CAP Measures for New Development, or for Additions, Alterations, and Tenant Improvements, to be incorporated into the proposed project as project features, mitigation of environmental effects, or mandatory conditions of approval commensurate with the project's intensity of use and site-specific conditions. Therefore, the proposed project would be consistent with the CAP. In addition, as previously discussed, the City's CAP is currently being updated. The 2014 CAP remains active until completion and adoption of the new CAP.

#### Conclusion

The proposed project would not conflict with land uses plans and policies such that a substantial adverse physical change in the environment related to land use would result. For this reason, the proposed project would have a *less-than-significant* impact related to conflict with a land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. No mitigation is required.

Potential conflicts with applicable policies will continue to be analyzed and considered as part of the review of entitlements applications required for the proposed project independent of environmental review under CEQA. They also will be considered by the decision makers during their deliberations on the merits of the proposed project and as part of their actions to approve, modify, or disapprove the proposed project.

# Impact C-LU-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on land use. (*Less than Significant*)

The cumulative geographic context for land use is the immediate vicinity of the project site (i.e., the parcels adjacent to the project site). The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

The nearest cumulative project, the project at 475 Eccles Avenue (Cumulative Project No. 16), is located approximately 630 feet east of the project site. The project at 475 Eccles Avenue would involve new office/R&D buildings that would be located on an infill site surrounded by office/R&D uses. The remaining cumulative projects would also involve new office, R&D, and hotel uses. In addition, two cumulative projects (Bicycle Master Plan [Cumulative Project No. 23] and Mobility 2020 - East of 101 Transportation Plan [Cumulative Project No. 24]) would make improvements and additions to existing bicycle, pedestrian, and/or transit networks. Conflicts with existing plans and policies do not, in themselves, indicate a significant environmental effect related to the topic of land use and planning within the meaning of CEQA, unless the project substantially conflicts with a land use plan/policy that was adopted for the purpose of avoiding or mitigating an environmental effect. In addition, cumulative projects in the vicinity of the project site would be constructed on infill sites and would not divide an established community. Rather, consistent with current urban design practice in the City, designs would

aim to enhance connectivity. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative land use impact. The cumulative impact would be *less than significant*. No mitigation is required.

# 4.10.6 Mineral Resources

# 4.10.6.1 Regulatory Framework

There are no federal, state, regional, or local laws, regulations, plans, or policies related to mineral resources with respect to implementation of the proposed project.

# 4.10.6.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant mineral resources impact if it would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, or
- Result in the loss of availability of a locally important mineral resource recovery site delineated in a local general plan, specific plan, or other land use plan.

# 4.10.6.3 Approach to Analysis

Evaluation of the proposed project is based on a review of the California Department of Conservation, Division of Mines and Geology, Mineral Lands Classification System, in accordance with the Surface Mining and Reclamation Act of 1975.34

# 4.10.6.4 Impact Evaluation

Impact MIN-1: The proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state and/or a locally important mineral resource recovery site delineated in a local general plan, specific plan, or other land use plan. (*No Impact*)

The project site is in an area of the City that has been zoned by the state as Mineral Resource Zone 1 (MRZ-1), an area where no significant mineral deposits are present and little likelihood exists for their presence.<sup>35</sup> The area surrounding the project site is not known to support significant mineral resources of any type, and no mineral resources are currently being extracted in the City. The list of mines from the Office of Mine Reclamation (the AB 3098 List), which lists mines that are regulated under the Surface Mining and Reclamation Act, does not include any mines that are within the City.<sup>36</sup> In addition, the project site has not been designated as a locally important mineral resource recovery site in the General Plan, any specific plan, or other land use plan.

<sup>&</sup>lt;sup>34</sup> California Department of Conservation. 2015. *Surface Mining and Reclamation Act (SMARA) Mineral Lands Classification (MLC) Data Portal Website*. Available: https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=mlc. Accessed: February 19, 2020.

<sup>&</sup>lt;sup>35</sup> California Division of Mines and Geology. 1996. *Open File Report 96-03—Update of Mineral Land Classification:* Aggregate Materials in the South San Francisco Bay Production-Consumption Region. Available: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/0FR\_96-03/0FR\_96-03\_Text.pdf. Accessed: February 18, 2020.

<sup>36</sup> California Department of Conservation. 2020. AB 3098 List. Available: https://www.conservation.ca.gov/dmr/smara-mines. Accessed: February 18, 2020.

Because the project site is in a developed urban area and does not contain any known or designated mineral resources or resource recovery sites, implementation of the proposed project would have **no impact** on known mineral resources or locally important mineral resource recovery sites. No mitigation is required.

# 4.10.7 Population and Housing

# 4.10.7.1 Regulatory Framework

# Regional

## Plan Bay Area

Plan Bay Area, created by the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission, approved in July 2013, is a long-range (2040), integrated transportation and land use/housing strategy for the San Francisco Bay Area. Senate Bill 375, adopted in 2008, requires preparation of a Sustainable Communities Strategy (SCS), an integrated transportation, land use, and housing strategy for the Bay Area. The SCS is intended to address transportation, mobility, and accessibility needs; land development concerns; and GHG emissions reduction requirements through 2040. Included in the plan are population and housing forecasts for the Bay Area. The most recent projections, *Projections 2040*, were released by ABAG in 2019.

# Regional Housing Need Plan for the San Francisco Bay Area: 2015-2023

In the Bay Area, the SCS and Regional Housing Needs Allocation (RHNA) are mutually reinforcing; they were developed together to meet the overlapping objectives of SB 375 and housing element law.<sup>37</sup> The City's housing element incorporates the RHNA and discusses the City's allocation of regional housing needs by income, as projected by ABAG. In addition, SB 375 requires the RHNA to be consistent with the SCS and establishes an eight-year cycle for the RHNA. The 2015–2023 RHNA has been incorporated into *Plan Bay Area*. The objectives of the RHNA include increasing the supply, diversity, and affordability of housing; promoting infill development and a more efficient land use pattern; promoting an improved intraregional relationship between jobs and housing; protecting environmental resources; and promoting socioeconomic equity. More important, the RHNA includes production targets that address the housing needs of a range of household income categories.

The RHNA determined that the Bay Area must plan for 187,990 additional housing units between 2015 and 2023.<sup>38</sup> South San Francisco's share of the regional housing need for this time period is 1,864 new units, with approximately 1,159 of these units allocated as affordable housing. The City's RHNA requirement represents approximately 1 percent of the total regional allocation and amounts to a citywide housing production goal of approximately 233 units per year.

Each jurisdiction's housing element must include a strategy to meet its share of the region's housing need. Jurisdictions that do not have the capacity to meet the RHNA requirement must rezone sites with appropriate development standards to accommodate the allocation requirement.

Association of Bay Area Governments. 2013. *Regional Housing Need Plan—San Francisco Bay Area, 2015–2023*. Available: https://abag.ca.gov/sites/default/files/2015-23\_rhna\_plan.pdf. Accessed: March 9, 2020.

#### Local

### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, and establishes a basis for judging whether specific development proposals and public projects are consistent with the City's plans and policy standards. The Economic Development Element of the General Plan provides a policy framework for ensuring South San Francisco's long-term competitiveness in the region. Based on the analysis of recognized business trends and available resources, the Economic Development Element outlines the City's economic development objectives, serves to ensure that economic decision making is integrated with other aspects of the City's development, and provides a framework for detailed implementing actions.

The General Plan Housing Element, adopted in April 2015, is the City's primary policy document regarding the development, rehabilitation, and preservation of housing for all economic segments of the population within the City's boundaries. Accordingly, the Housing Element identifies and analyzes the existing and projected housing needs of the City and states goals, policies, quantified objectives, and implementation programs for the preservation, improvement, and development of housing. The Housing Element describes housing needs and identifies the capacity for new housing in the City based on land supply and development capacity. This element focuses on the City's critical need for affordable housing. The Housing Element establishes goals for housing production, as well as policies related to mitigating the impacts of growth on the housing market. In addition, the housing element also identifies sites for housing development that are adequate with respect to accommodating South San Francisco's portion of the RHNA.

The project site is in the *East of 101 Area Plan* planning area. The General Plan states that none of the parcels, including the project site, are designated as residential. In addition, in the Planning Sub-Areas Element of the General Plan, Implementing Policy 3.5-I-3 states that no residential uses are allowed within the *East of 101 Area Plan* planning area, due to land use compatibility and the desire to protect land for employment uses.

# 4.10.7.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant population and housing impact if it would:

- Induce substantial unplanned 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); or
- Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

# 4.10.7.3 Approach to Analysis

Evaluation of the proposed project is based on the employment estimates provided by the project applicant and data regarding projected employment growth in the City provided by ABAG's *Projections 2040*.

# 4.10.7.4 Impact Evaluation

Impact PH-1: The proposed project would not induce substantial unplanned 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). (*Less than Significant*)

### **Direct Project-Related Population Growth**

#### **Construction**

Full buildout of the project is expected to take 18 months and be completed in December 2021, if the related entitlements are approved by the City. The approximate average number of construction workers onsite would be 73, with a maximum of 110 workers during building construction. It is anticipated that construction employees associated with the proposed project who are not already living in the City would commute from their residences elsewhere in the Bay Area rather than permanently relocated to South San Francisco from more distant locations; this is typical for employees in the various construction trades. Once construction is complete, construction workers typically seek employment at other job sites in the region that require their specific skills. Therefore, construction of the proposed project would not generate an unplanned population increase in the City and this impact would be *less than significant*. No mitigation is required.

#### Operation

The proposed project does not propose any new housing units and would not directly induce population growth. The existing office building at 701 Gateway Boulevard would remain. The proposed project would result in approximately 731 net new employees at the project site.<sup>39</sup> Upon project completion, there would be approximately 1,181 total employees on-site (including the 450 employees in the 701 Gateway building who would remain). The net new employees generated by the proposed project would increase the number of employees in the City and the East of 101 Area.

As shown in Table 4.10-2, ABAG projects the City's jobs will increase by approximately 7,865, from 46,365 in 2020 to 54,230 in 2040. The 731 net new employees that would be generated by the proposed project would represent less than 10 percent of the City's total projected job increase between 2020 and 2040 and would not represent a substantial portion of the projected job growth in the City. Per ABAG job projections, this is anticipated growth for the City. Therefore, operation of the proposed project would not generate an unplanned population increase in the City and this impact would be *less than significant*. No mitigation is required.

<sup>&</sup>lt;sup>39</sup> The estimated number of employees is based on data provided by the project applicant; it assumes 60 percent of the proposed square footage (approximately 118,000 square feet) is R&D space and 40 percent of the proposed square footage (approximately 78,700 square feet) is office space. The average square footage per R&D employee is assumed to be 350, and the average square footage per office employee is assumed to be 200. The estimated number of employees associated with the proposed fitness center and café is accounted for in the estimate of the number of employees associated with the proposed R&D and office uses.

Table 4.10-2. Population, Households, and Job Growth Projections, 2010–2040

|                                | 2010              | 2020      | 2030      | 2040      | Growth<br>2020-2040 |
|--------------------------------|-------------------|-----------|-----------|-----------|---------------------|
| Population                     |                   |           |           |           |                     |
| Bay Area                       | 7,150,739         | 7,920,230 | 8,689,440 | 9,652,950 | 1,732,720           |
| San Mateo<br>County            | 721,195           | 796,925   | 853,260   | 916,590   | 119,665             |
| City of South San<br>Francisco | 64,005            | 68,105    | 76,950    | 80,015    | 11,910              |
| Households                     |                   |           |           |           |                     |
| Bay Area                       | 2,608,025         | 2,881,965 | 3,142,015 | 3,426,700 | 544,735             |
| San Mateo<br>County            | 257,835           | 284,260   | 302,520   | 317,965   | 33,705              |
| City of South San<br>Francisco | 20,940            | 22,155    | 24,950    | 25,305    | 3,150               |
| Jobs                           |                   |           |           |           |                     |
| Bay Area                       | 3,451,820         | 4,136,190 | 4,405,125 | 4,698,375 | 562,185             |
| San Mateo<br>County            | 343,335           | 399,275   | 423,005   | 472,045   | 72.770              |
| City of South San<br>Francisco | 38,720            | 46,365    | 51,000    | 54,230    | 7,865               |
| Source: ABAG. 2019. F          | Projections 2040. |           |           |           |                     |

# **Indirect Project-Related Population Growth**

# Infrastructure

The proposed project would be located on a developed parcel within the Gateway Campus, which includes office, R&D, childcare, and amenity uses. The project site is serviced by existing water, wastewater, stormwater, natural gas, electric, telecommunications, and waste and recycling services. New on-site facilities would be connected to new services through the installation of new, localized connections. Expansion or an increase in capacity of off-site infrastructure would occur as required by the utility providers. In addition, the proposed project would not include the extension of area roadways. Because the proposed infrastructure would be sized to meet the needs of the proposed project, it would not lead to unplanned indirect population growth or the need for additional housing beyond that expected to be generated by the proposed project and this impact would be *less than significant*. No mitigation is required.

# **Employment-Related Housing Demand**

The net new 731 employees generated as a result of the proposed project could increase demand for housing and contribute to total overall housing demand citywide. It is assumed that most of the employees generated by the project would be existing residents in the City, the county, or the Bay Area, but a small portion of the new employees could generate new demand for housing within the City. However, this analysis conservatively assumes that all employees generated by the proposed project would be new to the City, thereby requiring housing.

The City is primarily built out and any housing constructed within the City limits would most likely be infill housing. The total number of jobs and the total number of housing units make up an area's jobs/housing ratio. The ratio is an indicator of the extent to which the workforce may have an opportunity to live and work in the same area, assuming the occupations and skills of the employees match the occupations and skills required for the jobs and that the housing supply meets the needs of those employees. Local governments may use the jobs/housing balance as a planning tool for achieving particular policy outcomes; however, it is not a regulatory tool and does not necessarily imply a physical change in the environment or relate to any recognized threshold of significance under CEQA. A worsening jobs/housing balance may be an indicator of longer commute times, the associated environmental consequences of which, such as impacts related to transportation, air quality, and GHG emissions, are discussed throughout this EIR. Therefore, the jobs/housing balance is discussed below for informational purposes only.

As shown in Table 4.10-2, ABAG projects the City's households will increase by approximately 3,150, from 22,155 in 2020 to 25,305 in 2040. In addition, ABAG projects the City's jobs will increase by approximately 7,865, from 46,365 in 2020 to 54,230 in 2040. This means that South San Francisco is a job center that imports employees from surrounding communities or, alternatively, that exports housing, and a high level of in-commuting. Housing availability, already projected to be out of balance, would decrease with project buildout because the proposed project would result in net new employees and no increase in housing units. Therefore, the proposed project would result in an increased unfavorable jobs/housing ratio in the City. However, continued job growth in the City will promote a greater regional balance between jobs and housing. In addition, the City has several residential and mixed-use projects west of U.S. 101 that are either under construction or in the development pipeline which would add to the City's housing supply and promote a greater regional balance between jobs and housing. The City is located in Bay Area and is well served by all modes of transit, including shuttles, bus, rail, and air. Therefore, additional potential future employees would have access to a variety of transportation options for reaching the project site from throughout the Bay Area.

ABAG projects the City, on average, currently has approximately 1.54 employed residents per household.<sup>40</sup> Accordingly, the proposed project would create the need for up to 475 new housing units upon buildout.<sup>41</sup> Although it is likely that some of the new employees would be existing residents in the City or the region, the potential employment increase resulting from the proposed project could result in indirect growth that the City may not be able to accommodate with existing and projected housing in the City. The City acknowledges that much of its land area, including the East of 101 Area, is not well suited for housing development due to existing land use conflicts (e.g., proximity to SFO, the historic and existing industrial uses of the East of 101 Area, and emerging office and R&D uses in the area).<sup>42</sup> The City does not have an adopted jobs/housing ratio goal that would be applicable to development within the East of 101 Area and relies upon the Bay Area's regional jobs-housing balance for informational purposes only. Nonetheless, the City adopted the Affordable Housing Commercial Linkage Fees in chapter 8.69 of the Municipal Code to establish fees for non-residential development projects and to address the effect of increased job opportunities and the need for affordable housing.

<sup>&</sup>lt;sup>40</sup> Association of Bay Area Governments. 2019. *Projections 2040*. Calculation based on employed residents (34,075) divided by households (22,155) in 2020.

The number new housing units needed for the employees generated from the proposed project was calculated as follows: Employees generated under the proposed project divided by the number of employed residents per household. (i.e. 731/1.54= 475 housing units required).

<sup>&</sup>lt;sup>42</sup> General Plan, Chapter 3, Policy 3.5-I-3, p. 3-45.

The proposed project would promote greater regional balance between jobs and housing and would be located within an area with compatible land uses, consistent with General Plan and specific plan designations. In addition, the job growth that would occur as a result of the proposed project would be consistent with the City's projected employment growth, and the project would be required to pay the commercial linkage fee under Chapter 8.69 of the Municipal Code, which would contribute to the development of affordable housing in other locations within the City. Therefore, the proposed project would not induce substantial unplanned population growth in an area, either directly (by proposing new businesses) or indirectly (through extension of roads or other infrastructure and this impact would be *less than significant*. No mitigation is required.

# Impact PH-2: The proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere. (*No Impact*)

The project site does not contain any existing residents or housing units. The existing 450 employees in the 701 Gateway Boulevard building would remain under the proposed project. Therefore, the proposed project would have *no impact* because it would not displace people or housing.

# Impact C-PH-1: The proposed project would not result in a cumulatively considerable contribution to a significant cumulative impact on population and housing. (*Less than Significant*)

Housing and employment growth in South San Francisco is consistent with the projections contained in Plan Bay Area, which is the current Regional Transportation Plan/Sustainable Communities Strategy adopted by Metropolitan Transportation Commission and ABAG in July 2017, in compliance with California's governing GHG reduction legislation, Senate Bill 375. Plan Bay Area calls for an increasing percentage of Bay Area growth to occur as infill development in areas with good transit access where the services necessary for daily living are provided in proximity to housing and jobs. South San Francisco is expected to accommodate its fair share of future regional growth. Therefore, the Plan Bay Area projections represent the cumulative geographic context for population and housing. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

# **Direct Population Growth**

The proposed project does not propose any new housing units and would not directly induce population growth. None of the cumulative projects are residential mixed-use or housing projects; thus, the cumulative projects would not increase the residential population surrounding the project site. Although the cumulative projects would generate demand for new housing units in the City, the cumulative projects would not constitute direct population growth.

For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a direct significant cumulative population and housing impact. The cumulative impact would be *less than significant*. No mitigation is required.

# **Indirect Population Growth**

### Infrastructure

The proposed project would be located on a developed parcel. In addition, the proposed infrastructure would be sized to meet the needs of the proposed project. Each of the cumulative projects would construct new uses on existing infill sites in an urbanized area. Development of infrastructure could remove obstacles to population growth if it would allow for development in an area that was not previously considered feasible for development because of infrastructure limitations, which could induce population growth indirectly. The proposed project and the cumulative projects would not include the extension of area roadways or expansion of infrastructure to areas lacking existing development. The East of 101 Area is confined by the San Francisco Bay on the north, east and south sides, and existing development west of U.S. 101. Therefore, the amount of development potential is limited by the amount of land available for infill development, and not generally limited by the availability of infrastructure. Some of the cumulative projects may require off-site improvements to utility infrastructure proportional to the scale of development proposed by each project. However, this infrastructure would not indirectly induce substantial population growth in the project area because the cumulative projects are located on infill sites surrounded by existing development and the proposed infrastructure improvements would be sized to meet only project needs and would not enable additional development. Furthermore, each of these projects would be required to provide impact fees associated with City infrastructure improvements. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant indirect population growth as a result of expansion of infrastructure. The cumulative impact would be *less than significant*. No mitigation is required.

# **Employment-Related Housing Demand**

As discussed under Impact PH-1, the City is a job center that imports employees from surrounding communities or, alternatively, that exports housing. Housing availability, already projected to be out of balance, would decrease with implementation of the proposed project in combination with past, present, and reasonably foreseeable future projects, and would result in an increased unfavorable jobs/housing ratio in the City.

The proposed project would result in approximately 731 net new employees at the project site.<sup>43</sup> The cumulative projects primarily include office, R&D, hotel, and other commercial uses. The cumulative projects would generate approximately 19,167 employees.<sup>44</sup> Therefore, at project

<sup>43</sup> The estimated number of employees is based on data provided by the project applicant; it assumes 60 percent of the proposed square footage (approximately 118,000 square feet) is R&D space and 40 percent of the proposed square footage (approximately 78,700 square feet) is office space. The average square footage per R&D employee is assumed to be 350, and the average square footage per office employee is assumed to be 200. The estimated number of employees associated with the proposed fitness center and café is accounted for in the estimate of the number of employees associated with the proposed R&D and office uses.

The employee generated by each of the cumulative projects was calculated using the following employee generation rates from the General Plan: 450 square feet of office/R&D space per employee, 400 square feet of commercial space per employee, and 955 square feet of industrial space per employee. The employee generation rates used for the proposed project is based on data provided by the project applicant and, thus, differs from the employee generation rates used for the cumulative projects, which are based on the General Plan.

buildout, the proposed project in combination with other projects would generate approximately 19,898 new employees in the City. As previously discussed, the City is projected to have 54,230 jobs in 2040. The proposed project in combination with the other projects would represent approximately 37 percent of the total jobs projected in the City in 2040, and approximately 244 percent of the incremental job growth from 2020-2040. The total job growth generated by the project and cumulative projects would be within total job growth projections for the City and consistent with the long-term goal of developing and intensifying office and R&D uses within the Gateway Specific Plan and East of 101 Area; however, the job growth generated by the project and cumulative projects would exceed the City's incremental job growth projections from 2020-2040.

ABAG projects the City, on average, currently has approximately 1.54 employed residents per household. 45 Accordingly, the proposed project would create the need for up to 475 new housing units upon buildout and the cumulative projects would create the need for up to 12,446 new housing units upon buildout. 46 Although it is likely that some of the new employees would be existing residents in the City or the region, the potential employment increase resulting from the proposed project could result in indirect growth that the City may not be able to accommodate with existing and projected housing in the City. The City acknowledges that much of its land area, including the East of 101 Area, is not well suited for housing development due to existing land use conflicts (e.g., proximity to SFO, the historic and existing industrial uses of the East of 101 Area, and emerging office and R&D uses in the area).<sup>47</sup> The City does not have an adopted jobs/housing ratio goal that would be applicable to development within the East of 101 Area and references the Bay Area's regional jobs-housing ratio data for informational purposes only, for the purposes of developing or analyzing policies. Nonetheless, the City adopted the Affordable Housing Commercial Linkage Fees in Chapter 8.69 of the Municipal Code to establish fees for non-residential development projects and to address the effect of increased job opportunities and the need for affordable housing. In addition, the City has several residential and mixed-use projects west of U.S. 101 that are either under construction or in the development pipeline which would add to the City's housing supply and help to offset the housing demand generated by the proposed project and cumulative projects. 48 Furthermore, as part of the City's General Plan Update, some areas throughout the City that are not considered for residential land uses under the current General Plan may be re-designated and re-zoned to allow for residential development in order to help accommodate for future housing demands.

Based on the analysis above, there would be a *significant* cumulative impact on indirect population growth as a result of increasing employment-related housing demand, due to the lack of housing available within the City. However, the project's contribution to the cumulative impact would not be cumulatively considerable and would be *less than significant* because growth under the project would be consistent with the long-term goal of developing and intensifying office and R&D uses within the Gateway Specific Plan and East of 101 Area, and within the growth projections for the City. No mitigation is required.

<sup>&</sup>lt;sup>45</sup> Association of Bay Area Governments. 2019. *Projections 2040*. Calculation based on employed residents (34,075) divided by households (22,155) in 2020.

The number new housing units needed for the employees generated from the cumulative projects was calculated as follows: Employees generated by the cumulative projects divided by the number of employed residents per household. (i.e. 19,167/1.54= 12,446 housing units required).

<sup>47</sup> General Plan, Chapter 3, Policy 3,5-I-3, p. 3-45.

<sup>&</sup>lt;sup>48</sup> City of South San Francisco. 2020. *South San Francisco Development and Construction Map.* Available: http://construction.ssf.net/. Accessed: April 27, 2020.

# 4.10.8 Public Services

# 4.10.8.1 Regulatory Framework

### State

#### California Fire Code

The California Fire Code, 2019 edition, as published by the International Code Council and adopted by the State Fire Marshal, is adopted by reference by the City of South San Francisco. Section 13000 *et seq.* of the California Health Safety Code includes regulations concerning the building standards set forth in the California Building Standards Code and state fire regulations. These include standards concerning fire protection and notification systems; fire protection devices, such as extinguishers and smoke alarms; fire suppression training; and high-rise construction.

#### Local

#### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Health and Safety Element, which acknowledges and mitigates the risks posed by hazards (e.g., fire) and ensures adequate police service. The General Plan includes the following policies applicable to public services:

- Policy 8.4-G-1: Minimize the risk to life and property from fire hazards in South San Francisco.
- Policy 8.4-G-2: Provide fire protection that is responsive to citizens' needs.
- Policy 8.4-I-4<sup>49</sup>: Require site design features, fire-retardant building materials, and adequate access
  as conditions for approval of development or improvements to reduce the risk of fire within the City.
- Policy 8.5-G-1: Provide police services that are responsive to citizens' needs to ensure a safe and secure environment for people and property in the community.
- Policy 8.5-I-1: Ensure adequate police staff to provide a 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:

- o Maintain a law enforcement standard of 1.5 police officers per 1,000 residents;
- Analyze and monitor factors affecting response time (population growth, police staffing, community policing programs) and average response times as guidelines based on past experience;
- Maintain, train, and equip special response teams for extraordinary or extremely hazardous emergency incidents; and
- Develop and/or use the City's Geographic Information System (GIS) for analysis of issues including crime location trends and response routes (see policy 2-I-14).

<sup>&</sup>lt;sup>49</sup> Policy 8.4-I-4 is misnumbered in the General Plan as the second Policy "8.4-I-3".

# 4.10.8.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant public services impact if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically
  altered governmental facilities or 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 any of the following
  public services:
  - Fire protection,
  - o Police protection,
  - o Schools,
  - o Parks, or
  - Other public facilities;

# 4.10.8.3 Approach to Analysis

Evaluation of the proposed project is based on considering how employee population growth resulting from implementation of the proposed project would affect public services. According to the CEQA significance criteria, the proposed project would have an adverse environmental impact if it were to result in a substantial adverse physical impact associated with the provision of new or physically altered government facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times, or other performance objectives for any public services (i.e., fire and police protection, schools, parks, other public facilities). Physical impacts associated with parks are discussed in Section 4.10.9, *Recreation*, of this draft EIR.

# 4.10.8.4 Impact Evaluation

Impact PS-1: The proposed project would not require the provision of new or physically altered fire and emergency medical services in order to maintain acceptable service ratios, response times, or other performance objectives. (*Less than Significant*)

The South San Francisco Fire Department (SSFFD) provides fire protection and emergency services for the project area. The department has 87 full-time-equivalent employees and 4.93 hourly and contract employees for operations that include fire prevention, emergency medical services, and administrative work.<sup>50</sup> A minimum of 24 emergency responders are on-duty during each of the department's three shifts. The Health and Safety Element of the General Plan does not identify a personnel-to-service population ratio.

There are five fire stations in the City. The nearest fire station to the project is Fire Station No. 62 at 249 Harbor Way, approximately 0.8 mile south of the project site. Fire Station No. 62 has three apparatus bays. Fire Station No. 62 would be supported by Fire Station No. 61 and Fire Station

<sup>&</sup>lt;sup>50</sup> City of South San Francisco. 2019. *Adopted Biennial Operating Budget and Capital Improvement Program, Fiscal Years 2019–2021*. Available: https://www.ssf.net/home/showdocument?id=16797. Accessed: February 24, 2020.

No. 65. The project site is not within a Fire Hazard Management Unit. 51 Existing access to the project site, via Gateway Boulevard, East Grand Avenue, and Oyster Point Boulevard, would not change as a result of the proposed project.

The SSFFD's goal is to arrive at emergency incidents within seven minutes of a call, including four minutes for travel time. 52,53 To determine the adequacy of fire and emergency medical service in the East of 101 Area, the City mapped areas that can be traveled to within 4 minutes from Station No. 62.54 Areas at the northeastern end of the East of 101 Area, including the project site, are within the existing Fire Station No. 62 4-minute travel time capability. Therefore, no new firefighting facilities would be necessary to serve the proposed project.

The proposed project would increase the demand for fire protection services as a result of the increased number of employees (i.e., 731 net new employees). Table 4.10-3 identifies the estimated annual service calls, calls per day, and firefighter demand generated by the proposed project. The proposed project would generate approximately 7 calls per year and fewer than 1 call per month. Therefore, the project would not require additional emergency-medical or fire-response personnel.

Table 4.10-3. Estimated Project Demand for Fire Protection and Emergency Medical Response

|                  | Proposed<br>Office/R&D Space<br>(square feet) | Annual<br>Service<br>Calls | Total<br>Calls<br>per Day | Firefighter<br>Demand |
|------------------|---|----------------------------|---------------------------|-----------------------|
| Proposed Project | 208,800                                       | 7.06                       | .019                      | 0                     |

Note: The average annual call volume was calculated using an annual service call generation rate of 0.0338 calls per 1,000 square feet of Office/R&D as follows: 0.0338 calls x (208,800 square feet/ 1,000 square feet) = 7.06 annual service calls.

Source: Michael Baker International. 2017. 2017 Oyster Point Specific Plan Update Appendix I- Municipal Services Assessment, Table A-1: Firefighter/Emergency Response Call Volume Demand Estimates. Available: https://weblink.ssf.net/WebLink/0/doc/367046/Page1.aspx. Accessed: February 25, 2020.

The SSFFD also commented on the proposed project through the City's standard review process. Staffing and service issues were not identified with respect to site development.

Based on the analysis above, although the project would result in more employees at the project site, it is expected that the proposed land uses would not lead to a substantial increase in service calls to SSFFD. In addition, it is anticipated that the project would not lead to an increase in SSFFD service call response times. Furthermore, the proposed project would be required to comply with the City's standard conditions, which will be attached to the entitlements for the proposed project, including Condition No. 26, which requires compliance with City the City's Fire Code Ordinance. In addition, the proposed project would be required to comply with any project-specific conditions of approval

<sup>51</sup> City of South San Francisco. 1999. City of South San Francisco General Plan. Health and Safety Element. Available: https://www.ssf.net/home/showdocument?id=472. Accessed: February 24, 2020.

<sup>52</sup> Michael Baker International. 2017. 2017 Oyster Point Specific Plan Update Appendix I- Municipal Services Assessment. Available: http://weblink.ssf.net/weblink/0/fol/51192/Row1.aspx?dbid=0&startid= 51192&row=1. Accessed: February 25, 2020.

<sup>53</sup> 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.

<sup>&</sup>lt;sup>54</sup> Michael Baker International. 2017. 2017 Oyster Point Specific Plan Update Appendix I- Municipal Services Assessment, Map7b- 4 Minute Travel Time from Station 62. Available: https://weblink.ssf.net/WebLink/0/doc/367046/Page1.aspx. Accessed: February 24, 2020.

which includes payment of the Public Safety Impact Fee for the East of 101 Area Therefore, the proposed project would not result in substantial adverse environmental impacts associated with the construction or alteration of fire protection facilities to maintain acceptable service ratios, response times, or other performance objectives and this impact would be *less than significant*. No mitigation is required.

# Impact PS-2: The proposed project would not require the provision of new or physically altered police protection services in order to maintain acceptable service ratios, response times, or other performance objectives. (*Less than Significant*)

The South San Francisco Police Department (SSFPD) provides police protection services for the project area. The department consists of a records division, communications division, canine unit, evidence division, neighborhood response team, and traffic unit; it also conducts day and night patrols. The SSFPD has a total of 117 full-time-equivalent employees and 4.87 hourly and contract employees. The department's 83 sworn officers and 35 civilian employees equate to a ratio of 1.75 officers per 1,000 residents. 56,57

There is only one SSFPD police station in the City; the station is located at 33 Arroyo Drive, approximately 2.2 miles west of the project site. A police sub-station is also located in the downtown, approximately 1.1 miles west of the project site. A new police headquarters that will replace the existing police station is part of the City's Community Civic Campus project, which is currently under construction. The new police headquarters will be approximately 44,000 square feet compared to the approximately 32,000-square-foot existing police station. The new police headquarters will result in an approximately 12,000 square feet of additional facility space.<sup>58</sup>

Policy 8.5-I-1 of the General Plan Health and Safety Element seeks to maintain a target ratio of 1.5 officers per 1,000 residents to ensure rapid and timely response to all emergencies. The proposed project does not propose any new housing units and would not impact the ratio of officers per resident. In 2016, the most recent year for which data is available, the response time to emergency calls averaged three minutes and 59 seconds; the response time to non-emergency calls averaged six minutes and three seconds.<sup>59</sup> These response times are considered acceptable under SSFPD goals, although there are no adopted standards.

The proposed project would increase the demand for police protection services as a result of the increased number of employees (i.e., 731 net new employees). Table 4.10-4 identifies the estimated annual service calls, calls per day, and police demand generated by the proposed project. The proposed project would generate fewer than 5 calls per year and fewer than 1 call per month. Therefore, the project would not require additional police personnel.

<sup>&</sup>lt;sup>55</sup> City of South San Francisco. 2019. *Adopted Biennial Operating Budget and Capital Improvement Program, Fiscal Years 2019–2021*. Available: https://www.ssf.net/home/showdocument?id=16797. Accessed: February 24, 2020.

Based on the City's 2018 total population of 67,587. City of South San Francisco. n.d. South San Francisco Demographic Information- South San Francisco Population. Available: https://www.ssf.net/our-city/about-south-san-francisco/demographic-information. Accessed: February 25, 2020.

City of South San Francisco. n.d. *Police Department Divisions*. Available: https://www.ssf.net/departments/police/divisions. Accessed: February 25, 2020.

<sup>&</sup>lt;sup>58</sup> City of South San Francisco. 2020. *Community Civic Campus Program—Police Station*. Available: http://www.measurewssfcivic.com/index.php/29-project-stats/107-police-station. Accessed: April 27, 2020.

<sup>&</sup>lt;sup>59</sup> Michael Baker International. 2017. 2017 Oyster Point Specific Plan Update Appendix I Municipal Services Assessment. Available: http://weblink.ssf.net/weblink/0/fol/51192/Row1.aspx?dbid=0&startid=51192&row=1. Accessed: February 25, 2020.

Table 4.10-4. Estimated Police Protection Incidents Generated by the Proposed Project

|                  | Proposed<br>Office/R&D<br>Space (square<br>feet) | Annual<br>Service<br>Calls | Total<br>Calls<br>per Day | Police Demand |
|------------------|--|----------------------------|---------------------------|---------------|
| Proposed Project | 208,800  | 4.6                        | .012                      | 0             |

Note: The average annual call volume was calculated using an annual service call generation rate of 0.0221 calls per 1,000 square feet of Office/R&D as follows: 0.0221 calls x (208,800 square feet/ 1,000 square feet) = 4.61 annual service calls.

Source: Michael Baker International. 2017. 2017 Oyster Point Specific Plan Update Appendix I- Municipal Services Assessment, Table A-2: Police Department Response Call Volume Demand Estimates. Available: https://weblink.ssf.net/WebLink/0/doc/367046/Page1.aspx. Accessed: February 25, 2020.

The SSFPD also commented on the proposed project through the City's standard review process. Staffing and service issues were not identified with respect to site development. The proposed project would be required to comply with the City Municipal Code, chapter 15.48.070, which includes specifications for security design measures, as a standard condition of project approval. Furthermore, the proposed project would be required to pay the Public Safety Impact Fee for the East of 101 Area as a condition of approval. Therefore, the proposed project's increased demand for services would not be substantial, given the overall demand for police protection throughout the City.

Based on the analysis above, although the project would result in more employees at the project site, it is expected that the proposed land uses would not lead to a substantial increase in service calls to SSFPD. In addition, it is anticipated that the project would not lead to an increase in SSFPD service call response times. The upgrade to police facilities that is currently underway would further reduce response times and service ratios. Furthermore, the proposed project would be required to comply with the City's standard conditions, which will be attached to the entitlements for the proposed project, including Condition No. 25, which requires compliance with City's Minimum Building Security Standards Ordinance. In addition, the proposed project would be required to comply with any project-specific conditions of approval. Therefore, the proposed project would not result in substantial adverse environmental impacts associated with the construction or alteration of police protection facilities to maintain acceptable service ratios, response times, or other performance objectives and this impact would be *less than significant*. No mitigation is required.

Impact PS-3: The proposed project would not require the provision of new or physically altered schools or other public facilities in order to maintain acceptable service ratios or other performance objectives. (*Less than Significant*)

# **Schools and Libraries**

The South San Francisco Unified School District (SSFUSD) and South San Francisco Public Library serve the project area. As discussed in Section 4.10.7, *Population and Housing*, of this draft EIR, it is anticipated that some of the proposed project's employees may relocate to the City, thereby generating a small indirect increase in student enrollment or library use. However, because the proposed project would not involve the construction of any housing units, it is not anticipated that the proposed project would generate a substantial increase in demand for SSFUSD or South San Francisco Public Library services. As part of phase II of the City's Community Civic Campus project, a new library will be constructed, which is scheduled to begin construction in late 2020 and would

likely increase the South San Francisco Public Library's capacity. The new library would replace the existing main library. In addition, the proposed project would be subject to a SSFUSD fee based on the square footage of the proposed development. Therefore, the proposed project would not result in substantial adverse environmental impacts associated with the construction or alteration of school or library facilities to maintain acceptable service ratios or other performance objectives and this impact would be *less than significant*. No mitigation is required.

#### Childcare

The proposed project would increase the demand for preschool childcare services as a result of the increased number of employees (i.e., 731 net new employees). An adequate number of preschool and other childcare facilities currently exist in the City and would likely be able to accommodate the increase in demand for preschool childcare services that would be generated by the proposed project. In addition, the proposed project would be required to pay the City's Childcare Impact Fee Program. The purpose of this program is to provide new and expanded childcare facilities with funding from new developments. Therefore, the proposed project would not result in substantial adverse environmental impacts associated with the construction or alteration of childcare facilities to maintain acceptable service ratios or other performance objectives and this impact would be *less than significant*. No mitigation is required.

# Impact C-PS-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on public services. (*Less than Significant*)

The cumulative geographic context for public services varies according to the type of public service. The cumulative geographic contexts for fire, police, and school service are the service areas of the SSFFD, SSFPD, and SSFUSD, respectively. The cumulative geographic context for library and childcare service is the generally the City. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

The City has several residential and mixed-use projects west of U.S. 101 that are either under construction or in the development pipeline which would increase the number of housing units in the City. Thus, the cumulative projects would generate a direct increase in the demand for fire, police, school, library, and childcare services. The proposed project would not involve the construction of any housing units. Some of the employees generated by the proposed project or the cumulative projects may relocate to the City, thereby generating a small indirect student population increase or an increase in library use. However, it is not anticipated that the SSFUSD or the South San Francisco Public Library would experience a substantial growth in demand. Furthermore, the cumulative projects, similar to the proposed project, would be subject to a SSFUSD development impact fee based on the square footage of each project, and would be subject to the South San Francisco Childcare Impact Fee. The cumulative projects, in combination with the proposed project, would increase the number of residents and employees in the area, leading to an increase in demand for fire protection, police protection, and childcare services. SSFFD and SSFPD are essential service

<sup>60</sup> Sarah Kinahan Consulting. 2017. San Mateo County Childcare and Preschool Needs Assessment. November 2017. Available: https://www.smcoe.org/assets/files/About\_FIL/Child%20Care%20Partnership%20Council\_FIL/Needs%20Assessment\_FIL/CCPC\_Full\_Report\_Needs\_Assessment\_11-17.pdf. Accessed: February 24, 2020.

providers that continually assess demand based on anticipated growth and service needs. By analyzing applicable metrics, SSFFD and SSFPD are able to adjust staffing, capacity, response times, and other measures of performance. In addition, most (if not all) the cumulative projects, similar to the proposed project, would be subject to the Public Safety Impact Fee of the East of 101 Area and the City's Childcare Impact Fee Program. Therefore, the cumulative projects would not result in any service gaps related to schools, libraries, fire, police, or childcare services. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative public services impact. The cumulative impact would be *less than significant*. No mitigation is required.

#### **Parks**

Refer to Section 4.10.9, *Recreation*, for a discussion of impacts on parks.

# 4.10.9 Recreation

# 4.10.9.1 Regulatory Framework

### Local

#### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Parks, Public Facilities, and Services Element, which outlines policies relating to parks and recreation, educational facilities, and public facilities. The General Plan includes the following policy applicable to recreation:

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

### South San Francisco Parks and Recreation Master Plan

The City of South San Francisco Parks and Recreation Department manages parks and recreation centers within the City's boundaries. The master plan includes the following goals that are relevant to recreation:

- Goal 4: Incorporate innovative amenities to serve multiple user groups as new parks and facilities are developed or existing parks are renovated.
- Goal 11: Incorporate sustainable features into parks and facilities to increase water conservation, energy efficiency, and habitat values; encourage non-motorized transportation; and educate about the environment.

# South San Francisco Municipal Code, Title 8, Chapter 8.67

According to the South San Francisco Municipal Code Title 8, *Health and Welfare*, Chapter 8.67, *Parks and Recreation Impact Fee*, the City determined that in order to provide sufficient funding to achieve the City's goal of maintaining park service levels and providing adequate parks and recreational services and facilities to residents of the City, certain development projects, as

outlined in Section 8.67.050, would be required to pay a parkland acquisition fee and a park construction fee in order to mitigate the impacts of the development projects on parks and recreational services and facilities within the City. The proposed project falls is considered a development project as defined in Section 8.67.050 and would be required to pay the impact fee.

# 4.10.9.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant recreation impact if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically
  altered park facilities or the need for new or physically altered park facilities, the construction of
  which could cause significant environmental impacts, in order to maintain acceptable service
  ratios, response times, or other performance objectives.
- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated, or
- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

# 4.10.9.3 Approach to Analysis

Evaluation of the proposed project is based on considering how employee population growth resulting from implementation of the proposed project would affect recreational facilities. The analysis also considers whether environmental impacts would result from development of the proposed open space improvements that would be incorporated as part of the proposed project. According to the CEQA significance criteria, the proposed project would have an adverse environmental impact if it were to result in a substantial adverse physical impact associated with the provision of new or physically altered government facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times, or other performance objectives for any public services (e.g., parks).

# 4.10.9.4 Impact Evaluation

Impact REC-1: The proposed project would not require the provision of new or physically altered park facilities in order to maintain acceptable service ratios or other performance objectives. (*Less than Significant*)

The City of South San Francisco Parks and Recreation Department manages over 270 acres of parks and open space parks and outdoor recreational facilities within the City, including 145 acres of 21 parks and playgrounds; over 80 acres of open space at Sign Hill Park, Oyster Point Marina, and a community garden; and 14 acres of athletic fields.<sup>61</sup>

As discussed in Section 4.10.7, *Population and Housing*, of this draft EIR, it is anticipated that some of the proposed project's employees may relocate to the City, thereby generating a small indirect increase in park use. However, because the proposed project would not involve the construction of any housing units, it is not anticipated that the proposed project would generate a substantial increase in demand

<sup>&</sup>lt;sup>61</sup> City of South San Francisco Parks Division. 2020. *Parks*. Available: https://www.ssf.net/departments/parks-recreation/parks-division. Accessed: April 28, 2020.

for City of South San Francisco Parks and Recreation Department park facilities. In addition, a 1.3-acre park s included in phase II of the City's Community Civic Campus project, which is scheduled to begin construction in late 2020 and would increase the amount of park space in the City. Furthermore, as defined in South San Francisco municipal code section 8.67, and described above in section 4.10.9.1, *Regulatory Framework*, the proposed project would be required to pay the parks and recreation impact fees to help the City achieve its goal of maintaining park service levels and providing adequate facilities, in order to help mitigate any impacts that may result from development projects. Therefore, the proposed project would not result in substantial adverse environmental impacts associated with the construction or alteration of park facilities to maintain acceptable service ratios or other performance objectives and this impact would be *less than significant*. No mitigation is required.

# Impact REC-2: 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 facilities would occur or be accelerated. (*Less than Significant*)

Table 4.10-5 identifies nine open space and recreational facilities within one mile of the project site. In addition, a 1.3-acre park that is part of phase II of the City's Community Civic Campus project, which is scheduled to begin construction in late 2020 and would increase the amount of park space in the City. The proposed project would increase the demand for recreational facilities as a result of the increased number of employees (i.e., 731 net new employees). However, this use would not substantially deteriorate existing parks or recreational facilities based on the relatively small number of new employees expected to occupy the proposed new building and because employees would most likely visit parks only briefly during lunch or while on breaks. The Bay Trail is the nearest recreational facility, located 0.2 mile north of the project site. The Bay Trail is a paved hardscaped resource that is designed for repetitive use for commuting and recreational use for users across the entire Bay Area. To accommodate future demand from employees, the proposed project would include an outdoor entry plaza northwest of the proposed building and an outdoor amenity space southwest of the proposed building. Both the entry plaza and the amenity space would include landscaping, outdoor gathering areas, and seating areas. In addition, the project would include new landscaping along the perimeter of the site. It is anticipated that the proposed amenities would partially offset recreation demand from employees on-site.

Because of accessibility, future employees would most likely choose to use onsite facilities provided as part of the proposed project and the nearby parks listed in Table 4.10-5, instead of more distant park and recreational facilities. Existing employees on the project site and in the surrounding area who use existing parks and recreational facilities may choose to visit the new facilities that would be provided with the proposed project. This could reduce the rate of deterioration at existing parks and recreational facilities both within and near the project area. Furthermore, as defined in South San Francisco municipal code section 8.67, and described above in section 4.10.9.1, *Regulatory Framework*, the proposed project would be required to pay the parks and recreation impact fee to help the City achieve its goal of maintaining park service levels and providing adequate facilities, in order to help mitigate any impacts that may result from development projects.

Although the number of park users is expected to increase as a result of the proposed project, such an increase, in and of itself, would not cause substantial physical deterioration of existing facilities or a need for new facilities to be constructed. Other factors that contribute to physical degradation of recreational resources include the availability of facilities, park design, the age of the infrastructure, how the park is used, and the level of maintenance. Given the variety of nearby open space and recreational facilities, the increased usage of any one park by new employees at the project site would not be substantial. In addition, the provision of adequate onsite open space under

Table 4.10-5. Open Space and Recreational Facilities within 1 Mile of the Project Site

| Name  | Size (acres)   | Amenities  | Distance from<br>Project Site (mile) |
|---|--|--|--------------------------------------|
| Oyster Point Marina   | 4.7 acres  | Open lawns, walking trails,<br>benches, picnic areas, marina, pier,<br>beach, ferry building, and live-<br>aboard boat docking | 0.6 mile east                        |
| Wind Harp Park  | 0.5 acre Open lawn, public art feature, walking trail, and benches                       |  | 0.8 mile southeast                   |
| Bay Trail   | Trail 6 miles within Bicycle and pedestrian trail, picnic tables, barbeques, and benches |  | 0.2 mile north                       |
| Jack Drago Park   | ark 0.8 acres Open lawn, landscaped areas, and a bench                                   |  | 0.5 mile southwest                   |
| Irish Town Greens   | 1.5 acres  | Flat open lawn, usable for active play (i.e., frisbee or pick-up soccer)   | 0.4 mile west                        |
| Gardiner Playlot  | 0.1 acre   | Children's play area, and half court   | 0.3 mile northwest                   |
| Paradise Valley Pocket Park and Paradise Valley Recreation Center Park  0.8 acre (Recreation Center Park) |  | Open lawn, walking trail, children's play area, recreation building, restrooms, picnic tables, and basketball court            | 0.7 mile northwest                   |
| Cypress and Pine Playlot  | 0.3 acre   | Open lawn, children's play area, picnic tables, two half courts  | 0.5 mile west                        |
| City Hall Playlot and<br>Grounds  | 1.8 acre   | Children's play area, picnic tables, and a fountain  | 0.9 mile southwest                   |
|   |  | d Recreation Master Plan. Available:<br>8. Accessed: February 21, 2020.  |                                      |

the proposed project would not increase the use of nearby recreational facilities such that substantial physical deterioration of existing facilities would occur or be accelerated. Therefore, impacts related to the use of existing parks and recreational facilities would be *less than significant*. No mitigation is required.

Impact REC-3: The proposed project would not include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment. (*Less than Significant*)

Any potential adverse effects from the incorporation of open space as part of the proposed project would be associated with construction of the open space, such as noise or air quality impacts (e.g., emissions of dust and other pollutants). These potential impacts are addressed in Sections 4.2 through 4.10 of this draft EIR as part of the analysis of construction impacts for the proposed project as a whole, with mitigation measures provided as necessary. Overall, no significant physical effect on the environment associated with construction of open spaces is anticipated, and no long-term effects from physical operation of these facilities are anticipated. Construction of the open spaces proposed by the project would not result in additional significant impacts that are not disclosed elsewhere in this environmental document; therefore, physical environmental impacts resulting from the construction of open space under the proposed project would be *less than significant*. No mitigation is required.

# Impact C-REC-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on recreation. (*No Impact*)

The cumulative geographic context for recreation is the City in addition to all existing and potential new open spaces that will be available to and accessible by employees in the project area. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

The City has several residential and mixed-use projects west of U.S. 101 that are either under construction or in the development pipeline which would increase the number of housing units in the City. Thus, the cumulative projects would generate a direct increase in the demand for fire, park facilities. The cumulative projects, in combination with the proposed project, would increase the number of residents and employees in the City, leading to an increase in demand for recreational facilities. As discussed under Impacts REC-1, REC-2, and REC-3, the proposed project would not physically degrade any existing recreational resources, would not result in significant effects related to the construction of new open spaces, would not increase demand for and use of either neighborhood parks or recreational facilities such that it would result in substantial physical deterioration. In addition, the cumulative projects, similar to the proposed project, would be required to pay the parks and recreation impact fee. Furthermore, additional recreational facilities are being developed throughout the City or are in the planning stages (e.g., the 1.3-acre park that is part of the City's Community Civic Campus project, the Bicycle Master Plan [No. 23]) to address existing and future recreational needs. Similar to the project, new employees in the East of 101 Area would also use portions of the Bay Trail that are near their sites. Because the Bay Trail is a paved hardscaped resource that is designed for repetitive use for commuting and recreational use for users across the entire Bay Area, the additional use by new development would not result in a significant cumulative impact on this recreational facility. As with the proposed project, other development projects proposed or under consideration nearby would be required to include on-site recreational open space and amenities for the residents and employees who would occupy their developments. For these reasons, and given that the proposed project would increase open space within the project site and surrounding area, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative recreational facilities impact. The cumulative impact would be *less than significant*. No mitigation is required.

# **4.10.10** Utilities

# 4.10.10.1 Regulatory Framework

#### State

### Senate Bill 610 and Senate Bill 221

Senate Bill (SB) 610 requires cities and counties to confirm through a water supply assessment (WSA) that sufficient water supply sources are available before certain large development are approved (see California Water Code Sections 10910 through 10915). The WSA for a project must be included in that project's CEQA documentation. A WSA must be prepared if a project includes, among other things: (1) the equivalent demand of 500 residential units; or (2) a shopping center or business establishment that employs more than 1,000 persons or has a floor space of more than

500,000 square feet; or (3) a commercial office building that employees more than 1,000 persons or has a floor space of more than 250,000 square feet. A WSA is not required for the proposed project because the proposed project would result in approximately 731 net new employees at the project site and would include approximately 208,800 square foot office/R&D space, which would be less than the 1,000 persons or 250,000 square feet of floor space associated with a commercial office building use under SB 610. Additionally, the proposed project would not result in the equivalent water demand of 500 residential units.<sup>62</sup> Therefore, the proposed project would not meet any of the requirements for the preparation of a WSA.

SB 221 requires a water supply verification, which is a letter of assurance for water from a water purveyor. A water supply verification is prepared to support approval of a tentative map. A water supply verification s not required for the proposed project because the proposed project would not require approval of a tentative tract map.

# Assembly Bill 939 and Senate Bill 1016

The California Integrated Waste Management Act of 1989, or AB 939, established the Integrated Waste Management Board, required the implementation of integrated waste management plans, and mandated that local jurisdictions divert at least 50 percent of all solid waste (from 1990 levels), beginning January 1, 2000, and divert at least 75 percent by 2010. In 2006, SB 1016 updated the requirements. The new per capita disposal and goal measurement system moves the emphasis from an estimated diversion measurement number to an actual disposal measurement number, along with an evaluation of program implementation efforts. These two factors will help determine each jurisdiction's progress toward achieving AB 939 diversion goals. The 50 percent diversion requirement is now measured in terms of per capita disposal, expressed as pounds per day. Under the SB 1016 measurement system, a City is required to annually dispose of an amount equal to or less than its "50 percent equivalent per capita disposal target," as calculated by CalRecycle.

# Title 24

In accordance with CCR Title 24, part 6 (last amended in 2019, effective January 1, 2020), buildings constructed after June 30, 1977, must comply with the standards identified in CCR title 24. The code covers five categories: planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and indoor environmental quality. Title 24 requires the inclusion of state-of-the-art energy conservation features in building designs and construction, such as specific energy-conserving design features and non-depletable energy resources. In addition, it must be demonstrated that a building would comply with a designated energy budget. Part 11 of the Title 24 Building Standards Code is referred to as the California Green Building Standards Code (CALGreen Code). Unless otherwise noted in a regulation, all newly constructed buildings in California are subject to the requirements of the CALGreen Code.

<sup>62</sup> As shown in Table 4.10-6, the proposed project would result in a net increase in water consumption of 15,132 gallons per day. A 500-residential unit project would consume approximately 150 to 250 acre-feet per year (or 133,911 to 223,186 gallons per day) assuming 0.3 to 0.5 acre-feet of water per year per dwelling unit "depending upon several factors" according to the Department of Water Resources *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001*. Therefore, the proposed project would not result in the equivalent water demand of 500 residential units.

# Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act of 2014 (SGMA) is a comprehensive three-bill package that Governor Jerry Brown signed into California state law in September 2014. The Sustainable Groundwater Management Act provides a framework for sustainable management of groundwater supplies by local authorities, with a limited role for state intervention only if necessary to protect the resource. The plan is intended to ensure a reliable groundwater water supply for California for years to come. SGMA requires the formation of local Groundwater Sustainability Agencies (GSA), which are required to adopt groundwater sustainability plans (GSPs) to manage the sustainability of groundwater basins. The adoption of a GSP is required for all high- and medium-priority basins as identified by DWR or submit an alternative to a GSP. SGMA also requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge.

# **Urban Water Management Planning Act**

The Urban Water Management Planning Act requires every public and private urban water supplier that directly or indirectly provides water for municipal purposes to prepare and adopt an urban water management plan (UWMP). This plan is required to be updated every five years, in years ending with "0" or "5." The UWMP must include a description of the reliability of the water supply and vulnerability to seasonal or climatic shortage (to the extent practicable) and provide data for average, single-dry, and multiple-dry water years as well as an urban water shortage contingency analysis.

The California Water Service Company prepared the last UWMP in 2015 for the South San Francisco District, providing information about the district's historical and projected water demands, water supplies, supply reliability and vulnerability, water shortage contingency planning, and demand management programs. The plan is used as a long-range planning document by the California Water Service Company for water supply and system planning.

#### **NPDES Permits**

Refer to Section 4.10.4, *Hydrology and Water Quality*, of this draft EIR, for a discussion of the NPDES permit applicable to the proposed project.

# Local

# South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Parks, Public Facilities, and Services Element, which outlines policies relating to parks and recreation, educational facilities, and public facilities. The General Plan contains a Health and Safety Element, which acknowledges the importance of reducing solid waste. The General Plan includes the following policy applicable to utilities and service systems:

• Policy 5.3-G-1: Promote the orderly and efficient operation and expansion of the water supply system to meet projected needs.

- Policy 5.3-G-2: Encourage water conservation measures for both existing and proposed development.
- Policy 5.3-G-3: Promote the equitable sharing of the costs associated with providing water service to new development.
- Policy 5.3-I-2: 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.
- Policy 5.3-1-3: Ensure that future residents and businesses equitably share costs associated with providing water service to new development in South San Francisco.
- 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 associated with providing wastewater service to new development.
- Policy 5.3-G-6: Maintain environmentally appropriate wastewater management practices.
- Policy 5.3-1-5: 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-7: Encourage new projects in the *East of 101 Area Plan* that are likely to generate large quantities of wastewater to lower treatment needs through recycling, pretreatment, or other means as necessary.
- Policy 8.3-G-1: 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.
- Policy 8.3-I-1: Continue to work toward reducing solid waste, increasing recycling, and complying with the San Mateo County Integrated Waste Management Plan.

# East of 101 Sewer System Management Plan

The City completed a Sewer System Management Plan for the east portion of the City (East of 101 Area) in September 2002 with subsequent updates in 2007 and 2011. The updates identified capacity deficiencies in the existing wastewater collection system and recommended improvements intended to mitigate deficiencies and serve future redevelopments.

Recognizing the importance of planning, developing, and financing system facilities to provide reliable sewer collection service to existing customers and for servicing anticipated growth, the City's latest Sewer System Management Plan was revised and adopted in November 2019. The purpose of the Sewer System Management Plan is to provide a plan and schedule to manage, operate, and maintain all parts of the sanitary sewer system. The primary objective is to eliminate sanitary sewer overflows and mitigate any sanitary sewer overflows that occur.

# Climate Action Plan<sup>63</sup>

The City's CAP, adopted in 2014 and discussed in greater detail in Section 4.4, *Greenhouse Gas Emissions*, of this draft EIR includes goals, policies, and strategies to reduce the City's GHG emissions, in compliance with AB 32 and SB 375.

The CAP provides guidance for a scientific and regulatory framework, a GHG emissions inventory, a GHG reduction strategy, adaptation and resiliency, and implementation. The CAP incorporates several policies regarding water usage and diversion of solid waste, including the policies listed below.

- Measure 5.1: Develop a waste reduction strategy to increase recycling and reuse of materials to achieve a 75% diversion of landfilled waste by 2020.
  - Continue to enforce the existing construction and demolition recycling ordinance, requiring 100% of inert waste and 65% of non-inert waste to be recycled from all eligible projects.
- Measure 6.1: Reduce water demand. Revitalize implementation and enforcement of the Water Efficient Landscape Ordinance by undertaking the following:
  - o Establishing a variable-speed pump exchange for water features.
  - o Limiting turf area in commercial and large multi-family projects.
  - o Restricting hours of irrigation to occur between 3:00 a.m. and two hours after sunrise.
  - Installing irrigation controllers with rain sensors.
  - Landscaping with native, water-efficient plants.
  - o Installing drip irrigation systems.
  - Reducing impervious surfaces.
- Measure 6.2: Provide alternative water resources for irrigation.
  - Create water policies for the stormwater management strategy that seek to capture storm runoff (e.g., bioswale, rainwater collection, and irrigation programs).
  - o Continue to implement the City's Water Efficient Landscape Guidelines.

The CAP includes a Development Checklist for City staff to use to identify applicable CAP measures for discretionary projects and required mitigation standards. The Development Checklist serves as the summary of project-level standards from the CAP. Criteria applicable to utilities and service systems include, but are not limited to, the following questions:

- Will certification of the building be sought under Leadership in Energy and Environmental Design (LEED) or other green building criteria?
- Will any water features exceed CALGreen standards?
- Will the project incorporate low-impact development practices?
- Will any xeriscaping be installed?
- Will captured rainwater or graywater be used for irrigation?

<sup>&</sup>lt;sup>63</sup> City of South San Francisco. 2014. City of South San Francisco Climate Action Plan. Prepared by PMC. Available: at https://www.ssf.net/home/showdocument?id=5640. Accessed: May 8, 2020.

# City of South San Francisco Municipal Code

The South San Francisco Municipal Code, chapter 14, Water and Sewage, establishes regulations including, but not limited to, stormwater management and control, water quality control, sewer rates, sewer lateral construction, maintenance, and inspection, and associated impact fees for use of the City's water and sewage utilities. Specifically, section 4, Stormwater Management and Discharge Control, is intended to protect and enhance the water quality of the City's watercourses, water bodies, and wetlands in a manner that is pursuant to and consistent with the Clean Water Act. The purpose of this section is to eliminate non-stormwater discharges to the separate municipal storm sewer, control the discharge to the separate municipal storm sewers from spills, dumping or disposal of materials other than stormwater, and reduce the pollutants in stormwater discharges to the maximum extent practicable. In addition, the City Municipal Code, chapter 15, section 60, Recycling and Diversion of Debris from Construction and Demolition, establishes regulations for recycling and the diversion of debris generated from construction and demolition. Specifically, the code details diversion requirements, such as submitting and completing a waste management plan, directing 100 percent of building materials to reuse or recycling facilities approved by the City, and either recycling all mixed debris to recycling facilities or separating/directing non-building materials to recycling facilities at a diversion rate of 65 percent.

# 4.10.10.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant utilities impact if it would:

- Require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects;
- Have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years;
- Result in a determination by the wastewater treatment provider that serves or may serve the
  project that it has inadequate capacity to serve the project's projected demand in addition to the
  provider's existing commitments;
- Generate solid waste in excess of state or local standards or in excess of the capacity of local infrastructure or otherwise impair the attainment of solid waste reduction goals; or
- Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste.

# 4.10.10.3 Approach to Analysis

Evaluation of the proposed project is based on the wet utilities memorandum and the sanitary sewer analyses prepared for the proposed project. <sup>64,65</sup> In addition, evaluation of the proposed project is based on dry utilities and wet utilities demand and generation estimates provided by the project sponsor. The estimate of solid waste that would be generated by the proposed project is based on generation rates provided by CalRecycle.

<sup>64</sup> BKF. 2020. 701 and 751 Gateway Boulevard, South San Francisco Wet Utilities. March 5.

<sup>65</sup> BKF. 2020. 751 Gateway Blvd - Sanitary Sewer Analyses. March 27.

# 4.10.10.4 Impact Evaluation

Impact UT-1: The proposed project would not require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects. (Less than Significant)

Existing water, stormwater, sanitary sewer system, natural gas, electricity, and telecommunications facilities (i.e., lines) would continue to the serve the project site. New on-site facilities would be connected to new services through the installation of new, localized connections. Expansion or an increase in capacity of off-site infrastructure would occur as required by the utility providers. The project could include off-site infrastructure improvements outside of the project site but within the Gateway Campus.

Based on the proposed on-site and off-site utility infrastructure described below, implementation of the project would result in the construction of utility facilities.

- Potable Water: New water utilities would be placed around the perimeter of the project site and throughout the site. A new 6-inch lateral would connect to the existing 12-inch lateral on the project site. Two new 8-inch laterals for fire needs would be constructed as part of the project. One 8-inch lateral would connect to the existing 12-inch lateral on the project site. The other 8-inch lateral would connect to the 12-inch water main in Gateway Boulevard.
- **Stormwater**: The existing 18-inch storm pipe on the project site would be relocated around the proposed building and service and loading yard. New storm drain collector pipes and biotreatment areas (discussed above) would be constructed within the project site to drain to the existing 18-inch storm drain line in Gateway Boulevard.
- Sanitary Sewer System: The 12-inch gravity pipe outfall in Gateway Boulevard may need to be
  upsized as part of the proposed project. A new 8-inch lateral would be constructed on the
  project site to serve the proposed building. In addition, the existing 8-inch lateral that serves the
  701 Gateway Boulevard building would need to be replaced with a 10-inch lateral.
- **Natural Gas and Electric**: The project would construct 4-inch electrical conduits to connect to the existing electricity lines in Gateway Boulevard. In addition, the project would construct a 4-inch natural gas lateral to connect to a new natural gas meter that would connect to the existing 4-inch natural gas line in Gateway Boulevard.
- **Telecommunications**: The project would construct 3- to 4-inch communication conduits to connect to the existing communication lines in Gateway Boulevard.

The installation or expansion of utility facilities would require excavation, trenching, soil movement, and other activities that are typical of development projects in South San Francisco, as discussed in detail in this draft EIR as part of the assessment of overall project impacts. As discussed in Section 4.2, *Air Quality*, construction of the proposed project, including construction or expansion of utilities as a component of the proposed project, would not generate significant fugitive dust and criteria air pollutants, violate an air quality standard, contribute substantially to an existing or projected air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants. Implementation of Mitigation Measure AQ-2 would control fugitive dust and reduce this impact to a less-than-significant level. As discussed in Section 4.8, *Noise and Vibration*, construction of the proposed project, including construction or expansion of utilities as a component of the proposed

project, would not result in a substantial temporary or periodic increase in ambient noise levels and would not violate the applicable local standards. Implementation of Mitigation Measure NOI-1 would reduce construction noise and reduce this impact to a less-than-significant level. As discussed in Section 4.9, *Transportation and Circulation*, construction of the proposed project, including construction or expansion of utilities as a component of the proposed project, would not cause significant impacts on the transportation and circulation network because construction activities would be temporary, and the flow of traffic would not be disrupted. In summary, impacts related to the construction of new utility facilities for the proposed project are addressed as part of the analysis of construction impacts for the proposed project as a whole. The installation or expansion of any utility facilities for the project would not result in additional significant impacts that are not otherwise disclosed elsewhere in this draft EIR.

The City's Sewer System Management Plan provides a discussion of the East of 101 Sewer Impact Fee Fund, which uses fees to improve the sewer infrastructure where new business development has shown the need for an improved sewer system, and the City's Capital Improvement Program. The City's Capital Improvement Program was adopted by the City on June 15, 2017, to assist the City in planning and constructing the collection system improvements through the 2040 scenario, and presents the methodologies for developing equitable distribution of costs. The capital improvement costs account for project-related costs associated with engineering design, project administration, construction management, inspection, and legal costs. The Sewer System Management Plan indicates that capacity allocation analysis is needed to identify improvement funding sources, and to establish a nexus between development impact fees and improvements needed to service growth. In compliance with the provisions of the Mitigation Fee Act, Government Code sections 66000, et. seq. (also known as AB 1600), the analysis differentiates between the needs of existing users and those of anticipated future developments. If required, the costs of capital improvements would be captured through payment of the City's Sewer System Capacity Study and Improvement Fee (the "Sewer Capacity Fee"), based on the square footage of proposed project new uses, pursuant to the City's Master Fee Schedule and Title 14 "Water and Sewage" of the Municipal Code.

Based on the analysis above, the project would not require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects and this impact would be *less than significant*. No mitigation is required.

Impact UT-2: The proposed project would have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years. (*Less than Significant*)

# Construction

Demolition and construction activities for the project would result in a temporary increase in water demand. Activities such as dust control, concrete mixing, equipment and site cleanup, irrigation for the establishment of plants and landscaping, and water line testing and flushing would occur periodically throughout the project's construction period. Water demand during construction would be minimal and temporary, and would be served utilizing the same infrastructure and sources described in the section below as would be utilized during project operation. The water demand generated during project construction would be less than the water demand generated during project operation. Therefore, sufficient water supplies are available to serve the project during construction and this impact would be *less than significant*. No mitigation is required.

### Operation

Table 4.10-6 provides an estimate of the existing and proposed water demand at the project site. As shown, the proposed project would result in a net increase in water demand of approximately 15,132 gallons per day, or 17 acre-feet per year.

The project site is served by the California Water Service Company (Cal Water), and is located in the South San Francisco District, which includes South San Francisco, Colma, a small portion of Daly City, and Broadmoor.<sup>66</sup> Cal Water provides water through a combination of purchased water from the

Table 4.10-6. Estimated Existing and Proposed Water Demand

| Feature  | Existing/<br>Proposed Project<br>(square feet) | Generation Rate <sup>1</sup>                           | Water Demand<br>(gallons per<br>day) |
|--|--|--|--------------------------------------|
| Existing uses at 701 Gateway Boulevard (to remain) | 170,235  | 0.0547 gallon per day per square foot (for office use) | 9,312                                |
| Proposed uses at<br>751 Gateway Boulevard          | 208,800  |  |                                      |
| R&D  | 118,000  | 0.082 gallon per day per square foot (for lab use)     | 9,676                                |
| Office   | 78,700   | 0.0547 gallon per day per square foot (for office use) | 4,305                                |
| Retail (including café and fitness center)         | 12,100   | 0.110 gallon per day per square foot (for amenity use) | 1,331                                |
| <b>Total Project Net Increase in W</b>             | 15,132   |  |                                      |

#### Notes:

San Francisco Public Utilities Commission (SFPUC) and groundwater from Cal Water owned wells. The water purchased from SFPUC provides approximately 85 percent of the District's water demand each year, is shared among three Cal Water districts (Bear Gulch, Mid-Peninsula, and South San Francisco), and is delivered through a network of pipelines, tunnels, and treatment plants. The amount of water allocated to the South San Francisco district varies each year depending on hydrology (i.e. amount of water supply available), and physical facilities, among other parameters. However, SFPUC historically has been able to meet the water demand in its service area (including drought years) through its watersheds, which include the Tuolumne River watershed, Alameda Creek watershed, and San Mateo County watershed. Groundwater from the Westside Basin has historically supplied anywhere between ten to fifteen percent of the South San Francisco district's water demand utilizing wells owned by Cal Water. Together, the water provided by the SFPUC and Cal Water's groundwater wells, generates a water supply of approximately 40,225 acre-feet for the three Cal Water Districts.

<sup>&</sup>lt;sup>1</sup> The generation rates are based on Table 18-2 in the draft EIR prepared for the Genentech Master Plan Update available at http://weblink.ssf.net/WebLink/0/edoc/425577/18%20-%20Utilities.pdf. For the purposes of this analysis, the generation rates were converted from per year to per day.

<sup>66</sup> Bay Area Water Supply and Conservation Agency. n.d. *California Water Service—South San Francisco District.* Available: https://bawsca.org/members/profiles/cws-san-francisco. Accessed: March 9, 2020.

The project would increase water demand compared to existing conditions. However, the project would not increase demand beyond that anticipated in the UWMP. Specifically, the total annual potable water demand of the project (approximately 17 acre-feet) represents approximately 0.24 percent and 0.19 percent, of the 2015 and 2040 potable water demand, respectively, in the South San Francisco District (7,064 acre-feet and 8,901 acre-feet).<sup>67</sup> In addition, according to the UWMP, the South San Francisco District would have adequate supplies through the planning horizon year of 2040 during average rainfall years for the City's and the project's water demands utilizing the existing water purchased and supplied through the SFPUC and Cal Water's groundwater wells. The project would represent approximately 0.04 percent of the projected 41,767 acre-feet of water to be supplied to Cal Water's three districts in 2040. In addition, the proposed project would comply with all applicable City and state water conservation measures, including title 24, part, 6, the California Energy Code, with baseline standard requirements for energy efficiency; the 2019 Building Energy Efficiency Standards; and the 2019 CALGreen Code. Furthermore, the SFPUC and Cal Water have plans to develop additional water supply sources in order to meet the increasing water demand and dry-year demands throughout the San Francisco peninsula, including the City; these projects include the Alameda Creek Recapture Project, Regional Groundwater Storage and Recovery Project, and the Bay Area Regional Desalination Project which would increase the amount of water supply available, and would ultimately help to address water demand for the proposed project in the future. Furthermore, the SFPUC and Cal Water have plans to develop additional water supply sources in order to meet increasing water demand and dry-year demands; these projects include the Alameda Creek Recapture Project, Regional Groundwater Storage and Recovery Project, which would help to offset water demand for the proposed project. Therefore, the water demand generated by the proposed project would not exceed the supply or capacity of the water utility; this would be a *less* than significant impact. No mitigation is required.

Impact UT-3: The proposed project would 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. (*Less than Significant*)

#### Construction

Demolition and construction activities for the project would result in a temporary increase in wastewater generation as a result of on-site construction workers. Wastewater generation during construction would be minimal and temporary. In addition, construction workers typically use portable toilets, which do not flow to the wastewater conveyance system. Therefore, sufficient wastewater treatment capacity is available to serve the project during construction and this impact would be *less than significant*. No mitigation is required.

# Operation

According to the sanitary sewer analyses prepared for the proposed project, the wastewater collection system that serves the project site is owned and operated by the City. The City's collection system includes a 10-inch force main that extends south along Gateway Boulevard from Lift Station No. 2 and

<sup>&</sup>lt;sup>67</sup> California Water Service. 2016. 2015 Urban Water Management Plan—South San Francisco District. Available: https://www.calwater.com/docs/uwmp2015/bay/South\_San\_Francisco/2015\_Urban\_Water\_Management\_ Plan\_Final\_(SSF).pdf. Accessed: March 9, 2020.

it outfalls to the 12-inch sewer main in Gateway Boulevard adjacent to the project site. The 12-inch gravity line extends west to connect to a 15-inch line in Gateway Boulevard, which conveys sewer flow to the south to East Grand Avenue via an 18-inch main. The 18-inch main continues to the northeast along East Grand Avenue until it discharges to a 27-inch main. All sewer flows generated are ultimately conveyed to Lift Station No. 4, which discharges to the Water Quality Control Plant (WQCP) where it is treated and discharged to the San Francisco Bay. According to the 2017 Master Plan, Lift Station 4 can convey 160 percent of the expected 2040 sewer peak flows with one pump out of service (which corresponds to a surplus of 4.9 million gallons per day).

The 12-inch main in Gateway Boulevard receives flow from Lift Station No. 2. Lift Station No. 2 has a 10-inch force main (approximately 610 feet) that connects to the 12-inch line serving the project site. Lift Station No. 2 serves sewershed Basins 1, 2 and 14; it is approximately 194 acres. Downstream of Lift Station No. 2, the 12-inch main serves additional parcels in Basin 4, which drain by gravity to the 12-inch main. Altogether, the 12-inch main in Gateway Boulevard accepts 275 acres of sewershed.

A total of four parcels contribute to the flow in the Gateway Boulevard 12-inch main in addition to flow from Lift Station No. 2: 700, 701, 750, and 751 Gateway Boulevard. The proposed project would result in a peak dry weather flow of 149,930 gallons per day (0.16 million gallons per day) and a peak wet weather flow of 249,883 gallons per day (0.26 million gallons per day). The increase in flow from the proposed project would be minimal compared to the overall flow through the existing system, which would have peak dry weather flow of 2,320,331 gallons per day (2.32 million gallons per day) and a peak wet weather flow of 4,333,885 gallons per day (4.33 million gallons per day). With the proposed project, the existing system would still operate within criteria established in the 2017 Master Plan to assess capacity impacts.

As discussed above, wastewater from the proposed project would be treated at the WQCP, which is monitored by the San Francisco Bay RWOCB to ensure compliance with the facility's NPDES wastewater discharge permit. The WQCP design capacity for average dry weather flow is 13 million gallons per day.<sup>68</sup> The average dry weather flow through the facility is 9 million gallons per day.<sup>69</sup> Peak wet weather flows can exceed 60 million gallons per day. With implementation of the project, the WQCP would still operate below its design capacity. Therefore, sufficient wastewater treatment capacity is available to serve the project during operation and this impact would be *less than significant*. No mitigation is required.

Impact UT-4: The proposed project would not generate solid waste in excess of state or local standards or in excess of the capacity of local infrastructure or otherwise impair the attainment of solid waste reduction goals. In addition, the proposed project would comply with federal, state, and local management and reduction statutes and regulations related to solid waste (Less than Significant)

# Construction

Demolition and construction activities for the project would result in a temporary increase in solid waste generation. Solid waste generation would occur periodically during construction. However, the

Schumacker, Brian, Plant Superintendent. City of South San Francisco-San Bruno Water Quality Control Plant, South San Francisco, CA. May 5, 2020. e-mail communication to Atteberry, Devan.

<sup>&</sup>lt;sup>69</sup> City of South San Francisco Public Works. 2020. Water Quality Control Plant. Available: https://www.ssf.net/departments/public-works/water-quality-control-plant. Accessed: April 28, 2020.

increase would be minimal and temporary. In addition, 100 percent of all inert solids (building materials) and 65 percent of non-inert solids (all other materials) would be recycled as required by the City under Chapter 15.60 of the South San Francisco Municipal Code. Therefore, the proposed project would not generate solid waste in excess of state or local standards or in excess of the capacity of local infrastructure during construction and would not conflict with solid waste regulations; this impact would be *less than significant*. No mitigation is required.

#### Operation

The project site would continue to be served by the South San Francisco Scavenger Company and Blue Line Transfer Inc. The South San Francisco Scavenger Company would transport all solid waste generated at the project site to the Blue Line Transfer Facility (approximately one mile south of the project site). This facility has a permitted capacity of 2,400 tons per day.<sup>70</sup> Any trash remaining after the usable materials have been separated at the transfer facility are transported to the Corinda Los Trancos (Ox Mountain) Sanitary Landfill or the Newby Island Sanitary Landfill.

As of 2015 (the most recent year for which data are available), the Ox Mountain Sanitary Landfill had a remaining capacity of approximately 22.18 million cubic yards. Ox Mountain Sanitary Landfill has a maximum permitted disposal capacity of 3,598 tons per day and is estimated to close in 2034. As of 2014 (the most recent year for which data are available), the Newby Island Sanitary Landfill had a remaining capacity of approximately 21.2 million cubic yards. The Newby Island Sanitary Landfill has a maximum permitted disposal capacity of 4,000 tons per day and is estimated to close in 2041.

Operation of the proposed project would generate approximately 6,798 pounds of solid waste per day (approximately 3.4 tons of solid waste per day).<sup>73,74</sup> The solid waste generated by the proposed project would represent approximately 0.09 percent of the maximum daily intake allowed at each of the landfills. The proposed project would not be a substantial contributor to the City's solid waste at Blue Line Transfer, Ox Mountain Sanitary Landfill, or Newby Island Sanitary Landfill.

Solid waste disposal and recycling in the City is regulated by the Municipal Code, particularly Chapters 8.16 and 8.28. As neither of these chapters establishes quantitative disposal or recycling rates, the project site would not be subject to diversion requirements. However, under the Municipal Code, the proposed project would be required to have its solid waste, including construction, demolition debris, and recyclable materials, collected by the South San Francisco Scavenger

California Department of Resources Recycling and Recovery. 2020. Blue Line MRF and TS. Available: https://www2.calrecycle.ca.gov/swfacilities/Directory/41-AA-0185. Accessed: March 9, 2020.

<sup>&</sup>lt;sup>71</sup> California Department of Resources Recycling and Recovery. 2020. *Corinda Los Trancos Landfill (Ox Mtn).* Available: https://www2.calrecycle.ca.gov/swfacilities/ Directory/41-AA-0002/. Accessed: March 9, 2020.

<sup>&</sup>lt;sup>72</sup> California Department of Resources Recycling and Recovery. 2020. *Newby Island Sanitary Landfill*. Available: https://www2.calrecycle.ca.gov/SWFacilities/ Directory/43-AN-0003/Detail. Accessed: March 9, 2020.

California Department of Resources Recycling and Recovery. 2020. South San Francisco Jurisdiction Diversion/Disposal Rate Summary. Available: https://www2.calrecycle.ca.gov/LGCentral/DiversionProgram/JurisdictionDiversionPost2006. Accessed: March 9, 2020. Solid waste generation was estimated for the project using the 2015 generation rate of 9.3 pounds per employee per day. There would be approximately 731 employees as part of the proposed project; therefore, (9.5 pounds per day/employee) x (731 employees) = 6,798.3 pounds of waste per day.

For the purposes of this analysis, the 2015 jurisdiction diversion/disposal rate report year (the most recently approved report year) was used; the 2020 report year is still pending review.

Company. Additional health and sanitation requirements set forth in the Municipal Code would be met by South San Francisco Scavenger Company. In addition, eligible projects (2,000 square feet or more) must submit a Waste Management Plan. AB 939 requires that local jurisdictions divert at least 50 percent of all solid waste by 2000. Furthermore, as described in the CAP, Measure 5.1, the project sponsor would be required to develop a waste reduction strategy to increase recycling and reuse of materials to achieve a generalized rate of 75 percent diversion of landfilled waste.

Based on the analysis above, the project would not generate solid waste in excess of state or local standards or in excess of the capacity of local infrastructure during operation and would not conflict with solid waste regulations; this impact would be *less than significant*. No mitigation is required.

# Impact C-UT-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on utilities and service systems. (*Less than Significant*)

The cumulative geographic contexts for utilities and service systems are the service territories of the utility providers. Over time, growth throughout the City will result in increased demand for water, wastewater treatment, solid waste disposal, natural gas, electricity, and telecommunications. As shown in Table 4.10-2 in Section 4.10.7, *Population and Housing*, of this draft EIR, ABAG projects the City's population will increase by approximately 11,910, from 68,105 in 2020 to 80,015 in 2040. In addition, ABAG projects the number of jobs in the City will increase by 7,865, from 46,365 in 2020 to 54,230 in 2040. Citywide growth would also generate increased demand for utilities. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

#### **Potable Water**

The cumulative projects would increase demands on water supplies as well as water infrastructure and treatment facilities. The reasonably foreseeable future projects that involve large commercial, residential, or office uses would be required to request a WSA from the California Water Service Company to identify project-specific impacts.<sup>75</sup> California Water Service Company has incorporated the demand from other development projects in its future water service projections. As discussed under Impact UT-2, according to the UWMP, the South San Francisco District would have adequate supplies through the planning horizon year of 2040 during average rainfall years for the City's and the project's water demands utilizing existing water infrastructure. As mentioned previously, the project would represent approximately 0.04 percent of the projected 41,767 acre-feet of water to be supplied to Cal Water's three districts in 2040. In addition, SFPUC and Cal Water have plans to expand water supplies through several water supply development projects, which would ultimately help to address increasing water demand, and offset water demand generated by the project. Furthermore, the proposed project and the reasonably foreseeable future projects would comply with all applicable City and state water conservation measures, including title 24, part, 6, the California Energy Code, with baseline standard requirements for energy efficiency; the 2019 Building Energy Efficiency Standards; and the 2019 CALGreen Code. For these reasons, the proposed

A WSA is required for projects with, among other things: (1) demand equivalent to 500 residential units, (2) a shopping/business center that employs more than 1,000 people or has a floor space of 500,000 square feet or greater, or (3) a commercial office building with more than 1,000 employees or floor space totaling 250,000 square feet or greater. If prepared for a project, the WSA determines if the existing water supply is adequate for the proposed project.

project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative water supply or water supply facilities impact. The cumulative impact would be *less than significant*. No mitigation is required.

#### Stormwater

The cumulative projects would be likely constructed on infill sites in highly urbanized areas where there is a substantial amount of existing impervious surface area. All cumulative projects would be required to include post-construction stormwater management features, such as LID measures, to reduce flows to pre-project conditions. New projects would be subject to the requirements of the San Francisco Bay MS4 Permit, the Construction General Permit, and the City's General Plan and Municipal Code related to protecting water resources. Thus, the proposed project, in combination with the reasonably foreseeable future projects, would not substantially increase impervious surfaces compared to existing conditions. Post-construction peak stormwater flows would not increase compared to existing conditions. Similar to the proposed project, the reasonably foreseeable future projects would be required to comply with all BMPs and the City's standard conditions regarding stormwater drainage and surface runoff detention measures (including Condition No. 13, Condition No. 23, and Condition No. 24). For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative stormwater facilities impact. The cumulative impact would be *less than significant*. No mitigation is required.

#### Wastewater

The cumulative projects would increase the amount of water used and increase demands on wastewater infrastructure and treatment facilities. The Sewer System Management Plan projects future land use development in the East of 101 Area to the year 2040, and identifies components for the system that would require improvement to support future growth. Those improvements include capacity (pipe diameter) upgrades, slope improvements, and lift station improvements. Similar to the proposed projects, the reasonably foreseeable future projects would be required to contribute to the Capital Improvement Program. Furthermore, as a standard condition of approval, the City would require the proponents of each project to provide project-specific sewer capacity studies. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative wastewater generation and facilities impact. The cumulative impact would be *less than significant*. No mitigation is required.

# Natural Gas, Electricity, and Telecommunications

The cumulative projects would likely be constructed on infill sites in highly urbanized areas; it is anticipated that these projects would not substantially increase electric power, natural gas, and telecommunications demands. Similar to the proposed project, the cumulative projects would comply with all applicable City and state water conservation measures, including title 24, part, 6, the California Energy Code, with baseline standard requirements for energy efficiency; the 2019 Building Energy Efficiency Standards; and the 2019 CALGreen Code. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative natural gas, electricity, and telecommunications demand and facilities impact. The cumulative impact would be *less than significant*. No mitigation is required.

### **Solid Waste**

In 2015 (the most recent year for which approved data are available), the average per capita residential disposal rate in South San Francisco was 6.9 pounds per day, which met South San Francisco's target identified by CalRecycle of 6.9 pounds per day. <sup>76</sup> For the employment sector, the average disposal rate was 9.3 pounds per day per employee, which did not meet the 9.0 pounds per day per employee target. The cumulative projects would incrementally increase the amount of solid waste generated by increasing the number of employees and residents in the City; excavation, demolition, and remodeling activities associated with growth would also increase total solid waste generation. However, the increasing rate of diversion citywide, achieved through recycling, composting, and other methods, would decrease the total amount of waste deposited in landfills. The proposed project, in combination with the reasonably foreseeable future projects, would not cause a significant impact on regional landfill capacity because the projects would be required to comply with the City's waste reduction and diversion measure (CAP Measure 5.1). In addition, 100 percent of all inert solids (building materials) and 65 percent of non-inert solids (all other materials) generated during construction of the cumulative projects would be recycled as required by the City under Chapter 15.60 of the South San Francisco Municipal Code, similar to the proposed project. Compliance with such regulatory requirements would reduce the project's and the cumulative projects' contribution to overall solid waste volumes generated during construction and operation. Given the future long-term capacity available at Ox Mountain Sanitary Landfill, Newby Island Sanitary Landfill, and other area landfills, the proposed project and cumulative projects would be served by a landfill with adequate permitted capacity to accommodate their solid waste disposal needs. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a solid waste impact. The cumulative impact would be less than significant. No mitigation is required.

# 4.10.11 Wildfire

# 4.10.11.1 Regulatory Framework

#### State

#### **Very High Fire Hazard Severity Zones Government Code 51177**

Very High Fire Hazard Severity Zones (VHFHSZs) are defined by Government Code section 51177 as areas that have been designated by the director of the California Department of Forestry and Fire Protection (CAL FIRE) as having the highest probability for wildfire. The designation of these zones is based on statewide criteria and the severity of the fire hazard in the area. The zones have characteristics that have been identified by CAL FIRE as major causes for the spread of wildfires, such as fuel load, slope, and weather. Other factors, such as wind, are also considered. Fire Hazard Severity Zone maps are produced and maintained for each county in California.

California Department of Resources Recycling and Recovery. 2020. South San Francisco Jurisdiction Diversion/Disposal Rate Summary. Available: https://www2.calrecycle.ca.gov/LGCentral/DiversionProgram/ JurisdictionDiversionPost2006. Accessed: March 9, 2020.

# State Responsibility Areas Public Resources Code 4102

State Responsibility Areas (SRAs) are defined by PRC section 4102 as areas of the state in which the State Board of Forestry and Fire Protection has determined that the financial responsibility for preventing and suppressing fires lies with the state. Specifically, SRAs are lands in California where CAL FIRE has legal and financial responsibility for wildfire protection. SRA lands are usually unincorporated areas of a county and not federally owned. These areas contain wildland vegetation cover, housing densities lower than three units per acre, and, typically, some sort of watershed or range/forage value. Where SRAs encompass developments or a built environment, the local government agency assumes responsibility through a local responsibility area (LRA) or contracts with CAL FIRE.

LRAs do not meet the criteria for SRAs or federal responsibility areas. LRAs are typically cities, cultivated agricultural lands, and nonflammable areas in unincorporated portions of a county but can include flammable vegetation and wildland-urban interface areas. LRA fire protection is provided by local fire departments, fire protection districts, county fire departments, or through contract with CAL FIRE.

# Regional

# **County of San Mateo Emergency Operations Plan**

The 2015 County of San Mateo Emergency Operations Plan establishes policies and procedures and assigns responsibilities to ensure effective management of emergency response operations within the San Mateo County Operational Area. Under the Emergency Operations Plan, the emergency management organization in San Mateo County identifies potential threats to life, property and the environment, and develops plans and procedures to protect, prevent and mitigate those assets from potential hazards (e.g., wildfires).

### Local

#### South San Francisco General Plan

The 1999 General Plan provides a vision for long-range physical and economic development of the City, provides strategies and specific implementing actions, 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 contains a Health and Safety Element, which acknowledges and mitigates the risks posed by hazards (e.g., fire). While the General Plan does not include policies specific to wildfire, it includes the following policies applicable to fire risk:

- Policy 8.4-G-1: Minimize the risk to life and property from fire hazards in South San Francisco.
- Policy 8.4-G-2: Provide fire protection that is responsive to citizens' needs.
- Policy 8.4-I-2: Explore incentives or programs as part of a comprehensive fire hazard management program to encourage private landowners to reduce fire hazards on their properties.
- Policy 8.4-I-4:<sup>77</sup> Require site design features, fire-retardant building materials, and adequate access as conditions for approval of development or improvements to reduce the risk of fire in the City.

<sup>&</sup>lt;sup>77</sup> Policy 8.4-I-4 is misnumbered in the General Plan as the second Policy "8.4-I-3".

# 4.10.11.2 Significance Criteria

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant wildfire impact if it is located in or near a state responsibility area or lands classified as very high fire hazard severity zones, and would:

- Substantially impair an adopted emergency response plan or emergency evacuation plan;
- Due to slope, prevailing winds, or other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire:
- Require the installation or maintenance of associated infrastructure, such as roads, fuel breaks, emergency water sources, power lines, or other utilities, that may exacerbate the fire risk or result in temporary or ongoing impacts on the environment; or
- Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

# 4.10.11.3 Approach to Analysis

According to CAL FIRE, the City, including the project site, is in a non-VHFHSZ.<sup>78</sup> The nearest VHFHSZ is approximately 5.3 miles southwest of the project site, near the City of Millbrae. In addition, the entire City, including the project site, is in an LRA, not an SRA.<sup>79</sup> The nearest SRA, San Bruno Mountain State and County Park, is approximately 0.5 mile northwest of the project site. Given the project site's proximity to an SRA (i.e., less than 1 mile), the evaluation of the proposed project considers each of the thresholds above. Evaluation of the proposed project is based on CAL FIRE'S Fire Hazard Severity Zone maps, the County of San Mateo's Emergency Operations Plan, and the South San Francisco General Plan.

# 4.10.11.4 Impact Evaluation

Impact WF-1: The proposed project would not substantially impair an adopted emergency response plan or emergency evacuation plan. (Less than Significant)

The project would not include any changes to existing public roadways that provide emergency access to the site or surrounding area. The project would demolish a surface parking lot and construct a seven-story office and R&D building with parking. The existing access to the project site (two driveways on Gateway Boulevard, one driveway from the internal access drive south of the building at 951 Gateway Boulevard, and one driveway on an unnamed street that connects Poletti Way to Gateway Boulevard) would be retained under the proposed project. Emergency vehicle access to the project site would be provided by Gateway Boulevard and the parking lot to be constructed north of the proposed building. In addition, the proposed project would be designed to comply with the California Fire Code and the City Fire Marshal's code requirements that require on site access for emergency vehicles, a standard condition for any new project approval.

<sup>&</sup>lt;sup>78</sup> California Department of Forestry and Fire Protection. 2007. *San Mateo County Fire Hazard Severity Zones in SRA*. Available: https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/. Accessed: February 19, 2020.

<sup>&</sup>lt;sup>79</sup> California Department of Forestry and Fire Protection. 2008. *San Mateo County Very High Fire Hazard Severity Zones in LRA as Recommended by CAL FIRE*. Available: https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/. Accessed: February 19, 2020.

During project construction, traffic levels would increase minimally, which is not expected to degrade traffic operations. Furthermore, emergency response access during the construction period would not be impeded significantly. The project would not involve development of a structure that would impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan. No streets would be closed, rerouted, or altered substantially. The 731 net new employees (refer to Section 4.10.7, *Population and Housing*, of this draft EIR) may slightly increase demand during an evacuation. Therefore, the project would not interfere with the County of San Mateo's Emergency Operations Plan, the City's Community Emergency Response Team (CERT) or any evacuation route.<sup>80</sup> Adequate access to the project site and surrounding area would be maintained. The City further requires that upon completion of the proposed building, occupancy is not allowed until a final inspection is made by the SSFFD, which includes a review of the emergency evacuation plans. Therefore, the proposed project would have a *less-than-significant* impact on a statewide or locally adopted emergency response plan or emergency evacuation plan. No mitigation is required.

Impact WF-2: The proposed project would not, because of slope, prevailing winds, or other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. (*Less than Significant*)

As previously stated, the project site is not in a VHFHSZ or an SRA; therefore, the risk of wildfire is low. In addition, the project site and surrounding buildings are separated by paved parking areas, landscaping, and building setbacks that reduce wildfire risks. Furthermore, the project site is relatively flat and would be properly irrigated and maintained, which would also reduce the risk of wildfire. Therefore, there would be a *less-than-significant* impact with respect to exposing project employees to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. No mitigation is required.

Impact WF-3: The proposed project would not require the installation or maintenance of associated infrastructure, such as roads, fuel breaks, emergency water sources, power lines, or other utilities, that may exacerbate the fire risk or that may result in temporary or ongoing impacts on the environment. (*No Impact*)

The project would be served by existing water, wastewater, stormwater, natural gas, electric, and telecommunications infrastructure. New on-site facilities would be connected to new services through the installation of new, localized connections. Expansion or an increase in capacity of off-site infrastructure would occur as required by the utility providers. The project could include off-site infrastructure improvements outside of the project site but within the Gateway Campus.

The proposed project would not require the installation or maintenance of any infrastructure that would exacerbate fire risk. The project, including infrastructure upgrades, would be completed in conformance with the South San Francisco Fire Code to reduce potential fire hazards. Therefore, the proposed project would not require the installation or maintenance of infrastructure that would exacerbate the fire risk or result in temporary or ongoing impacts on the environment and there would be *no impact*. No mitigation is required.

The CERT Program trains individuals within the City's neighborhoods, businesses and industries in emergency preparedness and basic disaster response techniques. After graduating from training, the CERT team meets monthly to train on various emergency response skills such as shelter operations, communications, or emergency operations center support.

# Impact WF-4: The proposed project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes. (*No Impact*)

The proposed project would be located on a developed parcel within the Gateway Campus, which includes office, R&D, childcare, and amenity uses. The topography of the project site and surrounding area is relatively flat. A portion of the project site would be graded and leveled during construction. Therefore, the proposed project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of post-fire slope instability or drainage changes and there would be *no impact*. No mitigation is required.

# Impact C-WF-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on a statewide or locally adopted emergency response plan or emergency evacuation plan. (*Less than Significant*)

Although the City utilizes the Countywide Emergency Operations Plan, actual emergency response and evacuation would be coordinated through the City CERT program. Therefore, the cumulative geographic context for wildfire is the City. The cumulative projects located within approximately 0.5 mile of the project site are described in Section 4.1.5, *Approach to Cumulative Impact Analysis*, of this draft EIR and shown in Figure 4.1-1.

The proposed project would result in approximately 731 net new employees at the project site. As discussed in Section 4.10.7, *Population and Housing*, of this draft EIR, the cumulative projects would generate approximately 19,167 employees. The new employees generated by the proposed project and the cumulative projects may increase demand during an evacuation. However, the City requires that upon completion of the proposed building, occupancy is not allowed until a final inspection is made by the SSFFD, which includes a review of the emergency evacuation plans. For these reasons, the proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a significant cumulative impact on a statewide or locally adopted emergency response plan or emergency evacuation plan. The cumulative impact would be *less than significant*. No mitigation is required.

## 5.1 Introduction

This chapter evaluates alternatives to the proposed project and examines the potential environmental impacts associated with each alternative. By comparing these alternatives to the proposed project, the relative environmental advantages and disadvantages of each may be analyzed and weighed. California Environmental Quality Act (CEQA) Guidelines Section 15126.6(a) states that an environmental impact report (EIR) must describe and evaluate a reasonable range of alternatives to the proposed project that would feasibly attain most of the proposed project's basic objectives but would avoid or substantially lessen any identified significant adverse environmental impacts of the proposed project.

The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those potentially feasible alternatives necessary to foster informed public participation and an informed and reasoned choice by the decision-making body (per CEQA Guidelines Section 15126.6(f)). Therefore, an EIR does not need to address every conceivable alternative or consider infeasible alternatives. CEQA generally defines "feasible" to mean the ability to be accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, technological, and legal factors (per CEQA Guidelines Section 15364). The following factors may also be considered.

- Site suitability
- Economic viability
- Availability of infrastructure
- General plan consistency
- Other plans or regulatory limitations
- Jurisdictional boundaries
- Ability of the project's proponent to attain site control (per CEQA Guidelines section 15126.6(f)(1))

An EIR does not need to consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative (per CEQA Guidelines Section 15126.6(f)(3)).

Nine alternatives to the project were considered, including the required No Project Alternative. To determine which of the alternatives should be evaluated in this draft EIR, each alternative was screened to determine whether it would meet most of the objectives of the project, reduce any of the significant impacts identified in the draft EIR, and be potentially feasible.

This chapter provides a description of the alternatives considered but rejected, followed by an analysis of the No Project Alternative and the two alternatives selected for evaluation: the Reduced Surface Parking Lot Demolition Alternative and the Reduced Building Footprint Alternative.

## **5.1.1** Project Objectives

Refer to Section 3.1.1 in Chapter 3, *Project Description*, of this draft EIR for a list of the project objectives that have been identified by the project sponsor.

## 5.1.2 Significant Impacts of the Project

Based on the analysis provided in Chapter 4 of this draft EIR, the project would have the following significant and unavoidable impacts.

- Impact GHG-1b: The proposed project would generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment during operation. The proposed project would result in a net loss of trees, reducing carbon sequestration in the land use sector. Implementation of Mitigation Measure GHG-2 would plant additional trees on existing surface parking lots, but would still result in a net loss of trees. In addition, the proposed project would not achieve the 16.8 percent vehicle miles traveled (VMT) per service population reduction target. The proposed project would be subject to regulatory programs related to fuel and vehicle efficiency as well as vehicle electrification. In addition, implementation of Mitigation Measure TR-1, as discussed in Section 4.9, Transportation and Circulation, would contribute a fair share towards funding the design and construction of off-site improvements to support the proposed project's first- and last-mile transit connection strategies, which are necessary to support reductions in the number of trips made by automobile. These improvements include fair-share contributions towards the City's cost of upgrading sidewalks, upgrading and extending bicycle and pedestrian pathways, providing a more direct connection to on-street shuttle stops, participating in first/last shuttle programs, and striping unmarked crosswalks contributing to bicycle and pedestrian infrastructure. However, the lead agency cannot determine with certainty that implementation of Mitigation Measure TR-1 would reduce the proposed project's VMT to a less-than-significant level because there are a range of GHG reductions associated with the measures in TR-1, making precise quantification of reductions difficult. Consequently, although emissions from the stationarysource, area, energy, waste, and water sectors would generally be consistent with the Bay Area Air Quality Management District's (BAAQMD's) stationary threshold or the scoping plan and regulatory programs, land use and mobile-source emissions from the proposed project would not be consistent with the scoping plan measures outlined to reduce GHG emissions consistent with the State's goals. Therefore, operational GHG impacts would be significant and unavoidable with mitigation.
- Impact GHG-2: The proposed project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Stationary-source emissions would be below BAAQMD's stationary-source threshold. In addition, the proposed project would achieve U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) Gold certification and implement sustainability measures, such as waste diversion programs and water reduction measures, consistent with the 2017 scoping plan. This would reduce GHG emissions and associated impacts from area energy, water, and waste sources to less-than-significant levels. These reductions would help the State meet its GHG reduction goals. However, the proposed project would not be consistent with the scoping plan's overall goal of avoiding losses in carbon sequestration, given the net tree loss despite implementation of Mitigation Measure GHG-2. In addition, implementation of Mitigation Measure TR-1 would reduce mobile-source emissions during operation but would not reduce

emissions enough to meet the 16.8 percent VMT per service population reduction target developed by CARB. Therefore, the GHG impacts of the proposed project would be significant and unavoidable with mitigation because the project would not be consistent with State goals to reduce GHG emissions.

Impact TR-1: Existing home-based work (HBW) VMT per employee in the travel demand model transportation analysis zone (TAZ) that encompasses the project result in greater than 16.8 percent below the regional average HBW VMT per employee under existing plus project and cumulative plus project conditions. The project would generate approximately 16.2 HBW VMT per employee under existing conditions, which is greater than the per-employee significance threshold of 11.8 HBW VMT (based on a VMT rate of a reduction of 16.8 percent below the regional average of 14.2 HBW VMT per employee). Therefore, the project would have a significant impact on VMT under existing plus project conditions. Under cumulative conditions, the project would generate approximately 14.0 HBW VMT per employee, which is greater than the per-employee significance threshold of 12.1 HBW VMT (based on a VMT rate 16.8 percent below the regional average of 14.6 HBW VMT per employee). Therefore, the project would have a significant impact on VMT under cumulative plus project conditions. Mitigation Measure TR-1 would support and enhance the effectiveness of the project's last-mile transit connection strategies, but would be unlikely to substantially reduce HBW VMT peremployee, and would aid in reducing project auto travel demand. It is appropriate mitigation under both the existing plus project and cumulative plus project conditions; however, its effectiveness is unknown and is unlikely to reduce the project's HBW VMT by 27 percent (i.e., the amount needed to reduce the project's HBW VMT per employee of 16.2 to the 11.8 threshold, to reach a less-than-significant level). Therefore, this impact would be significant and unavoidable with mitigation.

#### 5.2 **Alternatives Considered but Rejected**

Section 15126.6(c) of the CEQA Guidelines provides that an EIR should "identify any alternatives that were considered by the lead agency but rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination." The screening process for identifying viable EIR alternatives included consideration of the following criteria.

- Ability to meet the project objectives
- Potential ability to substantially lessen or avoid environmental effects associated with the proposed project
- Potential feasibility

The discussion below describes alternatives that were considered during preparation and scoping of this draft EIR, and gives the rationale for eliminating these alternatives from detailed consideration.

#### **Alternative with Podium Parking** 5.2.1

An alternative that would include a taller building with podium parking was considered based on its potential to maximize the development potential at the project site as a result of its larger size. However, this alternative was rejected because it would not substantially reduce or eliminate the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2)

because it would not reduce the average HBW VMT per employee. The project's cumulatively considerable GHG impacts are only related to mobile source emissions and are a direct consequence of the significant VMT impact. Therefore, this alternative was rejected because it would not substantially reduce or eliminate the project's significant VMT or cumulatively considerable contribution to significant cumulative GHG impacts.

## 5.2.2 Reduced Height Alternative

An alternative similar to the proposed project but with a building reduced in height by one story and reduced in size by approximately 30,000 square feet was considered based on its potential to reduce the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2) as a result of its smaller size. However, a smaller project does not directly correlate to a reduced VMT impact because VMT is assessed based on a per-capita or per-employee rate. The project's cumulatively considerable contribution to significant cumulative GHG impacts are only related to mobile source emissions and are a direct consequence of the significant VMT impact. Therefore, this alternative was rejected because it would not substantially reduce or eliminate the project's significant VMT or cumulatively considerable contribution to significant cumulative GHG impacts. In addition, this alternative would not fully meet the project objectives to redevelop underutilized parcels within the project site at a higher density to build on the synergy of R&D development and to take advantage of opportunities offered in the East of 101 Area to create a vibrant, attractive and efficiently-designed R&D campus; provide sufficient space for tenants to employ key scientific and business personnel in proximity to each other to foster efficient collaboration and productivity; and maximize positive fiscal impacts for the City through the creation of jobs, enhancement of property values, and generation of property taxes and development fees.

## 5.2.3 Residential Land Use Alternative

An alternative that would develop all residential uses at the project site was considered based on its potential to reduce the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2). A residential alternative would have the potential to reduce the average HBW VMT per employee² by locating residential uses in an area predominantly occupied by employment uses, providing more opportunities for employees in the East of 101 area to live closer to their place of work. The project site is identified as Business Commercial (BC) in the General Plan and is zoned Gateway Specific Plan District under the City's zoning ordinance. Neither of these designations permit residential uses, nor would residential uses be consistent with existing land uses in the vicinity of the project site. Residential development at this site is not consistent with current General Plan direction and policies to preserve land East of 101 for employment uses. As part of the City's *Shape SSF 2040 General Plan* process, the City is considering residential uses in the East of 101 area, including high-density mixed use residential uses in areas adjacent to and within 0.5 mile to the Caltrain station in one of the alternatives. The areas along Gateway Boulevard that are under consideration for residential uses are within 0.5 mile of the Caltrain station, and do not include the

The key metric used to determine a VMT impact is home-based work HBW VMT per capita, which is expressed as a rate per employee. For example, if an alternative would have fewer employees compared to the proposed project, it would still be required to substantially reduce the average trip length between employees' home and work to substantially reduce the average HBW VMT per employee compared to the proposed project.

<sup>&</sup>lt;sup>2</sup> Ibid.

project site.<sup>3</sup> The City does not anticipate that the *Shape SSF 2040 General Plan* will consider residential uses for the project site. Furthermore, a residential alternative would be inconsistent with virtually all of the project objectives. Therefore, this alternative was rejected based on its infeasibility and inability to meet the basic project objectives.

## 5.2.4 Mixed-Use (Residential, Office, and R&D) Alternative

An alternative that would include a mix of housing, office, and R&D space on the project site was considered based on its potential to reduce the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2). A mixed-use alternative with a residential component would have the potential to reduce the average HBW VMT per employee<sup>4</sup> by locating residential uses in an area predominantly occupied by office uses, providing more opportunities for employees in the East of 101 area to live closer to their place of work. Because of FAR constraints, a Mixed-Use (Residential, Office, and R&D) Alternative would require a substantial reduction of the office/R&D uses in the project, in order to accommodate residential uses on site. A Mixed-Use (Residential, Office, and R&D) Alternative therefore would not fully meet the project objectives for many of the same reasons as the Reduced Height Alternative. However, introducing residential uses on the project site is not feasible for the same reasons discussed above for the Residential Land Use Alternative. Therefore, this alternative was rejected.

## 5.2.5 Mixed Use (Retail, Office, and R&D) Alternative

An alternative that would include a mix of retail (e.g., pharmacy chain such as CVS or Walgreens), office, and R&D space on the project site was considered based on its potential to reduce the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2). A mixed-use alternative with a retail component would have the potential to reduce VMT by locating retail uses in an area predominantly occupied by office uses, providing more opportunities for employees in the East of 101 area to shop closer to their place of work. This alternative could also attract new trips associated with the retail use from the surrounding area. A Mixed-Use (Retail, Office, and R&D) Alternative would be generally consistent with most of the project objectives. In addition, this alternative would comply with the project site's current General Plan designation as BC, which permits "administrative, financial, business, professional, medical and public offices, research and development facilities, and visitor-oriented and regional commercial activities", and retail sales is a permitted use in the GSPD IV zoning district. However, a project with increased retail does not directly correlate to a reduced VMT impact because VMT is assessed based on a per-capita or per-employee rate. Therefore, this alternative was rejected because it would not substantially reduce or eliminate the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2) for the proposed office and R&D uses.

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<sup>&</sup>lt;sup>3</sup> City of South San Francisco. 2020. *Shape SSF 2040 General Plan*. Available: https://shapessf.com/alternatives/. Accessed: July 24, 2020.

The key metric used to determine a VMT impact is home-based work HBW VMT per capita, which is expressed as a rate per employee. For example, if an alternative would have fewer employees compared to the proposed project, it would still be required to substantially reduce the average trip length between employees' home and work to substantially reduce the average HBW VMT per employee compared to the proposed project.

## 5.2.6 Alternative Project Location

An alternative that would construct the proposed project at a different location in other areas of the City or in locations in the East of 101 area or within 0.5 mile to transit was considered based on its potential to reduce the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2).

Two potential alternative project locations were considered in the East of 101 area. One location is bounded by Sylvester Road to the west, Associated Road to the south, U.S. 101 to the east, and East Grand Avenue to the north. The site is currently occupied by a mix of light industrial and retail uses including an electric vehicle charging station, a bakery, a restaurant, a consignment shop, equipment rentals, and sheet metal fabrication. A second location is bounded by East Grand Avenue to the north, west, and south and Poletti Way to the east. The site is currently occupied by a Comfort Inn and Suites. As part of the City's Shape SSF 2040 General Plan process, the City is considering mixed-use development with residential uses at these sites in several of the land use alternatives. An alternative that would construct the proposed project closer to transit was considered based on its potential to reduce the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2). The Caltrain Station at East Grand Avenue is approximately 0.25 to 0.5 mile north of the two alternative project locations. CEQA Guidelines Section 15064.3, subdivision (b) (1), states that "generally, projects within  $\frac{1}{2}$  mile of an existing major transit stop<sup>5</sup> or a stop along an existing high quality transit corridor<sup>6</sup> should be presumed to cause less-than-significant transportation impact." OPR (2018) advises that the less than significant presumption would not apply, however, if projectspecific or location-specific information indicates the project will still generate significant levels of VMT. As shown in in Section 4.9, Transportation and Circulation, HBW VMT per employee in the East of 101 area is higher than that of the Bay Area Region (16.2 compared to 14.2). Given the high levels of VMT generated by sites in the East of 101 area, sites within 0.5 mile of an existing major transit stop in the East of 101 area may still generate significant levels of VMT. Furthermore, this alternative was rejected because neither of the potential alternative sites are owned by the project sponsor. In addition, both sites have long-term leases and tenants and neither site may be available for purchase or development. These sites therefore would not be consistent with the project objectives.

It is anticipated that an alternative that would construct the proposed project in another area of the city (possibly outside of the East of 101 area) would not reduce the project's significant VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2) because there are no low VMT office areas anywhere in the City outside of areas in close proximity to major transit stations.<sup>7</sup> In addition, this alternative would not reduce the project's significant VMT impact and GHG impacts because any new jobs added to the City of South San Francisco (particularly in the East of 101 area and in the biotech industry) would likely attract employees from throughout the Bay Area, which would generate substantially more VMT and worsen the regional balance between jobs and housing. Therefore, this alternative was rejected because of its potential infeasibility.

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<sup>&</sup>lt;sup>5</sup> A "major transit stop" means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.

<sup>&</sup>lt;sup>6</sup> A "high-quality transit corridor" means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

<sup>&</sup>lt;sup>7</sup> City of South San Francisco. 2020. City of South San Francisco Significance Thresholds for Transportation. Available: https://ci-ssf-ca.legistar.com/LegislationDetail.aspx?ID=4563798&GUID=D74B6441-5B43-4DE4-A0C3-1EFBBEC7ECB2&FullText=1. Accessed: July 29, 2020.

## 5.3 Alternatives Selected for Further Review

As discussed in Section 5.2, the lead agency considered six alternatives that would have the potential to reduce the project's significant and unavoidable VMT impact (Impact TR-1) and GHG impacts (Impacts GHG-1 and GHG-2), and each alternative was rejected based on its inability to reduce or avoid the significant impacts of the project, its infeasibility, and/or its inability to meet the basic project objectives. Therefore, the lead agency also considered alternatives that would substantially reduce or avoid the impacts of the project that would require mitigation to be reduced to a less-than-significant level. These impacts include:

- **Impact AQ-2 (construction)**: The proposed project would not result in a cumulatively considerable net increase in any criteria pollutant for which the project region is classified as nonattainment under an applicable federal or state ambient air quality standard after mitigation.
- **Impact AQ-3 (construction)**: The proposed project would not expose sensitive receptors to substantial pollutant concentrations after mitigation.
- **Impact C-AQ-2 (construction)**: The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts related to a net increase in criteria pollutants for which the region is in nonattainment for an applicable federal or state ambient air quality standard after mitigation.
- **Impact C-AQ-3**: The proposed project in combination with past, present, and reasonably foreseeable future projects would not contribute to cumulative health risks for sensitive receptors after mitigation.
- Impact BIO-1: The proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service after mitigation.
- **Impact BIO-4:** The proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites after mitigation.
- **Impact C-BIO-1:** The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on biological resources after mitigation.
- **Impact CR-2:** The proposed project would not cause a substantial adverse change in the significance of an archaeological resource, pursuant to Section 15064.5 after mitigation.
- **Impact CR-3:** The proposed project would not disturb any human remains, including those interred outside of formal cemeteries after mitigation.
- Impact CR-4: The proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resource Code Section 21074 after mitigation.
- **Impact C-CR-1:** The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on archeological resources, human remains, and tribal cultural resources after mitigation.

• **Impact EN-1 (construction):** The proposed project would not result in a potentially significant environmental impact due to the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation after mitigation.

- **Impact GEO-6:** The proposed project could directly or indirectly destroy a unique paleontological resource on site or unique geologic feature after mitigation.
- **Impact C-GEO-2:** The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on paleontological resources after mitigation.
- **Impact GHG-1a (construction)**: The proposed project would not generate GHG emissions, either directly or indirectly, that may have significant impact on the environment during construction after mitigation.
- **Impact NOI-1 (construction)**: The proposed project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies after mitigation.
- **Impact C-NOI-1 (construction):** The proposed project would not result in a cumulatively considerable contribution to the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project site in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies after mitigation.
- **Impact TR-4:** The proposed project would not produce a detrimental impact to local transit or shuttle services, or conflict with adopted plans and programs after mitigation.

The project impacts requiring mitigation to reduce impacts to less-than-significant levels are largely related to construction impacts including ground disturbance, tree removal, and equipment emissions. Therefore, the alternatives selected for evaluation focus on reducing ground disturbance associated with the project, which would in turn reduce tree removals and emissions.

The three alternatives are evaluated in this chapter as listed below.

- Alternative A—No Project Alternative
- Alternative B—Reduced Surface Parking Lot Demolition Alternative
- Alternative C—Reduced Building Footprint Alternative

Under Alternative A—No Project Alternative, existing land uses and site conditions at the project site would not change and the existing floor area ratio (FAR) would remain at 0.55. Under Alternative B—Reduced Surface Parking Lot Demolition Alternative, a smaller part of the existing surface parking lot at the project site would be demolished, resulting in the same building as the proposed project but with a reduced area for parking, streetscape, and landscape improvements compared to the proposed project. Alternative C—Reduced Building Footprint Alternative would involve constructing a building with office, research and development (R&D), and retail (i.e., café and fitness center) space of the same height as the project, but with a reduced building footprint, approximately 25 percent less square footage, and the same ratio of uses as the proposed project.

Table 5-1 compares the main features of the proposed project to those of the alternatives.

Table 5-1. Comparison of Main Features of the Proposed Project to the Alternatives

| Feature  | Proposed<br>Project  | Alternative A—<br>No Project<br>Alternative           | Alternative B—<br>Reduced Surface<br>Parking Lot<br>Demolition<br>Alternative | Alternative C—<br>Reduced Building<br>Footprint<br>Alternative               |
|--|--|---|---|--|
| Total<br>proposed<br>new uses at<br>751 Gateway<br>Boulevard | 208,800<br>square feet   | None  | 208,800 square feet   | 156,600 square<br>feet   |
| Building<br>Height   | 148 feet   | None<br>(existing 97-foot high<br>building to remain) | 148 feet  | 148 feet   |
| Vehicle<br>Parking   | 418 spaces   | None<br>(existing 558 spaces<br>to remain)            | Approximately 443 spaces  | 418 spaces   |
| Existing<br>Trees to be<br>Removed                           | 175 trees  | None  | 143 trees   | 175 trees  |
| Employees  | 1,181<br>employees<br>(731 net new<br>employees and<br>450 existing) | 450<br>(No net new<br>employees and 450<br>existing)  | 1,181 employees<br>(731 net new<br>employees and 450<br>existing)             | 998 employees<br>(548 net new<br>employees <sup>a</sup> and<br>450 existing) |

Source: 701 Gateway Center LLC, 2020; ICF, 2020.

Notes:  $\sim$  = approximately; ADA = Americans with Disabilities Act; BC = business commercial; GSPD = Gateway Specific Plan District; R&D = research and development; sf = square feet (foot)

# 5.4 Alternative A—No Project Alternative

CEQA Guidelines Section 15126.6(e) requires evaluation of a "no project" alternative, stating "The purpose of describing and analyzing a no project alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project." CEQA Guidelines Section 15126.6(e)(2) requires that the no project alternative analysis "discuss the existing conditions... as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and policies and consistent with the available infrastructure and community services." As noted in CEQA Guidelines Section 15126.6, an EIR for "a development project on identifiable property" typically analyzes a no project alternative, i.e., "the circumstance under which the project does not proceed. Such a discussion would compare the environmental effects of the property remaining in its existing state against environmental effects that would occur if the project is approved. If disapproval of the project under consideration would result in predictable actions by others, such as the proposal of some other project, this 'no project' consequence should be discussed."

This employee number is 25 percent reduced compared to the project because employee calculations are based on sf.

## 5.4.1 Description

Under Alternative A—No Project Alternative, the existing land uses and site conditions at the project site would not change. The existing six-story, approximately 170,235-square-foot office building on the project site would remain, as would the existing surface parking, which has approximately 558 parking spaces. There would be no tree removal. Under the Alternative A, the FAR at the project site would remain at 0.53. Alternative A would not preclude potential future development of the project site with a range of land uses that are permitted at the project site.

## 5.4.2 Ability to Meet Project Objectives

Under Alternative A—No Project Alternative, the physical environment of the project site would remain generally unchanged. Therefore, Alternative A would fail to meet all of the basic project objectives (refer to Section 3.1.1 in Chapter 3, *Project Description*, of this draft EIR for a list of the project objectives that have been identified by the project sponsor and Table 5-3 for a comparison of the ability of this alternative to meet the objectives of the proposed project).

## 5.4.3 Impacts

The impact analysis below focuses on those impacts that were determined to be significant and unavoidable and less than significant with mitigation under the proposed project. Less-than-significant impacts are generally discussed at the end of the impact analysis.

This environmental analysis assumes that the existing structure, surface parking lot, and existing uses on the project site would not change and that the existing physical conditions, as described in detail for each environmental topic in Chapter 4, *Environmental Setting, Impacts, and Mitigation*, would remain the same. If Alternative A were implemented, none of the impacts associated with the proposed project as described in Chapter 4 would occur. However, development and growth would continue within the vicinity of the project site as reasonably foreseeable future projects are approved, constructed, and occupied. These projects could contribute to cumulative impacts in the vicinity, but under Alternative A, land use activity on the project site would not contribute to these cumulative impacts beyond existing levels.

## 5.4.3.1 Air Quality

Under Alternative A, there would be no demolition or construction activities and no new operational sources of air pollutants on the project site. The project site would remain in its current condition. Existing stationary sources of air pollution on and near the project site and major roadways contributing to air pollution in the project vicinity would remain. Alternative A would have no impact related to air quality compared to the proposed project, which would result in less-than-significant with mitigation project-level air quality impacts and a less than cumulatively considerable contribution to significant cumulative air quality impacts. Potential construction-related air quality impacts that would occur under the proposed project would not occur under Alternative A; thus, implementation of Mitigation Measures AQ-1, Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related NO<sub>X</sub> Emissions, and AQ-2, Implement BAAQMD Basic Construction Mitigation Measures, would not be required for this alternative.

#### **5.4.3.2** Biological Resources

Under Alternative A, there would be no demolition activities, construction activities, or removal of trees or vegetation at the project site. The project site would remain in its current condition. Alternative A would have no impact related to biological resources compared to the proposed project, which would result in less-than-significant with mitigation project-level biological resources impacts and a less than cumulatively considerable contribution to significant cumulative biological resources impacts. Potential biological resources impacts that would occur under the proposed project would not occur under Alternative A; thus, implementation of Mitigation Measures BI-1, Preconstruction Nesting Bird Surveys and Buffer Areas; BI-2, Preconstruction Bat Survey for Roosting Bats and Roosting Habitat Abatement; BI-3, Lighting Measures to Reduce Impacts on Birds; and BI-4, Building Design Measures to Minimize Bird Strike Risk, would not be required for this alternative.

#### 5.4.3.3 Cultural Resources and Tribal Cultural Resources

Under Alternative A, there would be no excavation, grading, or demolition activities at the project site. The project site would remain in its current condition. Alternative A would have no impact related to cultural resources and tribal cultural resources compared to the proposed project, which would result in less-than-significant with mitigation project-level cultural resources and tribal cultural resources impacts and a less than cumulatively considerable contribution to significant cumulative cultural resources and tribal cultural resources impacts. Potential cultural resources and tribal cultural resources impacts that would occur under the proposed project would not occur under Alternative A; thus, implementation of Mitigation Measures CR-1, Cultural Resources Worker Environmental Awareness Program (WEAP); CR-2, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Archaeological, Historical, and Tribal Resources; and CR-3, Halt Construction Activity, Evaluate Remains, and Take Appropriate Action in Coordination with Native American Heritage Commission, would not be required for this alternative.

## 5.4.3.4 Energy

Under Alternative A, there would be no demolition or construction activities and no new operational demand for energy. The project site would remain in its current condition. Existing demand for energy at the project site would remain. Alternative A would have no impact related to energy compared to the proposed project, which would result in less-than-significant with mitigation project-level energy impacts and less than significant cumulative energy impacts. Potential energy impacts that would occur under the proposed project would not occur under Alternative A; thus, implementation of Mitigation Measure GHG-1, Require Implementation of BAAQMD-recommended Construction BMPs, and Mitigation Measure TR-1, First- and Last-mile Strategies, would not be required for this alternative.

#### 5.4.3.5 Geology and Soils

Under Alternative A, there would be no excavation, grading, or demolition activities at the project site. The project site would remain in its current condition. Alternative A would have no impact related to geology and soils compared to the proposed project, which would result in less-than-significant with mitigation project-level geology and soils impacts and a less than cumulatively considerable contribution to significant cumulative geology and soils impacts. Potential paleontology impacts that would occur under the proposed project would not occur under

Alternative A; thus, implementation of Mitigation Measure GEO-1, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Paleontological Resources, would not be required for this alternative.

#### 5.4.3.6 Greenhouse Gas Emissions

Under Alternative A, there would be no demolition or construction activities and no new operational sources of greenhouse gas (GHG) emissions on the project site. The project site would remain in its current condition. Existing sources of GHG emissions on and near the project site would remain. Alternative A would have no impact related to operational GHG emissions compared to the proposed project, which would result in significant and unavoidable cumulatively considerable contribution to significant cumulative VMT-related GHG impacts during operation. In addition, Alternative A would have no impact compared to the less-than-significant GHG impacts during construction. Potential GHG impacts that would occur under the proposed project would not occur under Alternative A; thus, implementation of Mitigation Measure GHG-1, Require Implementation of BAAQMD-recommended Construction BMPs, Mitigation Measure GHG-2, Operational GHG Reduction Measures, and Mitigation Measure TR-1, First- and Last-mile Strategies, would not be required for this alternative.

#### 5.4.3.7 Noise and Vibration

Under Alternative A, there would be no demolition or construction activities and no new operational sources of noise or vibration on the project site. The project site would remain in its current condition. Existing sources of noise and vibration on and near the project site and major roadways contributing to noise in the project vicinity would remain. Alternative A would have no impact related to noise and vibration compared to the proposed project, which would result in less-than-significant with mitigation project-level noise and vibration impacts and a less than cumulatively considerable contribution to significant cumulative noise and vibration impacts. Potential noise impacts that would occur under the proposed project would not occur under Alternative A; thus, implementation of Mitigation Measures NOI-1, Construction Noise Control Plan to Reduce Noise Outside of the Standard Construction Hours in the City of South San Francisco, and NOI-2, Operational Noise Study to Determine Attenuation Measures to Reduce Noise from Project Mechanical Equipment, would not be required for this alternative.

## 5.4.3.8 Transportation and Circulation

Under Alternative A, there would be no changes to transportation and circulation on or near the project site. The project site would remain in its current condition. Existing traffic conditions would remain. Alternative A would have no impact related to transportation and circulation compared to the proposed project, which would result in significant and unavoidable with mitigation project-level VMT-related transportation impacts and a cumulatively considerable contribution to significant and unavoidable cumulative VMT-related transportation impacts. In addition, Alternative A would have no impact compared to the other less-than-significant impacts of the project related to queuing, bicycle and pedestrian facilities, transit, hazards, and emergency access. Potential transportation and circulation impacts that would occur under the proposed project would not occur under Alternative A; thus, implementation of Mitigation Measure TR-1, First- and Last-mile Strategies, would not be required for this alternative.

### 5.4.3.9 Less-than-Significant Impacts

This draft EIR concludes that the proposed project would have no impact or less-than-significant impacts in all topics of the following analysis areas.

- Aesthetics
- Agricultural and Forest Resources
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Utilities
- Wildfire

Alternative A would result in no impact related to any of the above-listed environmental topics because this alternative would result in no changes to existing site conditions.

# 5.5 Alternative B—Reduced Surface Parking Lot Demolition Alternative

## 5.5.1 Description

Alternative B—Reduced Surface Parking Lot Demolition Alternative would demolish a smaller part of an existing surface parking lot at the project site, resulting in the same building as the proposed project but with a reduced area for parking, streetscape, and landscape improvements compared to the proposed project in the northern portion of the project site. Alternative B would redevelop approximately half of the existing surface parking lot in the northern portion of the project site with new parking, landscaping, trees, pedestrian entryway elements, and streetscape features compared to the proposed project, which would redevelop the entire surface parking lot. The other half of the existing surface parking lot would remain under Alternative B with the exception of possible asphalt resurfacing and new striping for the parking spaces. It is anticipated that the portion of the existing surface parking lot that would remain includes approximately 46 parking spaces compared to the 21 parking spaces that would be constructed in this area under the proposed project (refer to Figure 3-4 in Chapter 3, Project Description, of this draft EIR). The 376 existing parking spaces in the rectangular parking lots in the southern portion of the project site would be included in this alternative, as with the project. Thus, this alternative would result in approximately 25 more parking spaces than the proposed project, for a total of approximately 443 parking spaces compared to the 418 parking spaces proposed under the project, as shown in Table 5-1.

Alternative B would retain approximately 32 existing trees in the northeastern part of the project site that are proposed for removal under the project, bringing the total number of trees to be removed to 143 compared to 175 under the proposed project. It is anticipated that the amount of pervious surface under this alternative would be slightly less than under the proposed project because the existing surface parking lot includes more impervious surface area than the improvements proposed for the area under the project. Overall, Alternative B would involve a slightly reduced development area compared to the project. Site access and circulation would be similar to the proposed project.

The building design under Alternative B would be the same in height, square footage, bulk, architecture, and materials as the proposed project and would similarly be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. Alternative B would include the same design features that support VMT reduction as the proposed project, including the TDM plan, the new employee shuttle stop along the western portion of the project site, and the installation of electric charging stations and bicycle parking within the project site. Alternative B would implement the same sustainability features, such as Energy Star-rated appliances, green infrastructure (e.g., biotreatment areas and other low-impact development), lowflow shower heads, aerators, and toilets, and waste diversion programs.

Alternative B, like the proposed project, would maintain the existing zoning designation of Zone IV under the Gateway Specific Plan District (GSPD) and the same existing zoning would apply to this alternative, which allows for development at a FAR of 1.25, or a maximum of 402,930 square feet, within the project site.

Infrastructure improvements associated with Alternative B would be similar to those described for the proposed project. The project site is serviced by existing potable water, stormwater, sanitary sewer, natural gas, electric, and trash and recycling services. New on-site facilities would be connected to new services through the installation of new, localized connections. Expansion or an increase in capacity of off-site infrastructure would occur as required by the utility providers. As with the project, Alternative B could include off-site infrastructure improvements outside of the project site but within the Gateway Campus.

The construction activities for Alternative B would be similar to the proposed project. The construction schedule for Alternative B may be slightly shorter than the proposed project. In addition, Alternative B would require substantially less ground disturbance in the northern portion of the project site and slightly less ground disturbance overall compared to the proposed project. Overall, Alternative B would result in a slightly reduced construction program in terms of timeline and activity.

As for the anticipated approvals, Alternative B would still require a TDM Plan approval, design review, and precise plan approval. Alternative B would also require standard City engineering, building, fire, and protected tree removal permits, along with other agency approvals (e.g., Bay Area Regional Water Quality Control Board, BAAQMD, and Federal Aviation Administration).

## 5.5.2 Ability to Meet Project Objectives

Alternative B—Reduced Surface Parking Lot Demolition Alternative would only partially meet the project objective to "develop a building that is aesthetically compatible with the surrounding vicinity, with height, massing and design treatment" because it would not maximize the visual potential and compatibility with surrounding uses regarding the proposed landscape, hardscape,

and site plan. Alternative B would not redevelop a portion of the existing surface parking not in the northeastern portion of the project site. In addition, existing shrubs and other landscaping in the northeastern part of the project site would remain and would not be renovated. Similarly, Alternative B would also only partially meet the project objective to redevelop underutilized parcels within the project site at a higher density to build on the synergy of R&D development and to take advantage of opportunities offered in the East of 101 Area" because it would not maximize the opportunity to create a vibrant, attractive site. Alternative B would only partially meet the project objective to "develop an R&D campus with a high level of design quality" because it would not maximize the potential for high-quality landscape design treatments around the Gateway Campus. Alternative B would only partially meet the project objective to "enhance the visual quality of development around the existing Gateway Campus by providing a high-quality, modern building and functional and attractive landscape areas" because it would not maximize the potential for highquality landscape design treatments around the campus. Alternative B would only partially meet the project objective to "promote alternatives to automobile transportation to further the City's transportation objectives by emphasizing linkages, transportation demand management (TDM), pedestrian access, and ease of movement between buildings" and the project objective to "enhance vehicular, bicycle, and pedestrian circulation and access in the area" because it would not maximize pedestrian circulation and ease of movement. Alternative B would fully meet the other project objectives. Therefore, Alternative B would meet some but not all of the project objectives (refer to Section 3.1.1 in Chapter 3, Project Description, of this draft EIR for a list of the project objectives that have been identified by the project sponsor and Table 5-3 for a comparison of the ability of this alternative to meet the objectives of the proposed project).

## 5.5.3 Impacts

The impact analysis below focuses on those impacts that were determined to be significant and unavoidable and less than significant with mitigation under the proposed project. Less-than-significant impacts are generally discussed at the end of the impact analysis.

## 5.5.3.1 Air Quality

Under the slightly reduced construction program of Alternative B, slightly less demolition and construction activities would occur in the northern portion of the project site, which would reduce construction emissions. This would slightly reduce construction-related emissions impacts, but would not eliminate the impacts. Thus, Mitigation Measures AQ-1, Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related  $NO_X$  Emissions, and AQ-2, Implement BAAQMD Basic Construction Mitigation Measures, would continue to apply to Alternative B. Impacts associated with construction criteria air pollutant emissions under this alternative would be less than significant with mitigation, although slightly reduced compared to the proposed project. In addition, with implementation of Mitigation Measure AQ-1 and AQ-2, Alternative B's contribution to a cumulative criteria pollutant emissions impact would be less than cumulatively considerable, although slightly reduced compared to the proposed project.

During operations, the area and building energy sources of emissions under Alternative B would be similar to the proposed project. In addition, Alternative B would generate a similar number of vehicle trips. As with the project, Alternative B would be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. Consequently, Alternative B would generate a similar level of operational air quality emissions. Impacts associated with

operational criteria air pollutant emissions under this alternative would be less than significant, similar to the proposed project. In addition, similar to the proposed project, the alternative's contribution to cumulative operational air quality impacts would be less than cumulatively considerable under Alternative B.

Similar to the proposed project, construction and operation of Alternative B would generate toxic air contaminants (TACs), including diesel particulate matter and particulate matter (PM<sub>2.5</sub>), within the same proximity from the same sensitive receptors (Gateway Child Development Center Peninsula) that would be affected by the proposed project. Under the slightly limited construction program of Alternative B and with implementation of Mitigation Measure AQ-1 and AQ-2, health-risks from construction-related DPM and PM<sub>2.5</sub> concentrations during construction would be less than significant with mitigation, although slightly reduced compared to the proposed project. Alternative B would include the same generator and testing activity as the proposed project. As with the proposed project, all new stationary sources under Alternative B would be subject to the permit authority of BAAQMD. Thus, operational TAC impacts under Alternative B would be less than significant, similar to the proposed project. Operational PM<sub>2.5</sub> concentrations would also be less than significant, similar to the proposed project. In addition, the alternative's contribution to cumulative health risks and substantial PM2.5 concentrations would be less than cumulatively considerable under Alternative B, although slightly reduced compared to the proposed project.

### 5.5.3.2 Biological Resources

Alternative B would involve a slightly reduced development area, which would require slightly less demolition, ground disturbance, and tree and landscape removal compared to the project. Thus, construction impacts to biological resources would be reduced because more existing habitat for birds, bats, and other animals would be retained. Specifically, Alternative B would retain approximately 32 existing trees in the northeastern part of the project site that are proposed for removal under the project, bringing the total number of trees to be removed to 143 compared to 175 under the proposed project. This would slightly reduce impacts to wildlife species such as migratory birds and roosting bats, but would not eliminate the impacts. Thus, Mitigation Measures BI-1, Preconstruction Nesting Bird Surveys and Buffer Areas; BI-2, Preconstruction Bat Survey for Roosting Bats and Roosting Habitat Abatement; BI-3, Lighting Measures to Reduce Impacts on Birds; and BI-4, Building Design Measures to Minimize Bird Strike Risk, would continue to apply to Alternative B. Alternative B, like the project, would be required to abide by all conditions specified in the City's Municipal Code, which requires that the project sponsor obtain permits to remove protected trees and to compensate for their removal by planting replacement trees of certain sizes and species as specified in the Municipal Code and by the Parks and Recreation director. With implementation of Mitigation Measures BI-1, BI-2, BI-3, and BI-4, project-level and cumulative biological resources impacts under Alternative B would be less than significant/less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

#### 5.5.3.3 Cultural Resources and Tribal Cultural Resources

Alternative B would involve a slightly reduced development area, which would require slightly less ground disturbance compared to the project. This would slightly reduce the potential for ground-disturbing activities to unearth previously unknown archaeological resources, but would not eliminate the impacts. Thus, Mitigation Measures CR-1, Cultural Resources Worker Environmental Awareness Program (WEAP); CR-2, Halt Construction Activity, Evaluate Find, and Implement

Mitigation for Archaeological, Historical, and Tribal Resources; and CR-3, Halt Construction Activity, Evaluate Remains, and Take Appropriate Action in Coordination with Native American Heritage Commission, would continue to apply to Alternative B. With implementation of Mitigation Measures CR-1, CR-2, and CR-3, project-level and cumulative cultural resources and tribal cultural resources impacts under Alternative B would be less than significant/less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

#### 5.5.3.4 Energy

Under the slightly reduced construction program of Alternative B, less demolition and construction activities would occur in the northern portion of the project site. This would slightly reduce the construction-related energy usage and consumption, but would not eliminate the impacts. Mitigation Measure GHG-1, Require Implementation of BAAQMD-recommended Construction BMPs, would continue to apply to Alternative B. Operation of Alternative B would result in a similar operation-related energy usage and consumption compared to the proposed project. As with the project, Alternative B would be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. With implementation of Mitigation Measures GHG-1, project-level and cumulative energy impacts under Alternative B would be less than significant /less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

#### 5.5.3.5 Geology and Soils

Alternative B would involve a slightly reduced development area, which would require slightly less ground disturbance compared to the project. This would slightly reduce the potential for ground-disturbing activities to disturb geologic units with high paleontological sensitivity, but would not eliminate the impacts. Thus, Mitigation Measure GEO-1, Conduct Construction Personnel Training and Stop Work and Prepare and Implement a Recovery Plan If Paleontological Resources Are Discovered, would continue to apply to Alternative B. With implementation of Mitigation Measure GEO-1, project-level and cumulative geology and soils impacts under Alternative B would be less than significant/less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

#### 5.5.3.6 Greenhouse Gas Emissions

Under the slightly reduced construction program of Alternative B, less demolition and construction activities would occur in the northern portion of the project site. This would slightly reduce the construction-related GHG emissions, but would not eliminate the impacts. Mitigation Measure GHG-1, Require Implementation of BAAQMD-recommended Construction BMPs, would continue to apply to Alternative B. Alternative B would generate a similar number of vehicle trips compared to the proposed project. In addition, direct emissions generated by emergency generators, natural gas combustion, and landscaping activities and indirect emissions associated with electricity consumption, waste and wastewater generation, and water use would be similar to the proposed project. As with the project, Alternative B would be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. Alternative B would implement the same sustainability features, such as Energy Star-rated appliances, green infrastructure (e.g., biotreatment areas and other low-impact development), low-flow shower heads, aerators, and toilets, and waste diversion programs. Operation of Alternative B would result in similar operation-related GHG emissions compared to the proposed project. Mitigation Measure

Mitigation Measure GHG-2, Operational GHG Reduction Measures, would continue to apply to Alternative B. With implementation of Mitigation Measures GHG-1 and GHG-2, project contribution to significant cumulative GHG emissions impacts under Alternative B would be cumulatively considerable, and cumulative impacts would be significant and unavoidable with mitigation, similar to the proposed project.

#### 5.5.3.7 Noise and Vibration

Under the slightly reduced construction program of Alternative B, less demolition and construction activities would occur in the northern portion of the project site, which would reduce construction noise and vibration. This would slightly reduce construction-related noise and vibration impacts, but would not eliminate the impacts. Thus, Mitigation Measure NOI-1, Construction Noise Control Plan to Reduce Noise Outside of the Standard Construction Hours in the City of South San Francisco, would continue to apply to Alternative B. During operations, noise from the proposed heating, ventilation, and air conditioning (HVAC) systems and mechanical equipment and emergency generators under Alternative B would be similar to the proposed project. In addition, Alternative B would generate a similar number of vehicle trips and traffic noise would be similar to the proposed project. Thus, Mitigation Measure NOI-2, Operational Noise Study to Determine Attenuation Measures to Reduce Noise from Project Mechanical Equipment, would continue to apply to Alternative B. With implementation of Mitigation Measures NOI-1 and NOI-2, project-level and cumulative noise and vibration impacts under Alternative B would be less than significant/less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

#### 5.5.3.8 Transportation and Circulation

Under the slightly reduced construction program of Alternative B, less demolition and construction activities would occur in the northern portion of the project site, which would reduce construction trips. During operations, site access and circulation would be similar to the proposed project. Alternative B would generate a similar number of vehicle trips. Thus, Mitigation Measure TR-1, First- and Last-mile Strategies, would continue to apply to Alternative B. Mitigation Measure TR-1 requires approval and implementation of several off-site improvements and paying a fair-share contribution toward other off-site improvements. Alternative B would include the same design features that support VMT reduction as the proposed project, including the TDM plan measures, the new employee shuttle stop along the western portion of the project site, and the installation of electric charging stations and bicycle parking within the project site. Operation of Alternative B would result in similar operation-related transportation and circulation impacts compared to the proposed project. With implementation of Mitigation Measure TR-1, project-level and cumulative transportation and circulation impacts under Alternative B would be significant and unavoidable with mitigation, similar to the proposed project.

## 5.5.3.9 Less-than-Significant Impacts

This draft EIR concludes that the proposed project would have no impact or less-than-significant impacts in all topics of the following analysis areas.

- Aesthetics
- Agricultural and Forest Resources
- Hazards and Hazardous Materials

- Hydrology and Water Quality
- Land Use
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Utilities
- Wildfire

Alternative B would occupy the same project site and construct the same building with a slightly reduced development plan and demolition requirement compared to the proposed project. As a result, the construction and operational impacts of Alternative B for each of the environmental topics noted above would be similar to, or would be reduced compared to those of the proposed project.

# 5.6 Alternative C—Reduced Building Footprint Alternative

## 5.6.1 Description

Alternative C—Reduced Building Footprint Alternative would construct a building that is the same height as the proposed project with the same ratio of office, R&D, and retail (i.e., café and fitness center) uses, but with a reduced building footprint and approximately 25 percent less square footage. Alternative C includes a total of 156,600 square feet compared to 208,800 square feet under the proposed project, as shown in Table 5-1. The site plan for this alternative would otherwise be similar to the proposed project. Site access and circulation would be similar to the proposed project. Alternative C would include the same overall pedestrian and landscape improvements to the site as the proposed project. Thus, it is anticipated that the amount of pervious surface under this alternative would be similar to the proposed project. Overall, Alternative B would involve a similarly sized development area compared to the project even though the building footprint would be reduced because it is anticipated that additional site improvements (e.g., landscaping and hardscaped areas) would be constructed around the perimeter of the building. In addition, Alternative C would require the removal of 175 existing trees, as with the proposed project.

The building design under Alternative C would be the same in height, architecture, and materials as the proposed project. However, the building under Alternative C would include less square footage and, thus, less bulk than the proposed project. The building under Alternative C would similarly be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. Alternative C would include the same design features that support VMT reduction as the proposed project, including the TDM plan measures, the new employee shuttle stop along the western portion of the project site, and the installation of electric charging stations and bicycle parking within the project site. Alternative C would implement the same sustainability features, such as Energy Star-rated appliances, green infrastructure (e.g., biotreatment areas and other low-impact development), low-flow shower heads, aerators, and toilets, and waste diversion programs.

Alternative C, like the proposed project, would maintain the existing zoning designation of Zone IV under the GSPD and the same existing zoning would apply to this alternative, which allows for development at a FAR of 1.25, or a maximum of 402,930 square feet, within the project site.

Infrastructure improvements associated with Alternative C would be similar to those described for the proposed project. The project site is serviced by existing potable water, stormwater, sanitary sewer, natural gas, electric, and trash and recycling services. New on-site facilities would be connected to new services through the installation of new, localized connections. Expansion or an increase in capacity of off-site infrastructure would occur as required by the utility providers. As with the project, Alternative C could include off-site infrastructure improvements outside of the project site but within the Gateway Campus.

The construction activities for Alternative C would be similar to the proposed project. The construction schedule for Alternative C may be substantially shorter than the proposed project. In addition, Alternative C would require substantially less ground disturbance near the building footprint and slightly less ground disturbance overall compared to the proposed project. Overall, Alternative C would result in a substantially reduced construction program.

As for the anticipated approvals, Alternative C would still require a TDM Plan approval, design review, precise plan approval, and a CUP to Authorize a Parking Decrease. Alternative C would also require standard City engineering, building, fire, and protected tree removal permits, along with other agency approvals (e.g., Bay Area Regional Water Quality Control Board, BAAQMD, and Federal Aviation Administration).

## 5.6.2 Ability to Meet Project Objectives

Alternative C—Reduced Building Footprint Alternative would only partially meet the project objective to "create state-of-the-art R&D facilities consistent with the South San Francisco General Plan (General Plan) designation for the site as well as General Plan goals and policies" because it would not maximize allowable uses under the existing General Plan land use designation (BC). Alternative C would involve constructing a building that is the same height as the proposed project with the same ratio of office, R&D, and retail uses, but with a reduced building footprint and approximately 25 percent less square footage. Similarly, Alternative C would only partially meet the project objective to "promote the City's ongoing development of the "East of 101 Area" into a nationally recognized biotechnology and R&D center" because it would not maximize the site's potential uses to the same extent as the project. Alternative C would only partially meet the project objective to "further the City's policies for developing the East of 101 Area with new opportunities for continued evolution from manufacturing and warehousing/distribution to biotechnology and R&D" because it would not maximize biotechnology and R&D uses at the site compared to the proposed project. Alternative C would only partially meet the project objective to "redevelop underutilized parcels within the project site at a higher density" because it would not maximize the allowable land uses on the project site. Alternative C would only partially meet the project objective to "build a project that creates quality jobs for the City" because it would not maximize quality job creation to the extent possibly under the allowable land uses. Alternative C would generate fewer jobs than the proposed project. Alternative C would only partially meet the project objectives to "build a project that is viable in the East of 101 Area, based on market conditions and project service requirements for the area" and to "maximize positive fiscal impacts for the City through the creation of jobs, enhancement of property values, and generation of property taxes and development fees" because it would be less viable, generate a lower fewer jobs, enhance the property to a lesser extent,

and generate fewer taxes and fees compared to the proposed project. Therefore, Alternative C would meet some but not all of the project objectives (refer to Section 3.1.1 in Chapter 3, *Project Description*, of this draft EIR for a list of the project objectives that have been identified by the project sponsor and Table 5-3 for a comparison of the ability of this alternative to meet the objectives of the proposed project).

## **5.6.3 Impacts**

The impact analysis below focuses on those impacts that were determined to be significant and unavoidable and less than significant with mitigation under the proposed project. Less-than-significant impacts are generally discussed at the end of the impact analysis.

## 5.6.3.1 Air Quality

Under the substantially reduced construction program of Alternative C, less construction activities would be required for the reduced building footprint, which would reduce construction emissions. This would reduce construction-related emissions impacts, but would not eliminate the impacts. Thus, Mitigation Measures AQ-1, Use Clean Diesel-Powered Equipment during Construction to Control Construction-Related  $NO_X$  Emissions, and AQ-2, Implement BAAQMD Basic Construction Mitigation Measures, would continue to apply to Alternative C. Impacts associated with construction criteria air pollutant emissions under this alternative would be less than significant with mitigation, although slightly reduced compared to the proposed project. In addition, with implementation of Mitigation Measure AQ-1 and AQ-2, Alternative C's contribution to a cumulative criteria pollutant emissions impact would be less than cumulatively considerable, although slightly reduced compared to the proposed project.

During operations, the area and building energy sources of emissions under Alternative C would be less than the proposed project because the proposed building would be approximately 25 percent smaller. In addition, Alternative C would generate a fewer vehicle trips than the proposed project because there would be fewer employees at the project site. Consequently, Alternative C would generate fewer operational air quality emissions. As with the project, Alternative C would be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. Impacts associated with operational criteria air pollutant emissions under this alternative would be less than significant, although slightly reduced compared to the proposed project. In addition, similar to the proposed project, the alternative's contribution to cumulative operational air quality impacts would be less than cumulatively considerable under Alternative C.

Similar to the proposed project, construction and operation of Alternative C would generate toxic air contaminants (TACs), including diesel particulate matter and particulate matter ( $PM_{2.5}$ ), within the same proximity from the same sensitive receptors (Gateway Child Development Center Peninsula) that would be affected by the proposed project. Under the slightly limited construction program of Alternative C and with implementation of Mitigation Measure AQ-1 and AQ-2, health-risks from construction-related DPM and  $PM_{2.5}$  concentrations during construction would be less than significant with mitigation, although slightly reduced compared to the proposed project. Alternative B would include the same generator and testing activity as the proposed project. As with the proposed project, all new stationary sources under Alternative C would be subject to the permit authority of BAAQMD. Thus, operational TAC impacts under Alternative C would be less than significant, similar to the proposed project. Operational  $PM_{2.5}$  concentrations would also be

less than significant, similar to the proposed project. In addition, the alternative's contribution to cumulative health risks and substantial PM2.5 concentrations would be less than cumulatively considerable under Alternative C, although slightly reduced compared to the proposed project.

#### 5.6.3.2 Biological Resources

Alternative C would involve a similarly sized development area, which would require the removal of 175 existing trees, as with the proposed project. Impacts to wildlife species such as migratory birds and roosting bats under this alternative would be similar to the proposed project. Thus, Mitigation Measures BI-1, Preconstruction Nesting Bird Surveys and Buffer Areas; BI-2, Preconstruction Bat Survey for Roosting Bats and Roosting Habitat Abatement; BI-3, Lighting Measures to Reduce Impacts on Birds; and BI-4, Building Design Measures to Minimize Bird Strike Risk, would continue to apply to Alternative C. Alternative C, like the project, would be required to abide by all conditions specified in the City's Municipal Code, which requires that the project sponsor obtain permits to remove protected trees and to compensate for their removal by planting replacement trees of certain sizes and species as specified in the Municipal Code and by the Parks and Recreation director, and impacts. With implementation of Mitigation Measures BI-1, BI-2, BI-3, and BI-4, project-level and cumulative biological resources impacts under Alternative C would be less than significant with mitigation and slightly reduced compared to the proposed project.

#### 5.6.3.3 Cultural Resources and Tribal Cultural Resources

Alternative C would involve a reduced building footprint, which would require substantially less ground disturbance near the building footprint and slightly less ground disturbance overall compared to the proposed project. This would reduce the potential for ground-disturbing activities could unearth previously unknown archaeological resources, but would not eliminate the impacts. Mitigation Measures CR-1, Cultural Resources Worker Environmental Awareness Program (WEAP); CR-2, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Archaeological, Historical, and Tribal Resources; and CR-3, Halt Construction Activity, Evaluate Remains, and Take Appropriate Action in Coordination with Native American Heritage Commission, would continue to apply to Alternative C. With implementation of Mitigation Measures CR-1, CR-2, and CR-3, project-level cultural resources and tribal cultural resources impacts and under Alternative C would be less than significant with mitigation and the project's contribution to cumulative cultural resources and tribal cultural resources impacts and under Alternative C would be less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

## 5.6.3.4 Energy

Under the substantially reduced construction program of Alternative C, less construction activities would be required for the reduced building footprint. This would slightly reduce the construction-related energy usage and consumption, but would not eliminate the impacts. Mitigation Measure GHG-1, Require Implementation of BAAQMD-recommended Construction BMPs, would continue to apply to Alternative C. During operations, the energy usage and consumption under Alternative C would be less than the proposed project because the proposed building would be approximately 25 percent smaller. As with the project, Alternative C would be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. With implementation of Mitigation Measures GHG-1, project-level energy impacts under Alternative C

would be less than significant with mitigation the project's contribution to cumulative energy impacts and under Alternative C would be less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

#### 5.6.3.5 Geology and Soils

Alternative C would involve a reduced building footprint, which would require substantially less ground disturbance near the building footprint and slightly less ground disturbance overall compared to the proposed project. This would reduce the potential for ground-disturbing activities to disturb geologic units with high paleontological sensitivity, but would not eliminate the impacts. Thus, Mitigation Measure GEO-1, Halt Construction Activity, Evaluate Find, and Implement Mitigation for Paleontological Resources, would continue to apply to Alternative C. With implementation of Mitigation Measure GEO-1, project-level geology and soils impacts under Alternative C would be less than significant with mitigation the project's contribution to cumulative geology and soils impacts and under Alternative C would be less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

#### 5.6.3.6 Greenhouse Gas Emissions

Under the substantially reduced construction program of Alternative C, less construction activities would be required for the reduced building footprint. This would slightly reduce the constructionrelated GHG emissions, but would not eliminate the impacts. Mitigation Measure GHG-1, Require Implementation of BAAQMD-recommended Construction BMPs, would continue to apply to Alternative C. Alternative C would generate fewer vehicle trips than the proposed project because there would be fewer employees at the project site. In addition, direct emissions generated by emergency generators, natural gas combustion, and landscaping activities and indirect emissions associated with electricity consumption, waste and wastewater generation, and water use would be reduced compared to the proposed project because the proposed building would be approximately 25 percent smaller. As with the project, Alternative C would be designed to meet LEED Gold certification and International WELL Building Institute WELL and FITWELL standards. Alternative C would implement the same sustainability features, such as Energy Star-rated appliances, green infrastructure (e.g., biotreatment areas and other low-impact development), low-flow shower heads, aerators, and toilets, and waste diversion programs. Operation of Alternative C would result in reduced operation-related GHG emissions compared to the proposed project. Mitigation Measure Mitigation Measure GHG-2, Operational GHG Reduction Measures, would continue to apply to Alternative B. With implementation of Mitigation Measures GHG-1 and GHG-2, cumulative GHG emissions impacts under Alternative C would be cumulatively considerable with mitigation, similar to the proposed project because it would not reduce the average HBW VMT per employee.8

#### 5.6.3.7 Noise and Vibration

Under the substantially reduced construction program of Alternative C, less construction activities would be required for the reduced building footprint, which would reduce construction noise and vibration. This would slightly reduce construction-related noise and vibration impacts,

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<sup>&</sup>lt;sup>8</sup> The key metric used to determine a VMT impact is home-based work HBW VMT per capita, which is expressed as a rate per employee. For example, if an alternative would have fewer employees compared to the proposed project, it would still be required to substantially reduce the average trip length between employees' home and work to substantially reduce the average HBW VMT per employee compared to the proposed project.

but would not eliminate the impacts. Thus, Mitigation Measure NOI-1, Construction Noise Control Plan to Reduce Noise Outside of the Standard Construction Hours in the City of South San Francisco, would continue to apply to Alternative C. During operations, Alternative C would generate fewer vehicle trips than the proposed project because there would be fewer employees at the project site, which would reduce traffic noise. Noise from the proposed HVAC systems and mechanical equipment and emergency generators under Alternative C would be similar to the proposed project. Thus, Mitigation Measure NOI-2, Operational Noise Study to Determine Attenuation Measures to Reduce Noise from Project Mechanical Equipment, would continue to apply to Alternative C. With implementation of Mitigation Measures NOI-1 and NOI-2, project-level noise and vibration impacts under Alternative C would be less than significant and less than cumulatively considerable with mitigation and slightly reduced compared to the proposed project.

## 5.6.3.8 Transportation and Circulation

Under the substantially reduced construction program of Alternative C, less construction activities would be required for the reduced building footprint, which would reduce construction trips.

During operations, site access and circulation would be similar to the proposed project. The number of daily vehicle trips under Alternative C would be less than the proposed project because the proposed building would be approximately 25 percent smaller. Alternative C would generate approximately 1,400 net daily vehicle trips, with 160 in the morning peak hour and 130 in the evening peak hour (compared to 1,784 net daily vehicle trips, with 206 in the morning peak hour and 172 in the evening peak hour under the proposed project). This represents a decrease of approximately 38 net daily vehicle trips (or 25 percent) compared to the proposed project. Trip distribution percentages and choices of routes to and from the project site for Alternative C were assumed to be consistent with the assumptions used for analysis of the proposed project. These assumptions are based on the City/County Association of Governments of San Mateo County (C/CAG)'s Travel Demand Model and the City's Travel Demand Model, which have greater sensitivity to local travel patterns. Vehicle trips generated by Alternative C would result in some reduced transportation impacts as compared to the proposed project. While Alternative C would generate fewer employees and trips compared to the proposed project, it would not substantially reduce the average trip length between employees' home and work and would not substantially reduce the average HBW VMT per employee compared to the proposed project. Thus, Mitigation Measure TR-1, First- and Last-mile Strategies, would continue to apply to Alternative C. Mitigation Measure TR-1 requires approval and implementation of several offsite improvements and paying a fair-share contribution toward other off-site improvements. Alternative C would include the same design features that support VMT reduction as the proposed project, including the TDM plan, the new employee shuttle stop along the western portion of the project site, and the installation of electric charging stations and bicycle parking within the project site. With implementation of Mitigation Measure TR-1, project-level and cumulative transportation and circulation impacts under Alternative C would be significant and unavoidable with mitigation, similar to the proposed project because it would not reduce the average HBW VMT per employee.

<sup>9</sup> Ibid.

#### 5.6.3.9 Less-than-Significant Impacts

This draft EIR concludes that the proposed project would have no impact or less-than-significant impacts in all topics of the following analysis areas.

- Aesthetics
- Agricultural and Forest Resources
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Utilities
- Wildfire

Alternative C would occupy the same project site but with a smaller building footprint and reduced building square footage than the proposed project and would otherwise have a similar development program and site plan overall. As a result, the construction and operational impacts of Alternative C—Reduced Building Footprint Alternative, for each of the environmental topics noted above would be similar or reduced compared to those of the proposed project.

# 5.7 Environmentally Superior Alternative

CEQA Guidelines Section 15126.6(e)(2) requires identification of an environmentally superior alternative (i.e., the alternative that has the fewest significant environmental impacts) from among the other alternatives evaluated if the proposed project has significant impacts that cannot be mitigated to a less-than-significant level. If the No Project Alternative (i.e., Alternative A) is found to be the environmentally superior alternative, the EIR must identify an environmentally superior alternative among the other alternatives.

Table 5-2 compares the significant and less-than-significant with mitigation impacts of the proposed project to those of the alternatives. Table 5-3 compares the ability of the alternatives to meet the objectives of the proposed project.

Alternative B and Alternative C would result in the same significant and unavoidable impacts with mitigation related to transportation and circulation and GHG emissions because neither alternative would reduce the average HBW VMT per employee. Among the alternatives to the project, Alternative B would offer a lower level of impact by reducing the site-specific impacts that would be less than significant with mitigation. Specifically, Alternative B would require less ground disturbance and fewer tree removals, which would reduce impacts to biological resources, cultural resources and tribal resources, and geology and soils (paleontology) to a greater extent than Alternative C. Therefore, Alternative B is the environmentally superior alternative. Alternative B would also meet more of the project objectives compared to Alternative C, although it would not meet all of the project objectives and it would only partially meet some of the project objectives, as shown in Table 5-3.

| City of South San Francisco |                                 | Alternatives |
|-----------------------------|---------------------------------|--------------|
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City of South San Francisco

Table 5-2. Comparison of Proposed Project Significant Impacts and Less-than-Significant Impacts with Mitigation to Alternatives

|   |  | Alternative A— | Alternative B— Reduced Surface Parking Lot  | Alternative C—<br>Reduced Building  |
|---|--|----------------|---|---|
| Potential Environmental Impacts   | Proposed Project   | No Project     | Demolition Alternative  | Footprint Alternative   |
| Significant Impacts   |  |                |   |   |
| <b>Impact TR-1:</b> The project would generate per-employee VMT greater than the City threshold.  | Significant and Unavoidable with Mitigation                        | No Impact      | Significant and Unavoidable with Mitigation (similar to the project)  | Significant and Unavoidable with Mitigation (similar to the project)  |
| <b>Impact GHG-1b</b> : The project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment during operation.  | Significant and Unavoidable with Mitigation                        | No Impact      | Significant and Unavoidable with Mitigation (similar to the project)  | Significant and Unavoidable with Mitigation (similar to the project)  |
| <b>Impact GHG-2</b> : The project would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.   | Significant and Unavoidable with Mitigation                        | No Impact      | Significant and Unavoidable with Mitigation (similar to the project)  | Significant and Unavoidable with Mitigation (similar to the project)  |
| Less-than-Significant Impacts with Mitigation   |  |                |   |   |
| <b>Impact AQ-2 (construction)</b> : The proposed project would not result in a cumulatively considerable net increase in any criteria pollutant for which the project region is classified as nonattainment under an applicable federal or state ambient air quality standard.  | Less than Significant with Mitigation                              | No Impact      | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    |
| <b>Impact AQ-3 (construction)</b> : The proposed project would not expose sensitive receptors to substantial pollutant concentrations.  | Less than Significant with Mitigation                              | No Impact      | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    |
| <b>Impact C-AQ-2 (construction)</b> : The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts related to a net increase in criteria pollutants or which the region is in nonattainment for an applicable federal or state ambient air quality standard.   | Less than Cumulatively Considerable<br>Contributor with Mitigation | No Impact      | Less than Cumulatively Considerable<br>Contributor with Mitigation<br>(slightly reduced compared to the<br>project) | Less than Cumulatively Considerable<br>Contributor with Mitigation<br>(slightly reduced compared to the<br>project) |
| <b>Impact C-AQ-3:</b> The proposed project in combination with past, present, and reasonably foreseeable future projects would not contribute to cumulative health risks for sensitive receptors.   | Less than Significant with Mitigation                              | No Impact      | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    |
| <b>Impact BIO-1</b> : The proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. | Less than Significant with Mitigation                              | No Impact      | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (similar to the project)  |
| <b>Impact BIO-4:</b> The proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.  | Less than Significant with Mitigation                              | No Impact      | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (similar to the project)  |
| <b>Impact C-BIO-1:</b> The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on biological resources.   | Less than Cumulatively Considerable<br>Contributor with Mitigation | No Impact      | Less than Cumulatively Considerable<br>Contributor with Mitigation<br>(slightly reduced compared to the<br>project) | Less than Cumulatively Considerable<br>Contributor with Mitigation<br>(similar to the project)                      |
| <b>Impact CR-2:</b> The proposed project would not cause a substantial adverse change in the significance of an archaeological resource, pursuant to Section 15064.5.   | Less than Significant with Mitigation                              | No Impact      | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    |
| <b>Impact CR-3:</b> The proposed project would not disturb any human remains, including those interred outside of formal cemeteries.  | Less than Significant with Mitigation                              | No Impact      | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    |

| Potential Environmental Impacts   | Proposed Project   | Alternative A—<br>No Project | Alternative B—<br>Reduced Surface Parking Lot<br>Demolition Alternative   | Alternative C—<br>Reduced Building<br>Footprint Alternative  |
|---|--|------------------------------|---|--|
| <b>Impact CR-4:</b> The proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resource Code Section 21074.  | Less than Significant with Mitigation                              | No Impact                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                           |
| <b>Impact C-CR-1:</b> The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on archeological resources, human remains, and tribal cultural resources.   | Less than Cumulatively Considerable<br>Contributor with Mitigation | No Impact                    | Less than Cumulatively Considerable<br>Contributor with Mitigation<br>(slightly reduced compared to the<br>project) | Less than Cumulatively Considerable with Mitigation (slightly reduced compared to the project)             |
| <b>Impact EN-1 (construction):</b> The proposed project would not result in a potentially significant environmental impact due to the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation.   | Less than Significant with Mitigation                              | No Impact                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                           |
| <b>Impact GEO-6:</b> The proposed project could directly or indirectly destroy a unique paleontological resource on site or unique geologic feature.  | Less than Significant with Mitigation                              | No Impact                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                           |
| <b>Impact C-GEO-2:</b> The proposed project would not result in a cumulatively considerable contribution to significant cumulative impacts on paleontological resources.  | Less than Cumulatively Considerable<br>Contributor with Mitigation | No Impact                    | Less than Cumulatively Considerable<br>Contributor with Mitigation<br>(slightly reduced compared to the<br>project) | Less than Cumulatively Considerable Contributor with Mitigation (slightly reduced compared to the project) |
| <b>Impact GHG-1a (construction)</b> : The proposed project would not generate GHG emissions, either directly or indirectly, that may have significant impact on the environment during construction.  | Less than Significant with Mitigation                              | No Impact                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                           |
| <b>Impact NOI-1 (construction)</b> : The proposed project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.   | Less than Significant with Mitigation                              | No Impact                    | Less than Significant with Mitigation (slightly reduced compared to the project)                                    | Less than Significant with Mitigation (slightly reduced compared to the project)                           |
| <b>Impact C-NOI-1 (construction):</b> The proposed project would not result in a cumulatively considerable contribution to the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project site in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. | Less than Cumulatively Considerable<br>Contributor with Mitigation | No Impact                    | Less than Cumulatively Considerable<br>Contributor with Mitigation<br>(slightly reduced compared to the<br>project) | Less than Significant with Mitigation (slightly reduced compared to the project)                           |
| <b>Impact TR-4:</b> The proposed project would not produce a detrimental impact to local transit or shuttle services, or conflict with adopted plans and programs.  | Less than Significant with Mitigation                              | No Impact                    | Less than Significant with Mitigation (similar to the project)  | Less than Significant with Mitigation (slightly reduced compared to the project)                           |

## Table 5-3. Ability of Alternatives to Meet Project Objectives

| Project Objective  | Alternative A—<br>No Project | Alternative B—<br>Reduced Surface Parking Lot<br>Demolition Alternative   | Alternative C—<br>Reduced Building<br>Footprint Alternative   |
|--|------------------------------|---|---|
| Create state-of-the-art R&D facilities consistent with the South San Francisco General Plan (General Plan) designation for the site as well as General Plan goals and policies.  | No                           | Yes   | Partial: does not maximize allowable uses under the existing General Plan land use designation (BC) |
| Develop a building that is aesthetically compatible with the surrounding vicinity, with height, massing and design treatment that is compatible with other recent development in the East of 101 Area.   | No                           | Partial: does not maximize visual potential and compatibility with surrounding uses regarding landscape, hardscape, and site plan | Yes   |
| Promote the City's ongoing development of the "East of 101 Area" into a nationally recognized biotechnology and R&D center to attract other life science uses.   | No                           | Yes   | Partial: does not maximize this potential   |
| Further the City's policies for developing the East of 101 Area with new opportunities for continued evolution from manufacturing and warehousing/distribution to biotechnology and R&D.   | No                           | Yes   | Partial: does not maximize this opportunity   |
| Redevelop underutilized parcels within the project site at a higher density to build on the synergy of R&D development and to take advantage of opportunities offered in the East of 101 Area to create a vibrant, attractive, and efficiently-designed R&D campus.  | No                           | Partial: does not maximize the opportunity to create a vibrant, attractive site   | Partial: does not maximize allowable land uses  |
| Develop an R&D campus with a high level of design quality, as called for in the design policies and guidelines of the <i>East of 101 Area Plan</i> .   | No                           | Partial: does not maximize the potential for high-level of landscape and site design quality                                      | Yes   |
| Build a project that creates quality jobs for the City.  | No                           | Yes   | Partial: does not maximize quality job creation to the extent possible under allowable land uses    |
| Provide sufficient space for tenants to employ key scientific and business personnel in proximity to each other to foster efficient collaboration and productivity.  | No                           | Yes   | Partial   |
| Capitalize on the project's proximity to the new Caltrain station to provide transit-oriented employment opportunities, encourage employees to commute using public transit, and reduce VMT and air emissions by reducing single-occupancy vehicle trips.  | No                           | Yes   | Yes   |
| Enhance the visual quality of development around the existing Gateway Campus by providing a high-quality, modern building and functional and attractive landscape areas. The project will take advantage of and enhance access to the Caltrain station by upgrading the pedestrian and bicycle connections within and to the Gateway Campus. | No                           | Partial: does not maximize the potential for high-quality landscape design treatments around the Gateway Campus                   | Yes   |
| Promote alternatives to automobile transportation to further the City's transportation objectives by emphasizing linkages, transportation demand management (TDM), pedestrian access, and ease of movement between buildings.  | No                           | Partial: does not maximize pedestrian circulation and ease of movement experience   | Yes   |
| Enhance vehicular, bicycle, and pedestrian circulation and access in the area surrounding the project site.  | No                           | Partial: does not maximize user circulation and access potential  | Yes   |
| Build a project that is viable in the East of 101 area based on market conditions and project service requirements for the area.   | No                           | Yes   | Partial: less viable than the proposed project  |
| Incorporate flexibility for office and R&D uses to ensure that the project is responsive to tenant demands, based on market conditions.  | No                           | Yes   | Yes   |
| Maximize positive fiscal impacts for the City through the creation of jobs, enhancement of property values, and generation of property taxes and development fees.   | No                           | Yes   | Partial: does not maximize jobs, property values, property taxes, and fees                          |

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## **Other CEQA Considerations**

This chapter discusses mandatory findings of significance pursuant to California Environmental Quality Act (CEQA) Guidelines Section 15065(a). This chapter also discusses significant environmental effects that cannot be avoided as identified in this Environmental Impact Report (EIR); significant irreversible environmental changes, including energy and consumption of nonrenewable resources; and growth-inducing impacts pursuant to CEQA Guidelines Section 15126.2.

# **6.1** Mandatory Findings of Significance

CEQA Guidelines Section 15065(a) requires a lead agency to find that a project may have a significant effect on the environment and thereby require an EIR if that project has the potential to have particular impacts, as described below.

## 6.1.1 Quality of the Environment

CEQA Guidelines Section 15065(a)(1) requires a lead agency to find that a project may have a significant effect on the environment and thereby require an EIR if that project "has the potential to substantially degrade the quality of the environment."

This EIR, in its entirety, addresses and discloses all potential environmental impacts associated with construction and operation of the proposed project, including direct, indirect, and cumulative impacts. As described in Chapter 4, *Environmental Setting, Impacts, and Mitigation*, the proposed project would have no impact or a less-than-significant impact associated with aesthetics, agricultural and forest resources, energy, geology and soils (including seismic hazards), hazards and hazardous materials, hydrology, land use, mineral resources, population and housing, public services, recreation, utilities, and wildfire. Environmental impacts associated with air quality, biological resources, cultural resources (including tribal cultural resources), geology and soils (including paleontology), greenhouse gas (GHG) emissions (except vehicle miles traveled [VMT] impacts), noise and vibration, and transportation and circulation (except VMT impacts) are considered less than significant or less than significant with mitigation. Transportation and circulation and GHG emissions impacts related to VMT are considered significant and unavoidable, as discussed in Section 6.3, *Significant Environmental Effects that Cannot Be Avoided*. Based on the potential impacts of the project related to transportation and circulation and GHG emissions, the proposed project would have the potential to degrade the quality of the environment,

## 6.1.2 Impacts on Species

CEQA Guidelines Section 15065(a)(1) states that a lead agency shall find that a project may have a significant effect on the environment and thereby require an EIR where there is substantial evidence that the project has the potential to (1) substantially reduce the habitat of a fish or wildlife species; (2) cause a fish or wildlife population to drop below self-sustaining levels; or (3) substantially reduce the number or restrict the range of an endangered, rare, or threatened

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species. Section 4.3, *Biological Resources*, of this draft EIR addresses any impacts that might relate to the reduction of fish or wildlife habitat, the reduction of fish or wildlife populations, and the reduction or restriction of the range of special-status species as a result of project implementation. The proposed project would have no impact, a less-than-significant impact, or a less-than-significant impact with mitigation with respect to biological imapcts and, therefore, would not have the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of a rare or endangered plant or animal.

## 6.1.3 Impacts on Historical Resources

CEQA Guidelines Section 15065(a)(1) states that a lead agency shall find that a project may have a significant effect on the environment and thereby require an EIR where there is substantial evidence that the project has the potential to eliminate important examples of a major period of California history or prehistory. CEQA Guidelines Section 15065(a)(1) amplifies Public Resources Code Section 21001(c) by requiring preservation of major periods of California history for the benefit of future generations. It also reflects the provisions of Public Resource Code Section 21084.1 in requiring a finding of significance for substantial adverse changes to historical resources. CEQA Guidelines Section 15064.5 establishes standards for determining the significance of impacts to historical resources and archaeological sites that are an historical resource. Section 4.4, Cultural Resources, of this draft EIR addresses impacts related to California history and prehistory, historic resources, archaeological resources, and tribal cultural resources. Section 4.6, Geology and Soils, of this draft EIR addresses impacts related to paleontological resources. The proposed project would have either no impact or a less-than-significant impact with mitigation with respect to cultural resources, tribal and cultural resources, and paleontological resources and, therefore, would not have the potential to eliminate important examples of the major periods of California history or prehistory.

## 6.1.4 Long-Term Impacts

CEQA Guidelines Section 15065(a)(2) states that a lead agency shall find that a project may have a significant effect on the environment and thereby require an EIR where there is substantial evidence that the project has the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals. Section 6.3, Significant Environmental Effects that Cannot Be Avoided, below, identifies all significant and unavoidable impacts that could occur, thereby creating a long-term impact on the environment. Section 6.4, Significant Irreversible Environmental Changes, below, addresses the short-term and irretrievable commitment of natural resources to ensure that the consumption is justified on a long-term basis. Lastly, Section 6.5, Growth-Inducing Impacts, identifies any long-term environmental impacts caused by the proposed project with respect to economic or population growth.

## 6.1.5 Impacts on Human Beings

CEQA Guidelines Section 15065(a)(4) states that a lead agency shall find that a project may have a significant effect on the environment and thereby require an EIR where there is substantial evidence that the environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly. As described in Chapter 4, *Environmental Setting*,

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Impacts, and Mitigation, the proposed project would have no impact or a less-than-significant impact associated with aesthetics, agricultural and forest resources, energy, geology and soils (including seismic hazards), hazards and hazardous materials, hydrology, land use, mineral resources, population and housing, public services, recreation, utilities, and wildfire. Environmental impacts associated with air quality, biological resources, cultural resources (including tribal cultural resources), geology and soils (including paleontology), GHG emissions (exept VMT impacts), noise and vibration, and transportation and circulation (except VMT impacts) are considered less than significant or less than significant with mitigation. Transportation and circulation and GHG emissions impacts related to VMT are considered significant and unavoidable, as discussed in Section 6.3, Significant Environmental Effects that Cannot Be Avoided.

# 6.2 Cumulative Impacts

An EIR is required to examine cumulative impacts. California Code of Regulations Section 15130(a)(1), defines a cumulative impact as consisting "of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts." The analysis of cumulative impacts need not provide the same level of detail as that for project-specific impacts, but it shall "reflect the severity of the impacts and their likelihood of occurrence" (per California Code of Regulations Section 15130(b)). CEQA Guidelines

Section 15065 states that a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has potential environmental effects that are individually limited but cumulatively considerable. As defined in CEQA Guidelines Section 15065(a)(3), cumulatively considerable means "that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." The cumulative impacts analysis in an EIR must analyze either a list of past, present, and probable future projects or a summary of projections contained in an adopted general plan or related planning document.

The cumulative impact analysis in this draft EIR generally employs either a list-based approach or a projections approach, depending on which approach best suits the individual resource topic being analyzed. A list of the reasonably foreseeable future projects used to analyze cumulative impacts under most topics is provided in Section 4.1.5, Approach to Cumulative Impact Analysis, and shown in Figure 4.1-1. For transportation, GHG emissions, air quality, and energy, a projections approach was used to analyze cumulative impacts. Cumulative impacts related to each environmental topic are discussed in Chapter 4, Environmental Setting, Impacts, and Mitigation. As described in Chapter 4, either there would be no cumulative impacts, cumulative impacts would be less than significant, or the project would have a less than cumulatively considerable contribution (either with or without mitigation) to significant cumulative impacts in the areas of: aesthetics, air quality, agricultural and forest resources, biological resources, cultural resources, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology, land use, mineral resources, noise and vibration, population and housing, public services, recreation, utilities, and wildfire. However, Chapter 4 identifies significant and unavoidable cumulative GHG emissions impacts and transportation and circulation impacts to which the project's contribution would be cumulatively considerable, as discussed below.

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#### **Significant Environmental Effects that Cannot** 6.3 **Be Avoided**

In accordance with CEQA Section 21067 and with CEQA Guidelines Sections 15126(b) and 15126.2(b), the purpose of this section is to identify significant environmental impacts that could not be eliminated or reduced to less-than-significant levels by implementation of mitigation measures included in the proposed project or identified in Chapter 4, Environmental Setting, Impacts, and Mitigation. The findings of significant impacts are subject to final determination by the City of South San Francisco Planning Commission as part of the certification process for this EIR.

The proposed project would result in significant and unavoidable project-level impacts and cumulatively considerable contributions to significant and unavoidable cumulative impacts related to transportation and circulation and GHG emissions. No other environmental topics discussed in Chapter 4 would result in significant and unavoidable environmental effects. As described in detail in Section 4.7, Greenhouse Gas Emissions, and Section 4.9, Transportation and Circulation, these significant and unavoidable impacts are listed below.

- Impact GHG-1b: The proposed project would generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment during operation. The proposed project would result in a net loss of trees, reducing carbon sequestration in the land use sector. Implementation of Mitigation Measures GHG-2 would plant additional trees on existing surface parking lots but would still result in a net loss of trees. In addition, the proposed project would not achieve the 16.8 percent VMT per service population reduction target. The proposed project would be subject to regulatory programs related to fuel and vehicle efficiency as well as vehicle electrification. In addition, implementation of Mitigation Measure TR-1, as discussed in Section 4.9, Transportation and Circulation, would contribute a fair share toward funding the design and construction of off-site improvements to support the proposed project's first- and last-mile transit connection strategies, which are necessary to support reductions in the number of trips made by automobile. These improvements include fair-share contributions toward the City's cost of upgrading sidewalks, upgrading and extending bicycle and pedestrian pathways, providing a more direct connection to on-street shuttle stops, participating in first/last shuttle programs, striping unmarked crosswalks, and contributing to bicycle and pedestrian infrastructure. However, the lead agency cannot determine with certainty that implementation of Mitigation Measure TR-1 would reduce the proposed project's VMT to a lessthan-significant level because there are a range of GHG reductions associated with the measures in TR-1, making precise quantification of reductions difficult. Consequently, although emissions from the stationary-source, area, energy, waste, and water sectors would generally be consistent with the Bay Area Air Quality Management District's (BAAQMD's) stationary threshold or the scoping plan and regulatory programs, land use and mobile-source emissions from the proposed project would not be consistent with the scoping plan measures outlined to reduce GHG emissions consistent with the State's goals. Therefore, operational GHG impacts would be significant and unavoidable with mitigation.
- Impact GHG-2: The proposed project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Stationary-source emissions would be below BAAQMD's stationary-source threshold. In addition, the proposed project would achieve U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) Gold certification and implement sustainability measures, such as waste

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diversion programs and water reduction measures, consistent with the 2017 scoping plan. This would reduce GHG emissions and associated impacts from area energy, water, and waste sources to less-than-significant levels. These reductions would help the State meet its GHG reduction goals. However, the proposed project would not be consistent with the scoping plan's overall goal of avoiding losses in carbon sequestration, given the net tree loss despite implementation of Mitigation Measure GHG-2. In addition, implementation of Mitigation Measure TR-1 would reduce mobile-source emissions during operation but would not reduce emissions enough to meet the 16.8 percent VMT per service population reduction target developed by CARB. Therefore, the GHG impacts of the proposed project would be significant and unavoidable with mitigation because the project would not be consistent with State goals to reduce GHG emissions.

Impact TR-1: Existing home-based work (HBW) VMT per employee in the travel demand model transportation analysis zone (TAZ) that encompasses the project result in greater than 16.8 percent below the regional average HBW VMT per employee under existing plus project and cumulative plus project conditions. The project would generate approximately 16.2 HBW VMT per employee under existing conditions, which is greater than the per-employee significance threshold of 11.8 HBW VMT (based on a VMT rate of reduction of 16.8 percent below the regional average of 14.2 HBW VMT per employee). Therefore, the project would have a significant impact on VMT under existing plus project conditions. Under cumulative conditions, the project would generate approximately 14.0 HBW VMT per employee, which is greater than the per-employee significance threshold of 12.1 HBW VMT (based on a VMT rate 16.8 percent below the regional average of 14.6 HBW VMT per employee). Therefore, the project would have a significant impact on VMT under cumulative plus project conditions. Mitigation Measure TR-1 would support and enhance the effectiveness of the project's last-mile transit connection strategies but would be unlikely to substantially reduce HBW VMT per employee, and would aid in reducing project auto travel demand. It is appropriate mitigation under both the existing plus project and cumulative plus project conditions; however, its effectiveness is unknown and is unlikely to reduce the project's HBW VMT by 27 percent (i.e., the amount needed to reduce the project's HBW VMT per employee of 16.2 to the 11.8 threshold, to reach a less-than-significant level). Therefore, this impact would be significant and unavoidable with mitigation.

#### **Significant Irreversible Environmental Changes** 6.4

In accordance with CEQA Section 21100(b)(2)(B), and CEQA Guidelines Section 15126.2(c), an EIR must identify any significant irreversible environmental changes that could result from implementation of the proposed project. An EIR is required to consider whether "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 non-use thereafter unlikely" (per CEQA Guidelines Section 15126.2(c)). "Nonrenewable resource" refers to the physical features of the natural environment, such as land, waterways, etc. This may include current or future uses of nonrenewable resources and secondary or growth-inducing impacts that commit future generations to similar uses. According to the CEQA Guidelines, irretrievable commitments of resources should be evaluated to ensure that such current consumption is justified.

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Chapter 4, *Environmental Setting, Impacts, and Mitigation*, discusses topics that could potentially be affected by irreversible environmental impacts, such as agricultural and forestry resources, biological resources, cultural resources, energy, hydrology, and population and housing. None of these environmental topics were found to have significant impacts as a result of the proposed project.

No significant irreversible environmental damage related to hazardous materials is anticipated to occur with implementation of the proposed project. Compliance with federal, state, and local regulations related to office/research and development (R&D) uses identified in Section 4.10.3, *Hazards and Hazardous Materials*, would ensure that the possibility that hazardous substances from the demolition, construction, and operation of the proposed project would not cause significant and unavoidable environmental damage.

The proposed project would involve excavation of soils for grading and to accommodate utility trenches. Grading would be required for general site preparation and for proper on-site stormwater flows, but the proposed project would not substantially raise or lower the existing grade. Grading would not be excessive or greater than what is necessary to achieve stormwater goals.

Construction and implementation of the proposed project would not result in a large commitment of natural resources, require highway improvements to previously inaccessible areas, or cause irreversible damage due to environmental accidents. No other irreversible permanent changes such as those that might result from construction of a large-scale mining project, hydroelectric dam, or other industrial project would result from development of the proposed project.

## 6.4.1 Energy and Consumption of Nonrenewable Resources

Section 21100(b)(3) of CEQA requires that EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing any inefficient, wasteful, and unnecessary consumption of energy. Implementation of the proposed project would commit future generations to an irreversible commitment of energy resources in the form of usage of nonrenewable fossil fuels due to vehicle and equipment use during demolition, construction, and operation of the proposed project. See Section 4.5, *Energy*, of this draft EIR, for a discussion of the project's impacts related to electricity, natural gas, and transportation fuel demand.

Consumption of nonrenewable resources includes increased energy consumption, conversion of agricultural lands to urban uses, and loss of access to mineral reserves. No agricultural lands would be converted and no access to mining reserves would be lost with construction of the proposed project.

Resources consumed during demolition, construction, and operation would include lumber, concrete, gravel, asphalt, masonry, metals, and water. Similar to the existing uses on the project site, the proposed project would irreversibly use water and solid waste landfill resources. However, the proposed project would not involve a large commitment of resources relative to existing conditions or relative to supply, nor would it consume any of those resources wastefully.

The proposed project would redevelop an existing surface parking lot on an infill site in an urbanized area that currently serves R&D and office uses with a new state-of-the-art R&D facility and office building, with the goal to continue to attract biotech and R&D, as well other life science

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uses, as described in Sections 3.1.1, Project Objectives, 4.10.5, Land Use, and 4.10.7, Population and Housing. The project site is serviced by existing water, wastewater, stormwater, natural gas, electric, telecommunications, and waste and recycling services. New on-site facilities would be connected to new services through the installation of new, localized connections. Expansion of or an increase in capacity of off-site infrastructure would occur as required by the utility providers. Section 4.10.10, *Utilities*, describes the water supply and demand aspects of the proposed project. The proposed project includes several water conservation features. For example, the proposed project would achieve LEED Gold certification or equivalent and install low-flow fixtures. Outdoor water conservation measures would include the installation and maintenance of water-efficient landscaping with low-usage plant material to minimize irrigation requirements. Therefore, the proposed project would include the application of required water conservation measures and would be in conformance with policies addressing water efficiency. Compared to the mix of other existing development in South San Francisco and the region, compliance with the latest LEED Gold certification, International WELL and Fitwel Building Institute Standards, and other requirements would ensure that the proposed project would be more water efficient than all but recent buildings built to the same requirements, or buildings for which owners have chosen to exceed efficiency requirements. For these reasons, the proposed project would not result in the wasteful use of water.

#### 6.5 **Growth-Inducing Impacts**

As required by CEQ Guidelines Section 15126.2(d), an EIR must consider the ways in which the proposed project could directly or indirectly foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Growth-inducing impacts can result from the elimination of obstacles to growth; through increased stimulation of economic activity that would, in turn, generate increased employment or demand for housing and public services; or from the implementation of policies or measures that do not effectively minimize premature or unplanned growth.

Growth-inducing impacts such as those associated with job increases that might affect housing and retail demand in other areas over an extended time period are difficult to assess with precision, since future economic and population trends may be influenced by unforeseeable events and business development cycles. Moreover, long-term changes in economic and population growth are often regional in scope; they are not influenced solely by changes in policies or specific development projects. Business trends are influenced by economic conditions throughout the state and country as well as around the world.

Another consideration is that the creation of growth-inducing potential does not automatically lead to growth. Growth occurs through capital investment in new economic opportunities by the private and/or public sector. Investment patterns reflect, in turn, the desires of investors to mobilize and allocate their resources to development in particular localities and regions. A combination of these and other pressures serve to fashion policy. The regulatory authority of local governments serves to mediate the growth-inducing potential or pressure created by a project or plan. Despite these limitations on the analysis, it is still possible to qualitatively assess the general potential growth-inducing impacts of the proposed project.

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# 6.5.1 Projected Growth

Section 4.10.7, *Population and Housing*, discussed population and employment growth as a result of the proposed project and made the following findings. The proposed project does not include any new housing units and would not directly induce population growth. The proposed project would redevelop an existing parking lot on an infill site in an urbanized area that currently serves R&D and office uses with a new R&D facility and office building.

Development of infrastructure could remove obstacles to population growth if it would allow for development in an area that was not previously considered feasible for development because of infrastructure limitations. The proposed project would not include the extension of area roadways or expansion of infrastructure to areas lacking existing development. No indirect impacts related to population growth as a result of expansion of infrastructure would occur.

The existing office building on the project site at 701 Gateway Boulevard has approximately 450 employees. As stated in Chapter 3, *Project Description*, the existing office building would remain; no existing employees would be displaced as a result of the proposed project. However, the project would result in an increase of approximately 731 net new employees at the project site, and in the City, as a result of project development. As discussed in Section 4.10.7, *Population and Housing*, the proposed project's net number of newly generated employees would represent approximately 6.1 percent and less than 10 percent, respectively, of the City's total projected population and job numbers for 2040, and would not represent a substantial portion of the projected population and job growth planned for in the General Plan. Therefore, the proposed project would not result in substantial unplanned population and job growth. The project represents anticipated growth in the City.

The net new 731 employees generated as a result of the proposed project could increase demand for housing and contribute to total overall housing demand citywide. While, it is assumed that most of the employees generated by the project would be existing residents in the surrounding area, a small portion of the new employees could potentially generate new demand for housing within the City. Therefore, the analysis conservatively assumes that all employees generated by the proposed project would be new to the City, would require housing, and would contribute to the City's existing jobs/housing imbalance, which is already projected to be out of balance, according to the Association of Bay Area Government's (ABAG's) Projections 2040. According to the analysis, the proposed project would create the need for up to 475 new housing units upon completion. This conservatively-projected potential new housing demand resulting from the proposed project could cause indirect growth that the City may not be able to accommodate with existing and projected housing. As discussed in Section 4.10.7, *Population and Housing*, the City is primarily a jobs center that attracts employees who commute from other communities and cities to work there. This is partially because much of the land within City limits, including the project site, is not well suited for residential development because of City policy and land use designations intended to support the development of employment land uses, including office and R&D. Nonetheless, the City does not have an adopted jobs/housing ratio goal that would be applicable to development within the project site. However, to accommodate for the lack of developable residential land within the area surrounding the project site, as well as throughout the City, the City has adopted the Affordable Housing Commercial Linkage Fees in order to establish fees for non-residential development projects to address the effect they may have on the ratio of increased job opportunities and the demand created for affordable housing. The proposed project would be required to pay these fees, which would contribute to the development of affordable housing in other locations within the City. In addition,

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the proposed project would promote greater regional balance between jobs and housing and woud be within an area with comptiable land uses, consistent with the General Plan and specific plan designations. Therefore, the proposed project would have a less-than-significant indirect impact on population growth.

Overall, the proposed project would be an appropriate land use for the project site's limitations, and the job growth that would occur under the proposed project would be within the projected employment growth of the City. The proposed project would not induce direct or indirect population growth.

# 7.1 Lead Agency

City of South San Francisco Community and Economic Development Department Planning Division

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City of South San Francisco List of Report Preparers

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Appendix A Notice of Preparation and Comments



# NOTICE OF PREPARATION OF AN EIR FOR THE PROPOSED 751 GATEWAY BOULEVARD PROJECT

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 Code of Regulations (CCR). 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 will prepare an EIR for the proposed project identified below:

**Project Title:** 751 Gateway Boulevard Project. The project location and a summary of the project description are included below and on the following page.

**Current Environmental Review:** To ensure that the proposed project is fully analyzed under CEQA, an EIR will be prepared in compliance with Title 14, Section 15161 of the CCR. An Initial Study has not been prepared. The EIR will address all environmental topic areas.

**Agency/Public Comments:** The City requests your comments regarding the scope and content of the environmental review to be conducted for the proposed project. Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice. The City will accept written comments on this NOP between January 21, 2020 and February 20, 2020. Please send your comments by email to adena.friedman@ssf.net or by mail to: City of South San Francisco, Department of Economic and Community Development, 315 Maple Street, South San Francisco, CA 94080, Attention: Adena Friedman, Senior Planner.

**Scoping Meeting:** The Lead Agency will conduct a scoping meeting on January 30, 2020, beginning at 3:00 PM, in the Annex Conference Room, 315 Maple Avenue, South San Francisco, California, at which agencies, organizations, and the public will have an opportunity to submit verbal comment. Please note that verbal comments are limited to three minutes per speaker.

**EIR Process:** Following the close of the NOP comment period, a Draft EIR will be prepared that will consider all environmental topic areas in Appendix G of the CEQA Guidelines and take into consideration NOP comments. In accordance with Title 14, Section 15105(a) of the CCR, 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 in making the decision to certify the EIR and to approve or deny the project.

**Project Location & Existing Conditions:** The project site is part of the City's "Gateway Specific Plan" planning area, which is bounded by Oyster Point Boulevard to the north, Eccles Avenue to the east, East Grand Avenue to the south, and the Caltrain right-of-way to the west. The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) consists of a 6-story, approximately 176,000-square foot office building at 701 Gateway Boulevard and a surface parking lot containing approximately 564 parking spaces. The project site is located in the Gateway Campus and is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west (Figure 1). The proposed project would be constructed on the site of an existing surface parking lot.

**Project Description:** The proposed project would maintain the existing zoning designation of Zone IV under the Gateway Specific Plan District. The existing zoning allows for development at a floor area ratio (FAR) of 1.25 or maximum of 400,578 square feet within the project site. The existing building at 701 Gateway Boulevard includes a total square footage of approximately 176,000 square feet. Based on the zoning, there are 227,082 square feet of unrealized FAR associated with the 701 Gateway Boulevard portion of the project site. The proposed project would use a portion of the unrealized FAR associated with 701 Gateway Boulevard, and the proposed FAR for the site, including the proposed building at 751 Gateway Boulevard, would be 1.20.

The proposed project would construct a new 148-foot-tall, 7story building with approximately 208,800 square feet of lab and office uses on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would be retained. The ground floor of the proposed building would include a "through lobby" with access from the north and south; the lobby would include an amenity space. An entry plaza and landscaped visitor lot would be constructed north of the proposed building. An entrance and screened service yard would be constructed south of the proposed building. The proposed project would improve pedestrian connections between the nearby Gateway Campus buildings at 701, 901, 951 and 801 Gateway Boulevard by creating a



pedestrian hub. The proposed project would also include surface parking lots with a total of 418 parking spaces (including 46 parking spaces in a lot north of the proposed building) that would be used by other buildings within the Gateway Campus. Construction of the proposed project would begin in 2020 and occur over approximately 18 months, with anticipated completion in 2021. It is anticipated that the first stage of construction would consist of demolition activities, utility work, and other site preparation.

**Probable Environmental Impacts:** Each of the following CEQA environmental issue areas will be addressed in the EIR: Aesthetics, Agriculture and Forestry Resources, Air Quality, Biological Resources, Cultural Resources, Energy Resources, Geology and Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Mineral Resources, Noise and Vibration, Population and Housing, Public Services, Recreation, Tribal Cultural Resources, Utilities and Service Systems, Transportation and Traffic, and Wildfire. There is reasonable potential that the project may result in environmental effects related to regional Air Quality, Noise, and Transportation and Traffic; thus, it is anticipated that these topics will be discussed in detail in the EIR.

Date: January 14, 2020

Adena Friedman, Senior Planner Telephone: (650) 877-8535 Email: adena.friedman@ssf.net



# STATEOFCALIFORNIA Governor's Office of Planning and Research State Clearinghouse and Planning Unit



## **Notice of Preparation**

JAN 2 3 2020
PLANNING DEPT

January 21, 2020

To:

Reviewing Agencies

Re:

751 Gateway Boulevard Project

SCH# 2020010281

Attached for your review and comment is the Notice of Preparation (NOP) for the 751 Gateway Boulevard Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Adena Friedman South San Francisco, City of 315 Maple Avenue South San Francisco, CA 94080

with a copy to the State Clearinghouse in the Office of Planning and Research at <a href="mailto:state.clearinghouse@opr.ca.gov">state.clearinghouse@opr.ca.gov</a>. Please refer to the SCH number noted above in all correspondence concerning this project on our website: <a href="https://ceqanet.opr.ca.gov/2020010281/2">https://ceqanet.opr.ca.gov/2020010281/2</a>.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan

Director, State Clearinghouse

Notice of Completion & Environmental Document Transmittal

202001028

| Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613 For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814 |  |   |  |  |  |
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| ,   |  | L   |  |  |  |
| Project Title: 751 Gateway Boulevard Project  |  |   |  |  |  |
| Lead Agency: City of South San Francisco  |  | Contact Person:   |  |  |  |
| Mailing Address: 315 Maple Street   |  | Phone: (650) 877  |  |  |  |
| City: South San Francisco   | Zip: 94080                             | County: San Mat   | eo   |  |  |
| Project Location: County: San Mateo   | City/Nearest Comm                      | nunity: South San   |  |  |  |
| Cross Streets: Gateway Boulevard and Oyster Point Boulevard   |  | • 1.W \$1 \$1 \$2 \$1 | Zip Code: 94080  |  |  |
| Longitude/Latitude (degrees, minutes and seconds): 37   |  |   | Total Acres: 7.4   |  |  |
| Assessor's Parcel No.: 015-24-290 and 015-24-360  | Section: T                             | wp.: <u>T3S</u>   | Range: R5W Base: Mt. Dlablo  |  |  |
| Within 2 Miles: State Hwy #: US 101   | Waterways: San Fran                    | ncisco Bay, Colma C   | reek, San Bruno Canal  |  |  |
| Airports: San Francisco International A   | rport Railways: Caltrain, UF           | 'RR·  | Schools: Martin Elementary, Spruce Elementary  |  |  |
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| General Plan Amendment Master Plan  |  |   |  |  |  |
| General Plan Element Planned Unit De  |  |   | Coastal Permit   |  |  |
| Community Plan Site Plan  | Land Divisi                            | on (Subdivision,  | etc.) Cther:   |  |  |
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| Commercial: Sq.ft. Acres Emp  | loyees Mining:                         | Mineral_  | MW   |  |  |
| Industrial: Sq.ft. Acres Emp  | loyees Power:                          | Type<br>atment: Type  | MGD  |  |  |
| Recreational:   | Hazardous                              | s Waste: Type   |  |  |  |
| Water Facilities:Type MGD   | Other: Re                              | tain 6-story office bu  | iliding at 701 Gateway Boulevard   |  |  |
| Project Issues Discussed In Document:   |  |   | ر المراقع المراقع والمراقع والمراقع المراقع والمراقع المراقع والمراقع المراقع والمراقع والمراقع والمراقع والمر<br> |  |  |
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| Drainage/Absorption Population/Housi  |  | nus   | Cumulative Effects   |  |  |
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| Present Land Use/Zoning/General Plan Designat   |  |   | ر جي ڪه رسم جي حي سند سند سند بيدن اور حي بيدن سند   |  |  |
| The Project site is zoned IV under the Gateway  |  | nated Busines   | s Commercial.  |  |  |
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#### 2020010281 **NOP Distribution List** de\_ County: San Makeo SCH# Resources Agency Regional Water Quality Control Caltrans, District 9 Fish & Wildlife Region 4 Native American Heritage Board (RWQCB) Julie Vance Resources Agency Comm. Gavle Rosander **Debbie Treadway** Nadell Gayou Fish & Wildlife Region 5 Caltrans, District 10 Leslie Newton-Reed **Public Utilities RWQCB 1** Dept. of Boating & Tom Dumas Habitat Conservation Commission Cathleen Hudson Waterways Program Caltrans, District 11 Supervisor North Coast Region (1) Denise Peterson Jacob Armstrong Fish & Wildlife Region 6 Santa Monica Bay RWQCB 2 California Coastal Caltrans, District 12 Tiffany Ellis Restoration Environmental Document Commission **Habitat Conservation** Maureen El Harake Guangvu Wang Coordinator Allyson Hitt Program San Francisco Bay Region (2) State Lands Commission Colorado River Board Fish & Wildlife Region 6 I/M **RWQCB 3** Elsa Contreras Jennifer Deleona Cal EPA Heidi Calvert Central Coast Region (3) Tahoe Regional Planning **Dept. of Conservation** Invo/Mono, Habitat Air Resources Board **RWQCB 4** Crina Chan Agency (TRPA) Conservation Program Cherry Jacques Teresa Rodgers Airport & Freight Cal Fire Dept. of Fish & Wildlife M Los Angeles Region (4) Jack Wursten Cal State Transportation Dan Foster William Paznokas **RWQCB 5S** Marine Region Agency CalSTA **Transportation Projects Central Valley Flood** Central Valley Region (5) Nesamani Kalandiyur **Protection Board** Caltrans - Division of Other Departments **RWQCB 5F** James Herota **Aeronautics** Industrial/Energy Projects Central Valley Region (5) Mike Tollstrup Philip Crimmins California Department of Office of Historic Fresno Branch Office Education Preservation Caltrans - Planning California Department of Lesley Taylor **RWQCB 5R** Ron Parsons **HQ LD-IGR** Resources, Recycling & Central Valley Region (5) Recovery Christian Bushona **OES (Office of Emergency Dept of Parks & Recreation** Redding Branch Office Kevin Taylor/Jeff Esquivel Services) **Environmental Stewardship** California Highway Patrol **RWQCB 6** Monique Wilber Section State Water Resources Control Suzann Ikeuchi Lahontan Region (6) Office of Special Projects Board Food & Agriculture S.F. Bay Conservation & Regional Programs Unit **RWQCB 6V** Sandra Schubert Dev't. Comm. Dept. of Transportation Division of Financial Assistance Dept. of Food and Lahontan Region (6) Steve Goldbeck Agriculture Victorville Branch Office **State Water Resources Control** Dept. of Water Caltrans, District 1 **Dept. of General Services RWQCB7** Resources Rex Jackman Cindy Forbes - Asst Deputy Cathy Buck Colorado River Basin Region (7) Resources Agency Division of Drinking Water **Environmental Services** Nadell Gayou Caltrans, District 2 **RWQCB 8** Section Marcelino Gonzalez State Water Resources Control Santa Ana Region (8) Fish and Wildlife Board Housing & Comm. Dev. Caltrans, District 3 Div. Drinking Water # **RWQCB 9** CEQA Coordinator Depart, of Fish & Wildlife Susan Zanchi San Diego Region (9) Housing Policy Division Scott Flint State Water Resources Control Caltrans, District 4 **Environmental Services Board** Independent Mark Leong Division Student Intern, 401 Water Quality Commissions.Boards Certification Unit Caltrans, District 5 Fish & Wildlife Region 1 Division of Water Quality **Delta Protection** Larry Newland Other\_\_\_\_ Curt Babcock Commission State Water Resouces Control Caltrans, District 6 Fish & Wildlife Region 1E Erik Vink Board Michael Navarro Laurie Harnsberger Phil Crader **Delta Stewardship** Division of Water Rights Caltrans, District 7 Fish & Wildlife Region 2 Council Dianna Watson Anthony Navasero Jeff Drongesen **Dept. of Toxic Substances** Control Reg. #\_ Caltrans, District 8 California Energy Fish & Wildlife Region 3

Mark Roberts

Commission

Eric Knight

Craig Weightman

Last Updated 11/20/19

Conservancy

**CEQA Tracking Center** 

Regulation

**Department of Pesticide** 



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Pomo

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California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

# NATIVE AMERICAN HERITAGE COMMISSION

on 23, 2020

January 23, 2020

Adena Friedman South San Francisco, City of 315 Maple Avenue South San Francisco, CA 94080 JAN 3 @ 2020 PLANNING DEPT

Re: 2020010281, 751 Gateway Boulevard Project, San Mateo County

Dear Ms. Friedman:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015. If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). Both SB 18 and AB 52 have tribal consultation requirements. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of <u>portions</u> of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

- 1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
  - a. A brief description of the project.
  - b. The lead agency contact information.
  - **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
  - **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).
- 2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).
  - **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).
- **3.** <u>Mandatory Topics of Consultation If Requested by a Tribe</u>: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
  - a. Alternatives to the project.
  - **b.** Recommended mitigation measures.
  - c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).
- 4. <u>Discretionary Topics of Consultation</u>: The following topics are discretionary topics of consultation:
  - a. Type of environmental review necessary.
  - **b.** Significance of the tribal cultural resources.
  - c. Significance of the project's impacts on tribal cultural resources.
  - **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).
- 5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).
- **6.** <u>Discussion of Impacts to Tribal Cultural Resources in the Environmental Document:</u> If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
  - a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
  - **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

- 7. <u>Conclusion of Consultation</u>: Consultation with a tribe shall be considered concluded when either of the following occurs:
  - **a.** The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
  - **b.** A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).
- **8.** Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).
- 9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).
- **10.** Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
  - a. Avoidance and preservation of the resources in place, including, but not limited to:
    - i. Planning and construction to avoid the resources and protect the cultural and natural context.
    - **ii.** Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
  - **b.** Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
    - i. Protecting the cultural character and integrity of the resource.
    - ii. Protecting the traditional use of the resource.
    - iii. Protecting the confidentiality of the resource.
  - **c.** Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
  - d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).
  - **e.** Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
  - **f.** Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).
- 11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
  - **a.** The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
  - **b.** The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
  - **c.** The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

#### SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: <a href="https://www.opr.ca.gov/docs/09-14-05-updated-Guidelines-922.pdf">https://www.opr.ca.gov/docs/09-14-05-updated-Guidelines-922.pdf</a>.

Some of SB 18's provisions include:

- 1. <u>Tribal Consultation</u>: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe. (Gov. Code §65352.3 (a)(2)).
- 2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
- 3. <u>Confidentiality</u>: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
- 4. <u>Conclusion of SB 18 Tribal Consultation</u>: Consultation should be concluded at the point in which:
  - **a.** The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
  - **b.** Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: <a href="http://nahc.ca.gov/resources/forms/">http://nahc.ca.gov/resources/forms/</a>.

#### NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

- 1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (<a href="http://ohp.parks.ca.gov/?page\_id=1068">http://ohp.parks.ca.gov/?page\_id=1068</a>) for an archaeological records search. The records search will determine:
  - If part or all of the APE has been previously surveyed for cultural resources.
  - b. If any known cultural resources have already been recorded on or adjacent to the APE.
  - c. If the probability is low, moderate, or high that cultural resources are located in the APE.
  - d. If a survey is required to determine whether previously unrecorded cultural resources are present.
- 2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - **a.** The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
  - **b.** The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

- 3. Contact the NAHC for:
  - **a.** A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
  - **b.** A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.
- **4.** Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
  - **a.** Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, § 15064.5(f) (CEQA Guidelines § 15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
  - **b.** Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
  - **c.** Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: <u>Nancy.Gonzalez-Lopez@nahc.ca.gov</u>.

Sincerely,

Nancy Gonzalez-Lopez Staff Services Analyst

cc: State Clearinghouse

# RECEIVED

FEB 0 3 2020



# PLANNING DEPT. **County of San Mateo Department of Public Works Utilities-Flood Control-Watershed Protection**

# **751 GATEWAY BOULEVARD PROJECT** 751 Gateway Boulevard, South San Francisco

To:

Adena Friedman, Senior Planner, 315 Maple Street, South San Francisco, CA

94080

From:

Mark Chow, P.E., Principal Civil Engineer, Utilities-Flood Control-Watershed

Protection Section

e-cc:

Ann Stillman, P.E., Deputy Director, Engineering & Resource Protection

Division

Larry Patterson, Interim Chief Executive Officer, San Mateo County Flood and Sea Level Rise Resiliency District, 1700 S. El Camino Real, Suite 502, San

Mateo, CA 94402

Krzysztof Lisaj, P.E., Senior Civil Engineer, Utilities-Flood Control-Watershed

Protection-

Tiffany Deng, P.E., Associate Civil Engineer, Utilities-Flood Control-

Watershed Protection

Date:

January 27, 2020

Subject:

Colma Creek Flood Control Zone Review, 751 Gateway Boulevard, South San

Francisco, Submittal #1

Reason for Review:

Notice of Preparation (NOP) of an Environmental Impact

Report (EIR)

Reviewer: Tiffany Deng

Submittal/Review No.: #1

The County of San Mateo Department of Public Works, in its capacity as a consultant for the San Mateo County Flood and Sea Level Rise Resiliency District (District) which includes the Colma Creek Flood Control Zone (Zone) has reviewed the document identified above for the subject project and offers the following comments:

All comments must be addressed and incorporated into a modified, complete set of plans for re-submittal. Subsequent re-submittals will be returned without review comments if the District determines that all previous comments have not been addressed. Your careful attention to our comments and providing re-submittals that adequately address our comments will assist in completing the review process in a timely fashion.

# 751 Gateway Boulevard, South San Francisco- #1 Submittal

# **Flood Control Zone Comments**

- 1. According to the NOP, the proposed project site consists of two separate parcels: APN 015-024-290 (Parcel 1) and APN 015-024-360 (Parcel 2).
- 2. District records show that Parcel 1 is located outside of the Zone. Since this portion of the project site is located outside of the Zone boundaries and does not contribute financially to the Zone's revenue and maintenance of the District's facilities, storm water runoff from this parcel must not be directed to drain into City of South San Francisco storm drain lines which ultimately enter the District's flood control channel. We request that you provide us with a copy of the as built drawings when completed for our review and record.
- 3. District records show that Parcel 2 is located within the Zone. The District requires that the discharge rate from the site not exceed the existing rate prior to development, and drainage analyses and calculations showing existing and future discharge rates must be submitted for review and approval. If it is determined that the future discharge rate exceeds the existing rate, an on-site storm water detention system, which would release surface runoff at a rate comparable to the existing flow rate of the site must be designed and incorporated into the project.
- 4. The City of South San Francisco shall provide a copy of the Environmental Impact Report (EIR) to the District for review once the report becomes available.

\ldpw.sanmateocounty.ads\data\Users\utility\Colma Creek FCD\WORD\Review External Project\City of SSF\751 Gateway Boulevard Project\751 Gateway Blvd\_EIR\_NOP\_Comments.docx



# NOTICE OF PREPARATION OF AN EIR FOR THE PROPOSED 751 GATEWAY BOULEVARD PROJECT

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 Code of Regulations (CCR). 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 will prepare an EIR for the proposed project identified below:

**Project Title:** 751 Gateway Boulevard Project. The project location and a summary of the project description are included below and on the following page.

Current Environmental Review: To ensure that the proposed project is fully analyzed under CEQA, an EIR will be prepared in compliance with Title 14, Section 15161 of the CCR. An Initial Study has not been prepared. The EIR will address all environmental topic areas.

Agency/Public Comments: The City requests your comments regarding the scope and content of the environmental review to be conducted for the proposed project. Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice. The City will accept written comments on this NOP between January 21, 2020 and February 20, 2020. Please send your comments by email to adena.friedman@ssf.net or by mail to: City of South San Francisco, Department of Economic and Community Development, 315 Maple Street, South San Francisco, CA 94080, Attention: Adena Friedman, Senior Planner.

**Scoping Meeting:** The Lead Agency will conduct a scoping meeting on January 30, 2020, beginning at 3:00 PM, in the Annex Conference Room, 315 Maple Avenue, South San Francisco, California, at which agencies, organizations, and the public will have an opportunity to submit verbal comment. Please note that verbal comments are limited to three minutes per speaker.

**EIR Process:** Following the close of the NOP comment period, a Draft EIR will be prepared that will consider all environmental topic areas in Appendix G of the CEQA Guidelines and take into consideration NOP comments. In accordance with Title 14, Section 15105(a) of the CCR, 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 in making the decision to certify the EIR and to approve or deny the project.

**Project Location & Existing Conditions:** The project site is part of the City's "Gateway Specific Plan" planning area, which is bounded by Oyster Point Boulevard to the north, Eccles Avenue to the east, East Grand Avenue to the south, and the Caltrain right-of-way to the west. The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) consists of a 6-story, approximately 176,000-square foot office building at 701 Gateway Boulevard and a surface parking lot containing approximately 564 parking spaces. The project site is located in the Gateway Campus and is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west (Figure 1). The proposed project would be constructed on the site of an existing surface parking lot.



## San Francisco International Airport

February 3, 2020

Ms. Adena Friedman
Senior Planner
City of South San Francisco
Department of Economic and Community Development
315 Maple Ave
South San Francisco, CA 94080

Subject: Notice of Preparation of an Environmental Impact Report for 751 Gateway
Boulevard project – City of South San Francisco

Dear Ms. Friedman,

Thank you for notifying San Francisco International Airport (SFO or the Airport) regarding the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the new office building and surface parking lots at 751 Gateway Boulevard (the project). We appreciate this opportunity to coordinate with the City of South San Francisco (the City) in considering and evaluating potential land use compatibility issues that this may pose.

As described in the NOP, the project site, 751 Gateway Boulevard, is located in the City's "Gateway Specific Plan" planning area, which is bounded by Oyster Point Boulevard to the north, Eccles Avenue to the east, East Grand Avenue to the south, and the Caltrains right-of-way to the west. The project includes construction of an office/laboratory building that is seven stories (208,800 square feet) approximately 148 feet in height, and surface parking lots (418 parking spaces).

Most of South San Francisco, including the proposed project site area, is located within the Airport Influence Areas A and B, as defined in the Comprehensive Airport Land Use Compatibility Plan for the Environs of SFO (ALUCP). The ALUCP was adopted by the City/County Association of Governments of San Mateo County (C/CAG) in 2012 and addresses issues related to compatibility between airport operations and surrounding proposed land use development, considering noise impacts, safety of persons on the ground and in flight, height restrictions/airspace protection, and overflight notification. The forthcoming EIR should describe the project's consistency with these ALUCP policies.

With respect to noise compatibility, the project is situated outside of the Airport's CNEL 65 dB noise contour. Additionally, the project is not situated within a runway end safety zone. Therefore, based on the information provided, the proposed project would not pose an airport land use compatibility issue with regard to noise or safety. However, the forthcoming EIR should describe the project's consistency with land use criteria within these runway end safety zones as described in ALUCP SP-1 through SP-3. Furthermore, please keep in mind many airport

AIRPORT COMMISSION CITY AND COUNTY OF SAN FRANCISCO

Ms. Adena Friedman February 3, 2020 Page 2 of 2

departure procedures currently are designed to ascend over this area, and any overnight uses in this area could experience some noise disturbances from aircraft departures. Noise impacts on sensitive receptors and any necessary mitigation measures should be fully evaluated in the EIR and the EIR should describe the project's consistency with noise policies described in ALUCP NP-1 through NP-4.

The Airport appreciates your consideration of these comments. If I can be of assistance as the City considers airport land use compatibility as they relate to this project or future projects, please do not hesitate to contact me at (650) 821-9464 or at <a href="mailto:nupur.sinha@flysfo.com">nupur.sinha@flysfo.com</a>.

Sincerely

Nupur Sinha

**Acting Planning Director** 

Planning and Environmental Affairs

cc: Susy Kalkin, Airport Land Use Committee

Sandy Wong, C/CAG

Nixon Lam, SFO, Environmental Affairs Manager

Appendix B Air Quality and Greenhouse Gas Materials

#### Unmitigated Criteria Air Pollutant Emissions during Construction (pounds/day)

|                            | ROG             | NOX          | CO         | PM10 Dust   | PM10 Exhaust | PM2.5 Dust | PM2.5 Exhaust |
|----------------------------|-----------------|--------------|------------|-------------|--------------|------------|---------------|
| 2020                       | 7               | 68           | 41         | 1           | 2            | 0          | 2             |
| 2021                       | 29              | 46           | 31         | 14          | 1            | 3          | 5             |
| BAAQMD Threshold           | 54              | 54           |            | BMPs        | 82           | BMPs       | 54            |
| Exceed Threshold?          | No              | Yes          | No         |             | No           | -          | No            |
| Unmitigated Criteria Air P | ollutant Emissi | ons during O | peration ( | pounds/day) |              |            |               |
|                            | ROG             | NOX          | CO         | PM10        | PM2.5        |            |               |
| Existing                   |                 |              |            |             |              |            |               |
| Area                       | 4               |              | 0          | 0           | 0            |            |               |

|                             | ROG | NOX  | co  | PM10 | PM2.5 |
|-----------------------------|-----|------|-----|------|-------|
| Existing                    |     |      |     |      |       |
| Area                        | 4   | 0    | 0   | 0    | 0     |
| Energy                      | 0   | 1    | 1   | 0    | 0     |
| Mobile                      | 2   | 9    | 42  | 36   | 9     |
| Stationary                  | 3   | 15   | 9   | 0    | 0     |
| Total                       | 10  | 25   | 52  | 37   | 10    |
| 701 Gateway                 |     |      |     |      |       |
| Area                        | 4   | 0    | 0   | 0    | 0     |
| Energy                      | 0   | 1    | 1   | 0    | 0     |
| Mobile                      | 2   | 7    | 36  | 36   | 9     |
| Stationary                  | 3   | 15   | 9   | 0    | 0     |
| 751 Gateway                 |     |      |     |      |       |
| Area                        | 5   | 0    | 0   | 0    | 0     |
| Energy                      | 0   | 1    | 1   | 0    | 0     |
| Mobile                      | 3   | 12   | 58  | 59   | 15    |
| Stationary                  | 3   | 15   | 9   | 0    | 0     |
| Total                       | 21  | 51   | 112 | 96   | 26    |
| Net Increase with 751 Gatew | 11  | 26   | 61  | 59   | 16    |
| BAAQMD Threshold            | 54  | 54   | -   | 82   | 54    |
| Francis of Theoretical (1)  |     | M1 - |     |      |       |

|       |      | C02   | CH4  | N20  | CO2e  |   |
|-------|------|-------|------|------|-------|---|
|       | 2020 | 843   | 0.09 | 0.00 | 845   | Ī |
|       | 2021 | 488   | 0.08 | 0.00 | 490   |   |
| Total |      | 1,331 | 0    | 0    | 1,335 | Ī |

# Estimated Operational GHG Emissions from the Proposed Project (metric tons)

| Estimated Operational GHG | C02   | CH4  | N20  | CO2e  | %    |
|---------------------------|-------|------|------|-------|------|
| Existing                  | COL   | CITY | IVEO | COLC  | ,,,  |
| Area                      | 0     | 0    | 0    | 0     | 0%   |
| Energy                    | 398   | 0    | 0    | 401   | 14%  |
| Mobile                    | 2,331 | ō    | 0    | 2,360 | 82%  |
| Stationary                | 39    | ō    | 0    | 39    | 1%   |
| Waste                     | 32    | 2    | ō    | 80    | 3%   |
| Water                     | 2     | ō    | ō    | 4     | 0%   |
| Total                     | 2,802 | 2    | 0    | 2,884 | 100% |
| 701 Gateway               |       |      |      |       |      |
| Area                      | 0     | 0    | 0    | 0     | 0%   |
| Energy                    | 382   | 0    | 0    | 385   | 5%   |
| Mobile                    | 2,229 | 0    | 0    | 2,256 | 31%  |
| Stationary                | 39    | 0    | 0    | 39    | 1%   |
| Waste                     | 32    | 2    | 0    | 80    | 1%   |
| Water                     | 2     | 0    | 0    | 4     | 0%   |
| 751 Gateway               |       |      |      |       |      |
| Area                      | 0     | 0    | 0    | 0     | 0%   |
| Energy                    | 649   | 0    | 0    | 655   | 9%   |
| Mobile                    | 3,619 | 0    | 0    | 3,662 | 51%  |
| Stationary                | 39    | 0    | 0    | 39    | 1%   |
| Waste                     | 19    | 1    | 0    | 48    | 1%   |
| Water                     | 3     | 0    | 0    | 7     | 0%   |
| Total                     | 7,014 | 3    | 0    | 7,176 | -    |
|                           |       |      | _    |       |      |

# Mitigated Criteria Air Pollutant Emissions during Construction (pounds/day) ROG NOX CO PM10 Dust PM2.5 Dust PM2.5 Dust PM2.5 Exhaust

|                   | KUG | NUX | LU | PIMITO DUST | PIVITU EXHAUST | PIVIZ.5 DUST | PIVIZ.5 EXTIAUST |
|-------------------|-----|-----|----|-------------|----------------|--------------|------------------|
| 2020              | 2   | 14  | 78 | 1           | 0              | 0            | 1                |
| 2021              | 28  | 11  | 62 | 14          | 0              | 3            | 4                |
| BAAQMD Threshold  | 54  | 54  |    | BMPs        | 82             | BMPs         | 54               |
| Exceed Threshold? | No  | No  | No | -           | No             | -            | No               |

#### Construction (Electricity)

|      | KWN    |
|------|--------|
| 2020 | 52,000 |
| 2021 | 52,000 |

## Construction (Fuel)

| Construction (Fuel) |                    |                  |  |  |
|---------------------|--------------------|------------------|--|--|
|                     | Gasoline (Gallons) | Diesel (Gallons) |  |  |
| 2020                | 3,346              | 79,400           |  |  |
| 2021                | 18,762             | 31,437           |  |  |

#### Operations (Electricity, including Water)

|                        |           | Unmitig        | gated     |            |
|------------------------|-----------|----------------|-----------|------------|
| Scenario               | kwh/year  | BTU/year       | MBTU/year | therm/year |
| Existing (701 Gateway) | 1,753,936 | 5,984,679,727  | 5,985     | 59,861     |
| Project                | 7,252,999 | 24,748,260,872 | 24,748    | 247,542    |
| 701 Gateway            | 1,753,936 | 5,984,679,727  | 5,985     | 59,861     |
| 751 Gateway            | 5,499,063 | 18,763,581,145 | 18,764    | 187,681    |

#### Operations (Natural Gas)

|                        |           | Unmitig       | giated    |            |
|------------------------|-----------|---------------|-----------|------------|
| Scenario               | kBTU/Year | BTU/Year      | MBTU/year | therm/year |
| Existing (701 Gateway) | 4,466,600 | 4,466,600,000 | 4,467     | 44,677     |
| Project                | 7,917,579 | 7,917,579,000 | 7,918     | 79,195     |
| 701 Gateway            | 4,466,600 | 4,466,600,000 | 4,467     | 44,677     |
| 751 Gateway            | 3,450,979 | 3,450,979,000 | 3,451     | 34,518     |
|                        |           |               |           |            |

#### Operations (Fuel)

| Operations (ruei)      |                             |                           |  |  |  |
|------------------------|-----------------------------|---------------------------|--|--|--|
|                        | Unmitigated (gallons/year)  |                           |  |  |  |
| Scenario               | Gasoline (Gallons per Year) | Diesel (Gallons Per Year) |  |  |  |
| Existing (701 Gateway) | 243,226                     | 28,680                    |  |  |  |
| Project                | 603,881                     | 77,421                    |  |  |  |
| 701 Gateway            | 230,099                     | 29,500                    |  |  |  |
| 751 Gateway            | 373,783                     | 47,921                    |  |  |  |

| Operations (Water)     |                    | Unmitig             | gated             |          |
|------------------------|--------------------|---------------------|-------------------|----------|
| Scenario               | Indoor (Mgal/year) | Outdoor (Mgal/year) | Total (Mgal/year) | kwh/year |
| Existing (701 Gateway) | 2                  | 4                   | 6                 | 79,956   |
| Project                | 6                  | 5                   | 12                | 152,729  |
| 701 Gateway            | 2                  | 4                   | 6                 | 79,956   |
| 751 Gateway            | 5                  | 1                   | 6                 | 72,773   |

| Conversions |          | Source   |
|-------------|----------|----------|
| MBTU_kBTU   | 1.00E-06 | Standard |
| Therm_BTU   | 1.00E-05 | Standard |
| BTU_kwh     | 3.41E+03 | Standard |
| kBTU_BTU    | 1.00E-03 | Standard |
| kWh_mgal    | 13,021   | CalEEMod |

| Construction | Schedu | le |
|--------------|--------|----|

| Phase                               | Start     | End        | Work Days Provided | Work Days Modeled | Workdays/Week |
|-------------------------------------|-----------|------------|--------------------|-------------------|---------------|
| Site Prep/Demoliition               | 7/2/2020  | 8/29/2020  | 40                 | 42                | 5             |
| Foundations                         | 8/9/2020  | 1/2/2021   | 100                | 105               | 5             |
| Structure                           | 1/3/2021  | 9/13/2021  | 195                | 217               | 6             |
| Skin and Roof                       | 6/10/2021 | 10/5/2021  | 81                 | 84                | 5             |
| Interior Buildout                   | 4/2/2021  | 10/26/2021 | 143                | 148               | 5             |
| Commissioning and Final Inspections | 9/14/2021 | 12/2/2021  | 54                 | 58                | 5             |

## **Construction Equipment**

| Phase                               | Equipment           | Number | Horsepower | Hours/day |
|-------------------------------------|---------------------|--------|------------|-----------|
|                                     | Excavator           | 1      | 300        | 8         |
| Site Prep/Demoliition               | Crusher             | 1      | 200        | 8         |
|                                     | Dump Truck          | 1      | 300        | 8         |
|                                     | Excavator           | 2      | 300        | 8         |
| Foundations                         | Trucks              | 18     | 400        | 0.5       |
|                                     | Concrete Pumps      | 5      | 300        | 8         |
|                                     | Crane               | 1      | 400        | 8         |
| St                                  | Welder              | 8      | 15         | 8         |
| Structure                           | Manlift             | 2      | 50         | 8         |
|                                     | Gradall (Excavator) | 1      | 200        | 8         |
| Skin & Roof                         | Crane               | 1      | 200        | 8         |
| Interior Buildout                   | None                | -      | -          | -         |
| Commissioning and Final Inspections | None                | -      | -          | -         |

## **Total Trips**

| rotal riips                         |                      |                    |                       |                |         |
|-------------------------------------|----------------------|--------------------|-----------------------|----------------|---------|
| Phase                               | One Way Vendor Trips | One Way Haul Trips | One Way Haul Distance | Avg Vendor/Day | Rounded |
| Site Prep/Demoliition               | 223                  | -                  |                       | 5.72           | 6       |
| Foundations                         | 705                  | 500                | 40 miles              | 12.88          | 13      |
| Structure                           | 805                  | -                  |                       | 7.36           | 8       |
| Skin and Roof                       | 296                  | -                  |                       | 8.4            | 9       |
| Interior Buildout                   | 1050                 | -                  |                       | 8.4            | 9       |
| Commissioning and Final Inspections | 160                  | -                  |                       | 5.4            | 6       |
| Total Trips                         | 3239                 | 500                |                       |                |         |
|                                     |                      |                    |                       |                |         |

#### Workers

| Phase                               | Max/Day | Trips/Day |
|-------------------------------------|---------|-----------|
| Site Prep/Demoliition               | 20      | 40        |
| Foundations                         | 35      | 70        |
| Structure                           | 70      | 140       |
| Skin & Roof                         | 5       | 10        |
| Interior Buildout                   | 35      | 70        |
| Commissioning and Final Inspections | 90      | 180       |

# Soil Import/Export

| Phase                               | Import (CY) | Export (CY) |
|-------------------------------------|-------------|-------------|
| Site Prep/Demoliition               | 750         | 0           |
| Foundations                         | 0           | 0           |
| Structure                           | 0           | 0           |
| Interior Buildout                   | 0           | 0           |
| Commissioning and Final Inspections | 0           | 0           |

# Demolition

| Phase                               | CY  | Tons |
|-------------------------------------|-----|------|
| Site Prep/Demoliition               | 300 | 150  |
| Foundations                         | 0   | 0    |
| Structure                           | 0   | 0    |
| Interior Buildout                   | 0   | 0    |
| Commissioning and Final Inspections | 0   | 0    |

## Grading

| Phase                               | Max Acres/Day |
|-------------------------------------|---------------|
| Site Prep/Demoliition               | 1.4           |
| Foundations                         | 0             |
| Structure                           | 0             |
| Interior Buildout                   | 0             |
| Commissioning and Final Inspections | 0             |

## Paving

| Phase                               | Acres |
|-------------------------------------|-------|
| Site Prep/Demoliition               | 1.4   |
| Foundations                         | 1.4   |
| Structure                           | 0     |
| Interior Buildout                   | 0     |
| Commissioning and Final Inspections | 0     |

# Paving

| Phase                 | Total Acres | Asphalt | Concrete |
|-----------------------|-------------|---------|----------|
| Site Prep/Demoliition | 2.55        | 1.4     | 1.15     |

| Foundations                         | 1.4 | 0 | 1.4 |
|-------------------------------------|-----|---|-----|
| Structure                           | 0   | 0 | 0   |
| Interior Buildout                   | 0   | 0 | 0   |
| Commissioning and Final Inspections | 0   | 0 | 0   |

Annual Electricity Consumption 52,000 kwh

Trees Removed

Net Trees Remove 63

Source: Project Applicant

## Generators

| Туре                   | Quantity | Size            | LF  | Testing Hours per year | Testing Hours per day |
|------------------------|----------|-----------------|-----|------------------------|-----------------------|
| Existing (701 Gateway) | 1        | 1200 kw/1869 hp | 0.8 | 50                     | 1                     |
| Proposed (751 Gateway) | 1        | 1200 kw/1869 hp | 0.8 | 50                     | 1                     |

Source: Project Description; assumed existing 701 Gateway generator to be similar to proposed

Equipment

Off-Road Equipment None

Truck Trips/Deliveries

Misc Daily Trips 23

Source: Project Applicant; emissions associated with these trips included in VMT analysis

## **Operational Consumption**

| Land Use                         | Electricity (kwh) | Natural Gas (kbtu) | Water (gals) | Water (Indoor) | Water (Outdoor) |
|----------------------------------|-------------------|--------------------|--------------|----------------|-----------------|
| Parking Lot (751 Gateway)        | 0                 | 0                  | 0            | 0              | 0               |
| 701 Gateway                      | 1,673,980         | 4,466,600          | 3,398,880    | 2,107,306      | 1,291,574       |
| Per SF                           | 9.83335           | 26.23785           |              |                |                 |
| 751 Gateway                      | 5,426,290         | 3,450,979          | 5,588,880    |                |                 |
| R&D                              |                   |                    | 3,531,740    | 3,531,740      |                 |
| Office                           |                   |                    | 1,571,325    | 974,222        | 597,104         |
| Retail (Café and Fitness Center) |                   |                    | 485,815      | 301,205        | 184,610         |

Source: Project Applicant; assumed indoor/outdoor water useage using CalEEMod default % and annual water consumption

Page 1 of 1

Date: 3/12/2020 11:52 AM

701 Gateway - Existing - San Mateo County, Summer

# 701 Gateway - 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 | 170.24 | 1000sqft | 3.20        | 170,235.00         | 0          |  |
| Parking Lot             | 558.00 | Space    | 4.20        | 223,200.00         | 0          |  |

# 1.2 Other Project Characteristics

UrbanUrbanWind Speed (m/s)2.2Precipitation Freq (Days)70Climate Zone5Operational Year2019

Utility Company Pacific Gas & Electric Company

**CO2 Intensity** 210 **CH4 Intensity** 0.034 **N20 Intensity** 0.004

#### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - EFs adjusted for SB 100

Land Use - sf and spaces provided by applicant; lot acreage scaled by sf

Construction Phase - operational analysis only

Off-road Equipment - operational analysis only

Trips and VMT - operational analysis only

Grading -

Architectural Coating - operational analysis only

Vehicle Trips - mobile emissions modeled separately

Energy Use - Energy consumption provided by applicant

Water And Wastewater - water usage provided by project applicant; assumed Caleemod default for general office building of 62% indoor/38% outdoor

Land Use Change Sequestration - provided by project applicant
Stationary Sources - Emergency Generators and Fire Pumps - assumed existing generator at 701 Gateway to have same specs as future generator at

| Table Name                | Column Name                       | Default Value | New Value  |  |  |
|---------------------------|-----------------------------------|---------------|------------|--|--|
| tblArchitecturalCoating   | ConstArea_Nonresidential_Exterior | 85,118.00     | 0.00       |  |  |
| tblArchitecturalCoating   | ConstArea_Nonresidential_Interior | 255,353.00    | 0.00       |  |  |
| tblArchitecturalCoating   | ConstArea_Parking                 | 13,392.00     | 0.00       |  |  |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |  |  |
| tblConstructionPhase      | NumDays                           | 10.00         | 0.00       |  |  |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |  |  |
| tblConstructionPhase      | NumDays                           | 230.00        | 0.00       |  |  |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |  |  |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |  |  |
| tblEnergyUse              | LightingElect                     | 3.58          | 0.00       |  |  |
| tblEnergyUse              | LightingElect                     | 0.35          | 0.00       |  |  |
| tblEnergyUse              | NT24E                             | 4.80          | 0.00       |  |  |
| tblEnergyUse              | NT24NG                            | 1.01          | 0.00       |  |  |
| tblEnergyUse              | T24E                              | 4.10          | 9.83       |  |  |
| tblEnergyUse              | T24NG                             | 18.32         | 26.24      |  |  |
| tblLandUse                | LandUseSquareFeet                 | 170,240.00    | 170,235.00 |  |  |
| tblLandUse                | LotAcreage                        | 3.91          | 3.20       |  |  |
| tblLandUse                | LotAcreage                        | 5.02          | 4.20       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 4.00          | 0.00       |  |  |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |  |  |
| tblProjectCharacteristics | CH4IntensityFactor                | 0.029         | 0.034      |  |  |
| tblProjectCharacteristics | CO2IntensityFactor                | 641.35        | 210        |  |  |

| tblProjectCharacteristics       | N2OIntensityFactor  | 0.006         | 0.004        |  |  |
|---------------------------------|---------------------|---------------|--------------|--|--|
| tblSequestration                | NumberOfNewTrees    | 0.00          | 175.00       |  |  |
| tblStationaryGeneratorsPumpsEF  | CH4_EF              | 0.07          | 0.07         |  |  |
| tblStationaryGeneratorsPumpsEF  | ROG_EF              | 2.2480e-003   | 2.2477e-003  |  |  |
| tblStationaryGeneratorsPumpsUse | HorsePowerValue     | 0.00          | 1,869.00     |  |  |
| tblStationaryGeneratorsPumpsUse | HoursPerDay         | 0.00          | 1.00         |  |  |
| tblStationaryGeneratorsPumpsUse | HoursPerYear        | 0.00          | 50.00        |  |  |
| tblStationaryGeneratorsPumpsUse | Load_Factor         | 0.73          | 0.80         |  |  |
| tblStationaryGeneratorsPumpsUse | NumberOfEquipment   | 0.00          | 1.00         |  |  |
| tblTripsAndVMT                  | VendorTripNumber    | 64.00         | 0.00         |  |  |
| tblTripsAndVMT                  | WorkerTripNumber    | 148.00        | 0.00         |  |  |
| tblTripsAndVMT                  | WorkerTripNumber    | 30.00         | 0.00         |  |  |
| tblVehicleTrips                 | ST_TR               | 2.46          | 0.00         |  |  |
| tblVehicleTrips                 | SU_TR               | 1.05          | 0.00         |  |  |
| tblVehicleTrips                 | WD_TR               | 11.03         | 0.00         |  |  |
| tblWater                        | IndoorWaterUseRate  | 30,257,393.26 | 2,107,306.00 |  |  |
| tblWater                        | OutdoorWaterUseRate | 18,544,853.93 | 1,291,574.00 |  |  |

# 2.0 Emissions Summary

# 2.2 Overall Operational Unmitigated Operational

|            | ROG    | NOx      | СО     | SO2      | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O    | CO2e     |
|------------|--------|----------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|--------|----------|
| Category   |        | lb/day   |        |          |          |          |          |          |          |          |          | lb/d     | ay        |          |        |          |
| Area       | 4.2411 | 7.00E-04 | 0.0751 | 1.00E-05 |          | 2.70E-04 | 2.70E-04 |          | 2.70E-04 | 2.70E-04 |          | 0.1594   | 0.1594    | 4.30E-04 |        | 0.1702   |
| Energy     | 0.132  | 1.1998   | 1.0079 | 7.20E-03 |          | 0.0912   | 0.0912   |          | 0.0912   | 0.0912   |          | 1,439.80 | 1,439.80  | 0.0276   | 0.0264 | 1,448.35 |
| Mobile     | 0      | 0        | 0      | 0        | 0        | 0        | 0        | 0        | 0        | 0        |          | 0        | 0         | 0        |        | 0        |
| Stationary | 3.3608 | 15.0314  | 8.5705 | 0.0162   |          | 0.4945   | 0.4945   |          | 0.4945   | 0.4945   |          | 1,719.51 | 1,719.51  | 0.2411   |        | 1,725.54 |
| Total      | 7.7339 | 16.2319  | 9.6535 | 0.0234   | 0        | 0.5859   | 0.5859   | 0        | 0.5859   | 0.5859   |          | 3,159.46 | 3,159.46  | 0.2691   | 0.0264 | 3,174.06 |

# 5.0 Energy Detail

Historical Energy Use: N

# **5.1 Mitigation Measures Energy**

|            | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O    | CO2e     |
|------------|--------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|--------|--------|----------|
| Category   | lb/day |        |        |          |          |         |        |          |         | lb/day |          |          |           |        |        |          |
| NaturalGas | 0.132  | 1.1998 | 1.0079 | 7.20E-03 |          | 0.0912  | 0.0912 |          | 0.0912  | 0.0912 |          | 1,439.80 | 1,439.80  | 0.0276 | 0.0264 | 1,448.35 |

|            |       |        |        |          |        |        | <br>   |        | <br>     |          |        |        |          |
|------------|-------|--------|--------|----------|--------|--------|--------|--------|----------|----------|--------|--------|----------|
| NaturalGas | 0.132 | 1.1998 | 1.0079 | 7.20E-03 | 0.0912 | 0.0912 | 0.0912 | 0.0912 | 1,439.80 | 1,439.80 | 0.0276 | 0.0264 | 1,448.35 |

# **5.2 Energy by Land Use - NaturalGas Unmitigated**

|                | NaturalGa | ROG   | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O    | CO2e     |
|----------------|-----------|-------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|-----------|-----------|--------|--------|----------|
| Land Use       | kBTU/yr   |       |        |        |          | lb/d     | day     |        |          |         |        |          |           | lb/c      | ay     |        |          |
| General Office | 12238.3   | 0.132 | 1.1998 | 1.0079 | 7.20E-03 |          | 0.0912  | 0.0912 |          | 0.0912  | 0.0912 |          | 1,439.80  | 1,439.80  | 0.0276 | 0.0264 | 1,448.35 |
| Parking Lot    | 0         | 0     | 0      | 0      | 0        |          | 0       | 0      |          | 0       | 0      |          | 0         | 0         | 0      | 0      | 0        |
| Total          |           | 0.132 | 1.1998 | 1.0079 | 7.20E-03 |          | 0.0912  | 0.0912 |          | 0.0912  | 0.0912 |          | 1,439.80  | 1,439.80  | 0.0276 | 0.0264 | 1,448.35 |

#### 6.0 Area Detail

# **6.1 Mitigation Measures Area**

|             | ROG    | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-  | Total CO2 | CH4      | N2O | CO2e   |
|-------------|--------|----------|--------|----------|----------|----------|----------|----------|----------|----------|----------|--------|-----------|----------|-----|--------|
| Category    |        |          |        |          | lb/d     | lay      |          |          |          |          |          |        | lb/d      | ay       |     |        |
| Mitigated   | 4.2411 | 7.00E-04 | 0.0751 | 1.00E-05 |          | 2.70E-04 | 2.70E-04 |          | 2.70E-04 | 2.70E-04 |          | 0.1594 | 0.1594    | 4.30E-04 |     | 0.1702 |
| Unmitigated | 4.2411 | 7.00E-04 | 0.0751 | 1.00E-05 | )        | 2.70E-04 | 2.70E-04 |          | 2.70E-04 | 2.70E-04 | <u></u>  | 0.1594 | 0.1594    | 4.30E-04 | 0   | 0.1702 |

# 6.2 Area by SubCategory Unmitigated

|               | ROG      | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-  | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|----------|--------|----------|----------|----------|----------|----------|----------|----------|----------|--------|-----------|----------|-----|--------|
| SubCategory   |          |          |        |          | lb/c     | lay      |          |          |          |          |          |        | lb/c      | lay      |     |        |
| Architectural | 0.5119   |          |        |          |          | 0        | 0        |          | 0        | 0        |          |        | 0         |          |     | 0.0000 |
| Consumer      | 3.7221   | 1        |        |          |          | 0        | 0        | 7        | 0        | 0        |          | )      | 0         |          |     | 0.0000 |
| Landscaping   | 7.12E-03 | 7.00E-04 | 0.0751 | 1.00E-05 |          | 2.70E-04 | 2.70E-04 |          | 2.70E-04 | 2.70E-04 |          | 0.1594 | 0.1594    | 4.30E-04 |     | 0.1702 |
| Total         | 4.2411   | 7.00E-04 | 0.0751 | 1.00E-05 |          | 2.70E-04 | 2.70E-04 |          | 2.70E-04 | 2.70E-04 |          | 0.1594 | 0.1594    | 4.30E-04 |     | 0.1702 |

# 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/Dav    | Davs/Year  | Horse Power    | Load Factor | Fuel Type     |
|----------------|-----------|--------------|------------|----------------|-------------|---------------|
| Equipment Type | 110111001 | r iouro, Day | Dayor roan | 110100 1 01101 | autoi       | 1 401 1 7 7 0 |

# 10.0 Stationary Equipment

#### **Fire Pumps and Emergency Generators**

| Equipment Type      | Number | Hours/Day | Hours/Year | Horse Power | Load Factor | Fuel Type |
|---------------------|--------|-----------|------------|-------------|-------------|-----------|
| Emergency Generator | 1      | 1         | 50         | 1869        | 0.8         | Diesel    |

## **Boilers**

| Equipment Type | Number | Heat Input/Day | Heat Input/Year | Boiler Rating | Fuel Type |
|----------------|--------|----------------|-----------------|---------------|-----------|

## **User Defined Equipment**

| Equipment Type | Number |
|----------------|--------|

# 10.1 Stationary Sources Unmitigated/Mitigated

|                                 | ROG    | NOx     | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|---------------------------------|--------|---------|--------|--------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|--------|-----|----------|
| Equipment Type                  |        |         |        |        | lb/c     | day     |        |          |         |        |          |          | lb/d      | ay     |     |          |
| Emergency<br>Generator - Diesel | 3.3608 | 15.0314 | 8.5705 | 0.0162 |          | 0.4945  | 0.4945 |          | 0.4945  | 0.4945 |          | 1,719.51 | 1,719.51  | 0.2411 |     | 1,725.54 |
| Total                           | 3.3608 | 15.0314 | 8.5705 | 0.0162 |          | 0.4945  | 0.4945 |          | 0.4945  | 0.4945 |          | 1,719.51 | 1,719.51  | 0.2411 |     | 1,725.54 |

# 11.0 Vegetation

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Date: 3/12/2020 11:51 AM

701 Gateway - Existing - San Mateo County, Annual

#### 701 Gateway - 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 | 170.24 | 1000sqft | 3.20        | 170,235.00         | 0          |
| Parking Lot             | 558.00 | Space    | 4.20        | 223,200.00         | 0          |

#### 1.2 Other Project Characteristics

Wind Speed (m/s) Precipitation Freq (Days) Urbanization Urban 2.2 70 5 **Operational Year** 2019 Climate Zone

**Utility Company** Pacific Gas & Electric Company

**CO2 Intensity** 210 **CH4 Intensity** 0.034 **N2O Intensity** 0.004

#### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - EFs adjusted for SB 100

Land Use - sf and spaces provided by applicant; lot acreage scaled by sf

Construction Phase - operational analysis only

Off-road Equipment - operational analysis only

Trips and VMT - operational analysis only

Grading -

Architectural Coating - operational analysis only

Vehicle Trips - mobile emissions modeled separately

Energy Use - Energy consumption provided by applicant

Water And Wastewater - water usage provided by project applicant; assumed Caleemod default for general office building of 62% indoor/38% outdoor

Land Use Change Sequestration - provided by project applicant
Stationary Sources - Emergency Generators and Fire Pumps - assumed existing generator at 701 Gateway to have same specs as future generator at

| Table Name                | Column Name                       | Default Value | New Value  |
|---------------------------|-----------------------------------|---------------|------------|
| tblArchitecturalCoating   | ConstArea_Nonresidential_Exterior | 85,118.00     | 0.00       |
| tblArchitecturalCoating   | ConstArea_Nonresidential_Interior | 255,353.00    | 0.00       |
| tblArchitecturalCoating   | ConstArea_Parking                 | 13,392.00     | 0.00       |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |
| tblConstructionPhase      | NumDays                           | 10.00         | 0.00       |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |
| tblConstructionPhase      | NumDays                           | 230.00        | 0.00       |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |
| tblConstructionPhase      | NumDays                           | 20.00         | 0.00       |
| tblEnergyUse              | LightingElect                     | 3.58          | 0.00       |
| tblEnergyUse              | LightingElect                     | 0.35          | 0.00       |
| tblEnergyUse              | NT24E                             | 4.80          | 0.00       |
| tblEnergyUse              | NT24NG                            | 1.01          | 0.00       |
| tblEnergyUse              | T24E                              | 4.10          | 9.83       |
| tblEnergyUse              | T24NG                             | 18.32         | 26.24      |
| tblLandUse                | LandUseSquareFeet                 | 170,240.00    | 170,235.00 |
| tblLandUse                | LotAcreage                        | 3.91          | 3.20       |
| tblLandUse                | LotAcreage                        | 5.02          | 4.20       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 2.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 3.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 4.00          | 0.00       |
| tblOffRoadEquipment       | OffRoadEquipmentUnitAmount        | 1.00          | 0.00       |
| tblProjectCharacteristics | CH4IntensityFactor                | 0.029         | 0.034      |
| tblProjectCharacteristics | CO2IntensityFactor                | 641.35        | 210        |

| tblProjectCharacteristics       | N2OIntensityFactor  | 0.006         | 0.004        |
|---------------------------------|---------------------|---------------|--------------|
| tblStationaryGeneratorsPumpsEF  | CH4_EF              | 0.07          | 0.07         |
| tblStationaryGeneratorsPumpsEF  | ROG_EF              | 2.2480e-003   | 2.2477e-003  |
| tblStationaryGeneratorsPumpsUse | HorsePowerValue     | 0.00          | 1,869.00     |
| tblStationaryGeneratorsPumpsUse | HoursPerDay         | 0.00          | 1.00         |
| tblStationaryGeneratorsPumpsUse | HoursPerYear        | 0.00          | 50.00        |
| tblStationaryGeneratorsPumpsUse | Load_Factor         | 0.73          | 0.80         |
| tblStationaryGeneratorsPumpsUse | NumberOfEquipment   | 0.00          | 1.00         |
| tblTripsAndVMT                  | VendorTripNumber    | 64.00         | 0.00         |
| tblTripsAndVMT                  | WorkerTripNumber    | 148.00        | 0.00         |
| tblTripsAndVMT                  | WorkerTripNumber    | 30.00         | 0.00         |
| tblVehicleTrips                 | ST_TR               | 2.46          | 0.00         |
| tblVehicleTrips                 | SU_TR               | 1.05          | 0.00         |
| tblVehicleTrips                 | WD_TR               | 11.03         | 0.00         |
| tblWater                        | IndoorWaterUseRate  | 30,257,393.26 | 2,107,306.00 |
| tblWater                        | OutdoorWaterUseRate | 18,544,853.93 | 1,291,574.00 |

# 2.0 Emissions Summary

# 2.2 Overall Operational Unmitigated Operational

|            | ROG    | NOx      | CO       | SO2      | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O      | CO2e     |
|------------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|----------|----------|
| Category   |        |          |          |          | tons     | s/yr     |          |          |          |          |          |          | MT        | /yr      |          |          |
| Area       | 0.7733 | 6.00E-05 | 6.76E-03 | 0        |          | 2.00E-05 | 2.00E-05 |          | 2.00E-05 | 2.00E-05 | 0        | 0.013    | 0.013     | 4.00E-05 | 0        | 0.0139   |
| Energy     | 0.0241 | 0.219    | 0.1839   | 1.31E-03 |          | 0.0166   | 0.0166   |          | 0.0166   | 0.0166   | 0        | 397.774  | 397.774   | 0.0304   | 7.41E-03 | 400.7405 |
| Mobile     | 0      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0         | 0        | 0        | 0        |
| Stationary | 0.084  | 0.3758   | 0.2143   | 4.00E-04 |          | 0.0124   | 0.0124   | 0        | 0.0124   | 0.0124   | 0        | 38.9978  | 38.9978   | 5.47E-03 | 0        | 39.1345  |
| Waste      |        |          |          |          |          | 0        | 0        |          | 0        | 0        | 32.1375  | 0        | 32.1375   | 1.8993   | 0        | 79.6194  |
| Water      |        |          |          |          |          | 0        | 0        |          | 0        | 0        | 0.6686   | 1.5168   | 2.1853    | 0.0689   | 1.65E-03 | 4.3999   |
| Total      | 0.8815 | 0.5948   | 0.405    | 1.71E-03 | 0        | 0.029    | 0.029    | 0        | 0.029    | 0.029    | 32.8061  | 438.3016 | 471.1077  | 2.0041   | 9.06E-03 | 523.9082 |

# 5.0 Energy Detail

Historical Energy Use: N

# **5.1 Mitigation Measures Energy**

|             | ROG    | NOx   | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O      | CO2e     |
|-------------|--------|-------|--------|----------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|----------|----------|----------|
| Category    |        |       |        |          | tons     | s/yr    |        |          |         |        |          |          | MT        | /yr      |          |          |
| Electricity |        |       |        |          |          | 0       | 0      |          | 0       | 0      | 0        | 159.3997 | 159.3997  | 0.0258   | 3.04E-03 | 160.9496 |
| Electricity |        |       |        |          |          | 0       | 0      |          | 0       | 0      | 0        | 159.3997 | 159.3997  | 0.0258   | 3.04E-03 | 160.9496 |
| NaturalGas  | 0.0241 | 0.219 | 0.1839 | 1.31E-03 | D        | 0.0166  | 0.0166 | <u> </u> | 0.0166  | 0.0166 | 0        | 238.3743 | 238.3743  | 4.57E-03 | 4.37E-03 | 239.7909 |
| NaturalGas  | 0.0241 | 0.219 | 0.1839 | 1.31E-03 |          | 0.0166  | 0.0166 |          | 0.0166  | 0.0166 | 0        | 238.3743 | 238.3743  | 4.57E-03 | 4.37E-03 | 239.7909 |

# 5.2 Energy by Land Use - NaturalGas Unmitigated

|                | NaturalGa | ROG    | NOx   | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O      | CO2e     |
|----------------|-----------|--------|-------|--------|----------|----------|---------|--------|----------|---------|--------|----------|-----------|-----------|----------|----------|----------|
| Land Use       | kBTU/yr   |        |       |        |          | tons     | s/yr    |        |          |         |        |          |           | MT        | /yr      |          |          |
| General Office | 4.47E+06  | 0.0241 | 0.219 | 0.1839 | 1.31E-03 |          | 0.0166  | 0.0166 |          | 0.0166  | 0.0166 | 0        | 238.3743  | 238.3743  | 4.57E-03 | 4.37E-03 | 239.7909 |
| Parking Lot    | 0         | 0      | 0     | 0      | 0        |          | 0       | 0      |          | 0       | 0      | 0        | 0         | 0         | 0        | 0        | 0        |
| Total          |           | 0.0241 | 0.219 | 0.1839 | 1.31E-03 |          | 0.0166  | 0.0166 |          | 0.0166  | 0.0166 | 0        | 238.3743  | 238.3743  | 4.57E-03 | 4.37E-03 | 239.7909 |

## 5.3 Energy by Land Use - Electricity Unmitigated

|                | Electricity | Total CO2 | CH4    | N2O      | CO2e     |
|----------------|-------------|-----------|--------|----------|----------|
| Land Use       | kWh/yr      |           | M      | Γ/yr     |          |
| General Office | 1.67E+06    | 159.3997  | 0.0258 | 3.04E-03 | 160.9496 |
| Parking Lot    | 0           | 0         | 0      | 0        | 0        |
| Total          |             | 159.3997  | 0.0258 | 3.04E-03 | 160.9496 |

# 6.0 Area Detail

# **6.1 Mitigation Measures Area**

|             | ROG    | NOx      | CO       | SO2 | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio- | Total CO2 | CH4      | N2O | CO2e   |
|-------------|--------|----------|----------|-----|----------|----------|----------|----------|----------|----------|----------|-------|-----------|----------|-----|--------|
| Category    |        |          |          |     | tons     | s/yr     |          |          |          |          |          |       | MT        | /yr      |     |        |
| Mitigated   | 0.7733 | 6.00E-05 | 6.76E-03 | 0   |          | 2.00E-05 | 2.00E-05 |          | 2.00E-05 | 2.00E-05 | 0        | 0.013 | 0.013     | 4.00E-05 | 0   | 0.0139 |
| Unmitigated | 0.7733 | 6.00E-05 | 6.76E-03 | 0   |          | 2.00E-05 | 2.00E-05 |          | 2.00E-05 | 2.00E-05 | 0        | 0.013 | 0.013     | 4.00E-05 | 0   | 0.0139 |

# 6.2 Area by SubCategory Unmitigated

|               | ROG    | NOx | CO | SO2 | Fugitive | Exhaust | PM10 | Fugitive | Exhaust | PM2.5 | Bio- CO2 | NBio- | Total CO2 | CH4 | N2O | CO2e |
|---------------|--------|-----|----|-----|----------|---------|------|----------|---------|-------|----------|-------|-----------|-----|-----|------|
| SubCategory   |        |     | l. | l . | tons     | s/yr    |      |          |         |       |          |       | MT        | yr  |     |      |
| Architectural | 0.0934 |     |    |     |          | 0       | 0    |          | 0       | 0     | 0        | 0     | 0         | 0   | 0   | 0    |
| Consumer      | 0.6793 |     |    |     |          | 0       | 0    |          | 0       | 0     | 0        | 0     | 0         | 0   | 0   | 0    |

| Landscaping | 6.40E-04 | 6.00E-05 | 6.76E-03 | 0 | 2.00E-05 | 2.00E-05 | 2.00E-05 | 2.00E-05 | 0 | 0.013 | 0.013 | 4.00E-05 | 0 | 0.0139 |
|-------------|----------|----------|----------|---|----------|----------|----------|----------|---|-------|-------|----------|---|--------|
| Total       | 0.7733   | 6.00E-05 | 6.76E-03 | 0 | 2.00E-05 | 2.00E-05 | 2.00E-05 | 2.00E-05 | 0 | 0.013 | 0.013 | 4.00E-05 | 0 | 0.0139 |

## 7.0 Water Detail

## 7.1 Mitigation Measures Water

|             | Total CO2 | CH4    | N2O      | CO2e   |
|-------------|-----------|--------|----------|--------|
| Category    |           | MT     | /yr      |        |
| Mitigated   | 2.1853    | 0.0689 | 1.65E-03 | 4.3999 |
| Unmitigated | 2.1853    | 0.0689 | 1.65E-03 | 4.3999 |

# 7.2 Water by Land Use Unmitigated

|                            | Indoor/Out           | Total CO2 | CH4    | N2O             | CO2e   |
|----------------------------|----------------------|-----------|--------|-----------------|--------|
| Land Use                   | Mgal                 |           | МТ     | Γ/yr            |        |
| General Office<br>Building | 2.10731 /<br>1.29157 | 2.1853    | 0.0689 | 1.6500e-<br>003 | 4.3999 |
| Parking Lot                | 0/0                  | 0.0000    | 0.0000 | 0.0000          | 0.0000 |
| Total                      |                      | 2.1853    | 0.0689 | 1.6500e-        | 4.3999 |
|                            |                      |           |        | 003             |        |

## 8.0 Waste Detail

# 8.1 Mitigation Measures Waste

# Category/Year

|             | Total CO2 | CH4    | N2O    | CO2e    |
|-------------|-----------|--------|--------|---------|
|             |           | MT     | /yr    |         |
| Mitigated   | 32.1375   | 1.8993 | 0.0000 | 79.6194 |
| Unmitigated | 32.1375   | 1.8993 | 0.0000 | 79.6194 |

# 8.2 Waste by Land Use Unmitigated

|                | Waste | Total CO2 | CH4    | N2O    | CO2e    |
|----------------|-------|-----------|--------|--------|---------|
| Land Use       | tons  |           | МТ     | Γ/yr   |         |
| General Office |       | 32.1375   | 1.8993 | 0.0000 | 79.6194 |
| Parking Lot    | 0     | 0.0000    | 0.0000 | 0.0000 | 0.0000  |
| Total          |       | 32.1375   | 1.8993 | 0.0000 | 79.6194 |

## 9.0 Operational Offroad

| Equipment Type | Number | Hours/Day | Days/Year | Horse Power | Load Factor | Fuel Type |
|----------------|--------|-----------|-----------|-------------|-------------|-----------|

## **10.0 Stationary Equipment**

## **Fire Pumps and Emergency Generators**

| Equipment Type      | Number | Hours/Day | Hours/Year | Horse Power | Load Factor | Fuel Type |
|---------------------|--------|-----------|------------|-------------|-------------|-----------|
| Emergency Generator | 1      | 1         | 50         | 1869        | 0.8         | Diesel    |

#### **Boilers**

| Equipment Type | Number | Heat Input/Day | Heat Input/Year | Boiler Rating | Fuel Type |
|----------------|--------|----------------|-----------------|---------------|-----------|

## **User Defined Equipment**

| Equipment Type | Number |
|----------------|--------|
|                |        |

# 10.1 Stationary Sources Unmitigated/Mitigated

|                | ROG   | NOx     | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-   | Total CO2 | CH4      | N2O | CO2e    |
|----------------|-------|---------|--------|----------|----------|---------|--------|----------|---------|--------|----------|---------|-----------|----------|-----|---------|
| Equipment Type |       | tons/yr |        |          |          |         |        |          |         |        |          |         | МТ        | /yr      |     |         |
| Emergency      | 0.084 | 0.3758  | 0.2143 | 4.00E-04 |          | 0.0124  | 0.0124 |          | 0.0124  | 0.0124 | 0        | 38.9978 | 38.9978   | 5.47E-03 | 0   | 39.1345 |
| Total          | 0.084 | 0.3758  | 0.2143 | 4.00E-04 |          | 0.0124  | 0.0124 |          | 0.0124  | 0.0124 | 0        | 38.9978 | 38.9978   | 5.47E-03 | 0   | 39.1345 |

# 11.0 Vegetation

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751 Gateway - San Mateo County, Summer

#### 751 Gateway San Mateo County, Summer

#### 1.0 Project Characteristics

#### 1.1 Land Usage

| Land Uses                | Size   | Metric   | Lot Acreage | Floor Surface Area | Population |
|--------------------------|--------|----------|-------------|--------------------|------------|
| Office Park              | 78.70  | 1000sqft | 1.06        | 78,700.00          | 0          |
| Research & Development   | 118.00 | 1000sqft | 1.58        | 118,000.00         | 0          |
| Parking Lot              | 431.00 | Space    | 0.16        | 172,400.00         | 0          |
| Regional Shopping Center | 12.10  | 1000sqft | 2.31        | 12,100.00          | 0          |

#### 1.2 Other Project Characteristics

Urbanization Urban Wind Speed (m/s) 2.2 Precipitation Freq (Days) 70 Climate Zone 5 **Operational Year** 2021

**Utility Company** Pacific Gas & Electric Company

0.032 **N2O Intensity** CO2 Intensity 189 **CH4 Intensity** 0.004

#### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - EFs adjusted per SB 100

Land Use - square footages provided by applicant; parking spaces includes bicycle parking spaces (10:1); acreage scaled by sf. 5.11 acres assumed for

Construction Phase - Schedule start and end dates provided by applicant; model defaults conservatively used for total days; work days adjusted for

Off-road Equipment - per applicant no equipment

Off-road Equipment - equipment, hp, and work hours provided by applicant

Off-road Equipment - per applicant no equipment

Off-road Equipment - equipment, hp, work hours provided by applicant

Off-road Equipment - equipment accounted for in previous phase

Off-road Equipment - equipment, hp, and work hours provided by applicant

Off-road Equipment - equipment, hp, and work hours provided by applicant

Off-road Equipment - equipment, hp, and work hours provided by applicant

Trips and VMT - workers and vendors per day provided by applicant; total haul trips provided by applicant; hauling trip distance provided by applicant

Demolition - CY provided converted to tons per Caleemod

Grading - conservatively asumed entire site to be graded during site prep; import CY provided by applicant

Architectural Coating -

Vehicle Trips - mobile source emissions modeled separately

Energy Use - energy consumption provided by applicant

Water And Wastewater - water consumption provided by applicant and indoor and outdoor proportioned using Caleemod default % Land Use Change - no change

Sequestration - tree loss (net loss in trees)

Construction Off-road Equipment Mitigation - Tier 4 final equipment assumed, BAAQMD basic construction mitigation measures Area Mitigation - extremely compliant VOC g/L

Water Mitigation - per sustainability measures provided by applicant

Stationary Sources - Emergency Generators and Fire Pumps - provided by project applicant

| Table Name              | Column Name                          | Default Value | New Value    |
|-------------------------|--------------------------------------|---------------|--------------|
| tblAreaMitigation       | UseLowVOCPaintNonresidentialExterio  | 150           | 10           |
| tblAreaMitigation       | UseLowVOCPaintNonresidentialInterior | 100           | 10           |
| tblAreaMitigation       | UseLowVOCPaintParkingCheck           | False         | True         |
| tblAreaMitigation       | UseLowVOCPaintParkingValue           | 150           | 10           |
| tblConstDustMitigation  | WaterUnpavedRoadVehicleSpeed         | 0             | 15           |
| tblConstEquipMitigation | NumberOfEquipmentMitigated           | 0.00          | 2.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated           | 0.00          | 2.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated           | 0.00          | 1.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated           | 0.00          | 4.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated           | 0.00          | 19.00        |
| tblConstEquipMitigation | NumberOfEquipmentMitigated           | 0.00          | 5.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated           | 0.00          | 8.00         |
| tblConstEquipMitigation | Tier                                 | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                 | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                 | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                 | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                 | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                 | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                 | No Change     | Tier 4 Final |
| tblConstructionPhase    | NumDays                              | 20.00         | 84.00        |
| tblConstructionPhase    | NumDays                              | 230.00        | 217.00       |
| tblConstructionPhase    | NumDays                              | 230.00        | 148.00       |
| tblConstructionPhase    | NumDays                              | 20.00         | 42.00        |
| tblConstructionPhase    | NumDays                              | 20.00         | 105.00       |
| tblConstructionPhase    | NumDays                              | 20.00         | 58.00        |
| tblConstructionPhase    | NumDays                              | 10.00         | 42.00        |
| tblConstructionPhase    | NumDaysWeek                          | 5.00          | 6.00         |
| tblConstructionPhase    | PhaseEndDate                         | 8/10/2022     | 10/5/2021    |
| tblConstructionPhase    | PhaseEndDate                         | 7/28/2021     | 9/13/2021    |
| tblConstructionPhase    | PhaseEndDate                         | 6/15/2022     | 10/26/2021   |

| tblConstructionPhase                       | PhaseEndDate     | 7/29/2020 | 8/29/2020 |
|--|------------------|-----------|-----------|
| tblConstructionPhase                       | PhaseEndDate     | 9/9/2020  | 1/2/2021  |
| tblConstructionPhase                       | PhaseEndDate     | 7/13/2022 | 12/2/2021 |
| tblConstructionPhase                       | PhaseEndDate     | 8/12/2020 | 8/29/2020 |
| tblConstructionPhase                       | PhaseStartDate   | 7/14/2022 | 6/10/2021 |
| tblConstructionPhase                       | PhaseStartDate   | 9/10/2020 | 1/3/2021  |
| tblConstructionPhase                       | PhaseStartDate   | 7/29/2021 | 4/2/2021  |
| tblConstructionPhase                       | PhaseStartDate   | 8/13/2020 | 8/9/2020  |
| tblConstructionPhase                       | PhaseStartDate   | 6/16/2022 | 9/14/2021 |
| tblConstructionPhase                       | PhaseStartDate   | 7/30/2020 | 7/2/2020  |
| tblEnergyUse                               | LightingElect    | 3.47      | 0.00      |
| tblEnergyUse                               | LightingElect    | 0.35      | 0.00      |
| tblEnergyUse                               | LightingElect    | 4.88      | 0.00      |
| tblEnergyUse                               | LightingElect    | 2.99      | 0.00      |
| tblEnergyUse                               | NT24E            | 4.81      | 0.00      |
| tblEnergyUse                               | NT24E            | 3.36      | 0.00      |
| tblEnergyUse                               | NT24E            | 3.36      | 0.00      |
| tblEnergyUse                               | NT24NG           | 1.17      | 0.00      |
| tblEnergyUse                               | NT24NG           | 0.70      | 0.00      |
| tblEnergyUse                               | NT24NG           | 6.90      | 0.00      |
| tblEnergyUse                               | T24E             | 4.27      | 68.95     |
| tblEnergyUse                               | T24E             | 2.24      | 0.00      |
| tblEnergyUse                               | T24E             | 1.21      | 0.00      |
| tblEnergyUse                               | T24NG            | 17.44     | 43.86     |
| tblEnergyUse                               | T24NG            | 3.90      | 0.00      |
| tblEnergyUse                               | T24NG            | 17.85     | 0.00      |
| tblGrading                                 | AcresOfGrading   | 0.00      | 7.40      |
| tblGrading                                 | MaterialImported | 0.00      | 750.00    |
| tblLandUse                                 | LotAcreage       | 1.81      | 1.06      |
| tblLandUse                                 | LotAcreage       | 2.71      | 1.58      |
| tblLandUse                                 | LotAcreage       | 3.88      | 0.16      |
| tblLandUse                                 | LotAcreage       | 0.28      | 2.31      |
| tblOffRoadEquipment                        | HorsePower       | 231.00    | 400.00    |
| tblOffRoadEquipment                        | HorsePower       | 158.00    | 300.00    |
| tblOffRoadEquipment                        | HorsePower       | 158.00    | 300.00    |
| tblOffRoadEquipment                        | HorsePower       | 46.00     | 15.00     |
| tblOffRoadEquipment                        | HorsePower       | 63.00     | 50.00     |
| tblOffRoadEquipment                        | HorsePower       | 231.00    | 200.00    |
| tblOffRoadEquipment                        | HorsePower       | 85.00     | 200.00    |
| tblOffRoadEquipment                        | IID              | 158.00    | 200.00    |
|  | HorsePower       | 100.00    |           |
| tblOffRoadEquipment                        | HorsePower       | 402.00    | 300.00    |
| tblOffRoadEquipment<br>tblOffRoadEquipment |                  |           | I         |

| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
|---------------------------------|----------------------------|--------|-----------------------|
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00   | 1.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 2.00                  |
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| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00   | 0.00                  |
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| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00   | 0.00                  |
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| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 8.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00   | 0.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 0.00   | 1.00                  |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 0.00   | 1.00                  |
| tblOffRoadEquipment             | PhaseName                  |        | Site Prep/ Demolition |
| tblOffRoadEquipment             | PhaseName                  |        | Site Prep/ Demolition |
| tblOffRoadEquipment             | UsageHours                 | 7.00   | 8.00                  |
| tblProjectCharacteristics       | CH4IntensityFactor         | 0.029  | 0.032                 |
| tblProjectCharacteristics       | CO2IntensityFactor         | 641.35 | 189                   |
| tblProjectCharacteristics       | N2OIntensityFactor         | 0.006  | 0.004                 |
| tblSequestration                | NumberOfNewTrees           | 0.00   | 98.00                 |
| tblStationaryGeneratorsPumpsUse | HorsePowerValue            | 0.00   | 1,869.00              |
| tblStationaryGeneratorsPumpsUse | HoursPerDay                | 0.00   | 1.00                  |
| tblStationaryGeneratorsPumpsUse | HoursPerYear               | 0.00   | 50.00                 |
| tblStationaryGeneratorsPumpsUse | Load_Factor                | 0.73   | 0.80                  |
| tblStationaryGeneratorsPumpsUse | NumberOfEquipment          | 0.00   | 1.00                  |
| tblTripsAndVMT                  | HaulingTripLength          | 20.00  | 40.00                 |
| tblTripsAndVMT                  | HaulingTripNumber          | 15.00  | 0.00                  |
| tblTripsAndVMT                  | HaulingTripNumber          | 94.00  | 0.00                  |
| tblTripsAndVMT                  | HaulingTripNumber          | 0.00   | 500.00                |
| tblTripsAndVMT                  | VendorTripNumber           | 0.00   | 6.00                  |
| tblTripsAndVMT                  | VendorTripNumber           | 0.00   | 13.00                 |
|                                 |                            |        |                       |

| tblTripsAndVMT  | VendorTripNumber    | 62.00         | 8.00         |
|-----------------|---------------------|---------------|--------------|
| tblTripsAndVMT  | VendorTripNumber    | 62.00         | 9.00         |
| tblTripsAndVMT  | VendorTripNumber    | 0.00          | 6.00         |
| tblTripsAndVMT  | VendorTripNumber    | 0.00          | 9.00         |
| tblTripsAndVMT  | WorkerTripNumber    | 8.00          | 40.00        |
| tblTripsAndVMT  | WorkerTripNumber    | 63.00         | 70.00        |
| tblTripsAndVMT  | WorkerTripNumber    | 139.00        | 140.00       |
| tblTripsAndVMT  | WorkerTripNumber    | 139.00        | 70.00        |
| tblTripsAndVMT  | WorkerTripNumber    | 0.00          | 180.00       |
| tblTripsAndVMT  | WorkerTripNumber    | 28.00         | 10.00        |
| tblVehicleTrips | ST_TR               | 1.64          | 0.00         |
| tblVehicleTrips | ST_TR               | 49.97         | 0.00         |
| tblVehicleTrips | ST_TR               | 1.90          | 0.00         |
| tblVehicleTrips | SU_TR               | 0.76          | 0.00         |
| tblVehicleTrips | SU_TR               | 25.24         | 0.00         |
| tblVehicleTrips | SU_TR               | 1.11          | 0.00         |
| tblVehicleTrips | WD_TR               | 11.42         | 0.00         |
| tblVehicleTrips | WD_TR               | 42.70         | 0.00         |
| tblVehicleTrips | WD_TR               | 8.11          | 0.00         |
| tblWater        | IndoorWaterUseRate  | 13,987,645.97 | 974,222.00   |
| tblWater        | IndoorWaterUseRate  | 896,277.51    | 301,205.00   |
| tblWater        | IndoorWaterUseRate  | 58,019,885.77 | 3,531,740.00 |
| tblWater        | OutdoorWaterUseRate | 8,573,073.33  | 597,104.00   |
| tblWater        | OutdoorWaterUseRate | 549,331.38    | 184,610.00   |

# 2.0 Emissions Summary

# 2.1 Overall Construction (Maximum Daily Emission) <a href="Unmittigated Construction">Unmittigated Construction</a>

|         | ROG     | NOx     | CO      | SO2    | Fugitive | Exhaust | PM10    | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-     | Total CO2 | CH4    | N2O | CO2e      |
|---------|---------|---------|---------|--------|----------|---------|---------|----------|---------|--------|----------|-----------|-----------|--------|-----|-----------|
| Year    |         |         |         |        | lb/d     | lay     |         |          |         |        |          |           | lb/d      | ay     |     |           |
| 2020    | 7.3817  | 67.7933 | 41.0426 | 0.1893 | 1.4636   | 2.0624  | 3.526   | 0.3542   | 2.0017  | 2.3559 | 0        | 20,157.68 | 20,157.68 | 2.2821 | 0   | 20,214.74 |
| 2021    | 29.3771 | 46.0616 | 31.2318 | 0.1481 | 13.9233  | 1.3888  | 15.3121 | 3.4373   | 1.3564  | 4.7937 | 0        | 16,170.05 | 16,170.05 | 1.5544 | 0   | 16,208.91 |
| Maximum | 29.3771 | 67.7933 | 41.0426 | 0.1893 | 13.9233  | 2.0624  | 15.3121 | 3.4373   | 2.0017  | 4.7937 | 0        | 20,157.68 | 20,157.68 | 2.2821 | 0   | 20,214.74 |

## **Mitigated Construction**

|         | ROG     | NOx     | CO      | SO2    | Fugitive | Exhaust | PM10    | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-     | Total CO2 | CH4    | N2O | CO2e      |  |
|---------|---------|---------|---------|--------|----------|---------|---------|----------|---------|--------|----------|-----------|-----------|--------|-----|-----------|--|
| Year    | lb/day  |         |         |        |          |         |         |          |         | lb/day |          |           |           |        |     |           |  |
| 2020    | 2.4533  | 13.6131 | 77.7353 | 0.1893 | 1.3177   | 0.2926  | 1.6103  | 0.3365   | 0.2913  | 0.6278 | 0        | 20,157.68 | 20,157.68 | 2.2821 | 0   | 20,214.74 |  |
| 2021    | 27.7543 | 10.7241 | 61.66   | 0.1481 | 13.9233  | 0.2275  | 14.1508 | 3.4373   | 0.2268  | 3.6641 | 0        | 16,170.05 | 16,170.05 | 1.5544 | 0   | 16,208.91 |  |
| Maximum | 27.7543 | 13.6131 | 77.7353 | 0.1893 | 13.9233  | 0.2926  | 14.1508 | 3.4373   | 0.2913  | 3.6641 | 0        | 20,157.68 | 20,157.68 | 2.2821 | 0   | 20,214.74 |  |

|                      | ROG   | NOx   | CO     | SO2  | Fugitive | Exhaust | PM10  | Fugitive | Exhaust | PM2.5 | Bio- CO2 | NBio-CO2 | Total CO2 | CH4  | N20  | CO2e |
|----------------------|-------|-------|--------|------|----------|---------|-------|----------|---------|-------|----------|----------|-----------|------|------|------|
| Percent<br>Reduction | 17.82 | 78.62 | -92.87 | 0.00 | 0.95     | 84.93   | 16.33 | 0.46     | 84.57   | 39.97 | 0.00     | 0.00     | 0.00      | 0.00 | 0.00 | 0.00 |

# 2.2 Overall Operational Unmitigated Operational

|            | ROG    | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O    | CO2e     |
|------------|--------|----------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|--------|----------|
| Category   |        |          |        |          | lb/d     | day      |          |          |          |          |          |          | lb/d      | lay      |        |          |
| Area       | 5.1518 | 6.00E-04 | 0.0656 | 0        |          | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14     | 0.14      | 3.70E-04 |        | 0.1493   |
| Energy     | 0.102  | 0.9272   | 0.7788 | 5.56E-03 |          | 0.0705   | 0.0705   |          | 0.0705   | 0.0705   |          | 1,112.58 | 1,112.58  | 0.0213   | 0.0204 | 1,119.19 |
| Mobile     | 0      | 0        | 0      | 0        | 0        | 0        | 0        | 0        | 0        | 0        |          | 0        | 0         | 0        |        | 0        |
| Stationary | 3.3613 | 15.0314  | 8.5705 | 0.0162   |          | 0.4945   | 0.4945   |          | 0.4945   | 0.4945   |          | 1,719.51 | 1,719.51  | 0.2411   |        | 1,725.54 |
| Total      | 8.6151 | 15.9591  | 9.4149 | 0.0217   | 0        | 0.5651   | 0.5651   | 0        | 0.5651   | 0.5651   |          | 2,832.23 | 2,832.23  | 0.2628   | 0.0204 | 2,844.88 |

# **Mitigated Operational**

|            | ROG    | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O    | CO2e     |
|------------|--------|----------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|--------|----------|
| Category   |        |          |        |          | lb/c     | lay      |          |          |          |          |          |          | lb/d      | ay       |        |          |
| Area       | 5.1518 | 6.00E-04 | 0.0656 | 0        |          | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14     | 0.14      | 3.70E-04 |        | 0.1493   |
| Energy     | 0.102  | 0.9272   | 0.7788 | 5.56E-03 |          | 0.0705   | 0.0705   |          | 0.0705   | 0.0705   |          | 1,112.58 | 1,112.58  | 0.0213   | 0.0204 | 1,119.19 |
| Mobile     | 0      | 0        | 0      | 0        | 0        | 0        | 0        | 0        | 0        | 0        |          | 0        | 0         | 0        |        | 0        |
| Stationary | 3.3613 | 15.0314  | 8.5705 | 0.0162   |          | 0.4945   | 0.4945   |          | 0.4945   | 0.4945   |          | 1,719.51 | 1,719.51  | 0.2411   |        | 1,725.54 |
| Total      | 8.6151 | 15.9591  | 9.4149 | 0.0217   | 0        | 0.5651   | 0.5651   | 0        | 0.5651   | 0.5651   |          | 2,832.23 | 2,832.23  | 0.2628   | 0.0204 | 2,844.88 |

|                      | ROG  | NOx  | СО   | SO2  | Fugitive<br>PM10 | Exhaust<br>PM10 | PM10<br>Total | Fugitive<br>PM2.5 | Exhaust<br>PM2.5 | PM2.5<br>Total | Bio- CO2 | NBio-CO2 | Total<br>CO2 | CH4  | N20  | CO2e |
|----------------------|------|------|------|------|------------------|-----------------|---------------|-------------------|------------------|----------------|----------|----------|--------------|------|------|------|
| Percent<br>Reduction | 6.52 | 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 | Phase Name              | Phase Type            | Start Date | End Date   | Num Days | Num Days | Phase Description |
|-------|-------------------------|-----------------------|------------|------------|----------|----------|-------------------|
| 1     | Site Prep/ Demolition   | Demolition            | 7/2/2020   | 8/29/2020  | 5        | 42       |                   |
| 2     | Site Prep/Demolition    | Site Preparation      | 7/2/2020   | 8/29/2020  | 5        | 42       |                   |
| 3     | Foundations             | Grading               | 8/9/2020   | 1/2/2021   | 5        | 105      |                   |
| 4     | Structure               | Building Construction | 1/3/2021   | 9/13/2021  | 6        | 217      |                   |
| 5     | Interior Buildout       | Building Construction | 4/2/2021   | 10/26/2021 | 5        | 148      |                   |
| 6     | Skin and Roof           | Architectural Coating | 6/10/2021  | 10/5/2021  | 5        | 84       |                   |
| 7     | Commissioning and Final | Paving                | 9/14/2021  | 12/2/2021  | 5        | 58       |                   |

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.16

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 313,200; Non-Residential Outdoor: 104,400; Striped Parking Area:

## **OffRoad Equipment**

| Phase Name            | Offroad Equipment Type    | Amount | Usage Hours | Horse Power | Load Factor |
|-----------------------|---------------------------|--------|-------------|-------------|-------------|
| Site Prep/ Demolition | Concrete/Industrial Saws  | 0      | 8.00        | 81          | 0.73        |
| Site Prep/ Demolition | Crushing/Proc. Equipment  | 1      | 8.00        | 200         | 0.78        |
| Site Prep/ Demolition | Excavators                | 0      | 8.00        | 158         | 0.38        |
| Site Prep/ Demolition | Excavators                | 1      | 8.00        | 300         | 0.38        |
| Site Prep/ Demolition | Off-Highway Trucks        | 1      | 8.00        | 300         | 0.38        |
| Site Prep/ Demolition | Rubber Tired Dozers       | 0      | 8.00        | 247         | 0.40        |
| Site Prep/Demolition  | Rubber Tired Dozers       | 0      | 8.00        | 247         | 0.40        |
| Site Prep/Demolition  | Tractors/Loaders/Backhoes | 0      | 8.00        | 97          | 0.37        |
| Foundations           | Excavators                | 2      | 8.00        | 300         | 0.38        |
| Foundations           | Graders                   | 0      | 8.00        | 187         | 0.41        |
| Foundations           | Off-Highway Trucks        | 18     | 0.50        | 400         | 0.38        |
| Foundations           | Pumps                     | 5      | 8.00        | 300         | 0.74        |
| Foundations           | Rubber Tired Dozers       | 0      | 8.00        | 247         | 0.40        |
| Foundations           | Tractors/Loaders/Backhoes | 0      | 8.00        | 97          | 0.37        |
| Structure             | Aerial Lifts              | 2      | 8.00        | 50          | 0.31        |
| Structure             | Cranes                    | 1      | 8.00        | 400         | 0.29        |
| Structure             | Excavators                | 1      | 8.00        | 200         | 0.38        |
| Structure             | Forklifts                 | 0      | 8.00        | 89          | 0.20        |
| Structure             | Generator Sets            | 0      | 8.00        | 84          | 0.74        |
| Structure             | Tractors/Loaders/Backhoes | 0      | 7.00        | 97          | 0.37        |

| Structure                           | Welders                   | 8 | 8.00 | 15  | 0.45 |
|-------------------------------------|---------------------------|---|------|-----|------|
| Interior Buildout                   | Cranes                    | 0 | 7.00 | 231 | 0.29 |
| Interior Buildout                   | Forklifts                 | 0 | 8.00 | 89  | 0.20 |
| Interior Buildout                   | Generator Sets            | 0 | 8.00 | 84  | 0.74 |
| Interior Buildout                   | Tractors/Loaders/Backhoes | 0 | 7.00 | 97  | 0.37 |
| Interior Buildout                   | Welders                   | 0 | 8.00 | 46  | 0.45 |
| Skin and Roof                       | Air Compressors           | 0 | 6.00 | 78  | 0.48 |
| Skin and Roof                       | Cranes                    | 1 | 8.00 | 200 | 0.29 |
| Commissioning and Final Inspections | Pavers                    | 0 | 8.00 | 130 | 0.42 |
| Commissioning and Final Inspections | Paving Equipment          | 0 | 8.00 | 132 | 0.36 |
| Commissioning and Final Inspections | Rollers                   | 0 | 8.00 | 80  | 0.38 |

#### **Trips and VMT**

| Phase Name            | Offroad Equipment | Worker Trip | Vendor Trip | Hauling Trip | Worker Trip | Vendor Trip | Hauling Trip | Worker Vehicle | Vendor  | Hauling |
|-----------------------|-------------------|-------------|-------------|--------------|-------------|-------------|--------------|----------------|---------|---------|
| Site Prep/ Demolition | 3                 | 40.00       | 6.00        | 0.00         | 10.80       | 7.30        | 20.00        | LD_Mix         | HDT_Mix | HHDT    |
| Site Prep/Demolition  | 0                 | 0.00        | 0.00        | 0.00         | 10.80       | 7.30        | 20.00        | LD_Mix         | HDT_Mix | HHDT    |
| Foundations           | 25                | 70.00       | 13.00       | 500.00       | 10.80       | 7.30        | 40.00        | LD_Mix         | HDT_Mix | HHDT    |
| Structure             | 12                | 140.00      | 8.00        | 0.00         | 10.80       | 7.30        | 20.00        | LD_Mix         | HDT_Mix | HHDT    |
| Interior Buildout     | 0                 | 70.00       | 9.00        | 0.00         | 10.80       | 7.30        | 20.00        | LD_Mix         | HDT_Mix | HHDT    |
| Skin and Roof         | 1                 | 10.00       | 9.00        | 0.00         | 10.80       | 7.30        | 20.00        | LD_Mix         | HDT_Mix | HHDT    |
| Commissioning and     | 0                 | 180.00      | 6.00        | 0.00         | 10.80       | 7.30        | 20.00        | LD_Mix         | HDT_Mix | HHDT    |

# 3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment Water Exposed Area Reduce Vehicle Speed on Unpaved Roads

# 3.2 Site Prep/ Demolition - 2020 Unmitigated Construction On-Site

|               | ROG    | NOx     | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-     | Total CO2  | CH4    | N2O | CO2e      |
|---------------|--------|---------|--------|--------|----------|---------|--------|----------|---------|--------|----------|-----------|------------|--------|-----|-----------|
| Category      |        |         |        |        | lb/c     | lay     |        |          |         |        |          |           | lb/d       | ay     |     |           |
| Fugitive Dust |        |         |        |        | 0.0764   | 0.0000  | 0.0764 | 0.0116   | 0.0000  | 0.0116 |          |           | 0.0000     |        |     | 0.0000    |
| Off-Road      | 1.5984 | 13.4204 | 8.1536 | 0.0361 |          | 0.4549  | 0.4549 |          | 0.4328  | 0.4328 |          | 3,463.379 | 3,463.3795 | 0.6860 |     | 3,480.528 |
| Total         | 1.5984 | 13.4204 | 8.1536 | 0.0361 | 0.0764   | 0.4549  | 0.5313 | 0.0116   | 0.4328  | 0.4444 |          | 3,463.379 | 3,463.3795 | 0.6860 |     | 3,480.528 |

# **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|----------|-----|----------|
| Category |        |        |        |          | lb/d     | lay      |        |          |          |        |          |          | lb/d      | lay      |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0        |     | 0        |
| Vendor   | 0.0228 | 0.6853 | 0.2657 | 1.61E-03 | 0.0405   | 3.43E-03 | 0.0439 | 0.0117   | 3.28E-03 | 0.0149 |          | 176.558  | 176.558   | 0.0151   |     | 176.9347 |
| Worker   | 0.1099 | 0.0652 | 0.8278 | 3.08E-03 | 0.3286   | 1.98E-03 | 0.3306 | 0.0872   | 1.82E-03 | 0.089  |          | 306.8476 | 306.8476  | 5.93E-03 |     | 306.9959 |
| Total    | 0.1327 | 0.7504 | 1.0934 | 4.69E-03 | 0.3691   | 5.41E-03 | 0.3745 | 0.0988   | 5.10E-03 | 0.1039 |          | 483.4056 | 483.4056  | 0.021    |     | 483.9306 |

# **Mitigated Construction On-Site**

|               | ROG    | NOx    | CO      | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4   | N2O | CO2e     |
|---------------|--------|--------|---------|--------|----------|---------|--------|----------|---------|----------|----------|----------|-----------|-------|-----|----------|
| Category      |        |        |         |        | lb/c     | lay     |        |          |         |          |          |          | lb/d      | ay    |     |          |
| Fugitive Dust |        |        |         |        | 0.0344   | 0       | 0.0344 | 5.21E-03 | 0       | 5.21E-03 |          |          | 0         |       |     | 0        |
| Off-Road      | 0.4064 | 1.7609 | 14.8997 | 0.0361 |          | 0.0542  | 0.0542 |          | 0.0542  | 0.0542   | 0        | 3,463.38 | 3,463.38  | 0.686 |     | 3,480.53 |
| Total         | 0.4064 | 1.7609 | 14.8997 | 0.0361 | 0.0344   | 0.0542  | 0.0886 | 5.21E-03 | 0.0542  | 0.0594   | 0        | 3,463.38 | 3,463.38  | 0.686 |     | 3,480.53 |

# **Mitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|----------|-----|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |          |          | lb/c      | lay      |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0        |     | 0        |
| Vendor   | 0.0228 | 0.6853 | 0.2657 | 1.61E-03 | 0.0405   | 3.43E-03 | 0.0439 | 0.0117   | 3.28E-03 | 0.0149 |          | 176.558  | 176.558   | 0.0151   |     | 176.9347 |
| Worker   | 0.1099 | 0.0652 | 0.8278 | 3.08E-03 | 0.3286   | 1.98E-03 | 0.3306 | 0.0872   | 1.82E-03 | 0.089  |          | 306.8476 | 306.8476  | 5.93E-03 |     | 306.9959 |
| Total    | 0.1327 | 0.7504 | 1.0934 | 4.69E-03 | 0.3691   | 5.41E-03 | 0.3745 | 0.0988   | 5.10E-03 | 0.1039 |          | 483.4056 | 483.4056  | 0.021    |     | 483.9306 |

# 3.3 Site Prep/Demolition - 2020 Unmitigated Construction On-Site

|               | ROG    | NOx    | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-  | Total CO2 | CH4    | N2O | CO2e   |
|---------------|--------|--------|--------|--------|----------|---------|--------|----------|---------|--------|----------|--------|-----------|--------|-----|--------|
| Category      |        |        |        |        | lb/c     | lay     |        |          |         |        |          |        | lb/d      | ay     |     |        |
| Fugitive Dust |        |        |        |        | 0.1889   | 0.0000  | 0.1889 | 0.0205   | 0.0000  | 0.0205 |          |        | 0.0000    |        |     | 0.0000 |
| Off-Road      | 0.0000 | 0.0000 | 0.0000 | 0.0000 |          | 0.0000  | 0.0000 |          | 0.0000  | 0.0000 |          | 0.0000 | 0.0000    | 0.0000 |     | 0.0000 |
| Total         | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1889   | 0.0000  | 0.1889 | 0.0205   | 0.0000  | 0.0205 |          | 0.0000 | 0.0000    | 0.0000 |     | 0.0000 |

# **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-  | Total CO2 | CH4    | N2O | CO2e   |
|----------|--------|--------|--------|--------|----------|---------|--------|----------|---------|--------|----------|--------|-----------|--------|-----|--------|
| Category |        |        |        |        | lb/c     | lay     |        |          |         |        |          |        | lb/d      | lay    |     |        |
| 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   | 0.0000 | 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 |
| Total    | 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 |

# **Mitigated Construction On-Site**

|               | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10  | Fugitive | Exhaust | PM2.5    | Bio- CO2 | NBio- | Total CO2 | CH4 | N2O | CO2e |
|---------------|-----|-----|----|-----|----------|---------|-------|----------|---------|----------|----------|-------|-----------|-----|-----|------|
| Category      |     |     |    |     | lb/c     | lay     |       |          |         |          |          |       | lb/d      | lay |     |      |
| Fugitive Dust |     |     |    |     | 0.085    | 0       | 0.085 | 9.22E-03 | 0       | 9.22E-03 |          |       | 0         |     |     | 0    |
| Off-Road      | 0   | 0   | 0  | 0   |          | 0       | 0     |          | 0       | 0        | 0        | 0     | 0         | 0   |     | 0    |
| Total         | 0   | 0   | 0  | 0   | 0.085    | 0       | 0.085 | 9.22E-03 | 0       | 9.22E-03 | 0        | 0     | 0         | 0   |     | 0    |

## **Mitigated Construction Off-Site**

|          | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 | Fugitive | Exhaust | PM2.5 | Bio- CO2 | NBio- | Total CO2 | CH4 | N2O | CO2e |
|----------|-----|-----|----|-----|----------|---------|------|----------|---------|-------|----------|-------|-----------|-----|-----|------|
| Category |     |     |    |     | lb/d     | day     |      |          |         |       |          |       | lb/d      | ay  |     |      |
| Hauling  | 0   | 0   | 0  | 0   | 0        | 0       | 0    | 0        | 0       | 0     |          | 0     | 0         | 0   |     | 0    |
| Vendor   | 0   | 0   | 0  | 0   | 0        | 0       | 0    | 0        | 0       | 0     |          | 0     | 0         | 0   |     | 0    |
| Worker   | 0   | 0   | 0  | 0   | 0        | 0       | 0    | 0        | 0       | 0     |          | 0     | 0         | 0   |     | 0    |
| Total    | 0   | 0   | 0  | 0   | 0        | 0       | 0    | 0        | 0       | 0     |          | 0     | 0         | 0   |     | 0    |

# 3.4 Foundations - 2020 Unmitigated Construction On-Site

|               | ROG    | NOx     | CO      | SO2    | Fugitive | Exhaust | PM10  | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-     | Total CO2 | CH4    | N2O | CO2e      |
|---------------|--------|---------|---------|--------|----------|---------|-------|----------|---------|--------|----------|-----------|-----------|--------|-----|-----------|
| Category      |        |         |         |        | lb/d     | day     |       |          |         |        |          |           | lb/d      | ay     |     |           |
| Fugitive Dust |        |         |         |        | 0        | 0       | 0     | 0        | 0       | 0      |          |           | 0         |        |     | 0         |
| Off-Road      | 5.3332 | 49.4404 | 28.6047 | 0.1322 |          | 1.582   | 1.582 |          | 1.5447  | 1.5447 | <b>0</b> | 14,448.10 | 14,448.10 | 1.4269 |     | 14,483.77 |
| Total         | 5.3332 | 49.4404 | 28.6047 | 0.1322 | 0        | 1.582   | 1.582 | 0        | 1.5447  | 1.5447 |          | 14,448.10 | 14,448.10 | 1.4269 |     | 14,483.77 |

# **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|--------|-----|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |          |          | lb/d      | ay     |     |          |
| Hauling  | 0.0757 | 2.5833 | 1.1667 | 7.44E-03 | 0.1665   | 9.15E-03 | 0.1756 | 0.0455   | 8.76E-03 | 0.0543 |          | 843.2762 | 843.2762  | 0.1051 |     | 845.9048 |
| Vendor   | 0.0494 | 1.4847 | 0.5756 | 3.48E-03 | 0.0877   | 7.44E-03 | 0.0952 | 0.0253   | 7.12E-03 | 0.0324 |          | 382.5423 | 382.5423  | 0.0327 | 7   | 383.3585 |
| Worker   | 0.1923 | 0.1141 | 1.4486 | 5.38E-03 | 0.575    | 3.46E-03 | 0.5785 | 0.1525   | 3.19E-03 | 0.1557 |          | 536.9832 | 536.9832  | 0.0104 |     | 537.2427 |
| Total    | 0.3174 | 4.1821 | 3.1909 | 0.0163   | 0.8292   | 0.0201   | 0.8493 | 0.2233   | 0.0191   | 0.2424 |          | 1,762.80 | 1,762.80  | 0.1482 |     | 1,766.51 |

# **Mitigated Construction On-Site**

|               | ROG    | NOx    | CO      | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-     | Total CO2 | CH4    | N2O    | CO2e      |
|---------------|--------|--------|---------|--------|----------|---------|--------|----------|---------|--------|----------|-----------|-----------|--------|--------|-----------|
| Category      |        |        |         |        | lb/c     | lay     |        |          |         |        |          |           | lb/d      | ay     |        |           |
| Fugitive Dust |        |        |         |        | 0        | 0       | 0      | 0        | 0       | 0      |          |           | 0         |        |        | 0         |
| Off-Road      | 1.5969 | 6.9197 | 58.5513 | 0.1322 |          | 0.2129  | 0.2129 |          | 0.2129  | 0.2129 | 0        | 14,448.10 | 14,448.10 | 1.4269 | ,0<br> | 14,483.77 |
| Total         | 1.5969 | 6.9197 | 58.5513 | 0.1322 | 0        | 0.2129  | 0.2129 | 0        | 0.2129  | 0.2129 | 0        | 14,448.10 | 14,448.10 | 1.4269 |        | 14,483.77 |

# **Mitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|--------|-----|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |          |          | lb/d      | ay     |     |          |
| Hauling  | 0.0757 | 2.5833 | 1.1667 | 7.44E-03 | 0.1665   | 9.15E-03 | 0.1756 | 0.0455   | 8.76E-03 | 0.0543 |          | 843.2762 | 843.2762  | 0.1051 |     | 845.9048 |
| Vendor   | 0.0494 | 1.4847 | 0.5756 | 3.48E-03 | 0.0877   | 7.44E-03 | 0.0952 | 0.0253   | 7.12E-03 | 0.0324 |          | 382.5423 | 382.5423  | 0.0327 | 7   | 383.3585 |
| Worker   | 0.1923 | 0.1141 | 1.4486 | 5.38E-03 | 0.575    | 3.46E-03 | 0.5785 | 0.1525   | 3.19E-03 | 0.1557 |          | 536.9832 | 536.9832  | 0.0104 |     | 537.2427 |
| Total    | 0.3174 | 4.1821 | 3.1909 | 0.0163   | 0.8292   | 0.0201   | 0.8493 | 0.2233   | 0.0191   | 0.2424 |          | 1,762.80 | 1,762.80  | 0.1482 |     | 1,766.51 |

## 3.4 Foundations - 2021 Unmitigated Construction On-Site

|               | ROG    | NOx     | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-     | Total CO2 | CH4    | N2O | CO2e      |
|---------------|--------|---------|--------|--------|----------|---------|--------|----------|---------|--------|----------|-----------|-----------|--------|-----|-----------|
| Category      |        |         |        |        | lb/c     | lay     |        |          |         |        |          |           | lb/d      | ay     |     |           |
| Fugitive Dust |        |         |        |        | 0        | 0       | 0      | 0        | 0       | 0      |          |           | 0         |        |     | 0         |
| Off-Road      | 4.9532 | 42.2571 | 28.123 | 0.1322 |          | 1.3742  | 1.3742 |          | 1.3426  | 1.3426 |          | 14,445.23 | 14,445.23 | 1.4064 |     | 14,480.39 |
| Total         | 4.9532 | 42.2571 | 28.123 | 0.1322 | 0        | 1.3742  | 1.3742 | 0        | 1.3426  | 1.3426 |          | 14,445.23 | 14,445.23 | 1.4064 |     | 14,480.39 |

## **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10    | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|---------|----------|----------|--------|----------|----------|-----------|----------|-----|----------|
| Category |        |        |        |          | lb/c     | day      |         |          |          |        |          |          | lb/d      | ay       |     |          |
| Hauling  | 0.0723 | 2.367  | 1.2097 | 7.29E-03 | 13.2605  | 8.23E-03 | 13.2687 | 3.2595   | 7.87E-03 | 3.2674 |          | 829.1937 | 829.1937  | 0.1065   |     | 831.8562 |
| Vendor   | 0.0406 | 1.3351 | 0.5577 | 3.43E-03 | 0.0878   | 3.04E-03 | 0.0908  | 0.0253   | 2.91E-03 | 0.0282 |          | 377.7811 | 377.7811  | 0.0321   |     | 378.5836 |
| Worker   | 0.1795 | 0.1024 | 1.3414 | 5.19E-03 | 0.575    | 3.36E-03 | 0.5784  | 0.1525   | 3.09E-03 | 0.1556 |          | 517.8393 | 517.8393  | 9.34E-03 |     | 518.0727 |
| Total    | 0.2923 | 3.8044 | 3.1088 | 0.0159   | 13.9233  | 0.0146   | 13.9379 | 3.4373   | 0.0139   | 3.4512 |          | 1,724.81 | 1,724.81  | 0.1479   |     | 1,728.51 |

# **Mitigated Construction On-Site**

|               | ROG    | NOx    | CO      | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-     | Total CO2 | CH4    | N2O | CO2e      |
|---------------|--------|--------|---------|--------|----------|---------|--------|----------|---------|--------|----------|-----------|-----------|--------|-----|-----------|
| Category      |        |        |         |        | lb/c     | lay     |        |          |         |        |          |           | lb/d      | ay     |     |           |
| Fugitive Dust |        |        |         |        | 0        | 0       | 0      | 0        | 0       | 0      |          |           | 0         |        |     | 0         |
| Off-Road      | 1.5969 | 6.9197 | 58.5513 | 0.1322 |          | 0.2129  | 0.2129 |          | 0.2129  | 0.2129 | 0        | 14,445.23 | 14,445.23 | 1.4064 |     | 14,480.39 |
| Total         | 1.5969 | 6.9197 | 58.5513 | 0.1322 | 0        | 0.2129  | 0.2129 | 0        | 0.2129  | 0.2129 | 0        | 14,445.23 | 14,445.23 | 1.4064 |     | 14,480.39 |

## **Mitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10    | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|---------|----------|----------|--------|----------|----------|-----------|----------|-----|----------|
| Category |        |        |        |          | lb/c     | lay      |         |          |          |        |          |          | lb/c      | lay      |     |          |
| Hauling  | 0.0723 | 2.367  | 1.2097 | 7.29E-03 | 13.2605  | 8.23E-03 | 13.2687 | 3.2595   | 7.87E-03 | 3.2674 |          | 829.1937 | 829.1937  | 0.1065   |     | 831.8562 |
| Vendor   | 0.0406 | 1.3351 | 0.5577 | 3.43E-03 | 0.0878   | 3.04E-03 | 0.0908  | 0.0253   | 2.91E-03 | 0.0282 |          | 377.7811 | 377.7811  | 0.0321   |     | 378.5836 |
| Worker   | 0.1795 | 0.1024 | 1.3414 | 5.19E-03 | 0.575    | 3.36E-03 | 0.5784  | 0.1525   | 3.09E-03 | 0.1556 |          | 517.8393 | 517.8393  | 9.34E-03 |     | 518.0727 |

| Total | 0.2923 | 3.8044 | 3.1088 | 0.0159 | 13.9233 | 0.0146 | 13.9379 | 3.4373 | 0.0139 | 3.4512 | 1,724.81 | 1,724.81 | 0.1479 | 1,728.51 |
|-------|--------|--------|--------|--------|---------|--------|---------|--------|--------|--------|----------|----------|--------|----------|
|       |        |        |        |        |         |        |         |        |        |        | •        |          |        |          |

#### 3.5 Structure - 2021 Unmitigated Construction On-Site

|          | ROG    | NOx     | CO      | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4   | N2O | CO2e     |
|----------|--------|---------|---------|--------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|-------|-----|----------|
| Category |        |         |         |        | lb/c     | lay     |        |          |         |        |          |          | lb/d      | ay    |     |          |
| Off-Road | 1.5955 | 15.1768 | 11.5531 | 0.0271 |          | 0.5717  | 0.5717 |          | 0.5423  | 0.5423 |          | 2,427.32 | 2,427.32  | 0.671 |     | 2,444.09 |
| Total    | 1.5955 | 15.1768 | 11.5531 | 0.0271 |          | 0.5717  | 0.5717 |          | 0.5423  | 0.5423 |          | 2,427.32 | 2,427.32  | 0.671 |     | 2,444.09 |

## **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | СО     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|--------|-----|----------|
| Category |        |        |        |          | lb/d     | lay      |        |          |          |        |          |          | lb/d      | lay    |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0      |     | 0        |
| Vendor   | 0.025  | 0.8216 | 0.3432 | 2.11E-03 | 0.054    | 1.87E-03 | 0.0559 | 0.0155   | 1.79E-03 | 0.0173 |          | 232.4807 | 232.4807  | 0.0198 |     | 232.9745 |
| Worker   | 0.3589 | 0.2047 | 2.6828 | 0.0104   | 1.1501   | 6.71E-03 | 1.1568 | 0.3051   | 6.18E-03 | 0.3112 |          | 1,035.68 | 1,035.68  | 0.0187 |     | 1,036.15 |
| Total    | 0.3839 | 1.0263 | 3.026  | 0.0125   | 1.2041   | 8.58E-03 | 1.2127 | 0.3206   | 7.97E-03 | 0.3286 |          | 1,268.16 | 1,268.16  | 0.0384 |     | 1,269.12 |

## **Mitigated Construction On-Site**

|          | ROG    | NOx    | СО     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4   | N2O | CO2e     |
|----------|--------|--------|--------|--------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|-------|-----|----------|
| Category |        |        |        |        | lb/c     | lay     |        |          |         |        |          |          | lb/d      | lay   |     |          |
| Off-Road | 0.2688 | 2.3785 | 9.4728 | 0.0271 |          | 0.0315  | 0.0315 |          | 0.0315  | 0.0315 | 0        | 2,427.32 | 2,427.32  | 0.671 |     | 2,444.09 |
| Total    | 0.2688 | 2.3785 | 9.4728 | 0.0271 |          | 0.0315  | 0.0315 |          | 0.0315  | 0.0315 | 0        | 2,427.32 | 2,427.32  | 0.671 |     | 2,444.09 |

# **Mitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|--------|-----|----------|
| Category |        |        |        |          | lb/c     | lay      |        |          |          |        |          |          | lb/d      | ay     |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0      |     | 0        |
| Vendor   | 0.025  | 0.8216 | 0.3432 | 2.11E-03 | 0.054    | 1.87E-03 | 0.0559 | 0.0155   | 1.79E-03 | 0.0173 |          | 232.4807 | 232.4807  | 0.0198 |     | 232.9745 |
| Worker   | 0.3589 | 0.2047 | 2.6828 | 0.0104   | 1.1501   | 6.71E-03 | 1.1568 | 0.3051   | 6.18E-03 | 0.3112 |          | 1,035.68 | 1,035.68  | 0.0187 |     | 1,036.15 |
| Total    | 0.3839 | 1.0263 | 3.026  | 0.0125   | 1.2041   | 8.58E-03 | 1.2127 | 0.3206   | 7.97E-03 | 0.3286 |          | 1,268.16 | 1,268.16  | 0.0384 |     | 1,269.12 |

## 3.6 Interior Buildout - 2021 Unmitigated Construction On-Site

|          | ROG    | NOx    | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-  | Total CO2 | CH4    | N2O | CO2e   |
|----------|--------|--------|--------|--------|----------|---------|--------|----------|---------|--------|----------|--------|-----------|--------|-----|--------|
| Category |        |        |        |        | lb/d     | lay     |        |          |         |        |          |        | lb/d      | ay     |     |        |
| Off-Road | 0.0000 | 0.0000 | 0.0000 | 0.0000 |          | 0.0000  | 0.0000 |          | 0.0000  | 0.0000 |          | 0.0000 | 0.0000    | 0.0000 |     | 0.0000 |
| Total    | 0.0000 | 0.0000 | 0.0000 | 0.0000 |          | 0.0000  | 0.0000 |          | 0.0000  | 0.0000 |          | 0.0000 | 0.0000    | 0.0000 |     | 0.0000 |

# **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|----------|-----|----------|
| Category |        |        |        |          | lb/d     | lay      |        |          |          |        |          |          | lb/d      | lay      |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0        |     | 0        |
| Vendor   | 0.0281 | 0.9243 | 0.3861 | 2.37E-03 | 0.0608   | 2.10E-03 | 0.0629 | 0.0175   | 2.01E-03 | 0.0195 |          | 261.5408 | 261.5408  | 0.0222   |     | 262.0963 |
| Worker   | 0.1795 | 0.1024 | 1.3414 | 5.19E-03 | 0.575    | 3.36E-03 | 0.5784 | 0.1525   | 3.09E-03 | 0.1556 |          | 517.8393 | 517.8393  | 9.34E-03 |     | 518.0727 |
| Total    | 0.2075 | 1.0266 | 1.7275 | 7.56E-03 | 0.6358   | 5.46E-03 | 0.6412 | 0.17     | 5.10E-03 | 0.1751 |          | 779.3801 | 779.3801  | 0.0316   |     | 780.1691 |

#### **Mitigated Construction On-Site**

|          | ROG    | NOx    | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-  | Total CO2 | CH4    | N2O | CO2e   |
|----------|--------|--------|--------|--------|----------|---------|--------|----------|---------|--------|----------|--------|-----------|--------|-----|--------|
| Category |        |        |        |        | lb/d     | lay     |        |          |         |        |          |        | lb/c      | lay    |     |        |
| Off-Road | 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 |
| Total    | 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 |

# **Mitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|----------|-----|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |          |          | lb/c      | lay      |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0        |     | 0        |
| Vendor   | 0.0281 | 0.9243 | 0.3861 | 2.37E-03 | 0.0608   | 2.10E-03 | 0.0629 | 0.0175   | 2.01E-03 | 0.0195 |          | 261.5408 | 261.5408  | 0.0222   |     | 262.0963 |
| Worker   | 0.1795 | 0.1024 | 1.3414 | 5.19E-03 | 0.575    | 3.36E-03 | 0.5784 | 0.1525   | 3.09E-03 | 0.1556 |          | 517.8393 | 517.8393  | 9.34E-03 |     | 518.0727 |
| Total    | 0.2075 | 1.0266 | 1.7275 | 7.56E-03 | 0.6358   | 5.46E-03 | 0.6412 | 0.17     | 5.10E-03 | 0.1751 |          | 779.3801 | 779.3801  | 0.0316   |     | 780.1691 |

#### 3.7 Skin and Roof - 2021 Unmitigated Construction On-Site

|                 | ROG     | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|-----------------|---------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|--------|-----|----------|
| Category        |         |        |        |          | lb/c     | lay     |        |          |         |        |          |          | lb/d      | ay     |     |          |
| Archit. Coating | 26.7790 |        |        |          |          | 0.0000  | 0.0000 |          | 0.0000  | 0.0000 |          |          | 0.0000    |        |     | 0.0000   |
| Off-Road        | 0.3575  | 4.1986 | 1.7168 | 4.9900e- |          | 0.1705  | 0.1705 |          | 0.1568  | 0.1568 |          | 483.7565 | 483.7565  | 0.1565 |     | 487.6679 |
| Total           | 27.1365 | 4.1986 | 1.7168 | 4.9900e- |          | 0.1705  | 0.1705 |          | 0.1568  | 0.1568 |          | 483.7565 | 483.7565  | 0.1565 |     | 487.6679 |

# **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|----------|-----|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |          |          | lb/c      | lay      |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0        |     | 0        |
| Vendor   | 0.0281 | 0.9243 | 0.3861 | 2.37E-03 | 0.0608   | 2.10E-03 | 0.0629 | 0.0175   | 2.01E-03 | 0.0195 |          | 261.5408 | 261.5408  | 0.0222   |     | 262.0963 |
| Worker   | 0.0256 | 0.0146 | 0.1916 | 7.40E-04 | 0.0822   | 4.80E-04 | 0.0826 | 0.0218   | 4.40E-04 | 0.0222 |          | 73.977   | 73.977    | 1.33E-03 |     | 74.0104  |
| Total    | 0.0537 | 0.9389 | 0.5778 | 3.11E-03 | 0.1429   | 2.58E-03 | 0.1455 | 0.0393   | 2.45E-03 | 0.0417 |          | 335.5178 | 335.5178  | 0.0236   |     | 336.1067 |

#### **Mitigated Construction On-Site**

|                 | ROG     | NOx   | CO     | SO2      | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O    | CO2e     |
|-----------------|---------|-------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|--------|--------|----------|
| Category        |         |       |        |          | lb/c     | lay      |          |          |          |          |          |          | lb/d      | ay     |        |          |
| Archit. Coating | 26.779  |       |        |          |          | 0        | 0        |          | 0        | 0        |          |          | 0         |        |        | 0        |
| Off-Road        | 0.0614  | 0.266 | 2.2505 | 4.99E-03 |          | 8.18E-03 | 8.18E-03 |          | 8.18E-03 | 8.18E-03 | 0        | 483.7565 | 483.7565  | 0.1565 | ,0<br> | 487.6679 |
| Total           | 26.8404 | 0.266 | 2.2505 | 4.99E-03 |          | 8.18E-03 | 8.18E-03 |          | 8.18E-03 | 8.18E-03 | 0        | 483.7565 | 483.7565  | 0.1565 |        | 487.6679 |

## **Mitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2     | NBio-    | Total CO2 | CH4      | N2O                                    | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|--------------|----------|-----------|----------|--|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |              |          | lb/d      | lay      |  |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |              | 0        | 0         | 0        |  | 0        |
| Vendor   | 0.0281 | 0.9243 | 0.3861 | 2.37E-03 | 0.0608   | 2.10E-03 | 0.0629 | 0.0175   | 2.01E-03 | 0.0195 | Mannanananan | 261.5408 | 261.5408  | 0.0222   | 10000000000000000000000000000000000000 | 262.0963 |
| Worker   | 0.0256 | 0.0146 | 0.1916 | 7.40E-04 | 0.0822   | 4.80E-04 | 0.0826 | 0.0218   | 4.40E-04 | 0.0222 |              | 73.977   | 73.977    | 1.33E-03 |  | 74.0104  |
| Total    | 0.0537 | 0.9389 | 0.5778 | 3.11E-03 | 0.1429   | 2.58E-03 | 0.1455 | 0.0393   | 2.45E-03 | 0.0417 |              | 335.5178 | 335.5178  | 0.0236   |  | 336.1067 |

# 3.8 Commissioning and Final Inspections - 2021 Unmitigated Construction On-Site

|          | ROG      | NOx | CO | SO2 | Fugitive | Exhaust | PM10 | Fugitive | Exhaust | PM2.5 | Bio- CO2 | NBio- | Total CO2 | CH4 | N2O | CO2e |
|----------|----------|-----|----|-----|----------|---------|------|----------|---------|-------|----------|-------|-----------|-----|-----|------|
| Category |          |     |    |     | lb/c     | lay     |      |          |         |       |          |       | lb/d      | ay  |     |      |
| Off-Road | 0        | 0   | 0  | 0   |          | 0       | 0    |          | 0       | 0     |          | 0     | 0         | 0   |     | 0    |
| Paving   | 7.23E-03 |     |    |     |          | 0       | 0    |          | 0       | 0     |          |       | 0         |     |     | 0    |
| Total    | 7.23E-03 | 0   | 0  | 0   |          | 0       | 0    |          | 0       | 0     |          | 0     | 0         | 0   |     | 0    |

# **Unmitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|--------|-----|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |          |          | lb/d      | ay     |     |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0      |     | 0        |
| Vendor   | 0.0187 | 0.6162 | 0.2574 | 1.58E-03 | 0.0405   | 1.40E-03 | 0.0419 | 0.0117   | 1.34E-03 | 0.013  |          | 174.3605 | 174.3605  | 0.0148 |     | 174.7309 |
| Worker   | 0.4615 | 0.2632 | 3.4493 | 0.0134   | 1.4787   | 8.63E-03 | 1.4873 | 0.3922   | 7.94E-03 | 0.4002 |          | 1,331.59 | 1,331.59  | 0.024  |     | 1,332.19 |
| Total    | 0.4802 | 0.8794 | 3.7067 | 0.0149   | 1.5192   | 0.01     | 1.5292 | 0.4039   | 9.28E-03 | 0.4131 |          | 1,505.95 | 1,505.95  | 0.0388 |     | 1,506.92 |

# **Mitigated Construction On-Site**

|   |         | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 | Fugitive | Exhaust | PM2.5 | Bio- CO2 | NBio- | Total CO2 | CH4 | N2O | CO2e |
|---|---------|-----|-----|----|-----|----------|---------|------|----------|---------|-------|----------|-------|-----------|-----|-----|------|
| C | ategory |     |     |    |     | lb/c     | lay     |      |          |         |       |          |       | lb/d      | ay  |     |      |

| Off-Road | 0        | 0 | 0 | 0 | <br>0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|----------|----------|---|---|---|-------|---|---|---|---|---|---|---|---|
| Paving   | 7.23E-03 |   |   |   | 0     | 0 | 0 | 0 |   |   | 0 |   | 0 |
| Total    | 7.23E-03 | 0 | 0 | 0 | 0     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# **Mitigated Construction Off-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10   | Fugitive | Exhaust  | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O                                    | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|--------|----------|----------|--------|----------|----------|-----------|--------|--|----------|
| Category |        |        |        |          | lb/d     | day      |        |          |          |        |          |          | lb/d      | lay    |  |          |
| Hauling  | 0      | 0      | 0      | 0        | 0        | 0        | 0      | 0        | 0        | 0      |          | 0        | 0         | 0      |  | 0        |
| Vendor   | 0.0187 | 0.6162 | 0.2574 | 1.58E-03 | 0.0405   | 1.40E-03 | 0.0419 | 0.0117   | 1.34E-03 | 0.013  |          | 174.3605 | 174.3605  | 0.0148 | 10000000000000000000000000000000000000 | 174.7309 |
| Worker   | 0.4615 | 0.2632 | 3.4493 | 0.0134   | 1.4787   | 8.63E-03 | 1.4873 | 0.3922   | 7.94E-03 | 0.4002 |          | 1,331.59 | 1,331.59  | 0.024  |  | 1,332.19 |
| Total    | 0.4802 | 0.8794 | 3.7067 | 0.0149   | 1.5192   | 0.01     | 1.5292 | 0.4039   | 9.28E-03 | 0.4131 |          | 1,505.95 | 1,505.95  | 0.0388 |  | 1,506.92 |

# 5.0 Energy Detail

Historical Energy Use: N

# **5.1 Mitigation Measures Energy**

|            | ROG   | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O    | CO2e     |
|------------|-------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|--------|--------|----------|
| Category   |       |        |        |          | lb/d     | ay      |        |          |         | lb/d   | ay       |          |           |        |        |          |
| NaturalGas | 0.102 | 0.9272 | 0.7788 | 5.56E-03 |          | 0.0705  | 0.0705 |          | 0.0705  | 0.0705 |          | 1,112.58 | 1,112.58  | 0.0213 | 0.0204 | 1,119.19 |
| NaturalGas | 0.102 | 0.9272 | 0.7788 | 5.56E-03 |          | 0.0705  | 0.0705 |          | 0.0705  | 0.0705 |          | 1,112.58 | 1,112.58  | 0.0213 | 0.0204 | 1,119.19 |

# 5.2 Energy by Land Use - NaturalGas <u>Unmitigated</u>

|             | NaturalGa | ROG   | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O    | CO2e     |
|-------------|-----------|-------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|-----------|-----------|--------|--------|----------|
| Land Use    | kBTU/yr   |       |        |        |          | lb/d     | day     |        |          |         |        |          |           | lb/d      | lay    |        |          |
| Office Park | 9456.94   | 0.102 | 0.9272 | 0.7788 | 5.56E-03 |          | 0.0705  | 0.0705 |          | 0.0705  | 0.0705 |          | 1,112.58  | 1,112.58  | 0.0213 | 0.0204 | 1,119.19 |
| Parking Lot | 0         | 0     | 0      | 0      | 0        |          | 0       | 0      |          | 0       | 0      |          | 0         | 0         | 0      | 0      | 0        |
| Regional    | 0         | 0     | 0      | 0      | 0        |          | 0       | 0      |          | 0       | 0      |          | 0         | 0         | 0      | 0      | 0        |
| Research &  | 0         | 0     | 0      | 0      | 0        |          | 0       | 0      |          | 0       | 0      |          | 0         | 0         | 0      | 0      | 0        |
| Total       |           | 0.102 | 0.9272 | 0.7788 | 5.56E-03 |          | 0.0705  | 0.0705 |          | 0.0705  | 0.0705 |          | 1,112.58  | 1,112.58  | 0.0213 | 0.0204 | 1,119.19 |

# **Mitigated**

|          | NaturalGa | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 | Fugitive | Exhaust | PM2.5 | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|----------|-----------|-----|-----|----|-----|----------|---------|------|----------|---------|-------|----------|-----------|-----------|-----|-----|------|
| Land Use | kBTU/yr   |     |     |    |     | lb/e     | day     |      |          |         |       |          |           | lb/c      | lay |     |      |

| Office Park | 9.45694 | 0.102 | 0.9272 | 0.7788 | 5.56E-03 | 0.0705 | 0.0705 | 0.0705 | 0.0705 | 1,112.58 | 1,112.58 | 0.0213 | 0.0204 | 1,119.19 |
|-------------|---------|-------|--------|--------|----------|--------|--------|--------|--------|----------|----------|--------|--------|----------|
| Parking Lot | 0       | 0     | 0      | 0      | 0        | 0      | 0      | 0      | 0      | 0        | 0        | 0      | 0      | 0        |
| Regional    | 0       | 0     | 0      | 0      | 0        | 0      | 0      | 0      | 0      | 0        | 0        | 0      | 0      | 0        |
| Research &  | 0       | 0     | 0      | 0      | 0        | 0      | 0      | 0      | 0      | 0        | 0        | 0      | 0      | 0        |
| Total       |         | 0.102 | 0.9272 | 0.7788 | 5.56E-03 | 0.0705 | 0.0705 | 0.0705 | 0.0705 | 1,112.58 | 1,112.58 | 0.0213 | 0.0204 | 1,119.19 |

#### 6.0 Area Detail

# **6.1 Mitigation Measures Area**

|             | ROG    | NOx      | СО     | SO2 | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio- | Total CO2 | CH4      | N2O | CO2e   |
|-------------|--------|----------|--------|-----|----------|----------|----------|----------|----------|----------|----------|-------|-----------|----------|-----|--------|
| Category    |        |          |        |     | lb/c     | lay      |          |          |          |          |          |       | lb/c      | lay      |     |        |
| Mitigated   | 4.5899 | 6.00E-04 | 0.0656 | 0   |          | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14  | 0.14      | 3.70E-04 |     | 0.1493 |
| Unmitigated | 5.1518 | 6.00E-04 | 0.0656 | 0   | Φ        | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14  | 0.14      | 3.70E-04 |     | 0.1493 |

# 6.2 Area by SubCategory Unmitigated

|               | ROG      | NOx      | CO     | SO2 | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio- | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|----------|--------|-----|----------|----------|----------|----------|----------|----------|----------|-------|-----------|----------|-----|--------|
| SubCategory   |          |          |        |     | lb/c     | day      |          |          |          |          |          |       | lb/d      | lay      |     |        |
| Architectural | 0.6163   |          |        |     |          | 0        | 0        |          | 0        | 0        |          |       | 0         |          |     | 0      |
| Consumer      | 4.5294   |          |        |     |          | 0        | 0        |          | 0        | 0        | 1Φ       |       | 0         |          |     | 0      |
| Landscaping   | 6.13E-03 | 6.00E-04 | 0.0656 | 0   |          | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14  | 0.14      | 3.70E-04 |     | 0.1493 |
| Total         | 5.1518   | 6.00E-04 | 0.0656 | 0   |          | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14  | 0.14      | 3.70E-04 |     | 0.1493 |

# **Mitigated**

|               | ROG      | NOx      | CO     | SO2                                     | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio- | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|----------|--------|---|----------|----------|----------|----------|----------|----------|----------|-------|-----------|----------|-----|--------|
| SubCategory   |          |          |        |   | lb/c     | lay      |          |          |          |          |          |       | lb/c      | lay      |     |        |
| Architectural | 0.6163   |          |        |   |          | 0        | 0        |          | 0        | 0        |          |       | 0         |          |     | 0      |
| Consumer      | 4.5294   |          |        | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |          | 0        | 0        |          | 0        | 0        |          |       | 0         |          |     | 0      |
| Landscaping   | 6.13E-03 | 6.00E-04 | 0.0656 | 0                                       |          | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14  | 0.14      | 3.70E-04 |     | 0.1493 |
| Total         | 5.1518   | 6.00E-04 | 0.0656 | 0                                       |          | 2.30E-04 | 2.30E-04 |          | 2.30E-04 | 2.30E-04 |          | 0.14  | 0.14      | 3.70E-04 |     | 0.1493 |
|               |          |          |        |   |          |          |          |          |          |          |          |       |           |          |     |        |

# 7.0 Water Detail

# 7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet Install Low Flow Kitchen Faucet

Install Low Flow Toilet
Install Low Flow Shower
Use Water Efficient Irrigation System

#### 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 Stationary Equipment**

#### **Fire Pumps and Emergency Generators**

| Equipment Type      | Number | Hours/Day | Hours/Year | Horse Power | Load Factor | Fuel Type |
|---------------------|--------|-----------|------------|-------------|-------------|-----------|
| Emergency Generator | 1      | 1         | 50         | 1869        | 0.8         | Diesel    |

#### **Boilers**

| Equipment Type | Number | Heat Input/Day | Heat Input/Year | Boiler Rating | Fuel Type |
|----------------|--------|----------------|-----------------|---------------|-----------|
|                |        |                |                 |               |           |

#### **User Defined Equipment**

| Equipment Type | Number |
|----------------|--------|
|                |        |

# 10.1 Stationary Sources Unmitigated/Mitigated

|                | ROG    | NOx     | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |  |  |  |
|----------------|--------|---------|--------|--------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|--------|-----|----------|--|--|--|
| Equipment Type |        | lb/day  |        |        |          |         |        |          |         |        |          |          | lb/day    |        |     |          |  |  |  |
| Emergency      | 3.3613 | 15.0314 | 8.5705 | 0.0162 |          | 0.4945  | 0.4945 |          | 0.4945  | 0.4945 |          | 1,719.51 | 1,719.51  | 0.2411 |     | 1,725.54 |  |  |  |
| Total          | 3.3613 | 15.0314 | 8.5705 | 0.0162 |          | 0.4945  | 0.4945 |          | 0.4945  | 0.4945 |          | 1,719.51 | 1,719.51  | 0.2411 |     | 1,725.54 |  |  |  |

## 11.0 Vegetation

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751 Gateway - San Mateo County, Annual

#### 751 Gateway San Mateo County, Annual

#### 1.0 Project Characteristics

#### 1.1 Land Usage

| Land Uses                | Size   | Metric   | Lot Acreage | Floor Surface Area | Population |
|--------------------------|--------|----------|-------------|--------------------|------------|
| Office Park              | 78.70  | 1000sqft | 1.06        | 78,700.00          | 0          |
| Research & Development   | 118.00 | 1000sqft | 1.58        | 118,000.00         | 0          |
| Parking Lot              | 431.00 | Space    | 0.16        | 172,400.00         | 0          |
| Regional Shopping Center | 12.10  | 1000sqft | 2.31        | 12,100.00          | 0          |

#### 1.2 Other Project Characteristics

UrbanizationUrbanWind Speed (m/s)2.2Precipitation Freq (Days)70Climate Zone5Operational Year2021

Utility Company Pacific Gas & Electric Company

**CO2 Intensity** 189 **CH4 Intensity** 0.032 **N20 Intensity** 0.004

#### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - EFs adjusted per SB 100

Land Use - square footages provided by applicant; parking spaces includes bicycle parking spaces (10:1); acreage scaled by sf. 5.11 acres assumed for site exclusing 701

Construction Phase - Schedule start and end dates provided by applicant; model defaults conservatively used for total days; work days adjusted for Structure to

Off-road Equipment - per applicant no equipment

Off-road Equipment - equipment, hp, and work hours provided by applicant

Off-road Equipment - per applicant no equipment

Off-road Equipment - equipment, hp, work hours provided by applicant

Off-road Equipment - equipment accounted for in previous phase

Off-road Equipment - equipment, hp, and work hours provided by applicant

Off-road Equipment - equipment, hp, and work hours provided by applicant

Off-road Equipment - equipment, hp, and work hours provided by applicant

Trips and VMT - workers and vendors per day provided by applicant; total haul trips provided by applicant; hauling trip distance provided by applicant

Demolition - CY provided converted to tons per Caleemod

Grading - conservatively asumed entire site to be graded during site prep; import CY provided by applicant

Architectural Coating -

Vehicle Trips - mobile source emissions modeled separately

Energy Use - energy consumption provided by applicant

Water And Wastewater - water consumption provided by applicant and indoor and outdoor proportioned using Caleemod default % Land Use Change - no change

Construction Off-road Equipment Mitigation - Tier 4 final equipment assumed, BAAQMD basic construction mitigation measures Area Mitigation - extremely compliant VOC g/L

Water Mitigation - per sustainability measures provided by applicant

Stationary Sources - Emergency Generators and Fire Pumps - provided by project applicant

| Table Name              | Column Name                               | Default Value | New Value    |
|-------------------------|---|---------------|--------------|
| tblAreaMitigation       | UseLowVOCPaintNonresidentialExteriorValue | 150           | 10           |
| tblAreaMitigation       | UseLowVOCPaintNonresidentialInteriorValue | 100           | 10           |
| tblAreaMitigation       | UseLowVOCPaintParkingCheck                | False         | True         |
| tblAreaMitigation       | UseLowVOCPaintParkingValue                | 150           | 10           |
| tblConstDustMitigation  | WaterUnpavedRoadVehicleSpeed              | 0             | 15           |
| tblConstEquipMitigation | NumberOfEquipmentMitigated                | 0.00          | 2.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated                | 0.00          | 2.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated                | 0.00          | 1.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated                | 0.00          | 4.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated                | 0.00          | 19.00        |
| tblConstEquipMitigation | NumberOfEquipmentMitigated                | 0.00          | 5.00         |
| tblConstEquipMitigation | NumberOfEquipmentMitigated                | 0.00          | 8.00         |
| tblConstEquipMitigation | Tier                                      | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                      | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                      | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                      | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                      | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                      | No Change     | Tier 4 Final |
| tblConstEquipMitigation | Tier                                      | No Change     | Tier 4 Final |
| tblConstructionPhase    | NumDays                                   | 20.00         | 84.00        |
| tblConstructionPhase    | NumDays                                   | 230.00        | 217.00       |
| tblConstructionPhase    | NumDays                                   | 230.00        | 148.00       |
| tblConstructionPhase    | NumDays                                   | 20.00         | 42.00        |
| tblConstructionPhase    | NumDays                                   | 20.00         | 105.00       |
| tblConstructionPhase    | NumDays                                   | 20.00         | 58.00        |
| tblConstructionPhase    | NumDays                                   | 10.00         | 42.00        |
| tblConstructionPhase    | NumDaysWeek                               | 5.00          | 6.00         |
| tblConstructionPhase    | PhaseEndDate                              | 8/10/2022     | 10/5/2021    |
| tblConstructionPhase    | PhaseEndDate                              | 7/28/2021     | 9/13/2021    |
| tblConstructionPhase    | PhaseEndDate                              | 6/15/2022     | 10/26/2021   |
| tblConstructionPhase    | PhaseEndDate                              | 7/29/2020     | 8/29/2020    |
| tblConstructionPhase    | PhaseEndDate                              | 9/9/2020      | 1/2/2021     |
| tblConstructionPhase    | PhaseEndDate                              | 7/13/2022     | 12/2/2021    |
| tblConstructionPhase    | PhaseEndDate                              | 8/12/2020     | 8/29/2020    |
| tblConstructionPhase    | PhaseStartDate                            | 7/14/2022     | 6/10/2021    |

| tblConstructionPhase | - ■ PhaseStartDate         | 9/10/2020 | 1/3/2021  |
|----------------------|----------------------------|-----------|-----------|
| tblConstructionPhase | PhaseStartDate             | 7/29/2021 | 4/2/2021  |
| tblConstructionPhase | PhaseStartDate             | 8/13/2020 | 8/9/2020  |
| tblConstructionPhase | PhaseStartDate             | 6/16/2022 | 9/14/2021 |
| tblConstructionPhase | PhaseStartDate             | 7/30/2020 | 7/2/2020  |
| tblEnergyUse         | LightingElect              | 3.47      | 0.00      |
| tblEnergyUse         | LightingElect              | 0.35      | 0.00      |
| tblEnergyUse         | LightingElect              | 4.88      | 0.00      |
| tblEnergyUse         | LightingElect              | 2.99      | 0.00      |
| tblEnergyUse         | NT24E                      | 4.81      | 0.00      |
| tblEnergyUse         | NT24E                      | 3.36      | 0.00      |
| tblEnergyUse         | NT24E                      | 3.36      | 0.00      |
| tblEnergyUse         | NT24NG                     | 1.17      | 0.00      |
| tblEnergyUse         | NT24NG                     | 0.70      | 0.00      |
| tblEnergyUse         | NT24NG                     | 6.90      | 0.00      |
| tblEnergyUse         | T24E                       | 4.27      | 68.95     |
| tblEnergyUse         | T24E                       | 2.24      | 0.00      |
| tblEnergyUse         | T24E                       | 1.21      | 0.00      |
| tblEnergyUse         | T24NG                      | 17.44     | 43.86     |
| tblEnergyUse         | T24NG                      | 3.90      | 0.00      |
| tblEnergyUse         | T24NG                      | 17.85     | 0.00      |
| tblGrading           | AcresOfGrading             | 0.00      | 7.40      |
| tblGrading           | MaterialImported           | 0.00      | 750.00    |
| tblLandUse           | LotAcreage                 | 1.81      | 1.06      |
| tblLandUse           | LotAcreage                 | 2.71      | 1.58      |
| tblLandUse           | LotAcreage                 | 3.88      | 0.16      |
| tblLandUse           | LotAcreage                 | 0.28      | 2.31      |
| tblOffRoadEquipment  | HorsePower                 | 231.00    | 400.00    |
| tblOffRoadEquipment  | HorsePower                 | 158.00    | 300.00    |
| tblOffRoadEquipment  | HorsePower                 | 158.00    | 300.00    |
| tblOffRoadEquipment  | HorsePower                 | 46.00     | 15.00     |
| tblOffRoadEquipment  | HorsePower                 | 63.00     | 50.00     |
| tblOffRoadEquipment  | HorsePower                 | 231.00    | 200.00    |
| tblOffRoadEquipment  | HorsePower                 | 85.00     | 200.00    |
| tblOffRoadEquipment  | HorsePower                 | 158.00    | 200.00    |
| tblOffRoadEquipment  | HorsePower                 | 402.00    | 300.00    |
| tblOffRoadEquipment  | HorsePower                 | 402.00    | 400.00    |
| tblOffRoadEquipment  | HorsePower                 | 84.00     | 300.00    |
| tblOffRoadEquipment  | OffRoadEquipmentUnitAmount | 1.00      | 0.00      |
| tblOffRoadEquipment  | OffRoadEquipmentUnitAmount | 1.00      | 0.00      |
| tblOffRoadEquipment  | OffRoadEquipmentUnitAmount | 1.00      | 0.00      |
| tblOffRoadEquipment  | OffRoadEquipmentUnitAmount | 3.00      | 0.00      |
| tblOffRoadEquipment  | OffRoadEquipmentUnitAmount | 3.00      | 1.00      |
| tblOffRoadEquipment  | OffRoadEquipmentUnitAmount | 1.00      | 2.00      |
| tblOffRoadEquipment  | OffRoadEquipmentUnitAmount | 3.00      | 0.00      |
|                      |                            |           |           |

| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 3.00           | 0.00                  |
|----------------------------------|--------------------------------------|----------------|-----------------------|
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 1.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 1.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 1.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 2.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 2.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 2.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 2.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 1.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 3.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 3.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 3.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 3.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 4.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 1.00           | 8.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 1.00           | 0.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 0.00           | 1.00                  |
| tblOffRoadEquipment              | OffRoadEquipmentUnitAmount           | 0.00           | 1.00                  |
| tblOffRoadEquipment              | PhaseName                            |                | Site Prep/ Demolition |
| tblOffRoadEquipment              | PhaseName                            |                | Site Prep/ Demolition |
| tblOffRoadEquipment              | UsageHours                           | 7.00           | 8.00                  |
| tblProjectCharacteristics        | CH4IntensityFactor                   | 0.029          | 0.032                 |
| tblProjectCharacteristics        | CO2IntensityFactor                   | 641.35         | 189                   |
| tblProjectCharacteristics        | N2OIntensityFactor                   | 0.006          | 0.004                 |
| tblStationaryGeneratorsPumpsUse  | HorsePowerValue                      | 0.00           | 1,869.00              |
| tblStationaryGeneratorsPumpsUse  | HoursPerDay                          | 0.00           | 1.00                  |
| tblStationaryGeneratorsPumpsUse  | HoursPerYear                         | 0.00           | 50.00                 |
| tblStationaryGeneratorsPumpsUse  | Load_Factor                          | 0.73           | 0.80                  |
| tblStationaryGeneratorsPumpsUse  | NumberOfEquipment                    | 0.00           | 1.00                  |
| tblTripsAndVMT                   | HaulingTripLength                    | 20.00          | 40.00                 |
| tblTripsAndVMT                   | HaulingTripNumber                    | 15.00          | 0.00                  |
| tblTripsAndVMT                   | HaulingTripNumber                    | 94.00          | 0.00                  |
| tblTripsAndVMT                   | HaulingTripNumber                    | 0.00           | 500.00                |
| tblTripsAndVMT                   | VendorTripNumber                     | 0.00           | 6.00                  |
| tblTripsAndVMT                   | VendorTripNumber                     | 0.00           | 13.00                 |
| tblTripsAndVMT                   | VendorTripNumber                     | 62.00          | 8.00                  |
| tblTripsAndVMT                   | VendorTripNumber                     | 62.00          | 9.00                  |
| tblTripsAndVMT                   | VendorTripNumber                     | 0.00           | 6.00                  |
| tblTripsAndVMT                   | VendorTripNumber                     | 0.00           | 9.00                  |
| tblTripsAndVMT                   | WorkerTripNumber                     | 8.00           | 40.00                 |
| tblTripsAndVMT                   | WorkerTripNumber                     | 63.00          | 70.00                 |
| tblTripsAndVMT                   | WorkerTripNumber                     | 139.00         | 140.00                |
| •                                | •                                    |                |                       |
| tblTripsAndVMT                   | WorkerTripNumber                     | 139.00         | 70.00                 |
| tblTripsAndVMT<br>tblTripsAndVMT | WorkerTripNumber<br>WorkerTripNumber | 139.00<br>0.00 | 70.00<br>180.00       |

| tblVehicleTrips | ST_TR               | 1.64          | 0.00         |
|-----------------|---------------------|---------------|--------------|
| tblVehicleTrips | ST_TR               | 49.97         | 0.00         |
| tblVehicleTrips | ST_TR               | 1.90          | 0.00         |
| tblVehicleTrips | SU_TR               | 0.76          | 0.00         |
| tblVehicleTrips | SU_TR               | 25.24         | 0.00         |
| tblVehicleTrips | SU_TR               | 1.11          | 0.00         |
| tblVehicleTrips | WD_TR               | 11.42         | 0.00         |
| tblVehicleTrips | WD_TR               | 42.70         | 0.00         |
| tblVehicleTrips | WD_TR               | 8.11          | 0.00         |
| tblWater        | IndoorWaterUseRate  | 13,987,645.97 | 974,222.00   |
| tblWater        | IndoorWaterUseRate  | 896,277.51    | 301,205.00   |
| tblWater        | IndoorWaterUseRate  | 58,019,885.77 | 3,531,740.00 |
| tblWater        | OutdoorWaterUseRate | 8,573,073.33  | 597,104.00   |
| tblWater        | OutdoorWaterUseRate | 549,331.38    | 184,610.00   |

# 2.0 Emissions Summary

# 2.1 Overall Construction Unmitigated Construction

|         | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O | CO2e     |
|---------|--------|--------|--------|----------|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|--------|-----|----------|
| Year    |        |        |        |          | tons/    | yr      |            |          |         |             |          |           | N         | /IT/yr |     |          |
| 2020    | 0.3302 | 3.0925 | 1.8433 | 8.56E-03 | 0.0544   | 0.093   | 0.1474     | 0.0139   | 0.0905  | 0.1044      | 0        | 837.8572  | 837.8572  | 0.0878 | 0   | 840.0513 |
| 2021    | 1.3887 | 2.1065 | 1.9018 | 5.59E-03 | 0.225    | 0.0716  | 0.2966     | 0.0601   | 0.0677  | 0.1278      | 0        | 483.6998  | 483.6998  | 0.0804 | 0   | 485.7101 |
| Maximum | 1.3887 | 3.0925 | 1.9018 | 8.56E-03 | 0.225    | 0.093   | 0.2966     | 0.0601   | 0.0905  | 0.1278      | 0        | 837.8572  | 837.8572  | 0.0878 | 0   | 840.0513 |

## **Mitigated Construction**

|         | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O | CO2e     |
|---------|--------|--------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|--------|-----|----------|
| Year    |        |        |        |          | tons/    | yr       |            |          |          |             |          |           | ı         | MT/yr  |     |          |
| 2020    | 0.1108 | 0.6366 | 3.5422 | 8.56E-03 | 0.0513   | 0.0134   | 0.0647     | 0.0135   | 0.0133   | 0.0268      | 0        | 837.8563  | 837.8563  | 0.0878 | 0   | 840.0504 |
| 2021    | 1.2306 | 0.535  | 1.7138 | 5.59E-03 | 0.225    | 5.62E-03 | 0.2306     | 0.0601   | 5.49E-03 | 0.0656      | 0        | 483.6995  | 483.6995  | 0.0804 | 0   | 485.7097 |
| Maximum | 1.2306 | 0.6366 | 3.5422 | 8.56E-03 | 0.225    | 0.0134   | 0.2306     | 0.0601   | 0.0133   | 0.0656      | 0        | 837.8563  | 837.8563  | 0.0878 | 0   | 840.0504 |

|                      | ROG   | NOx   | CO     | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 | Bio- CO2 | NBio-CO2 | Total CO2 | CH4 | N20 | CO2e |
|----------------------|-------|-------|--------|-----|----------|---------|------------|----------|---------|-------|----------|----------|-----------|-----|-----|------|
| Percent<br>Reduction | 21.96 | 77.46 | -40.34 | 0   | 1.1      | 88.46   | 33.49      | 0.5      | 88.12   | 60.22 | 0        | 0        | 0         | 0   | 0   | 0    |

| Quarter | Start Date | End Date  | Maximum Unmitigated ROG + NOX (tons/quarter) | Maximum Mitigated ROG + NOX (tons/quarter) |
|---------|------------|-----------|--|--|
| 1       | 7-2-2020   | 10-1-2020 | 1.4783                                       | 0.3154                                     |

| 2 | 10-2-2020 | 1-1-2021  | 1.9507 | 0.4336 |
|---|-----------|-----------|--------|--------|
| 3 | 1-2-2021  | 4-1-2021  | 0.7158 | 0.1632 |
| 4 | 4-2-2021  | 7-1-2021  | 1.0032 | 0.4191 |
| 5 | 7-2-2021  | 9-30-2021 | 1.6757 | 1.0903 |
|   |           | Highest   | 1.9507 | 1.0903 |

# 2.2 Overall Operational Unmitigated Operational

|            | ROG    | NOx      | СО       | SO2      | Fugitive<br>PM10 | Exhaust<br>PM10 | PM10 Total | Fugitive<br>PM2.5 | Exhaust<br>PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O      | CO2e     |
|------------|--------|----------|----------|----------|------------------|-----------------|------------|-------------------|------------------|-------------|----------|-----------|-----------|----------|----------|----------|
| Category   |        |          |          |          | tons/            | /yr             |            |                   |                  |             |          |           |           | MT/yr    |          |          |
| Area       | 0.9396 | 5.00E-05 | 5.90E-03 | 0        |                  | 2.00E-05        | 2.00E-05   |                   | 2.00E-05         | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0        | 0.0122   |
| Energy     | 0.0186 | 0.1692   | 0.1421   | 1.02E-03 |                  | 0.0129          | 0.0129     |                   | 0.0129           | 0.0129      | 0        | 649.3969  | 649.3969  | 0.0823   | 0.0132   | 655.3945 |
| Mobile     | 0      | 0        | 0        | 0        | 0                | 0               | 0          | 0                 | 0                | 0           | 0        | 0         | 0         | 0        | 0        | 0        |
| Stationary | 0.084  | 0.3758   | 0.2143   | 4.00E-04 |                  | 0.0124          | 0.0124     |                   | 0.0124           | 0.0124      | 0        | 38.9978   | 38.9978   | 5.47E-03 | 0        | 39.1345  |
| Waste      |        |          |          |          |                  | 0               | 0          |                   | 0                | 0           | 19.2578  | 0         | 19.2578   | 1.1381   | 0        | 47.7103  |
| Water      |        |          |          |          |                  | 0               | 0          |                   | 0                | 0           | 1.5251   | 2.4645    | 3.9896    | 0.1571   | 3.75E-03 | 9.0338   |
| Total      | 1.0423 | 0.545    | 0.3623   | 1.42E-03 | 0                | 0.0252          | 0.0252     | 0                 | 0.0252           | 0.0252      | 20.7828  | 690.8706  | 711.6534  | 1.383    | 0.017    | 751.2852 |

## **Mitigated Operational**

|            | ROG    | NOx      | CO       | SO2      | Fugitive<br>PM10 | Exhaust<br>PM10 | PM10 Total | Fugitive<br>PM2.5 | Exhaust<br>PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O      | CO2e     |
|------------|--------|----------|----------|----------|------------------|-----------------|------------|-------------------|------------------|-------------|----------|-----------|-----------|----------|----------|----------|
| Category   |        |          |          |          | tons/            | yr              |            |                   |                  |             |          |           |           | MT/yr    |          |          |
| Area       | 0.8371 | 5.00E-05 | 5.90E-03 | 0        |                  | 2.00E-05        | 2.00E-05   |                   | 2.00E-05         | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0        | 0.0122   |
| Energy     | 0.0186 | 0.1692   | 0.1421   | 1.02E-03 |                  | 0.0129          | 0.0129     |                   | 0.0129           | 0.0129      | 0        | 649.3969  | 649.3969  | 0.0823   | 0.0132   | 655.3945 |
| Mobile     | 0      | 0        | 0        | 0        | 0                | 0               | 0          | 0                 | 0                | 0           | 0        | 0         | 0         | 0        | 0        | 0        |
| Stationary | 0.084  | 0.3758   | 0.2143   | 4.00E-04 |                  | 0.0124          | 0.0124     |                   | 0.0124           | 0.0124      | 0        | 38.9978   | 38.9978   | 5.47E-03 | 0        | 39.1345  |
| Waste      | D      | D        | )        | D        | 0                | 0               | 0          |                   | 0                | 0           | 19.2578  | 0         | 19.2578   | 1.1381   | 0        | 47.7103  |
| Water      |        |          |          | D        |                  | 0               | 0          |                   | 0                | 0           | 1.2201   | 2.0042    | 3.2243    | 0.1257   | 3.00E-03 | 7.26     |
| Total      | 0.9397 | 0.545    | 0.3623   | 1.42E-03 | 0                | 0.0252          | 0.0252     | 0                 | 0.0252           | 0.0252      | 20.4778  | 690.4103  | 710.8881  | 1.3515   | 0.0162   | 749.5114 |

|                      | ROG  | NOx | co | SO2 | Fugitive PM10 | Exhaust<br>PM10 | PM10 Total | Fugitive<br>PM2.5 | Exhaust<br>PM2.5 | PM2.5<br>Total | Bio- CO2 | NBio-CO2 | Total CO2 | CH4  | N20  | CO2e |
|----------------------|------|-----|----|-----|---------------|-----------------|------------|-------------------|------------------|----------------|----------|----------|-----------|------|------|------|
| Percent<br>Reduction | 9.84 | 0   | 0  | 0   | 0             | 0               | 0          | 0                 | 0                | 0              | 1.47     | 0.07     | 0.11      | 2.27 | 4.42 | 0.24 |

# 3.0 Construction Detail

## **Construction Phase**

| Phase Phase Name Phase Type Start Date End Date Num Days Num Days Phase | ription |
|---|---------|
|---|---------|

| 1 | Site Prep/ Demolition               | Demolition            | 7/2/2020  | 8/29/2020  | 5 | 42  |  |
|---|-------------------------------------|-----------------------|-----------|------------|---|-----|--|
| 2 | Site Prep/Demolition                | Site Preparation      | 7/2/2020  | 8/29/2020  | 5 | 42  |  |
| 3 | Foundations                         | Grading               | 8/9/2020  | 1/2/2021   | 5 | 105 |  |
| 4 | Structure                           | Building Construction | 1/3/2021  | 9/13/2021  | 6 | 217 |  |
| 5 | Interior Buildout                   | Building Construction | 4/2/2021  | 10/26/2021 | 5 | 148 |  |
| 6 | Skin and Roof                       | Architectural Coating | 6/10/2021 | 10/5/2021  | 5 | 84  |  |
| 7 | Commissioning and Final Inspections | Paving                | 9/14/2021 | 12/2/2021  | 5 | 58  |  |

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.16

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 313,200; Non-Residential Outdoor: 104,400; Striped Parking Area: 10,344

## OffRoad Equipment

| Phase Name            | Offroad Equipment Type    | Amount | Usage Hours | Horse Power | Load Factor |
|-----------------------|---------------------------|--------|-------------|-------------|-------------|
| Site Prep/ Demolition | Concrete/Industrial Saws  | 0      | 8           | 81          | 0.73        |
| Site Prep/ Demolition | Crushing/Proc. Equipment  | 1      | 8           | 200         | 0.78        |
| Site Prep/ Demolition | Excavators                | 0      | 8           | 158         | 0.38        |
| Site Prep/ Demolition | Excavators                | 1      | 8           | 300         | 0.38        |
| Site Prep/ Demolition | Off-Highway Trucks        | 1      | 8           | 300         | 0.38        |
| Site Prep/ Demolition | Rubber Tired Dozers       | 0      | 8           | 247         | 0.4         |
| Site Prep/Demolition  | Rubber Tired Dozers       | 0      | 8           | 247         | 0.4         |
| Site Prep/Demolition  | Tractors/Loaders/Backhoes | 0      | 8           | 97          | 0.37        |
| Foundations           | Excavators                | 2      | 8           | 300         | 0.38        |
| Foundations           | Graders                   | 0      | 8           | 187         | 0.41        |
| Foundations           | Off-Highway Trucks        | 18     | 0.5         | 400         | 0.38        |
| Foundations           | Pumps                     | 5      | 8           | 300         | 0.74        |
| Foundations           | Rubber Tired Dozers       | 0      | 8           | 247         | 0.4         |
| Foundations           | Tractors/Loaders/Backhoes | 0      | 8           | 97          | 0.37        |
| Structure             | Aerial Lifts              | 2      | 8           | 50          | 0.31        |
| Structure             | Cranes                    | 1      | 8           | 400         | 0.29        |
| Structure             | Excavators                | 1      | 8           | 200         | 0.38        |
| Structure             | Forklifts                 | 0      | 8           | 89          | 0.2         |
| Structure             | Generator Sets            | 0      | 8           | 84          | 0.74        |
| Structure             | Tractors/Loaders/Backhoes | 0      | 7           | 97          | 0.37        |
| Structure             | Welders                   | 8      | 8           | 15          | 0.45        |
| Interior Buildout     | Cranes                    | 0      | 7           | 231         | 0.29        |
| Interior Buildout     | Forklifts                 | 0      | 8           | 89          | 0.2         |
| Interior Buildout     | Generator Sets            | 0      | 8           | 84          | 0.74        |
| Interior Buildout     | Tractors/Loaders/Backhoes | 0      | 7           | 97          | 0.37        |
| Interior Buildout     | Welders                   | 0      | 8           | 46          | 0.45        |

| Skin and Roof                       | Air Compressors  | 0 | 6 | 78  | 0.48 |
|-------------------------------------|------------------|---|---|-----|------|
| Skin and Roof                       | Cranes           | 1 | 8 | 200 | 0.29 |
| Commissioning and Final Inspections | Pavers           | 0 | 8 | 130 | 0.42 |
| Commissioning and Final Inspections | Paving Equipment | 0 | 8 | 132 | 0.36 |
| Commissioning and Final Inspections | Rollers          | 0 | 8 | 80  | 0.38 |

#### **Trips and VMT**

| Phase Name            | Offroad Equipment | Worker Trip | Vendor Trip | Hauling Trip | Worker Trip | Vendor Trip | Hauling Trip Worker Vehi | cle Vendor Vehicle | Hauling Vehicle |
|-----------------------|-------------------|-------------|-------------|--------------|-------------|-------------|--------------------------|--------------------|-----------------|
| Site Prep/ Demolition | 3                 | 40          | 6           | 0            | 10.8        | 7.3         | 20 LD_Mix                | HDT_Mix            | HHDT            |
| Site Prep/Demolition  | 0                 | 0           | 0           | 0            | 10.8        | 7.3         | 20 LD_Mix                | HDT_Mix            | HHDT            |
| Foundations           | 25                | 70          | 13          | 500          | 10.8        | 7.3         | 40 LD_Mix                | HDT_Mix            | HHDT            |
| Structure             | 12                | 140         | 8           | 0            | 10.8        | 7.3         | 20 LD_Mix                | HDT_Mix            | HHDT            |
| Interior Buildout     | 0                 | 70          | 9           | 0            | 10.8        | 7.3         | 20 LD_Mix                | HDT_Mix            | HHDT            |
| Skin and Roof         | 1                 | 10          | 9           | 0            | 10.8        | 7.3         | 20 LD_Mix                | HDT_Mix            | HHDT            |
| Commissioning and     | 0                 | 180         | 6           | 0            | 10.8        | 7.3         | 20 LD_Mix                | HDT_Mix            | HHDT            |

# 3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment Water Exposed Area Reduce Vehicle Speed on Unpaved Roads

# 3.2 Site Prep/ Demolition - 2020 Unmitigated Construction On-Site

|               | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O | CO2e    |
|---------------|--------|--------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|--------|-----|---------|
| Category      |        |        |        |          | tons/    | /yr      |            |          |          |             |          |           |           | MT/yr  |     |         |
| Fugitive Dust |        |        |        |          | 1.60E-03 | 0        | 1.60E-03   | 2.40E-04 | 0        | 2.40E-04    | 0        | 0         | 0         | 0      | 0   | 0       |
| Off-Road      | 0.0336 | 0.2818 | 0.1712 | 7.60E-04 | )        | 9.55E-03 | 9.55E-03   | 0        | 9.09E-03 | 9.09E-03    | 0        | 65.9804   | 65.9804   | 0.0131 | 0   | 66.3071 |
| Total         | 0.0336 | 0.2818 | 0.1712 | 7.60E-04 | 1.60E-03 | 9.55E-03 | 0.0112     | 2.40E-04 | 9.09E-03 | 9.33E-03    | 0        | 65.9804   | 65.9804   | 0.0131 | 0   | 66.3071 |

# **Unmitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|----------|----------|----------|----------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category |          |          |          |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |        |
| Hauling  | 0        | 0        | 0        | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Vendor   | 4.90E-04 | 0.0146   | 5.82E-03 | 3.00E-05 | 8.20E-04 | 7.00E-05 | 8.90E-04   | 2.40E-04 | 7.00E-05 | 3.10E-04    | 0        | 3.3389    | 3.3389    | 2.90E-04 | 0   | 3.3462 |
| Worker   | 2.29E-03 | 1.55E-03 | 0.0164   | 6.00E-05 | 6.61E-03 | 4.00E-05 | 6.65E-03   | 1.76E-03 | 4.00E-05 | 1.80E-03    | 0        | 5.5065    | 5.5065    | 1.10E-04 | 0   | 5.5091 |
| Total    | 2.78E-03 | 0.0162   | 0.0222   | 9.00E-05 | 7.43E-03 | 1.10E-04 | 7.54E-03   | 2.00E-03 | 1.10E-04 | 2.11E-03    | 0        | 8.8454    | 8.8454    | 4.00E-04 | 0   | 8.8553 |

#### **Mitigated Construction On-Site**

|               | ROG      | NOx   | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O | CO2e    |
|---------------|----------|-------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|--------|-----|---------|
| Category      |          |       |        |          | tons/    | /yr      |            |          |          |             |          |           | ı         | MT/yr  |     |         |
| Fugitive Dust |          |       |        |          | 7.20E-04 | 0        | 7.20E-04   | 1.10E-04 | 0        | 1.10E-04    | 0        | 0         | 0         | 0      | 0   | 0       |
| Off-Road      | 8.53E-03 | 0.037 | 0.3129 | 7.60E-04 |          | 1.14E-03 | 1.14E-03   |          | 1.14E-03 | 1.14E-03    | 0        | 65.9804   | 65.9804   | 0.0131 | 0   | 66.3071 |
| Total         | 8.53E-03 | 0.037 | 0.3129 | 7.60E-04 | 7.20E-04 | 1.14E-03 | 1.86E-03   | 1.10E-04 | 1.14E-03 | 1.25E-03    | 0        | 65.9804   | 65.9804   | 0.0131 | 0   | 66.3071 |

# **Mitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|----------|----------|----------|----------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category |          |          |          |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |        |
| Hauling  | 0        | 0        | 0        | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Vendor   | 4.90E-04 | 0.0146   | 5.82E-03 | 3.00E-05 | 8.20E-04 | 7.00E-05 | 8.90E-04   | 2.40E-04 | 7.00E-05 | 3.10E-04    | 0        | 3.3389    | 3.3389    | 2.90E-04 | 0   | 3.3462 |
| Worker   | 2.29E-03 | 1.55E-03 | 0.0164   | 6.00E-05 | 6.61E-03 | 4.00E-05 | 6.65E-03   | 1.76E-03 | 4.00E-05 | 1.80E-03    | 0        | 5.5065    | 5.5065    | 1.10E-04 | 0   | 5.5091 |
| Total    | 2.78E-03 | 0.0162   | 0.0222   | 9.00E-05 | 7.43E-03 | 1.10E-04 | 7.54E-03   | 2.00E-03 | 1.10E-04 | 2.11E-03    | 0        | 8.8454    | 8.8454    | 4.00E-04 | 0   | 8.8553 |

# 3.3 Site Prep/Demolition - 2020 Unmitigated Construction On-Site

|               | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e |
|---------------|-----|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|------|
| Category      |     |     |    |     | tons/    | 'yr     |            |          |         |             |          |           |           | MT/yr |     |      |
| Fugitive Dust |     |     |    |     | 3.97E-03 | 0       | 3.97E-03   | 4.30E-04 | 0       | 4.30E-04    | 0        | 0         | 0         | 0     | 0   | 0    |
| Off-Road      | 0   | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Total         | 0   | 0   | 0  | 0   | 3.97E-03 | 0       | 3.97E-03   | 4.30E-04 | 0       | 4.30E-04    | 0        | 0         | 0         | 0     | 0   | 0    |

## **Unmitigated Construction Off-Site**

|          | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e |
|----------|-----|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|------|
| Category |     |     |    |     | tons/    | yr      |            |          |         |             |          |           |           | MT/yr |     |      |
| Hauling  | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Vendor   | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Worker   | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Total    | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |

## **Mitigated Construction On-Site**

|               | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e |
|---------------|-----|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|------|
| Category      |     |     |    |     | tons/    | 'yr     |            |          |         |             |          |           |           | MT/yr |     |      |
| Fugitive Dust |     |     |    |     | 1.78E-03 | 0       | 1.78E-03   | 1.90E-04 | 0       | 1.90E-04    | 0        | 0         | 0         | 0     | 0   | 0    |
| Off-Road      | 0   | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Total         | 0   | 0   | 0  | 0   | 1.78E-03 | 0       | 1.78E-03   | 1.90E-04 | 0       | 1.90E-04    | 0        | 0         | 0         | 0     | 0   | 0    |

## **Mitigated Construction Off-Site**

|          | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e |
|----------|-----|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|------|
| Category |     |     |    |     | tons/    | yr      |            |          |         |             |          |           |           | MT/yr |     |      |
| Hauling  | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Vendor   | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Worker   | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Total    | 0   | 0   | 0  | 0   | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |

#### 3.4 Foundations - 2020 Unmitigated Construction On-Site

|               | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O | CO2e     |
|---------------|--------|--------|--------|----------|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|--------|-----|----------|
| Category      |        |        |        |          | tons/    | yr      |            |          |         |             |          |           |           | MT/yr  |     |          |
| Fugitive Dust |        |        |        |          | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0      | 0   | 0        |
| Off-Road      | 0.2773 | 2.5709 | 1.4874 | 6.87E-03 |          | 0.0823  | 0.0823     |          | 0.0803  | 0.0803      | 0        | 681.5689  | 681.5689  | 0.0673 | 0   | 683.2517 |
| Total         | 0.2773 | 2.5709 | 1.4874 | 6.87E-03 | 0        | 0.0823  | 0.0823     | 0        | 0.0803  | 0.0803      | 0        | 681.5689  | 681.5689  | 0.0673 | 0   | 683.2517 |

## **Unmitigated Construction Off-Site**

|          | ROG      | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------|----------|----------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|---------|
| Category |          |          |        |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |         |
| Hauling  | 3.95E-03 | 0.1385   | 0.0604 | 3.90E-04 | 8.34E-03 | 4.80E-04 | 8.82E-03   | 2.29E-03 | 4.60E-04 | 2.75E-03    | 0        | 39.6877   | 39.6877   | 4.97E-03 | 0   | 39.8118 |
| Vendor   | 2.62E-03 | 0.0784   | 0.0312 | 1.80E-04 | 4.41E-03 | 3.90E-04 | 4.80E-03   | 1.27E-03 | 3.70E-04 | 1.65E-03    | 0        | 17.9136   | 17.9136   | 1.56E-03 | 0   | 17.9525 |
| Worker   | 9.93E-03 | 6.73E-03 | 0.0708 | 2.60E-04 | 0.0287   | 1.80E-04 | 0.0288     | 7.63E-03 | 1.70E-04 | 7.79E-03    | 0        | 23.8613   | 23.8613   | 4.70E-04 | 0   | 23.8729 |
| Total    | 0.0165   | 0.2236   | 0.1624 | 8.30E-04 | 0.0414   | 1.05E-03 | 0.0425     | 0.0112   | 1.00E-03 | 0.0122      | 0        | 81.4625   | 81.4625   | 7.00E-03 | 0   | 81.6372 |

# **Mitigated Construction On-Site**

|               | ROG   | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O | CO2e     |
|---------------|-------|--------|--------|----------|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|--------|-----|----------|
| Category      |       |        |        |          | tons/    | yr      |            |          |         |             |          |           |           | MT/yr  |     |          |
| Fugitive Dust |       |        |        |          | 0        | 0       | 0          | 0        | 0       | 0           | 0        | 0         | 0         | 0      | 0   | 0        |
| Off-Road      | 0.083 | 0.3598 | 3.0447 | 6.87E-03 |          | 0.0111  | 0.0111     |          | 0.0111  | 0.0111      | 0        | 681.5681  | 681.5681  | 0.0673 | 0   | 683.2509 |
| Total         | 0.083 | 0.3598 | 3.0447 | 6.87E-03 | 0        | 0.0111  | 0.0111     | 0        | 0.0111  | 0.0111      | 0        | 681.5681  | 681.5681  | 0.0673 | 0   | 683.2509 |

#### **Mitigated Construction Off-Site**

|          | ROG      | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------|----------|----------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|---------|
| Category |          |          |        |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |         |
| Hauling  | 3.95E-03 | 0.1385   | 0.0604 | 3.90E-04 | 8.34E-03 | 4.80E-04 | 8.82E-03   | 2.29E-03 | 4.60E-04 | 2.75E-03    | 0        | 39.6877   | 39.6877   | 4.97E-03 | 0   | 39.8118 |
| Vendor   | 2.62E-03 | 0.0784   | 0.0312 | 1.80E-04 | 4.41E-03 | 3.90E-04 | 4.80E-03   | 1.27E-03 | 3.70E-04 | 1.65E-03    | 0        | 17.9136   | 17.9136   | 1.56E-03 | 0   | 17.9525 |
| Worker   | 9.93E-03 | 6.73E-03 | 0.0708 | 2.60E-04 | 0.0287   | 1.80E-04 | 0.0288     | 7.63E-03 | 1.70E-04 | 7.79E-03    | 0        | 23.8613   | 23.8613   | 4.70E-04 | 0   | 23.8729 |
| Total    | 0.0165   | 0.2236   | 0.1624 | 8.30E-04 | 0.0414   | 1.05E-03 | 0.0425     | 0.0112   | 1.00E-03 | 0.0122      | 0        | 81.4625   | 81.4625   | 7.00E-03 | 0   | 81.6372 |

|               | ROG      | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|--------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category      |          |        |        |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |        |
| Fugitive Dust |          |        |        |          | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Off-Road      | 2.48E-03 | 0.0211 | 0.0141 | 7.00E-05 | 0        | 6.90E-04 | 6.90E-04   |          | 6.70E-04 | 6.70E-04    | 0        | 6.5523    | 6.5523    | 6.40E-04 | 0   | 6.5682 |
| Total         | 2.48E-03 | 0.0211 | 0.0141 | 7.00E-05 | 0        | 6.90E-04 | 6.90E-04   | 0        | 6.70E-04 | 6.70E-04    | 0        | 6.5523    | 6.5523    | 6.40E-04 | 0   | 6.5682 |

## **Unmitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|----------|----------|----------|----------|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category |          |          |          |     | MT/yr    |         |            |          |         |             |          |           |           |          |     |        |
| Hauling  | 4.00E-05 | 1.22E-03 | 6.00E-04 | 0   | 6.31E-03 | 0       | 6.32E-03   | 1.55E-03 | 0       | 1.56E-03    | 0        | 0.3752    | 0.3752    | 5.00E-05 | 0   | 0.3765 |
| Vendor   | 2.00E-05 | 6.80E-04 | 2.90E-04 | 0   | 4.00E-05 | 0       | 4.00E-05   | 1.00E-05 | 0       | 1.00E-05    | 0        | 0.1701    | 0.1701    | 1.00E-05 | 0   | 0.1705 |
| Worker   | 9.00E-05 | 6.00E-05 | 6.30E-04 | 0   | 2.80E-04 | 0       | 2.80E-04   | 7.00E-05 | 0       | 7.00E-05    | 0        | 0.2213    | 0.2213    | 0        | 0   | 0.2214 |
| Total    | 1.50E-04 | 1.96E-03 | 1.52E-03 | 0   | 6.63E-03 | 0       | 6.64E-03   | 1.63E-03 | 0       | 1.64E-03    | 0        | 0.7666    | 0.7666    | 6.00E-05 | 0   | 0.7683 |

## **Mitigated Construction On-Site**

|               | ROG      | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|----------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category      |          |          |        |          | MT/yr    |          |            |          |          |             |          |           |           |          |     |        |
| Fugitive Dust |          |          |        |          | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Off-Road      | 8.00E-04 | 3.46E-03 | 0.0293 | 7.00E-05 |          | 1.10E-04 | 1.10E-04   |          | 1.10E-04 | 1.10E-04    | 0        | 6.5522    | 6.5522    | 6.40E-04 | 0   | 6.5682 |
| Total         | 8.00E-04 | 3.46E-03 | 0.0293 | 7.00E-05 | 0        | 1.10E-04 | 1.10E-04   | 0        | 1.10E-04 | 1.10E-04    | 0        | 6.5522    | 6.5522    | 6.40E-04 | 0   | 6.5682 |

## **Mitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |  |  |  |  |
|----------|----------|----------|----------|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|----------|-----|--------|--|--|--|--|
| Category | tons/yr  |          |          |     |          |         |            |          |         |             |          |           | MT/yr     |          |     |        |  |  |  |  |
| Hauling  | 4.00E-05 | 1.22E-03 | 6.00E-04 | 0   | 6.31E-03 | 0       | 6.32E-03   | 1.55E-03 | 0       | 1.56E-03    | 0        | 0.3752    | 0.3752    | 5.00E-05 | 0   | 0.3765 |  |  |  |  |
| Vendor   | 2.00E-05 | 6.80E-04 | 2.90E-04 | 0   | 4.00E-05 | 0       | 4.00E-05   | 1.00E-05 | 0       | 1.00E-05    | 0        | 0.1701    | 0.1701    | 1.00E-05 | 0   | 0.1705 |  |  |  |  |
| Worker   | 9.00E-05 | 6.00E-05 | 6.30E-04 | 0   | 2.80E-04 | 0       | 2.80E-04   | 7.00E-05 | 0       | 7.00E-05    | 0        | 0.2213    | 0.2213    | 0        | 0   | 0.2214 |  |  |  |  |
| Total    | 1.50E-04 | 1.96E-03 | 1.52E-03 | 0   | 6.63E-03 | 0       | 6.64E-03   | 1.63E-03 | 0       | 1.64E-03    | 0        | 0.7666    | 0.7666    | 6.00E-05 | 0   | 0.7683 |  |  |  |  |

# 3.5 Structure - 2021 Unmitigated Construction On-Site

|          | ROG     | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e     |  |  |  |
|----------|---------|--------|--------|----------|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|----------|--|--|--|
| Category | tons/yr |        |        |          |          |         |            |          |         |             |          | MT/yr     |           |       |     |          |  |  |  |
| Off-Road | 0.1731  | 1.6467 | 1.2535 | 2.94E-03 |          | 0.062   | 0.062      |          | 0.0588  | 0.0588      | 0        | 238.9197  | 238.9197  | 0.066 | 0   | 240.5707 |  |  |  |
| Total    | 0.1731  | 1.6467 | 1.2535 | 2.94E-03 |          | 0.062   | 0.062      |          | 0.0588  | 0.0588      | 0        | 238.9197  | 238.9197  | 0.066 | 0   | 240.5707 |  |  |  |

# **Unmitigated Construction Off-Site**

| _ |      |      |    |     |           |         |              |           |         |                 |          |           |           |     |      |      |
|---|------|------|----|-----|-----------|---------|--------------|-----------|---------|-----------------|----------|-----------|-----------|-----|------|------|
|   | <br> |      |    |     |           |         |              |           |         |                 |          |           |           |     |      |      |
|   | ROG  | NOx  | CO | SO2 | Fugitive  | Exhaust | PM10 Total   | Fuaitive  | Exhaust | PM2.5 Total     | Rio- CO2 | NBio- CO2 | Total CO2 | CHA | N2O  | CO2e |
|   | NOO  | INOX | 00 | 302 | i ugitive | Linaust | I WITO TOTAL | i ugitive | LAHaust | i iviz.o i otal | DI0- CO2 | NDIO- COZ | Total CO2 | CH4 | 1120 | 0026 |
|   |      |      |    |     | _         |         |              | -         |         |                 |          |           |           |     |      |      |

| Category |          |        |        |          | tons     | /yr      |          |          |          |          |   |          |          | MT/yr    |   |          |
|----------|----------|--------|--------|----------|----------|----------|----------|----------|----------|----------|---|----------|----------|----------|---|----------|
| Hauling  | 0        | 0      | 0      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0 | 0        | 0        | 0        | 0 | 0        |
| Vendor   | 2.77E-03 | 0.0904 | 0.0388 | 2.30E-04 | 5.66E-03 | 2.10E-04 | 5.87E-03 | 1.64E-03 | 2.00E-04 | 1.83E-03 | 0 | 22.7158  | 22.7158  | 1.96E-03 | 0 | 22.7649  |
| Worker   | 0.0387   | 0.0252 | 0.273  | 1.06E-03 | 0.1196   | 7.30E-04 | 0.1203   | 0.0318   | 6.70E-04 | 0.0325   | 0 | 96.0328  | 96.0328  | 1.74E-03 | 0 | 96.0764  |
| Total    | 0.0415   | 0.1156 | 0.3118 | 1.29E-03 | 0.1252   | 9.40E-04 | 0.1262   | 0.0335   | 8.70E-04 | 0.0343   | 0 | 118.7486 | 118.7486 | 3.70E-03 | 0 | 118.8413 |

### **Mitigated Construction On-Site**

|          | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e     |
|----------|--------|--------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|-------|-----|----------|
| Category |        |        |        |          | tons/    | yr       |            |          |          |             |          |           | 1         | MT/yr |     |          |
| Off-Road | 0.0292 | 0.2581 | 1.0278 | 2.94E-03 |          | 3.41E-03 | 3.41E-03   |          | 3.41E-03 | 3.41E-03    | 0        | 238.9194  | 238.9194  | 0.066 | 0   | 240.5704 |
| Total    | 0.0292 | 0.2581 | 1.0278 | 2.94E-03 |          | 3.41E-03 | 3.41E-03   |          | 3.41E-03 | 3.41E-03    | 0        | 238.9194  | 238.9194  | 0.066 | 0   | 240.5704 |

### **Mitigated Construction Off-Site**

|          | ROG      | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e     |
|----------|----------|--------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|----------|
| Category |          |        |        |          | tons/    | /yr      |            |          |          |             |          |           | ı         | MT/yr    |     |          |
| Hauling  | 0        | 0      | 0      | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0        |
| Vendor   | 2.77E-03 | 0.0904 | 0.0388 | 2.30E-04 | 5.66E-03 | 2.10E-04 | 5.87E-03   | 1.64E-03 | 2.00E-04 | 1.83E-03    | 0        | 22.7158   | 22.7158   | 1.96E-03 | 0   | 22.7649  |
| Worker   | 0.0387   | 0.0252 | 0.273  | 1.06E-03 | 0.1196   | 7.30E-04 | 0.1203     | 0.0318   | 6.70E-04 | 0.0325      | 0        | 96.0328   | 96.0328   | 1.74E-03 | 0   | 96.0764  |
| Total    | 0.0415   | 0.1156 | 0.3118 | 1.29E-03 | 0.1252   | 9.40E-04 | 0.1262     | 0.0335   | 8.70E-04 | 0.0343      | 0        | 118.7486  | 118.7486  | 3.70E-03 | 0   | 118.8413 |

### 3.6 Interior Buildout - 2021 Unmitigated Construction On-Site

|          | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e |
|----------|-----|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|------|
| Category |     |     |    |     | tons     | /yr     |            |          |         |             |          |           |           | MT/yr |     |      |
| Off-Road | 0   | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Total    | 0   | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |

### **Unmitigated Construction Off-Site**

|          | ROG      | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------|----------|----------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|---------|
| Category |          |          |        |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |         |
| Hauling  | 0        | 0        | 0      | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0       |
| Vendor   | 2.13E-03 | 0.0694   | 0.0298 | 1.70E-04 | 4.34E-03 | 1.60E-04 | 4.50E-03   | 1.26E-03 | 1.50E-04 | 1.41E-03    | 0        | 17.4294   | 17.4294   | 1.51E-03 | 0   | 17.4671 |
| Worker   | 0.0132   | 8.59E-03 | 0.0931 | 3.60E-04 | 0.0408   | 2.50E-04 | 0.041      | 0.0109   | 2.30E-04 | 0.0111      | 0        | 32.7485   | 32.7485   | 5.90E-04 | 0   | 32.7634 |
| Total    | 0.0153   | 0.078    | 0.1229 | 5.30E-04 | 0.0451   | 4.10E-04 | 0.0455     | 0.0121   | 3.80E-04 | 0.0125      | 0        | 50.1779   | 50.1779   | 2.10E-03 | 0   | 50.2305 |

### **Mitigated Construction On-Site**

|          | ROG | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|----------|-----|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-----|-----|------|
| Category |     |     |    |     | tons/    |         |            |          |         | MT/yr       |          |           |           |     |     |      |
| Off-Road | 0   | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0   | 0   | 0    |

| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

### **Mitigated Construction Off-Site**

|          | ROG      | NOx      | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------|----------|----------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|---------|
| Category |          |          |        |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |         |
| Hauling  | 0        | 0        | 0      | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0       |
| Vendor   | 2.13E-03 | 0.0694   | 0.0298 | 1.70E-04 | 4.34E-03 | 1.60E-04 | 4.50E-03   | 1.26E-03 | 1.50E-04 | 1.41E-03    | 0        | 17.4294   | 17.4294   | 1.51E-03 | 0   | 17.4671 |
| Worker   | 0.0132   | 8.59E-03 | 0.0931 | 3.60E-04 | 0.0408   | 2.50E-04 | 0.041      | 0.0109   | 2.30E-04 | 0.0111      | 0        | 32.7485   | 32.7485   | 5.90E-04 | 0   | 32.7634 |
| Total    | 0.0153   | 0.078    | 0.1229 | 5.30E-04 | 0.0451   | 4.10E-04 | 0.0455     | 0.0121   | 3.80E-04 | 0.0125      | 0        | 50.1779   | 50.1779   | 2.10E-03 | 0   | 50.2305 |

### 3.7 Skin and Roof - 2021 Unmitigated Construction On-Site

|                 | ROG    | NOx    | СО     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|-----------------|--------|--------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category        |        |        |        |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |        |
| Archit. Coating | 1.1247 |        |        |          |          | 0        | 0          |          | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Off-Road        | 0.015  | 0.1763 | 0.0721 | 2.10E-04 |          | 7.16E-03 | 7.16E-03   |          | 6.59E-03 | 6.59E-03    | 0        | 18.432    | 18.432    | 5.96E-03 | 0   | 18.581 |
| Total           | 1.1397 | 0.1763 | 0.0721 | 2.10E-04 |          | 7.16E-03 | 7.16E-03   |          | 6.59E-03 | 6.59E-03    | 0        | 18.432    | 18.432    | 5.96E-03 | 0   | 18.581 |

### **Unmitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------|----------|----------|----------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|---------|
| Category |          |          |          |          | tons/    | /yr      |            |          |          |             |          |           |           | MT/yr    |     |         |
| Hauling  | 0        | 0        | 0        | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0       |
| Vendor   | 1.21E-03 | 0.0394   | 0.0169   | 1.00E-04 | 2.46E-03 | 9.00E-05 | 2.55E-03   | 7.10E-04 | 9.00E-05 | 8.00E-04    | 0        | 9.8924    | 9.8924    | 8.50E-04 | 0   | 9.9138  |
| Worker   | 1.07E-03 | 7.00E-04 | 7.55E-03 | 3.00E-05 | 3.31E-03 | 2.00E-05 | 3.33E-03   | 8.80E-04 | 2.00E-05 | 9.00E-04    | 0        | 2.6553    | 2.6553    | 5.00E-05 | 0   | 2.6565  |
| Total    | 2.28E-03 | 0.0401   | 0.0245   | 1.30E-04 | 5.77E-03 | 1.10E-04 | 5.88E-03   | 1.59E-03 | 1.10E-04 | 1.70E-03    | 0        | 12.5477   | 12.5477   | 9.00E-04 | 0   | 12.5703 |

### **Mitigated Construction On-Site**

|                 | ROG      | NOx    | CO     | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|-----------------|----------|--------|--------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category        |          |        |        |          | tons/    | yr       |            |          |          |             |          |           | ı         | MT/yr    |     |        |
| Archit. Coating | 1.1247   |        |        |          |          | 0        | 0          |          | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Off-Road        | 2.58E-03 | 0.0112 | 0.0945 | 2.10E-04 |          | 3.40E-04 | 3.40E-04   |          | 3.40E-04 | 3.40E-04    | 0        | 18.432    | 18.432    | 5.96E-03 | 0   | 18.581 |
| Total           | 1.1273   | 0.0112 | 0.0945 | 2.10E-04 |          | 3.40E-04 | 3.40E-04   |          | 3.40E-04 | 3.40E-04    | 0        | 18.432    | 18.432    | 5.96E-03 | 0   | 18.581 |

### **Mitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|----------|----------|----------|----------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category |          |          |          |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |        |
| Hauling  | 0        | 0        | 0        | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Vendor   | 1.21E-03 | 0.0394   | 0.0169   | 1.00E-04 | 2.46E-03 | 9.00E-05 | 2.55E-03   | 7.10E-04 | 9.00E-05 | 8.00E-04    | 0        | 9.8924    | 9.8924    | 8.50E-04 | 0   | 9.9138 |
| Worker   | 1.07E-03 | 7.00E-04 | 7.55E-03 | 3.00E-05 | 3.31E-03 | 2.00E-05 | 3.33E-03   | 8.80E-04 | 2.00E-05 | 9.00E-04    | 0        | 2.6553    | 2.6553    | 5.00E-05 | 0   | 2.6565 |

| Total | 2.28E-03 | 0.0401 | 0.0245 | 1.30E-04 | 5.77E-03 | 1.10E-04 | 5.88E-03 | 1.59E-03 | 1.10E-04 | 1.70E-03 | 0 | 12.5477 | 12.5477 | 9.00E-04 | 0 | 12.5703 |
|-------|----------|--------|--------|----------|----------|----------|----------|----------|----------|----------|---|---------|---------|----------|---|---------|

### 3.8 Commissioning and Final Inspections - 2021 Unmitigated Construction On-Site

|          | ROG      | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e |
|----------|----------|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|------|
| Category |          |     |    |     | tons/    | 'yr     |            |          |         |             |          |           |           | MT/yr |     |      |
| Off-Road | 0        | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Paving   | 2.10E-04 |     |    |     |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Total    | 2.10E-04 | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |

### **Unmitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------|----------|----------|----------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|---------|
| Category |          |          |          |          | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |         |
| Hauling  | 0        | 0        | 0        | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0       |
| Vendor   | 5.60E-04 | 0.0181   | 7.78E-03 | 5.00E-05 | 1.13E-03 | 4.00E-05 | 1.18E-03   | 3.30E-04 | 4.00E-05 | 3.70E-04    | 0        | 4.5536    | 4.5536    | 3.90E-04 | 0   | 4.5635  |
| Worker   | 0.0133   | 8.66E-03 | 0.0938   | 3.60E-04 | 0.0411   | 2.50E-04 | 0.0413     | 0.0109   | 2.30E-04 | 0.0112      | 0        | 33.0014   | 33.0014   | 6.00E-04 | 0   | 33.0164 |
| Total    | 0.0139   | 0.0268   | 0.1016   | 4.10E-04 | 0.0422   | 2.90E-04 | 0.0425     | 0.0113   | 2.70E-04 | 0.0115      | 0        | 37.555    | 37.555    | 9.90E-04 | 0   | 37.5798 |

### **Mitigated Construction On-Site**

|          | ROG      | NOx | CO | SO2 | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O | CO2e |
|----------|----------|-----|----|-----|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|-------|-----|------|
| Category |          |     |    |     | tons/    | /yr     |            |          |         |             |          |           | ı         | MT/yr |     |      |
| Off-Road | 0        | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Paving   | 2.10E-04 |     |    |     |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |
| Total    | 2.10E-04 | 0   | 0  | 0   |          | 0       | 0          |          | 0       | 0           | 0        | 0         | 0         | 0     | 0   | 0    |

### **Mitigated Construction Off-Site**

|          | ROG      | NOx      | CO       | SO2      | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------|----------|----------|----------|----------|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|---------|
| Category |          |          |          |          | tons/    | /yr      |            |          |          |             |          |           |           | MT/yr    |     |         |
| Hauling  | 0        | 0        | 0        | 0        | 0        | 0        | 0          | 0        | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0       |
| Vendor   | 5.60E-04 | 0.0181   | 7.78E-03 | 5.00E-05 | 1.13E-03 | 4.00E-05 | 1.18E-03   | 3.30E-04 | 4.00E-05 | 3.70E-04    | 0        | 4.5536    | 4.5536    | 3.90E-04 | 0   | 4.5635  |
| Worker   | 0.0133   | 8.66E-03 | 0.0938   | 3.60E-04 | 0.0411   | 2.50E-04 | 0.0413     | 0.0109   | 2.30E-04 | 0.0112      | 0        | 33.0014   | 33.0014   | 6.00E-04 | 0   | 33.0164 |
| Total    | 0.0139   | 0.0268   | 0.1016   | 4.10E-04 | 0.0422   | 2.90E-04 | 0.0425     | 0.0113   | 2.70E-04 | 0.0115      | 0        | 37.555    | 37.555    | 9.90E-04 | 0   | 37.5798 |

### 5.0 Energy Detail

Historical Energy Use: N

### **5.1 Mitigation Measures Energy**

|                         | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O      | CO2e     |
|-------------------------|--------|--------|--------|----------|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|----------|----------|----------|
| Category                |        |        |        |          | tons/    | yr      |            |          |         |             |          |           |           | MT/yr    |          |          |
| Electricity             |        |        |        |          |          | 0       | 0          |          | 0       | 0           | 0        | 465.1966  | 465.1966  | 0.0788   | 9.85E-03 | 470.0996 |
| Electricity             | D      | D      | 0      | 0        | 0        | 0       | 0          |          | 0       | 0           | 0        | 465.1966  | 465.1966  | 0.0788   | 9.85E-03 | 470.0996 |
| NaturalGas<br>Mitigated | 0.0186 | 0.1692 | 0.1421 | 1.02E-03 | 0        | 0.0129  | 0.0129     |          | 0.0129  | 0.0129      | 0        | 184.2002  | 184.2002  | 3.53E-03 | 3.38E-03 | 185.2948 |
| NaturalGas              | 0.0186 | 0.1692 | 0.1421 | 1.02E-03 |          | 0.0129  | 0.0129     |          | 0.0129  | 0.0129      | 0        | 184.2002  | 184.2002  | 3.53E-03 | 3.38E-03 | 185.2948 |

### 5.2 Energy by Land Use - NaturalGas <u>Unmitigated</u>

|             | NaturalGas | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O      | CO2e     |
|-------------|------------|--------|--------|--------|----------|----------|---------|------------|----------|---------|--------|----------|-----------|-----------|----------|----------|----------|
| Land Use    | kBTU/yr    |        |        |        |          | tons/y   | r       |            |          |         |        |          |           | МТ        | ∏/yr     |          |          |
| Office Park | 3.45E+06   | 0.0186 | 0.1692 | 0.1421 | 1.02E-03 |          | 0.0129  | 0.0129     |          | 0.0129  | 0.0129 | 0        | 184.2002  | 184.2002  | 3.53E-03 | 3.38E-03 | 185.2948 |
| Parking Lot | 0          | 0      | 0      | 0      | 0        |          | 0       | 0          |          | 0       | 0      | 0        | 0         | 0         | 0        | 0        | 0        |
| Regional    | 0          | 0      | 0      | 0      | 0        |          | 0       | 0          |          | 0       | 0      | 0        | 0         | 0         | 0        | 0        | 0        |
| Research &  | 0          | 0      | 0      | 0      | 0        |          | 0       | 0          |          | 0       | 0      | 0        | 0         | 0         | 0        | 0        | 0        |
| Total       |            | 0.0186 | 0.1692 | 0.1421 | 1.02E-03 |          | 0.0129  | 0.0129     |          | 0.0129  | 0.0129 | 0        | 184.2002  | 184.2002  | 3.53E-03 | 3.38E-03 | 185.2948 |

### **Mitigated**

|             | NaturalGas | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O      | CO2e     |
|-------------|------------|--------|--------|--------|----------|----------|---------|------------|----------|---------|--------|----------|-----------|-----------|----------|----------|----------|
| Land Use    | kBTU/yr    |        |        |        |          | tons/y   | 'r      |            |          |         |        |          |           | МТ        | Γ/yr     |          |          |
| Office Park | 3.45E+06   | 0.0186 | 0.1692 | 0.1421 | 1.02E-03 |          | 0.0129  | 0.0129     |          | 0.0129  | 0.0129 | 0        | 184.2002  | 184.2002  | 3.53E-03 | 3.38E-03 | 185.2948 |
| Parking Lot | 0          | 0      | 0      | 0      | 0        |          | 0       | 0          |          | 0       | 0      | 0        | 0         | 0         | 0        | 0        | 0        |
| Regional    | 0          | 0      | 0      | 0      | 0        |          | 0       | 0          |          | 0       | 0      | 0        | 0         | 0         | 0        | 0        | 0        |
| Research &  | 0          | 0      | 0      | 0      | 0        |          | 0       | 0          |          | 0       | 0      | 0        | 0         | 0         | 0        | 0        | 0        |
| Total       |            | 0.0186 | 0.1692 | 0.1421 | 1.02E-03 |          | 0.0129  | 0.0129     |          | 0.0129  | 0.0129 | 0        | 184.2002  | 184.2002  | 3.53E-03 | 3.38E-03 | 185.2948 |

### 5.3 Energy by Land Use - Electricity Unmitigated

|             | Electricity | Total CO2 | CH4    | N2O      | CO2e     |
|-------------|-------------|-----------|--------|----------|----------|
| Land Use    | kWh/yr      |           | MT.    | /yr      |          |
| Office Park | 5.43E+06    | 465.1966  | 0.0788 | 9.85E-03 | 470.0996 |
| Parking Lot | 0           | 0         | 0      | 0        | 0        |
| Regional    | 0           | 0         | 0      | 0        | 0        |
| Research &  | 0           | 0         | 0      | 0        | 0        |
| Total       |             | 465.1966  | 0.0788 | 9.85E-03 | 470.0996 |

### **Mitigated**

|             | Electricity | Total CO2 | CH4    | N2O      | CO2e     |
|-------------|-------------|-----------|--------|----------|----------|
| Land Use    | kWh/yr      |           | MT     | /yr      |          |
| Office Park | 5.43E+06    | 465.1966  | 0.0788 | 9.85E-03 | 470.0996 |
| Parking Lot | 0           | 0         | 0      | 0        | 0        |
| Regional    | 0           | 0         | 0      | 0        | 0        |
| Research &  | 0           | 0         | 0      | 0        | 0        |
| Total       |             | 465.1966  | 0.0788 | 9.85E-03 | 470.0996 |

### 6.0 Area Detail

### **6.1 Mitigation Measures Area**

|             | ROG    | NOx      | CO       | SO2 | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|-------------|--------|----------|----------|-----|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| Category    |        |          |          |     | tons/    | yr       |            |          |          |             |          |           |           | MT/yr    |     |        |
| Mitigated   | 0.8371 | 5.00E-05 | 5.90E-03 | 0   |          | 2.00E-05 | 2.00E-05   |          | 2.00E-05 | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0   | 0.0122 |
| Unmitigated | 0.8371 | 5.00E-05 | 5.90E-03 | 0   |          | 2.00E-05 | 2.00E-05   |          | 2.00E-05 | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0   | 0.0122 |

### 6.2 Area by SubCategory Unmitigated

|               | ROG      | NOx      | CO       | SO2 | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|----------|----------|-----|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| SubCategory   |          |          |          |     | tons/    | /yr      |            |          |          |             |          |           | 1         | MT/yr    |     |        |
| Architectural | 0.1125   |          |          |     |          | 0        | 0          |          | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Consumer      | 0.8266   |          |          |     |          | 0        | 0          |          | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Landscaping   | 5.50E-04 | 5.00E-05 | 5.90E-03 | 0   |          | 2.00E-05 | 2.00E-05   |          | 2.00E-05 | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0   | 0.0122 |
| Total         | 0.9396   | 5.00E-05 | 5.90E-03 | 0   |          | 2.00E-05 | 2.00E-05   |          | 2.00E-05 | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0   | 0.0122 |

### **Mitigated**

|               | ROG      | NOx      | CO       | SO2 | Fugitive | Exhaust  | PM10 Total | Fugitive | Exhaust  | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|----------|----------|-----|----------|----------|------------|----------|----------|-------------|----------|-----------|-----------|----------|-----|--------|
| SubCategory   |          |          |          |     | tons/    | yr       |            |          |          |             |          |           | ı         | MT/yr    |     |        |
| Architectural | 0.1125   |          |          |     |          | 0        | 0          |          | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Consumer      | 0.8266   |          |          |     |          | 0        | 0          |          | 0        | 0           | 0        | 0         | 0         | 0        | 0   | 0      |
| Landscaping   | 5.50E-04 | 5.00E-05 | 5.90E-03 | 0   |          | 2.00E-05 | 2.00E-05   |          | 2.00E-05 | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0   | 0.0122 |
| Total         | 0.9396   | 5.00E-05 | 5.90E-03 | 0   |          | 2.00E-05 | 2.00E-05   |          | 2.00E-05 | 2.00E-05    | 0        | 0.0114    | 0.0114    | 3.00E-05 | 0   | 0.0122 |

### 7.0 Water Detail

### 7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet Install Low Flow Kitchen Faucet Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

|             | Total CO2 | CH4    | N2O      | CO2e   |  |  |  |  |  |
|-------------|-----------|--------|----------|--------|--|--|--|--|--|
| Category    | MT/yr     |        |          |        |  |  |  |  |  |
| Mitigated   | 3.2243    | 0.1257 | 3.00E-03 | 7.26   |  |  |  |  |  |
| Unmitigated | 3.9896    | 0.1571 | 3.75E-03 | 9.0338 |  |  |  |  |  |

## 7.2 Water by Land Use <u>Unmitigated</u>

|             | Indoor/Outdo | Total CO2 | CH4      | N2O      | CO2e   |  |  |  |  |  |
|-------------|--------------|-----------|----------|----------|--------|--|--|--|--|--|
| Land Use    | Mgal         | MT/yr     |          |          |        |  |  |  |  |  |
| Office Park | 0.974222 /   | 0.9402    | 0.0319   | 7.60E-04 | 1.9638 |  |  |  |  |  |
| Parking Lot | 0/0          | 0         | 0        | 0        | 0      |  |  |  |  |  |
| Regional    | 0.301205/    | 0.2907    | 9.85E-03 | 2.40E-04 | 0.6072 |  |  |  |  |  |
| Research &  | 3.53174 / 0  | 2.7588    | 0.1154   | 2.75E-03 | 6.4628 |  |  |  |  |  |
| Total       |              | 3.9896    | 0.1571   | 3.75E-03 | 9.0338 |  |  |  |  |  |

### **Mitigated**

|             | Indoor/Outdo | Total CO2 | CH4      | N2O      | CO2e   |
|-------------|--------------|-----------|----------|----------|--------|
| Land Use    | Mgal         |           | MT       | /yr      |        |
| Office Park | 0.779378/    | 0.777     | 0.0255   | 6.10E-04 | 1.5962 |
| Parking Lot | 0/0          | 0         | 0        | 0        | 0      |
| Regional    | 0.240964 /   | 0.2402    | 7.88E-03 | 1.90E-04 | 0.4935 |
| Research &  | 2.82539 / 0  | 2.207     | 0.0923   | 2.20E-03 | 5.1703 |
| Total       |              | 3.2243    | 0.1257   | 3.00E-03 | 7.26   |

### 8.0 Waste Detail

### 8.1 Mitigation Measures Waste

### Category/Year

|             | Total CO2 | CH4    | N2O | CO2e    |  |  |  |  |  |  |
|-------------|-----------|--------|-----|---------|--|--|--|--|--|--|
|             | MT/yr     |        |     |         |  |  |  |  |  |  |
| Mitigated   | 19.2578   | 1.1381 | 0   | 47.7103 |  |  |  |  |  |  |
| Unmitigated | 19.2578   | 1.1381 | 0   | 47.7103 |  |  |  |  |  |  |

### 8.2 Waste by Land Use Unmitigated

|             | Waste | Total CO2 | CH4    | N2O | CO2e    |
|-------------|-------|-----------|--------|-----|---------|
| Land Use    | tons  |           | MT     | /yr |         |
| Office Park | 73.19 | 14.8569   | 0.878  | 0   | 36.8074 |
| Parking Lot | 0     | 0         | 0      | 0   | 0       |
| Regional    | 12.71 | 2.58      | 0.1525 | 0   | 6.3919  |
| Research &  | 8.97  | 1.8208    | 0.1076 | 0   | 4.511   |
| Total       |       | 19.2578   | 1.1381 | 0   | 47.7103 |

### **Mitigated**

|             | Waste | Total CO2 | CH4    | N2O | CO2e    |
|-------------|-------|-----------|--------|-----|---------|
| Land Use    | tons  |           | MT     | /yr |         |
| Office Park | 73.19 | 14.8569   | 0.878  | 0   | 36.8074 |
| Parking Lot | 0     | 0         | 0      | 0   | 0       |
| Regional    | 12.71 | 2.58      | 0.1525 | 0   | 6.3919  |
| Research &  | 8.97  | 1.8208    | 0.1076 | 0   | 4.511   |
| Total       |       | 19.2578   | 1.1381 | 0   | 47.7103 |

### 9.0 Operational Offroad

| Equipment Type Number Hours/Day Days/Year Horse Power Load Factor F |          |
|---|----------|
| Equipment Type Number Hours/Day Days/Year Horse Power Load Factor F | uel Type |

### 10.0 Stationary Equipment

### **Fire Pumps and Emergency Generators**

| Equipment Type      | Number | Hours/Day | Hours/Year | Horse Power | Load Factor | Fuel Type |
|---------------------|--------|-----------|------------|-------------|-------------|-----------|
| Emergency Generator | 1      | 1         | 50         | 1869        | 0.8         | Diesel    |

### **Boilers**

| Equipment Type | Number | Heat Input/Day | Heat Input/Year | Boiler Rating | Fuel Type |
|----------------|--------|----------------|-----------------|---------------|-----------|
|                |        |                |                 |               | , , , ,   |

### **User Defined Equipment**

| Equipment Type | Number |
|----------------|--------|

### 10.1 Stationary Sources Unmitigated/Mitigated

|                | ROG   | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10 Total | Fugitive | Exhaust | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4      | N2O | CO2e    |
|----------------|-------|--------|--------|----------|----------|---------|------------|----------|---------|-------------|----------|-----------|-----------|----------|-----|---------|
| Equipment Type |       |        |        |          | tons/    | yr      |            |          |         |             |          |           | N         | /IT/yr   |     |         |
| Emergency      | 0.084 | 0.3758 | 0.2143 | 4.00E-04 |          | 0.0124  | 0.0124     |          | 0.0124  | 0.0124      | 0        | 38.9978   | 38.9978   | 5.47E-03 | 0   | 39.1345 |
| Total          | 0.084 | 0.3758 | 0.2143 | 4.00E-04 |          | 0.0124  | 0.0124     |          | 0.0124  | 0.0124      | 0        | 38.9978   | 38.9978   | 5.47E-03 | 0   | 39.1345 |

CalEEMod Version: CalEEMod.2016.3.2

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701 Gateway - Sequestration Only - San Mateo County, Annual

# 701 Gateway - Sequestration Only 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 | 170.24 | 1000sqft | 3.20        | 170,235.00         | 0          |

### 1.2 Other Project Characteristics

Urbanization Wind Speed (m/s) 2.2 Precipitation Freq (Days) 70 Urban **Climate Zone** 5 **Operational Year** 2021 Pacific Gas & Electric Company **Utility Company** CO2 Intensity 189 **CH4 Intensity** 0.032 **N2O Intensity** 0.004 (lb/MWhr) (lb/MWhr) (lb/MWhr)

### 1.3 User Entered Comments & Non-Default Data

Sequestration - net tree loss

| Table Name       | Column Name      | Default Value | New Value |
|------------------|------------------|---------------|-----------|
| tblSequestration | NumberOfNewTrees | 0.00          | 63.00     |

### 2.0 Emissions Summary

### 2.3 Vegetation

Vegetation

|           | CO2e    |
|-----------|---------|
| Category  | MT      |
| New Trees | 46.2420 |
| Total     | 46.242  |

11.2 Net New Trees
Species Class

|                | Number of<br>Trees | Total CO2 | CH4    | N2O    | CO2e    |
|----------------|--------------------|-----------|--------|--------|---------|
|                |                    |           | M      | ΊΤ     |         |
| Mixed Hardwood | 63                 | 46.2420   | 0.0000 | 0.0000 | 46.2420 |
| Total          |                    | 46.2420   | 0.0000 | 0.0000 | 46.2420 |

### **Construction Energy**

|      |            |            | CO2     | CH4 (metric | N2O     | CO2e    |
|------|------------|------------|---------|-------------|---------|---------|
| Year | Annual kWh | Annual MWh | (metric | •           | (metric | (metric |
|      |            |            | tons)   | tons)       | tons)   | tons)   |
| 2020 | 52,000     | 52         | 5.0     | 0.00078     | 0.00009 | 4.99977 |
| 2021 | 52,000     | 52         | 4.5     | 0.00075     | 0.00009 | 4.50268 |

### **GHG Emission Factors**

| Year | CO2 | CH4    | N20    |
|------|-----|--------|--------|
| 2020 | 210 | 0.0329 | 0.0039 |
| 2021 | 189 | 0.0316 | 0.0037 |

Source: eGrid (2018); PG&E (2019); see RPS Electricity Efs

### Conversions

| kWh-MWh | 0.001       | Standard |
|---------|-------------|----------|
| lb-ton  | 0.000453592 | Standard |
| CH4 GWP | 25          | CARB     |
| N2O GWP | 298         | CARB     |

Source: CARB (2020) https://ww2.arb.ca.gov/ghg-gwps

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701 Gateway - Operation (2021) - San Mateo County, Summer

### 701 Gateway - Operation (2021) 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 | 170.24 | 1000sqft | 3.20        | 170,235.00         | 0          |

### 1.2 Other Project Characteristics

UrbanizationUrbanWind Speed (m/s)2.2Precipitation Freq (Days)70Climate Zone5Operational Year2021

Utility Company Pacific Gas & Electric Company

**CO2 Intensity** 189 **CH4 Intensity** 0.032 **N20 Intensity** 0.004

### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - EFs adjusted for SB 100

Land Use - sf and spaces provided by applicant; lot acreage scaled by sf with parking lot

Construction Phase - operational analysis only

Off-road Equipment - operational analysis only

Trips and VMT - operational analysis only

Grading -

Architectural Coating - operational analysis only

Vehicle Trips - mobile emissions modeled separately

Energy Use - Energy consumption provided by applicant

Water And Wastewater - water usage provided by project applicant; assumed Caleemod default for general office building of 62% indoor/38% outdoor Land Use Change -

Sequestration Stationary Sources - Emergency Generators and Fire Pumps - assumed existing generator at 701 Gateway to have same specs as future generator at Demolition -

Construction Off-road Equipment Mitigation -

| Table Name                      | Column Name                | Default Value | New Value   |
|---------------------------------|----------------------------|---------------|-------------|
| tblEnergyUse                    | LightingElect              | 3.58          | 0.00        |
| tblEnergyUse                    | NT24E                      | 4.80          | 0.00        |
| tblEnergyUse                    | NT24NG                     | 1.01          | 0.00        |
| tblEnergyUse                    | T24E                       | 4.10          | 9.83        |
| tblEnergyUse                    | T24NG                      | 18.32         | 26.24       |
| tblLandUse                      | LandUseSquareFeet          | 170,240.00    | 170,235.00  |
| tblLandUse                      | LotAcreage                 | 3.91          | 3.20        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 4.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblProjectCharacteristics       | CH4IntensityFactor         | 0.029         | 0.032       |
| tblProjectCharacteristics       | CO2IntensityFactor         | 641.35        | 189         |
| tblProjectCharacteristics       | N2OIntensityFactor         | 0.006         | 0.004       |
| tblStationaryGeneratorsPumpsEF  | CH4_EF                     | 0.07          | 0.07        |
| tblStationaryGeneratorsPumpsEF  | ROG_EF                     | 2.2480e-003   | 2.2477e-003 |
| tblStationaryGeneratorsPumpsUse | HorsePowerValue            | 0.00          | 1,869.00    |
| tblStationaryGeneratorsPumpsUse | HoursPerDay                | 0.00          | 1.00        |
| tblStationaryGeneratorsPumpsUse | HoursPerYear               | 0.00          | 50.00       |
| tblStationaryGeneratorsPumpsUse | Load_Factor                | 0.73          | 0.80        |
| tblStationaryGeneratorsPumpsUse | NumberOfEquipment          | 0.00          | 1.00        |

| tblTripsAndVMT  | VendorTripNumber    | 28.00         | 0.00         |
|-----------------|---------------------|---------------|--------------|
| tblTripsAndVMT  | WorkerTripNumber    | 54.00         | 0.00         |
| tblTripsAndVMT  | WorkerTripNumber    | 11.00         | 0.00         |
| tblVehicleTrips | ST_TR               | 2.46          | 0.00         |
| tblVehicleTrips | SU_TR               | 1.05          | 0.00         |
| tblVehicleTrips | WD_TR               | 11.03         | 0.00         |
| tblWater        | IndoorWaterUseRate  | 30,257,393.26 | 2,107,306.00 |
| tblWater        | OutdoorWaterUseRate | 18,544,853.93 | 1,291,574.00 |

### 2.0 Emissions Summary

### 2.2 Overall Operational Unmitigated Operational

|            | ROG    | NOx      | CO     | SO2      | Fugitive    | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O    | CO2e     |
|------------|--------|----------|--------|----------|-------------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|--------|----------|
| Category   |        | lb/day   |        |          |             |          |          |          |          |          |          | lb/d     | ay        |          |        |          |
| Area       | 4.1311 | 1.60E-04 | 0.0175 | 0        |             | 6.00E-05 | 6.00E-05 |          | 6.00E-05 | 6.00E-05 |          | 0.0373   | 0.0373    | 1.00E-04 |        | 0.0397   |
| Energy     | 0.132  | 1.1997   | 1.0078 | 7.20E-03 | Tilling (1) | 0.0912   | 0.0912   |          | 0.0912   | 0.0912   |          | 1,439.68 | 1,439.68  | 0.0276   | 0.0264 | 1,448.23 |
| Mobile     | 0      | 0        | 0      | 0        | 0           | 0        | 0        | 0        | 0        | 0        | 1        | 0        | 0         | 0        |        | 0        |
| Stationary | 3.3608 | 15.0314  | 8.5705 | 0.0162   |             | 0.4945   | 0.4945   |          | 0.4945   | 0.4945   |          | 1,719.51 | 1,719.51  | 0.2411   |        | 1,725.54 |
| Total      | 7.6238 | 16.2313  | 9.5957 | 0.0234   | 0           | 0.5857   | 0.5857   | 0        | 0.5857   | 0.5857   |          | 3,159.22 | 3,159.22  | 0.2688   | 0.0264 | 3,173.81 |

### 5.0 Energy Detail

Historical Energy Use: N

### **5.1 Mitigation Measures Energy**

|            | ROG    | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O    | CO2e     |
|------------|--------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|--------|--------|----------|
| Category   | lb/day |        |        |          |          |         |        |          |         |        | lb/d     | ay       |           |        |        |          |
| NaturalGas | 0.132  | 1.1997 | 1.0078 | 7.20E-03 |          | 0.0912  | 0.0912 |          | 0.0912  | 0.0912 |          | 1,439.68 | 1,439.68  | 0.0276 | 0.0264 | 1,448.23 |
| NaturalGas | 0.132  | 1.1997 | 1.0078 | 7.20E-03 |          | 0.0912  | 0.0912 |          | 0.0912  | 0.0912 |          | 1,439.68 | 1,439.68  | 0.0276 | 0.0264 | 1,448.23 |

### 5.2 Energy by Land Use - NaturalGas Unmitigated

|                | NaturalGa | ROG   | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio- CO2 | Total CO2 | CH4    | N2O    | CO2e     |
|----------------|-----------|-------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|-----------|-----------|--------|--------|----------|
| Land Use       | kBTU/yr   |       |        |        |          | lb/d     | lay     |        |          |         |        |          |           | lb/d      | ay     |        |          |
| General Office | 12237.3   | 0.132 | 1.1997 | 1.0078 | 7.20E-03 |          | 0.0912  | 0.0912 |          | 0.0912  | 0.0912 |          | 1,439.68  | 1,439.68  | 0.0276 | 0.0264 | 1,448.23 |
| Total          |           | 0.132 | 1.1997 | 1.0078 | 7.20E-03 |          | 0.0912  | 0.0912 |          | 0.0912  | 0.0912 |          | 1,439.68  | 1,439.68  | 0.0276 | 0.0264 | 1,448.23 |

### 6.0 Area Detail

### **6.1 Mitigation Measures Area**

|             | ROG    | NOx      | CO     | SO2 | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-  | Total CO2 | CH4      | N2O | CO2e   |
|-------------|--------|----------|--------|-----|----------|----------|----------|----------|----------|----------|----------|--------|-----------|----------|-----|--------|
| Category    |        |          |        |     | lb/c     | lay      |          |          |          |          |          |        | lb/d      | ay       |     |        |
| Mitigated   | 4.1311 | 1.60E-04 | 0.0175 | 0   |          | 6.00E-05 | 6.00E-05 |          | 6.00E-05 | 6.00E-05 |          | 0.0373 | 0.0373    | 1.00E-04 |     | 0.0397 |
| Unmitigated | 4.1311 | 1.60E-04 | 0.0175 | 0   |          | 6.00E-05 | 6.00E-05 |          | 6.00E-05 | 6.00E-05 |          | 0.0373 | 0.0373    | 1.00E-04 |     | 0.0397 |

### 6.2 Area by SubCategory Unmitigated

|               | ROG      | NOx      | CO     | SO2 | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-  | Total CO2 | CH4      | N2O | CO2e   |
|---------------|----------|----------|--------|-----|----------|----------|----------|----------|----------|----------|----------|--------|-----------|----------|-----|--------|
| SubCategory   |          |          |        |     | lb/c     | lay      |          |          |          |          |          |        | lb/d      | lay      |     |        |
| Architectural | 0.4864   |          |        |     |          | 0        | 0        |          | 0        | 0        |          |        | 0         |          |     | 0      |
| Consumer      | 3.643    |          |        |     |          | 0        | 0        |          | 0        | 0        |          |        | 0         |          |     | 0      |
| Landscaping   | 1.63E-03 | 1.60E-04 | 0.0175 | 0   |          | 6.00E-05 | 6.00E-05 |          | 6.00E-05 | 6.00E-05 |          | 0.0373 | 0.0373    | 1.00E-04 |     | 0.0397 |
| Total         | 4.1311   | 1.60E-04 | 0.0175 | 0   |          | 6.00E-05 | 6.00E-05 |          | 6.00E-05 | 6.00E-05 |          | 0.0373 | 0.0373    | 1.00E-04 |     | 0.0397 |

### 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 Stationary Equipment**

### **Fire Pumps and Emergency Generators**

| Equipment Type      | Number | Hours/Day | Hours/Year | Horse Power | Load Factor | Fuel Type |
|---------------------|--------|-----------|------------|-------------|-------------|-----------|
| Emergency Generator | 1      | 1         | 50         | 1869        | 0.8         | Diesel    |

### **Boilers**

| Equipment Type | Number | Heat Input/Day | Heat Input/Year | Boiler Rating | Fuel Type | ı |
|----------------|--------|----------------|-----------------|---------------|-----------|---|

### **User Defined Equipment**

| Equipment Type | Number |
|----------------|--------|

### 10.1 Stationary Sources <u>Unmitigated/Mitigated</u>

|                | ROG    | NOx     | CO     | SO2    | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4    | N2O | CO2e     |
|----------------|--------|---------|--------|--------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|--------|-----|----------|
| Equipment Type |        |         |        |        | lb/c     | lay     |        |          |         |        |          |          | lb/d      | ay     |     |          |
| Emergency      | 3.3608 | 15.0314 | 8.5705 | 0.0162 |          | 0.4945  | 0.4945 |          | 0.4945  | 0.4945 |          | 1,719.51 | 1,719.51  | 0.2411 |     | 1,725.54 |
| Total          | 3.3608 | 15.0314 | 8.5705 | 0.0162 |          | 0.4945  | 0.4945 |          | 0.4945  | 0.4945 |          | 1,719.51 | 1,719.51  | 0.2411 |     | 1,725.54 |

### 11.0 Vegetation

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701 Gateway - Operation (2021) - San Mateo County, Annual

### 701 Gateway - Operation (2021) 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 | 170.24 | 1000sqft | 3.20        | 170,235.00         | 0          |

### 1.2 Other Project Characteristics

UrbanizationUrbanWind Speed (m/s)2.2Precipitation Freq (Days)70Climate Zone5Operational Year2021

Utility Company Pacific Gas & Electric Company

**CO2 Intensity** 189 **CH4 Intensity** 0.032 **N20 Intensity** 0.004

### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - EFs adjusted for SB 100

Land Use - sf and spaces provided by applicant; lot acreage scaled by sf with parking lot

Construction Phase - operational analysis only

Off-road Equipment - operational analysis only

Trips and VMT - operational analysis only

Grading -

Architectural Coating - operational analysis only

Vehicle Trips - mobile emissions modeled separately

Energy Use - Energy consumption provided by applicant

Water And Wastewater - water usage provided by project applicant; assumed Caleemod default for general office building of 62% indoor/38% outdoor Land Use Change -

Sequestration Stationary Sources - Emergency Generators and Fire Pumps - assumed existing generator at 701 Gateway to have same specs as future generator at Demolition -

Construction Off-road Equipment Mitigation -

| Table Name                      | Column Name                | Default Value | New Value   |
|---------------------------------|----------------------------|---------------|-------------|
| tblEnergyUse                    | LightingElect              | 3.58          | 0.00        |
| tblEnergyUse                    | NT24E                      | 4.80          | 0.00        |
| tblEnergyUse                    | NT24NG                     | 1.01          | 0.00        |
| tblEnergyUse                    | T24E                       | 4.10          | 9.83        |
| tblEnergyUse                    | T24NG                      | 18.32         | 26.24       |
| tblLandUse                      | LandUseSquareFeet          | 170,240.00    | 170,235.00  |
| tblLandUse                      | LotAcreage                 | 3.91          | 3.20        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 4.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 3.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 2.00          | 0.00        |
| tblOffRoadEquipment             | OffRoadEquipmentUnitAmount | 1.00          | 0.00        |
| tblProjectCharacteristics       | CH4IntensityFactor         | 0.029         | 0.032       |
| tblProjectCharacteristics       | CO2IntensityFactor         | 641.35        | 189         |
| tblProjectCharacteristics       | N2OIntensityFactor         | 0.006         | 0.004       |
| tblStationaryGeneratorsPumpsEF  | CH4_EF                     | 0.07          | 0.07        |
| tblStationaryGeneratorsPumpsEF  | ROG_EF                     | 2.2480e-003   | 2.2477e-003 |
| tblStationaryGeneratorsPumpsUse | HorsePowerValue            | 0.00          | 1,869.00    |
| tblStationaryGeneratorsPumpsUse | HoursPerDay                | 0.00          | 1.00        |
| tblStationaryGeneratorsPumpsUse | HoursPerYear               | 0.00          | 50.00       |
| tblStationaryGeneratorsPumpsUse | Load_Factor                | 0.73          | 0.80        |
| tblStationaryGeneratorsPumpsUse | NumberOfEquipment          | 0.00          | 1.00        |

| tblTripsAndVMT  | VendorTripNumber    | 28.00         | 0.00         |
|-----------------|---------------------|---------------|--------------|
| tblTripsAndVMT  | WorkerTripNumber    | 54.00         | 0.00         |
| tblTripsAndVMT  | WorkerTripNumber    | 11.00         | 0.00         |
| tblVehicleTrips | ST_TR               | 2.46          | 0.00         |
| tblVehicleTrips | SU_TR               | 1.05          | 0.00         |
| tblVehicleTrips | WD_TR               | 11.03         | 0.00         |
| tblWater        | IndoorWaterUseRate  | 30,257,393.26 | 2,107,306.00 |
| tblWater        | OutdoorWaterUseRate | 18,544,853.93 | 1,291,574.00 |

### 2.0 Emissions Summary

### 2.2 Overall Operational Unmitigated Operational

|            | ROG                                    | NOx      | CO       | SO2      | Fugitive  | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O      | CO2e     |
|------------|--|----------|----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|----------|----------|
| Category   |  |          |          |          | tons      | s/yr     |          |          |          |          |          |          | MT        | /yr      |          |          |
| Area       | 0.7538                                 | 1.00E-05 | 1.57E-03 | 0        |           | 1.00E-05 | 1.00E-05 |          | 1.00E-05 | 1.00E-05 | 0        | 3.04E-03 | 3.04E-03  | 1.00E-05 | 0        | 3.24E-03 |
| Energy     | 0.0241                                 | 0.219    | 0.1839   | 1.31E-03 | Managaria | 0.0166   | 0.0166   | N        | 0.0166   | 0.0166   | 0        | 381.8634 | 381.8634  | 0.0289   | 7.41E-03 | 384.7924 |
| Mobile     | 0                                      | 0        | 0        | 0        | 0         | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0         | 0        | 0        | 0        |
| Stationary | 0.084                                  | 0.3758   | 0.2143   | 4.00E-04 |           | 0.0124   | 0.0124   |          | 0.0124   | 0.0124   | 0        | 38.9978  | 38.9978   | 5.47E-03 | 0        | 39.1345  |
| Waste      | ###################################### |          |          | )        |           | 0        | 0        |          | 0        | 0        | 32.1375  | 0        | 32.1375   | 1.8993   | 0        | 79.6194  |
| Water      |  |          |          |          |           | 0        | 0        |          | 0        | 0        | 0.6686   | 1.3651   | 2.0336    | 0.0689   | 1.65E-03 | 4.2479   |
| Total      | 0.8619                                 | 0.5947   | 0.3998   | 1.71E-03 | 0         | 0.029    | 0.029    | 0        | 0.029    | 0.029    | 32.8061  | 422.2293 | 455.0354  | 2.0025   | 9.06E-03 | 507.7973 |

### 5.0 Energy Detail

Historical Energy Use: N

### **5.1 Mitigation Measures Energy**

|             | ROG    | NOx   | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O      | CO2e     |
|-------------|--------|-------|--------|----------|----------|---------|--------|----------|---------|--------|----------|----------|-----------|----------|----------|----------|
| Category    |        |       |        |          | tons     | s/yr    |        |          |         |        |          |          | MT        | /yr      |          |          |
| Electricity |        |       |        |          |          | 0       | 0      |          | 0       | 0      | 0        | 143.5086 | 143.5086  | 0.0243   | 3.04E-03 | 145.0211 |
| Electricity |        |       |        |          |          | 0       | 0      |          | 0       | 0      | 0        | 143.5086 | 143.5086  | 0.0243   | 3.04E-03 | 145.0211 |
| NaturalGas  | 0.0241 | 0.219 | 0.1839 | 1.31E-03 |          | 0.0166  | 0.0166 |          | 0.0166  | 0.0166 | 0        | 238.3548 | 238.3548  | 4.57E-03 | 4.37E-03 | 239.7712 |
| NaturalGas  | 0.0241 | 0.219 | 0.1839 | 1.31E-03 |          | 0.0166  | 0.0166 |          | 0.0166  | 0.0166 | 0        | 238.3548 | 238.3548  | 4.57E-03 | 4.37E-03 | 239.7712 |

# 5.2 Energy by Land Use - NaturalGas <u>Unmitigated</u>

| NaturalGa ROG NOx CO SO2 Fugitive Exhaust PM10 Fugitive Exhaust PM2.5 Bio- CO2 NBio- CO2 Total CO2 | CH4 | N2O C | CO2e |
|--|-----|-------|------|
|--|-----|-------|------|

| Land Use                   | kBTU/yr  |        | tons/yr |        |          |  |        |        |  |        |        | MT/yr |          |          |          |          |          |
|----------------------------|----------|--------|---------|--------|----------|--|--------|--------|--|--------|--------|-------|----------|----------|----------|----------|----------|
| General Office<br>Building | 4.47E+06 | 0.0241 | 0.219   | 0.1839 | 1.31E-03 |  | 0.0166 | 0.0166 |  | 0.0166 | 0.0166 | 0     | 238.3548 | 238.3548 | 4.57E-03 | 4.37E-03 | 239.7712 |
| Total                      |          | 0.0241 | 0.219   | 0.1839 | 1.31E-03 |  | 0.0166 | 0.0166 |  | 0.0166 | 0.0166 | 0     | 238.3548 | 238.3548 | 4.57E-03 | 4.37E-03 | 239.7712 |

### 5.3 Energy by Land Use - Electricity Unmitigated

|                            | Electricity | Total CO2 | CH4    | N2O      | CO2e     |
|----------------------------|-------------|-----------|--------|----------|----------|
| Land Use                   | kWh/yr      |           | M      | Γ/yr     |          |
| General Office<br>Building | 1.67E+06    | 143.5086  | 0.0243 | 3.04E-03 | 145.0211 |
| Total                      |             | 143.5086  | 0.0243 | 3.04E-03 | 145.0211 |

### 6.0 Area Detail

### **6.1 Mitigation Measures Area**

|             | ROG    | NOx      | CO       | SO2 | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |  |
|-------------|--------|----------|----------|-----|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|-----|----------|--|
| Category    |        | tons/yr  |          |     |          |          |          |          |          |          |          | MT/yr    |           |          |     |          |  |
| Mitigated   | 0.7538 | 1.00E-05 | 1.57E-03 | 0   |          | 1.00E-05 | 1.00E-05 |          | 1.00E-05 | 1.00E-05 | 0        | 3.04E-03 | 3.04E-03  | 1.00E-05 | 0   | 3.24E-03 |  |
| Unmitigated | 0.7538 | 1.00E-05 | 1.57E-03 | 0   |          | 1.00E-05 | 1.00E-05 |          | 1.00E-05 | 1.00E-05 | 0        | 3.04E-03 | 3.04E-03  | 1.00E-05 | 0   | 3.24E-03 |  |

### 6.2 Area by SubCategory Unmitigated

|               | ROG      | NOx      | CO       | SO2 | Fugitive | Exhaust  | PM10     | Fugitive | Exhaust  | PM2.5    | Bio- CO2 | NBio-    | Total CO2 | CH4      | N2O | CO2e     |
|---------------|----------|----------|----------|-----|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|-----|----------|
| SubCategory   |          |          |          |     | tons     | s/yr     |          |          |          |          |          |          | MT        | /yr      |     |          |
| Architectural | 0.0888   |          |          |     |          | 0        | 0        |          | 0        | 0        | 0        | 0        | 0         | 0        | 0   | 0        |
| Consumer      | 0.6649   |          |          |     |          | 0        | 0        |          | 0        | 0        | 0        | 0        | 0         | 0        | 0   | 0        |
| Landscaping   | 1.50E-04 | 1.00E-05 | 1.57E-03 | 0   |          | 1.00E-05 | 1.00E-05 |          | 1.00E-05 | 1.00E-05 | 0        | 3.04E-03 | 3.04E-03  | 1.00E-05 | 0   | 3.24E-03 |
| Total         | 0.7538   | 1.00E-05 | 1.57E-03 | 0   |          | 1.00E-05 | 1.00E-05 |          | 1.00E-05 | 1.00E-05 | 0        | 3.04E-03 | 3.04E-03  | 1.00E-05 | 0   | 3.24E-03 |

### 7.0 Water Detail

### 7.1 Mitigation Measures Water

|           | Total CO2 | Total CO2 CH4 N2O CO2e |          |        |  |  |  |  |  |  |  |
|-----------|-----------|------------------------|----------|--------|--|--|--|--|--|--|--|
| Category  | MT/yr     |                        |          |        |  |  |  |  |  |  |  |
| Mitigated | 2.0336    |                        | 1.65E-03 | 4.2479 |  |  |  |  |  |  |  |

|             | <br>   |        |          |        |
|-------------|--------|--------|----------|--------|
| Unmitidated | 2.0336 | 0.0689 | 1.65E-03 | 4.2479 |

## 7.2 Water by Land Use Unmitigated

|                            | Indoor/Out           | Total CO2 | CH4    | N2O             | CO2e   |
|----------------------------|----------------------|-----------|--------|-----------------|--------|
| Land Use                   | Mgal                 |           | МТ     | Γ/yr            |        |
| General Office<br>Building | 2.10731 /<br>1.29157 |           | 0.0689 | 1.6500e-<br>003 | 4.2479 |
| Total                      |                      | 2.0336    | 0.0689 | 1.6500e-<br>003 | 4.2479 |

### 8.0 Waste Detail

### **8.1 Mitigation Measures Waste**

### Category/Year

|             | Total CO2 | CH4    | N2O | CO2e    |  |  |  |  |  |  |  |  |
|-------------|-----------|--------|-----|---------|--|--|--|--|--|--|--|--|
|             |           | MT/yr  |     |         |  |  |  |  |  |  |  |  |
| Mitigated   | 32.1375   | 1.8993 | 0   | 79.6194 |  |  |  |  |  |  |  |  |
| Unmitigated | 32.1375   | 1.8993 | 0   | 79.6194 |  |  |  |  |  |  |  |  |

### 8.2 Waste by Land Use Unmitigated

|                | Waste  | Total CO2 | CH4    | N2O  | CO2e    |
|----------------|--------|-----------|--------|------|---------|
| Land Use       | tons   |           | M      | Γ/yr |         |
| General Office | 158.32 | 32.1375   | 1.8993 | 0    | 79.6194 |
| Total          |        | 32.1375   | 1.8993 | 0    | 79.6194 |

### 9.0 Operational Offroad

|  | Equipment T | ype Num | ber Hours/Day | Days/Year | Horse Power | Load Factor | Fuel Type |
|--|-------------|---------|---------------|-----------|-------------|-------------|-----------|
|--|-------------|---------|---------------|-----------|-------------|-------------|-----------|

### **10.0 Stationary Equipment**

### **Fire Pumps and Emergency Generators**

| Equipment Type      | Number | Hours/Day | Hours/Year | Horse Power | Load Factor | Fuel Type |
|---------------------|--------|-----------|------------|-------------|-------------|-----------|
| Emergency Generator | 1      | 1         | 50         | 1869        | 0.8         | Diesel    |

### **Boilers**

| Equipment Type | Number | Heat Input/Day | Heat Input/Year | Boiler Rating | Fuel Type |
|----------------|--------|----------------|-----------------|---------------|-----------|

### **User Defined Equipment**

| Equipment Type | Number |
|----------------|--------|

### 10.1 Stationary Sources Unmitigated/Mitigated

|                | ROG   | NOx    | CO     | SO2      | Fugitive | Exhaust | PM10   | Fugitive | Exhaust | PM2.5  | Bio- CO2 | NBio-   | Total CO2 | CH4      | N2O | CO2e    |
|----------------|-------|--------|--------|----------|----------|---------|--------|----------|---------|--------|----------|---------|-----------|----------|-----|---------|
| Equipment Type |       |        |        |          | tons     | s/yr    |        |          |         |        |          |         | МТ        | /yr      |     |         |
| Emergency      | 0.084 | 0.3758 | 0.2143 | 4.00E-04 |          | 0.0124  | 0.0124 |          | 0.0124  | 0.0124 | 0        | 38.9978 | 38.9978   | 5.47E-03 | 0   | 39.1345 |
| Total          | 0.084 | 0.3758 | 0.2143 | 4.00E-04 |          | 0.0124  | 0.0124 |          | 0.0124  | 0.0124 | 0        | 38.9978 | 38.9978   | 5.47E-03 | 0   | 39.1345 |

### 11.0 Vegetation

eGrid2018 Emission Factors

 $https://www.epa.gov/sites/production/files/2020-01/documents/egrid2018\_summary\_tables.pdf$ 

210.000 lb CO2/MWh

https://www.pge.com/en\_US/about-pge/environment/what-we-are-doing/fighting-climate-change/fighting-climate-change.page https://www.pge.com/pge\_global/common/pdfs/your-account/your-bill/understand-your-bill/bill-inserts/2019/1019 Power-Content-Label.pdf

0.034 lb CH4/MWh 0.004 lb N2O/MWh

496.536 lb CO2/MWh

| 2018 CA            | %       |      | EF (lb/MWh | )     |      |     | EF (lb/MWh | )      |
|--------------------|---------|------|------------|-------|------|-----|------------|--------|
| 2018 CA            | 76      | CO2  | CH4        | N2O   | Year | CO2 | CH4        | N2O    |
| Hydro              | 10.68%  | 0    | 0          | 0     | 2016 | 497 | 0.034      | 0.004  |
| Nuclear            | 9.05%   | 0    | 0          | 0     | 2017 | 497 | 0.034      | 0.004  |
| Renewable          | 31.36%  | 0    | 0          | 0     | 2018 | 492 | 0.034      | 0.004  |
| Non-renewable      | 48.91%  | 1015 | 0.070      | 0.008 | 2019 | 488 | 0.034      | 0.004  |
| Total              | 100.00% | 497  | 0.034      | 0.004 | 2020 | 480 | 0.033      | 0.004  |
|                    |         |      |            |       | 2021 | 462 | 0.032      | 0.004  |
| 2020 (DDC 220/)    | 21      |      | EF (lb/MWh | )     | 2022 | 443 | 0.030      | 0.004  |
| 2020 (RPS = 33%)   | %       | CO2  | CH4        | N2O   | 2023 | 425 | 0.029      | 0.003  |
| Hydro              | 10.68%  | 0    | 0          | 0     | 2024 | 407 | 0.028      | 0.003  |
| Nuclear            | 9.05%   | 0    | 0          | 0     | 2025 | 389 | 0.027      | 0.003  |
| Renewable          | 33.00%  | 0    | 0          | 0     | 2026 | 371 | 0.025      | 0.003  |
| Non-renewable      | 47.27%  | 1015 | 0.070      | 0.008 | 2027 | 352 | 0.024      | 0.003  |
| Total              | 100.00% | 480  | 0.033      | 0.004 | 2028 | 334 | 0.023      | 0.003  |
|                    |         |      |            |       | 2029 | 316 | 0.022      | 0.003  |
| 2030 (RPS = 60%)   | %       |      | EF (lb/MWh | )     | 2030 | 298 | 0.020      | 0.002  |
| 2030 (KPS = 60%)   | 76      | CO2  | CH4        | N2O   | 2031 | 278 | 0.019      | 0.002  |
| Hydro              | 10.68%  | 0    | 0          | 0     | 2032 | 258 | 0.018      | 0.002  |
| Nuclear            | 0.00%   | 0    | 0          | 0     | 2033 | 238 | 0.016      | 0.002  |
| Renewable          | 60.00%  | 0    | 0          | 0     | 2034 | 218 | 0.015      | 0.002  |
| Non-renewable      | 29.32%  | 1015 | 0.070      | 0.008 | 2035 | 198 | 0.014      | 0.002  |
| Total              | 100.00% | 298  | 0.020      | 0.002 | 2036 | 179 | 0.012      | 0.001  |
|                    |         |      |            |       | 2037 | 159 | 0.011      | 0.001  |
| 2045 (Carbon Free) | %       |      | EF (lb/MWh | )     | 2038 | 139 | 0.010      | 0.001  |
| 2043 (Carbon Free) |         | CO2  | CH4        | N2O   | 2039 | 119 | 0.008      | 0.001  |
| Hydro              | 10.68%  | 0    | 0          | 0     | 2040 | 99  | 0.007      | 0.0008 |
| Nuclear            | 0.00%   | 0    | 0          | 0     | 2041 | 79  | 0.005      | 0.001  |
| Renewable          | 89.32%  | 0    | 0          | 0     | 2042 | 60  | 0.004      | 0.000  |
| Non-renewable      | 0.00%   | 1015 | 0.070      | 0.008 | 2043 | 40  | 0.003      | 0.000  |
| Total              | 100.00% | 0    | 0.000      | 0.000 | 2044 | 20  | 0.001      | 0.000  |
|                    |         |      |            |       | 2045 | 0   | 0.000      | 0.000  |

| 2017 PGE           | %       | EF (lb/MWh) |      | EF (lb/MWh) |
|--------------------|---------|-------------|------|-------------|
|                    |         | CO2         | Year | CO2         |
| Hydro              | 13.00%  | 0           | 2016 | -           |
| Nuclear            | 34.00%  | 0           | 2017 | 210         |
| Renewable          | 39.00%  | 0           | 2018 | 210         |
| Non-renewable      | 14.00%  | 1500        | 2019 | 210         |
| Total              | 100.00% | 210         | 2020 | 210         |
|                    |         |             | 2021 | 189         |
| 2020 (DDC 220/)    | %       | EF (lb/MWh) | 2022 | 168         |
| 2020 (RPS = 33%)   | %       | CO2         | 2023 | 147         |
| Hydro              | 13.00%  | 0           | 2024 | 126         |
| Nuclear            | 34.00%  | 0           | 2025 | 105         |
| Renewable          | 39.00%  | 0           | 2026 | 84          |
| Non-renewable      | 14.00%  | 1500        | 2027 | 63          |
| Total              | 100.00% | 210         | 2028 | 42          |
|                    |         |             | 2029 | 21          |
| 2020 (DDC - COV)   | %       | EF (lb/MWh) | 2030 | 0           |
| 2030 (RPS = 60%)   | %       | CO2         | 2031 | 0           |
| Hydro              | 13.00%  | 0           | 2032 | 0           |
| Nuclear            | 34.00%  | 0           | 2033 | 0           |
| Renewable          | 60.00%  | 0           | 2034 | 0           |
| Non-renewable      | 0.00%   | 0           | 2035 | 0           |
| Total              | 107.00% | 0           | 2036 | 0           |
|                    |         |             | 2037 | 0           |
| 2045 (Carbon Free) | %       | EF (lb/MWh) | 2038 | 0           |
| 2045 (Carbon Free) | 76      | CO2         | 2039 | 0           |
| Hydro              | 0.00%   | 0           | 2040 | 0           |
| Nuclear            | 0.00%   | 0           | 2041 | 0           |
| Renewable          | 100.00% | 0           | 2042 | 0           |
| Non-renewable      | 0.00%   | 0           | 2043 | 0           |
| Total              | 100.00% | 0           | 2044 | 0           |
|                    |         |             | 2045 | 0           |

|                          |                             |     |     | Pounds/Da  | зу          |    |       | Metric | Tons/Year |       |
|--------------------------|-----------------------------|-----|-----|------------|-------------|----|-------|--------|-----------|-------|
| Running Emissions (VMT)  |                             | 2   | 5   |            |             | 4  | 6     | 7      | 13        |       |
|                          |                             | ROG | NOx | Total PM10 | Total PM2.5 | co | CO2   | CH4    | N20       | CO2e  |
|                          | 2019 Existing (701 Gateway) | 2   | 9   | 36         | 9           | 41 | 2,325 | 0      | 0         | 2,354 |
|                          | 2021 701 Gateway            | 1   | 7   | 36         | 9           | 34 | 2,224 | 0      | 0         | 2,250 |
|                          | 2021 731 Gateway            | 2   | 11  | 59         | 15          | 56 | 3,613 | 0      | 0         | 3,655 |
|                          |                             |     |     | Pounds/Da  | зу          |    |       | Metric | Tons/Year |       |
| Proces Emissions (Trips) |                             | 14  | 17  | 20         | 21          | 16 | 18    | 19     | 23        |       |
| Year                     | Condition                   | ROG | NOx | PM10       | PM2.5       | co | CO2   | CH4    | N20       | CO2e  |
| •                        | 2019 Existing (701 Gateway) | 0   | 0   | 0          | 0           | 1  | 5     | 0      | 0         | 6     |
|                          | 2021 701 Gateway            | 0   | 0   | 0          | 0           | 1  | 5     | 0      | 0         | 6     |
|                          | 2021 731 Gateway            | 1   | 0   | 0          | 0           | 2  | 6     | 0      | 0         | 7     |

|      |                             |     |     | Pounds/Da | у     |    |       | Metric | Tons/Year |       | Fuel (Gal | lons/Year) |
|------|-----------------------------|-----|-----|-----------|-------|----|-------|--------|-----------|-------|-----------|------------|
| Year | Condition                   | ROG | NOx | PM10      | PM2.5 | CO | CO2   | CH4    | N20       | CO2e  | Gasoline  | Diesel     |
|      | 2019 Existing (701 Gateway) | 2   | 9   | 36        | 9     | 42 | 2,331 | 0      | 0         | 2,360 | 243,226   | 28,680     |
|      | 2021 701 Gateway            | 2   | 7   | 36        | 9     | 36 | 2,229 | 0      | 0         | 2,256 | 230,099   | 29,500     |
|      | 2021 731 Gateway            | 3   | 12  | 59        | 15    | 58 | 3,619 | 0      | 0         | 3,662 | 373,783   | 47,921     |
|      | Net Change From Existing    | 3   | 10  | 59        | 15    | 51 | 3,517 | 0      | 0         | 3,559 | 360,655   | 48,741     |

Emission Factors - Fleet Average (Adjusted for SAFF Vehicle Rule Part 1

| Emission Fac | tors - Fleet | t Average (Adj | usted for SA | AFE Vehicle | Rule Part 1) |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
|--------------|--------------|----------------|--------------|-------------|--------------|-----------|--------------|-------------|----------|---------|------|------|------|------|-------------|---------------|-------------|--------------|---------------|---------------|------|------|
|              |              |                |              |             | Running (RU  | JNEX, PMT | N, PMBW) gra | ms per mile |          |         |      |      |      |      | Process (ID | LEX, STREX, 1 | TOTEX, DIUR | N, HTSK, RUI | NLS, RESTL) g | rams per trip |      |      |
|              | ROG          | TOG            | co           | NOx         | CO2          | CH4       | PM10 Ex      | PM10 D      | PM2.5 Ex | PM2.5 D | SOX  | N20  | ROG  | TOG  | co          | NOx           | CO2         | CH4          | PM10          | PM2.5         | SOX  | N20  |
| 2019         | 0.04         | 0.06           | 0.99         | 0.22        | 357.99       | 0.01      | 0.00         | 0.87        | 0.00     | 0.22    | 0.00 | 0.01 | 0.15 | 0.15 | 0.42        | 0.06          | 9.91        | 0.01         | 0.00          | 0.00          | 0.00 | 0.01 |
| 2021         | 0.04         | 0.05           | 0.83         | 0.17        | 342.37       | 0.01      | 0.00         | 0.87        | 0.00     | 0.22    | 0.00 | 0.01 | 0.13 | 0.14 | 0.42        | 0.06          | 9.99        | 0.01         | 0.00          | 0.00          | 0.00 | 0.00 |
|              |              |                |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
|              |              |                |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
|              |              | gal/mile       |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
| 2019         | GAS          | 0.03744        |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
| 2019         | DSL          | 0.00442        |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
|              |              |                |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
| 2021         | GAS          | 0.03542        |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
| 2021         | DSL          | 0.00454        |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |
|              |              |                |              |             |              |           |              |             |          |         |      |      |      |      |             |               |             |              |               |               |      |      |

Source: EMFAC2017, Adjusted for SAFE Rule Part 1

# **Technical Modeling Considerations for Criteria Pollutants and Human Health Effects**

In their interim guidance addressing *Sierra Club v. County of Fresno* (6 Cal. 5<sup>th</sup> 502) (Friant Ranch), SMAQMD (2019) recommends lead agencies compare the air quality models used in CEQA analyses to those models designed to evaluate regional attainment with ambient air quality standards and associated human health consequences. This section describes the three models used to estimate criteria pollutant emissions generated by construction and operation of the project and evaluates their ability to assess specific health impacts of the project. This section also analyzes whether models and tools that have been developed to quantify ambient pollutant concentrations could be used to reasonably correlate project-level emissions to specific health consequences.

### **Review of Project Analysis Models**

Criteria pollutant emissions generated by construction and operation of the project were estimated using the California Emissions Estimator Model (CalEEMod), SMAQMD's Roadway Construction Emissions Model (RCEM), and the California Air Resources Board's (CARB) Emissions FACtor (EMFAC) model. Each of the following sections note whether the given model is suitable for quantify human health consequences or changes in nonattainment days.

### **California Emissions Estimator Model**

CalEEMod is a statewide computer model quantifies construction and operational criteria pollutant and greenhouse gas (GHG) emissions from land use development projects. The model evaluates construction emissions associated with six phases—demolition, site preparation, grading, building construction, architectural coatings, and paving. Emission sources considered by the model include offroad construction equipment, onroad mobile vehicles, fugitive dust from land disturbance, and volatile organic compounds from architectural coatings and paving activities.

CalEEMod quantifies project emissions based on user-defined inputs for project location, operational year, land use type (e.g., commercial), climate zone, and size. Based on these minimum data inputs, users can estimate construction emissions based model generated default assumptions for construction phasing, construction equipment inventory and activities, and trip lengths. Default values included in the model were provided by California air districts and account for local conditions and regulations. Where appropriate, CalEEMod combines local data with regional and statewide values to ensure enough information is available to quantify emissions. Users can override default values with project-specific information. In addition, users can implement mitigation measures and strategies to reduce construction-related exhaust and fugitive dust emissions.

Based on the user inputs and emission factors from the CARB's EMFAC and OFFROAD models, CalEEMod calculates both daily maximum (pounds per day) and annual average (tons per year) emissions. These emissions can be compared to air district mass emission thresholds, such as those adopted by EDCAQMD. CalEEMod does not quantify concentrations of the various air pollutants (in

terms of micrograms per cubic meter or parts per million), nor does it estimate secondary pollutants (such as ozone and PM2.5) or potential human health effects from exposure to criteria pollutants. Accordingly, CalEEMod cannot be used to evaluate changes in the number of regional nonattainment days or correlate project-level emissions to specific health consequences.

### **Road Construction Emissions Model**

SMAQMD's RCEM is a public-domain spreadsheet model formatted as a series of individual worksheets. The model is specifically designed to evaluate construction criteria pollutant and GHG emissions from linear projects (e.g., water infrastructure, roads). Four generic construction phases are considered by the model: 1) grubbing/land clearing, 2) grading/excavation, 3) drainage/utilities/subgrade, and 4) paving. Within these phases, the model estimates construction emissions for load hauling (onroad heavy-duty vehicle trips), worker commutes, construction site fugitive dust, and offroad construction vehicles. Although exhaust emissions are estimated for each activity, fugitive dust estimates are currently limited to major dust-generating activities, which include grubbing/land clearing and grading/excavation.

The RCEM was designed to enable users to estimate emissions using a minimum amount of project-specific information, such as construction start year and duration, project type, and the project length and area. This was done because specific data to quantify emissions from transportation projects is often unavailable when the environmental document is being prepared. To help facilitate the quantification of construction emissions based on valid assumptions, the RCEM contains default data based on surveys of construction equipment, schedules, and other construction data from a selection of construction projects in Sacramento County, as well as construction surveys conducted for CalEEMod and a technical evaluation completed by the University of California, Davis. Emission factors used by the model are from the CARB's EMFAC and OFFROAD models.

Like CalEEMod, RCEM calculates both daily maximum (pounds per day) and annual average (tons per year) emissions. RCEM does not quantify concentrations of the various air pollutants (in terms of micrograms per cubic meter or parts per million), nor does it estimate secondary pollutants (such as ozone and PM2.5) or potential human health effects from exposure to criteria pollutants. Accordingly, RCEM cannot be used to evaluate changes in the number of regional nonattainment days or correlate project-level emissions to specific health consequences.

### **EMissions FACtor Model**

CARB developed the EMFAC model to facilitate preparation of statewide and regional mobile source emissions inventories. The model generates criteria pollutant and GHG emissions rates that can be multiplied by vehicle activity data from all motor vehicles, including passenger cars to heavy-duty trucks, operating on highways, freeways, and local roads in California. The resulting emissions estimates are mass emission quantities that can be expressed in terms of pounds per day and tons per year (or other similar unit rates). Like CalEEMod and RCEM, EMFAC does not assess pollutant dispersion or quantify concentrations or potential health effects. Accordingly, EMFAC cannot be used to evaluate changes in the number of regional nonattainment days or correlate project-level emissions to specific health consequences.

### **Review of Photochemical and Human Health Models**

Several models and tools capable of translating mass emissions of criteria pollutants to ambient pollutant concentrations and various health endpoints have been developed. Table 1 summarizes key tools, identifies the analyzed pollutants, describes their intended application and resolution, and analyzes whether they could be used to reasonably correlate project-level emissions to specific health consequences.

As shown in Table 1, almost all tools were designed to be used at the national, state, regional, and/or city-levels. This is because criteria pollutants emitted by a specific source often do not deposit immediately adjacent to that source. Pollutants can be transported by prevailing winds or transformed through chemical reactions and physical interactions with other pollutants in the atmosphere. Because some pollutants can be transported over long distances, recorded violations of the ambient air quality standards at a specific monitoring station and resultant health effects experienced by the local population may be the result of faraway emission sources (some of which may not even be located within the same air basin). For this reason, attaining the ambient air quality standards and protecting human health from exposure to criteria pollutants requires a regional, and sometimes multiregional strategy that considers the combined effect of all emission-generating sources that influence air quality within an air basin.

The models and tools that have been developed to assess attainment of the ambient air quality standards and human health effects are therefore regional in nature and are not well suited to analyze small or localized changes in pollutant concentrations associated with individual projects. Said another way, "it remains impossible, using today's models, to correlate that increase in concentration to a specific health impact [because] such models are designed to determine regional, population-wide health impacts, and simply are not accurate when applied at the local level" (San Joaquin Valley Air Pollution Control District 2015). As of the writing of this analysis "neither the Sac Metro Air District nor any other air district currently have methodologies that would provide Lead Agencies and CEQA practitioners with a consistent, reliable, and meaningful analysis to correlate specific health impacts that may result from a proposed project's mass emissions" (Sacramento Metropolitan Air Quality Management District 2019).

Table 1. Analysis of Photochemical and Human Health Models

| Tool   | Created by                      | Description   | Resolution   | Pollutants Analyzed                                     | Project-Level CEQA Applicability  |
|--|---------------------------------|---|--|---|---|
| AirCounts  | Abt Assoc.                      | Online tool that helps large and medium-sized cities quickly estimate the health benefits of PM2.5 emission reductions and economic value of those benefits. The tool estimates the number of deaths (mortality) avoided and economic value related to user-specified regional, annual PM2.5 emissions reduction. The modeling year is 2010; avoided deaths are expected to occur over a 20-year period and their present value is shown in 2010 US dollars at a 3% discount rate.  | City-level   | Primary PM2.5   | This tool is only illustrative, as it is limited to certain cities and does not target specific sectors. Given that it was designed as a screening-level tool, is not sector specific, and includes limited California data, the tool is <b>not recommended</b> for project-level CEQA analysis.  |
| AP2 (formerly Air<br>Pollution Emission<br>Experiments and<br>Policy [APEEP])  | Mueller and<br>Mendelsohn, 2006 | AP2 is an integrated assessment model developed to assess marginal damage impacts from emissions at the national scale but can be applied at the county-level. The model connects emissions to monetary damages through six modules: emissions (per EPA's national inventory), air quality modeling, concentrations, exposures, physical effects, and valuation. Damages are presented on a dollar-per-ton basis. Model extends damage assessment beyond human health, and includes assessment on reduced crop and timber yields, reductions in visibility, enhanced depreciation of man-made materials and damages due to lost recreation services.                    | National or<br>county-level                            | SO <sub>2</sub> , ROG, NOx, ozone,<br>PM2.5, PM10       | The model operates at the national scale but may be applied at the county-level (although it is not clear how this adjustment should be made). The tool is also not commercially available. Accordingly, the tool is <b>not recommended</b> for project-level CEQA analysis.  |
| Methodology for Estimating Premature Deaths Associated with Long-Term Exposure to Fine Airborne Particulate Matter in California | CARB                            | The staff report identifies a relative risk of premature death associated with PM2.5 exposure based on a review of all relevant scientific literature, and a new relative risk factor was developed. This new factor is a 10% increase in risk of premature death per 10 $\mu$ g/m³ increase in exposure to PM2.5 concentrations (uncertainty interval: 3% to 20%)  | National   |   | The primary author of the CARB staff report notes that the analysis method is not suited for small projects and may yield unreliable results due to various uncertainties. Accordingly, the tool is <b>not recommended</b> for project-level CEQA analysis.   |
| Co-Benefits Risk<br>Assessment (COBRA)   | US EPA                          | Preliminary screening tool that contains baseline emission estimates of a variety of air pollutants for a single year (2017). COOBRA is targeted to state and local governments as a screening assessment for clean energy policies. Users specify changes to the baseline emission estimates. COBRA then uses "canned" source-receptor matrix model to estimate PM changes and resulting health outcomes and monetized values. The results can be mapped to visually represent air quality, human health, and health-related economic benefits. Analysis can be performed across the 14 major emissions categories included in the EPA's National Emissions Inventory. | National, regional,<br>state, or county-<br>levels     | PM2.5, SO <sub>2</sub> , NOx, NH <sub>3</sub> , and ROG | COBRA is a preliminary screening tool only and cannot be used at sub-county resolution. It also does not account for secondary emission changes resulting from market responses. Accordingly, the tool is <b>not recommended</b> for project-level CEQA analysis.   |
| Environmental Benefits and Mapping Program-Community Edition (BenMAP-CE)   | US EPA                          | Note that COBRA is based on EPA's BenMAP-CE (discussed in a separate entry).  BenMAP is EPA's detailed model for estimating the health impacts from air pollution. It relies on input concentrations and applies concentration-response (C-R) health impact functions, which relate a change in the concentration of a pollutant with a change in the incidence of a health endpoint, including premature mortality, heart attacks, chronic respiratory illnesses, asthma exacerbation and other adverse health effects. Detailed inputs are required for air quality changes (concentrations from AERMOD), population, baseline incidence rates, and effect estimates. | National, County,<br>City, and sub-<br>regional levels | Ozone, PM, NO <sub>2</sub> , SO <sub>2</sub> , CO       | The smallest default analysis resolution for BenMAP-CE is 144 square kilometers (equivalent to approximately 56 square miles or 36,000 acres).  This tool could be used to derive average health incidence/ton estimates that can be used for illustrative purposes only for most projects with proper disclosure of the inherent inaccuracies involved in averaging. It is <b>not recommended</b> for individual modeling of smaller projects, however.  The tool may be appropriate for modeling certain large-scale General Plan-level analyses. |

| Tool   | Created by                                    | Description  | Resolution   | Pollutants Analyzed   | Project-Level CEQA Applicability   |
|--|---|--|--|---|--|
| Fast Scenario<br>Screening Tool (TM5-<br>FASST)  | Joint Research<br>Centre (Italy)              | Tool allows users to evaluate how air pollutant emissions affect large scale pollutant concentrations and their impact on human health (mortality and years of life lost) and crop yield from national to regional air quality policies, such as climate policies. The tool is web-based and does not require coding or modelling. Users must gain access through publishers.  | Global and<br>national-levels                                  | PM2.5, ozone, NOx, NH <sub>3</sub> , CO, ROG, EC, CH <sub>4</sub> , SO <sub>2</sub> | This tool is applicable at national to global scales. Accordingly, the tool is <b>not recommended</b> for project-level CEQA analysis.   |
| Long-range Energy<br>Alternatives Planning<br>System Integrated<br>Benefits Calculator<br>(LEAP-IBC) | Climate and Clean<br>Air Coalit-ion<br>(CCAC) | Allows users to rapidly estimate the impacts of reducing emissions on health, climate, and agriculture. Tool uses sensitivity coefficients that link gridded emissions of air pollutants and precursors to health, climate and agricultural impacts at a national level. The sensitivity coefficients are generated by a chemical transport model, so air quality modeling not necessary. Tool is currently Excel-based and is available through the developers only. A web-based interface is currently under development.  | National-level   | PM2.5, ozone, NO <sub>2</sub>   | This tool is applicable at national scale. Accordingly, the tool is <b>not recommended</b> for project-level CEQA analysis.  |
| Multi-Pollutant<br>Evaluation Method<br>(MPEM)   | BAAQMD  | Estimates the impacts of control measures on pollutant concentration, population exposures, and health outcomes for criteria, toxic, and GHG pollutants. Monetizes the value of total health benefits from reductions in PM2.5, ozone, and certain carcinogens, and the social value of GHG reductions. MPEM was designed for development of a Clean Air Plan for the San Francisco Bay Area. The inputs are specific to the SF region and are not appropriate for projects outside BAAQMD.  | Regional level in<br>the SFBAAB                                | Ozone, PM, air toxics,<br>GHG   | This tool is designed to support the BAAQMD in regional planning and emissions analysis within the SFBAAB. The model applies changes in pollutant concentrations over a four-square kilometer grid.  This tool could be used to derive average health incidence/ton estimates that can be used for illustrative purposes only for most projects with proper disclosure of the inherent inaccuracies involved in averaging. It is <b>not recommended</b> for individual modeling of smaller projects, however.  The tool may be appropriate for certain large-scale planning-level analyses in the SFBAAB (with permission of BAAQMD).  |
| Response Surface<br>Model (RSM)-based<br>Benefit-per-Ton<br>Estimates                                | US EPA  | Consists of tables reporting the monetized PM2.5-related health benefits from reducing PM2.5 precursors from certain source types nationally and for 9 US cities/regions. Applying these estimates simply involves multiplying the emissions reduction by the relevant benefit per-ton metric. The resulting value is the PM mortality risk estimate at a 3% discount rate.  Note that RSM is based on EPA's BenMAP-CE (discussed in a separate entry).  | National or<br>regional (San<br>Joaquin County<br>only) levels | EC, SOx, VOC, NH3, NOx  | While RSM includes regional values specific to San Joaquin County, the metrics only reflect the benefits of reductions in exposure to ambient PM alone and do not include the benefits of reductions in other pollutants. The values are also dated as new sector-based BPT values are more current. Accordingly, the tool is <b>not recommended</b> for project-level CEQA analysis (even in San Joaquin County).   |
| Sector-based Benefit-<br>per-Ton Estimates   | US EPA  | Two specific sets of BPT estimates for 17 key source categories are available. Both are a reduced-form approach based on BenMAP modeling. The first are based on Fann et al. (2012) values and available from EPA's website. The second is based on updated modeling from Fann et al. (2017) and available in a Technical Support Document (TSD) from EPA. Applying these factors involves multiplying the emissions reduction (in tons) by the relevant benefit (economic value) or incidence (rates of mortality and morbidity) per-ton metric. The resulting value is the economics, mortality, and morbidity of direct and indirect PM2.5 emissions.  All values are based on a national-scale study. Local values are preferred, but not available from any existing reduced form model and use of reduced form estimates for another city is unlikely to provide a better-than-national value. Use of the current values from EPA's 2018 TSD represent the most current estimate of monetized or incidence risk. Values from Lepeule et al. (2012) represent the most current estimate of mortality. | National-scale   | PM2.5, SO2, NOx   | Due to the complex non-linear chemistry governing ozone formation, EPA was not able to derive ozone or secondary PM BPT values.  The BPT estimates provide a rough order-of-magnitude analysis of health consequences from directly-emitted PM and precursors to PM (with no secondary formation). However, the multipliers do not account for project-specific characteristics, receptor locations, or local dispersion characteristics. The resultant health effects are therefore reflective of national averages and may not be exact when applied to the project-level. Nonetheless, the estimates can be used to present an informational and scaled health risk analysis of directly-emitted PM and precursors to PM (with no secondary formation). |

### Summary of Health Risk Assessment for DPM and PM2.5 Emissions during Construction

|                              | Excess<br>Lifetime<br>Cancer Risk | Maximum<br>Chronic HI | Maximum Annual<br>Average PM <sub>2.5</sub><br>Concentration |  |  |
|------------------------------|-----------------------------------|-----------------------|--|--|--|
|                              | (in a<br>million)                 |                       | (μg/m³)  |  |  |
| MEIR                         | 0.56                              | 0.0001                | 0.0008   |  |  |
| 2 <sup>nd</sup> Highest MEIR | 0.52                              | 0.0001                | 0.0007   |  |  |
| 3 <sup>rd</sup> Highest MEIR | 0.49                              | 0.0001                | 0.0007   |  |  |
| BAAQMD's Thresholds          | 10                                | 1                     | 0.3  |  |  |

Source: AQ Appendix.

Notes:  $\mu g/m^3$  = micrograms per cubic meter

MEIR = maximum exposed individual receptor (all located at Gateway Peninsula)

#### Summary of Health Risk Assessment for DPM and PM2.5 Emissions during Operation

|                     | Excess<br>Lifetime<br>Cancer Risk | Maximum<br>Chronic HI | Maximum Annual<br>Average PM <sub>2.5</sub><br>Concentration |  |  |
|---------------------|-----------------------------------|-----------------------|--|--|--|
|                     | (in a<br>million)                 |                       | $(\mu g/m^3)$  |  |  |
| MEIR                | 0.1                               | 0.000026              | 0.00013  |  |  |
| BAAQMD's Thresholds | 10                                | 1                     | 0.3  |  |  |

Source: AQ Appendix.

Notes:  $\mu g/m^3$  = micrograms per cubic meter MEIR = maximum exposed individual receptor

#### **Cumlative Health Risk Assessment**

Cumulative

| Source                                 | Cancer<br>Risk<br>(cases per<br>million) | Non-Cancer<br>Hazard Index | Annual PM2.5<br>Concentration<br>(μg/m3) |  |
|--|--|----------------------------|--|--|
| Contribution from Existing Sources     |  |                            |  |  |
| Stationary Sources                     | 6.7                                      | 0.070                      | 0.04                                     |  |
| Roadway Sources                        | 14.0                                     | -                          | 0.29                                     |  |
| Rail Sources                           | 21.6                                     | -                          | 0.04                                     |  |
| Contribution from Project Construction |  |                            |  |  |
| Maximum Exposed Individual Receptor    | 0.6                                      | 0.0                        | 0.0                                      |  |
| Contribution from Project Operation    |  |                            |  |  |
| Maximum Exposed Individual Receptor    | 0.1                                      | 0.0                        | 0.0                                      |  |
| Cumulative Totals                      |  |                            |  |  |
| Existing + Construction                | 42.8                                     | 0.07                       | 0.37                                     |  |
| Existing + Operation                   | 42.4                                     | 0.07                       | 0.37                                     |  |
| Existing + Construction + Operation    | 43.0                                     | 0.07                       | 0.37                                     |  |
| BAAQMD Thresholds                      | 100                                      | 10                         | 0.8                                      |  |
|  |  |                            |  |  |

Source: Appendix A.

Notes:

μg/m3 = micrograms per cubic meter

The cancer risk, chronic HI, and PM2.5 for the generator is scaled, based on the Diesel Backup Generator Distance Multiplier Tool, per the BAAQMD guidance.

### Summary of Offsite Cancer and Noncancer Health Risks and PM2.5 Concentrations for the MEI

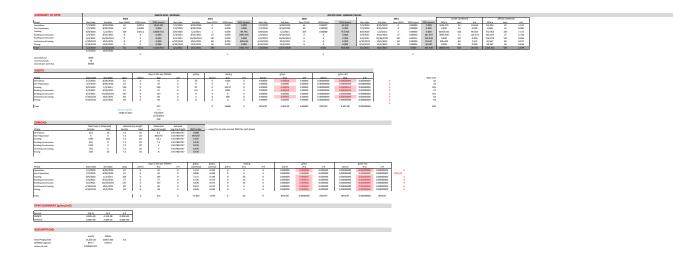
Mitigated

| Receptor  | Cancer Risk (per million) | Chronic HI | PM2.5 (ug/m3) |  |  |
|-----------|---------------------------|------------|---------------|--|--|
| MEIR 1    | 0.56                      | 0.0001     | 0.0008        |  |  |
| MEIR 2    | 0.52                      | 0.0001     | 0.0007        |  |  |
| MEIR 3    | 0.49                      | 0.0001     | 0.0007        |  |  |
| Threshold | 10                        | 1.0        | 0.3           |  |  |

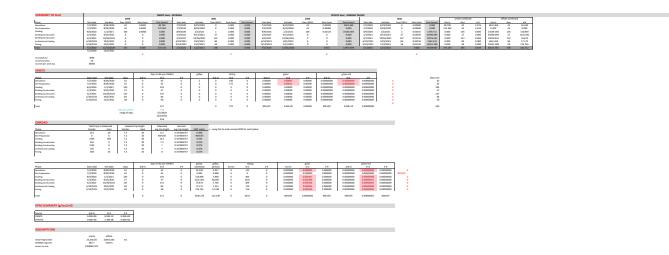
| Ξ | Receptors    |        |           |            | Concentration | Dose     | Cancer Risk | Sum of Cancer Risk |             | Chronic HI (max   | Max PM2.5 |               |
|---|--------------|--------|-----------|------------|---------------|----------|-------------|--------------------|-------------|-------------------|-----------|---------------|
|   | Rec ID       | Detail | Х         | Υ          | Type          | 0_2      | 0_2         | 0_2                | Summed Risk | Cases Per Million | annual)   | Total (ug/m3) |
|   | Highest_DPM1 | School | 552928.74 | 4168030.85 | School        | 6.40E-04 | 5.26E-07    | 5.6E-07            | 6E-07       | 0.555             | 0.0001    | 0.0008        |
|   | Highest_DPM2 | School | 552928.74 | 4168010.85 | School        | 6.00E-04 | 4.93E-07    | 5.2E-07            | 5E-07       | 0.521             | 0.0001    | 0.0007        |
|   | Highest_DPM3 | School | 552928.74 | 4167990.85 | School        | 5.70E-04 | 4.68E-07    | 4.9E-07            | 5E-07       | 0.495             | 0.0001    | 0.0007        |

RISKinh-res = DOSEair × CPF × ASF × ED/AT × FAH

Dose-air =  $C_{air} \times \{BR/BW\} \times A \times EF \times 10^{-6}$ 







Source Inputs

South SF Population 67,733 San Mateo County Population 766,573

offroad sources

Release Height (RH) 4.1 m Vertical Dimension 3.81 m Elevation 0 m

onroad/truck sources

Release Height (RH) 3.4 m EPA PM Hostpot, Appx J

Vertical Dimension 3.16 m CAPCOA 2009/AERMOD (RH/2.15)

Elevation 0 m

receptor height (m) 0 Default

Met from SFO

PM2.5 Exhaust (Offroad+Hauling+Vendor)= DPM Construction 7am-5pm

#### Health Risk - Dose and Risk Factors and Values

Dose factors

Risk Factors

Dose-air = C<sub>atr</sub> × {BR/BW} × A × EF × 10 <sup>-6</sup>

Dose-air = (C<sub>ar</sub> × WAF) × (SR/6W) × A × EF × 10<sup>-4</sup>

|   |              | 3rd trimester | 0<2      | 2<9      | 2<16     | 16<30    | 16-70    | source   |
|---|--------------|---------------|----------|----------|----------|----------|----------|--|
| Daily Breath Rate (BR/BW) (L/kg-day)            | Residential  | 361           | 1090     | 631      | 572      | 261      | 233      | OEHHA 2015, Table 5.6, 95th %ile for 3rdtri-2yrs old; 80th for other age groups                      |
|   | Recreational | 240           | 1200     | 640      | 520      | 240      | 230      | OEHHA 2015, Table 5.8 (95th, moderate) for all bins but 3rd tri, which was taken from SJVAPCD's drai |
|   | School       | 240           | 1200     | 640      | 520      | 240      | 230      | SJVAPCD for 3rd tri; 95th percentile for all   |
|   |              | 1             | 1        | 1        | 1        | 1        | 1        | OEHHA 2015, page 5-24  |
| F, Exposure frequency (unitless), days/365 days | Residential  | 0.96          | 0.96     | 0.96     | 0.96     | 0.96     | 0.96     | OEHHA 2015, page 5-24, 350 days/yr   |
|   | Recreational | 0.285         | 0.285    | 0.285    | 0.285    | 0.285    | 0.285    | 2x/week, 2 hours/day, for 9 years  |
|   | School       | 0.68          | 0.68     | 0.68     | 0.68     | 0.68     | 0.68     | 5 days/week, 11.5 hours/day (Daycare)  |
| Conversion Factor                               |              | 1.00E-06      | 1.00E-06 | 1.00E-06 | 1.00E-06 | 1.00E-06 | 1.00E-06 | (mg/ug + m3/L)   |
| RISKint-res = DOSEair × CPF × ASF × EDIAT × FAH | <u>-</u>     | 3rd trimester | 0<2      | 2<9      | 2<16     | 16<30    | 16-70    | source   |
| CPF, DPM ([mg/kg-day]-1)                        |              | 1.1           | 1.1      | 1.1      | 1.1      | 1.1      | 1.1      | OEHHA 2015, Table 7.1  |
| Average Age Sensitivity Factor                  |              | 10            | 10       | 3        | 3        | 1        | 1        | OEHHA 2015, Table 8.3  |
| AT, Average Time (days)                         |              | 70            | 70       | 70       | 70       | 70       | 70       | Averaging time for lifetime cancer risk  |
|   |              |               |          |          |          |          |          | OEHHA 2015, Table 8.4: Use FAH = 1 if a school is within the 1×10-6 (or greater) cancer risk         |
| FAH   |              | 1.00          | 1.00     | 1.00     | 1.00     | 1.00     | 1.00     | isopleth   |
| ED, Exposure Duration (years)                   |              | -             | 2        | -        | -        | -        | -        | Equation 8.2.4 A, OEHHA 2015; Gateway School   |
| Adjustment Factor                               | Residential  | 1.00          | 1.00     | 1.00     | 1.00     | 1.00     | 1.00     | OEHHA 2015, Page 4-44 and Equation 4.1; exposure is adjusted upward to account for                   |
|   | Recreational | 3.36          | 3.36     | 3.36     | 3.36     | 3.36     | 3.36     | overlapping daytime exposure.  |
|   | School       | 3.36          | 3.36     | 3.36     | 3.36     | 3.36     | 3.36     | overlapping dayunic exposure.  |

5

Hazard Index

Chronic Inhalation Reference Exposure Level, respiratory, DPM

OEHHA 2015, Table 6.3

- \* AERMOD ( 19191):
- C:\USERS\35578\DESKTOP\751\_GATEWAY\_HRA\_DPM\751\_GATEWAY\_HRA\_DPM.ISC 07/23/20
- \* AERMET ( 14134):

12:05:56

\* MODELING OPTIONS USED: NonDFAULT CONC ELEV FASTAREA URBAN

\* PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR

SOURCE GROUP: ALL

- \* FOR A TOTAL OF 7 RECEPTORS.

| 552888.74000 | 4167990.85000 | 0.00045 | 8.89 | 125.64 | 0.00 |
|--------------|---------------|---------|------|--------|------|
| ANNUAL ALL   | 0000005       |         |      |        |      |
| 552928.74000 | 4167990.85000 | 0.00057 | 7.73 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552888.74000 | 4168010.85000 | 0.00047 | 8.48 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552908.74000 | 4168010.85000 | 0.00053 | 8.85 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552928.74000 | 4168010.85000 | 0.00060 | 8.95 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552908.74000 | 4168030.85000 | 0.00056 | 8.91 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552928.74000 | 4168030.85000 | 0.00064 | 8.77 | 125.64 | 0.00 |
| ANNUAL ALL   | 0000005       |         |      |        |      |

<sup>\*\*</sup> CONCUNIT ug/m^3

<sup>\*\*</sup> DEPUNIT g/m^2

<sup>\*\*</sup> CONCUNIT ug/m^3

<sup>\*\*</sup> DEPUNIT g/m^2

\* AERMET ( 14134):

12:21:43

\* MODELING OPTIONS USED: NonDFAULT CONC ELEV FASTAREA URBAN PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS

FOR SOURCE GROUP: ALL

FOR A TOTAL OF 7 RECEPTORS.

FORMAT:

X

(3(1X,F13.5),3(1X,F8.2),2X,A6,2X,A8,2X,I8.8,2X,A8) Y AVERAGE CONC ZELEV ZHILL

| ZFLAG  | AVE      | GRP             | NUM    | YRS | NET   | ID  |      |        |
|--------|----------|-----------------|--------|-----|-------|-----|------|--------|
| *      |          |                 |        |     |       |     |      |        |
|        | 74000    | 4167990.        |        |     | 0.000 | 110 | 8.89 | 125.64 |
|        |          | 416/990.<br>ALL |        | 105 | 0.000 | JIU | 0.09 | 125.04 |
|        | _        | 4167990.        |        | 703 | 0.000 | )11 | 7.73 | 125.64 |
| 0.00 A | NNUAL A  | ALL             | 000000 | 05  |       |     |      |        |
| 55288  | 88.74000 | 4168010.        | 85000  |     | 0.000 | 10  | 8.48 | 125.64 |
| 0.00 A | NNUAL A  | ALL             | 000000 | 05  |       |     |      |        |
| 55290  | 8.74000  | 4168010.        | 85000  |     | 0.000 | 11  | 8.85 | 125.64 |
| 0.00 A | NNUAL A  | ALL             | 000000 | 05  |       |     |      |        |
| 55292  | 8.74000  | 4168010.        | 85000  |     | 0.000 | 12  | 8.95 | 125.64 |
| 0.00 A | NNUAL A  | ALL             | 000000 | 05  |       |     |      |        |
| 55290  | 8.74000  | 4168030.        | 85000  |     | 0.000 | 11  | 8.91 | 125.64 |
| 0.00 A | NNUAL A  | ALL             | 000000 | 05  |       |     |      |        |
| 55292  | 8.74000  | 4168030.        | 85000  |     | 0.000 | 12  | 8.77 | 125.64 |
| 0.00 A | NNUAL A  | ALL             | 000000 | 05  |       |     |      |        |
|        |          |                 |        |     |       |     |      |        |

<sup>\*\*</sup> CONCUNIT ug/m^3

<sup>\*</sup> AERMOD ( 19191): C:\USERS\35578\DESKTOP\751\_GATEWAY\_HRA\_EXHAUST \751 GATEWAY HRA EXHAU 07/23/20

<sup>\*\*</sup> DEPUNIT g/m^2

<sup>\*\*</sup> CONCUNIT ug/m^3

<sup>\*\*</sup> DEPUNIT g/m^2

- \* AERMOD ( 19191):
- $\label{lem:c:start} $$C:\Users\35578\Desktop\751\_Gateway\_HRA\_Exhaust\751\_Gateway\_HRA\_Exhaust\751\_Gateway\_HRA\_Exhaust\951\_Gateway\951\_Gateway\951\_Gateway\951\_Gateway\951\_Gateway\951\_Gateway\951\_Gateway\951\_Gateway\951\_Ga$
- \* AERMET ( 14134):

12:13:12

\* MODELING OPTIONS USED: NonDFAULT CONC ELEV FASTAREA URBAN

\* PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR

SOURCE GROUP: ALL

- \* FOR A TOTAL OF 7 RECEPTORS.

| 552888.74000 |               | 0.00045 | 8.89 | 125.64 | 0.00 |
|--------------|---------------|---------|------|--------|------|
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552928.74000 | 4167990.85000 | 0.00058 | 7.73 | 125.64 | 0.00 |
| ANNUAL ALL   | 0000005       |         |      |        |      |
| 552888.74000 | 4168010.85000 | 0.00047 | 8.48 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552908.74000 | 4168010.85000 | 0.00053 | 8.85 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552928.74000 | 4168010.85000 | 0.00061 | 8.95 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552908.74000 | 4168030.85000 | 0.00056 | 8.91 | 125.64 | 0.00 |
| ANNUAL ALL   | 00000005      |         |      |        |      |
| 552928.74000 | 4168030.85000 | 0.00064 | 8.77 | 125.64 | 0.00 |
| ANNUAL ALL   | 0000005       |         |      |        |      |

<sup>\*\*</sup> CONCUNIT ug/m^3

<sup>\*\*</sup> DEPUNIT g/m^2

```
* AERMOD ( 19191): C:\Users\35578\Desktop\751_Gateway_HRA_Exhaust
\751 Gateway HRA Exhau 07/23/20
* AERMET ( 14134):
13:25:13
* MODELING OPTIONS USED: NonDFAULT CONC ELEV FASTAREA URBAN
       PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS
FOR SOURCE GROUP: ALL
        FOR A TOTAL OF
                        7 RECEPTORS.
        FORMAT:
(3(1X,F13.5),3(1X,F8.2),2X,A6,2X,A8,2X,I8.8,2X,A8)
      X
                  Y AVERAGE CONC ZELEV
                                              ZHILL
                   NUM YRS NET ID
ZFLAG
       AVE
              GRP
 552888.74000 4167990.85000 0.00011
                                        8.89 125.64
0.00 ANNUAL ALL 00000005
                              0.00012
 552928.74000 4167990.85000
                                       7.73
                                              125.64
0.00 ANNUAL ALL 00000005
 552888.74000 4168010.85000
                              0.00011 8.48
                                              125.64
0.00 ANNUAL ALL 00000005
 552908.74000 4168010.85000
                              0.00012 8.85
                                               125.64
0.00 ANNUAL ALL
                    00000005
 552928.74000 4168010.85000
                              0.00013 8.95 125.64
0.00 ANNUAL ALL
                   00000005
```

0.00012

8.91 125.64

0.00013 8.77 125.64

552908.74000 4168030.85000

0.00 ANNUAL ALL 00000005 552928.74000 4168030.85000

0.00 ANNUAL ALL 00000005

<sup>\*\*</sup> CONCUNIT ug/m^3

<sup>\*\*</sup> DEPUNIT g/m^2

Operational Risk Calcs

|   |                  | 3rd trimester | 0<2      | 2<9      | 2<16     | 16<30    | 16-70    | Total  |
|---|------------------|---------------|----------|----------|----------|----------|----------|--|
| Receptor Type   | School           |               |          |          |          |          |          |  |
|   |                  |               |          |          |          |          |          |  |
| AERMOD CONCENTRATION  |                  |               |          |          |          |          |          |  |
| (ug/m^3)  | 0.00013          |               |          |          |          |          |          |  |
|   | Dose             | 2.14E-08      | 1.07E-07 | 5.70E-08 | 4.63E-08 | 2.14E-08 |          |  |
|   | Risk             | 0.00          | 1.13E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.1E-07  |
|   | Risk per million | 0.00          | 0.113    | 0.00     | 0.00     | 0.00     | 0.00     | 0.11   |
|   | Chronic HI       | -             | -        | -        | -        | -        | -        | 0.000026   |
|   | PM2.5            | -             | -        | -        | -        | -        | -        | 0.00013  |
| HRA Factors and values - Construction                             |                  |               |          |          |          |          |          |  |
| Dose-air = C <sub>air</sub> × (BR/BW) × A × EF × 10 <sup>-6</sup> |                  | 3rd trimester | 0<2      | 2<9      | 9<16     | 16<30    | 16-70    | source   |
| Dose factors for calcs>   | School           | 1.64E-04      | 8.22E-04 | 4.38E-04 | 3.56E-04 | 1.64E-04 | 1.58E-04 | dose factors for lookup in risk calcs  |
| Daily Breath Rate (L/kg-day)                                      | School           | 240           | 1200     | 640      | 520      | 240      | 230      | SJVAPCD for 3rd tri; 95th percentile for all   |
| A   | 501001           | 1             | 1        | 1        | 1        | 1        | 1        | OEHHA 2015, page 5-24  |
| EF, Exposure frequency (unitless), days/365 days                  | School           | 0.68          | 0.68     | 0.68     | 0.68     | 0.68     | 0.68     | OEHHA 2015, page 5-24, 5 days/week, 11.5 hours/day (Daycare)                                       |
| Conversion Factor   |                  | 1.00E-06      | 1.00E-06 | 1.00E-06 | 1.00E-06 | 1.00E-06 | 1.00E-06 | (mg/ug + m3/L)   |
|   |                  |               |          |          |          |          |          |  |
| RISKinh-res = DOSEair × CPF × ASF × ED/AT × FAH                   |                  |               |          |          |          |          |          |  |
| Risk factors for calcs>   | School           | 0.00E+00      | 1.06E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | risk factors for lookup in risk calcs  |
| CPF, DPM ([mg/kg-day] <sup>-1</sup> )                             |                  | 1.1           | 1.1      | 1.1      | 1.1      | 1.1      | 1.1      | OEHHA 2015, Table 7.1  |
| Average Age Sensitivity Factor                                    |                  | 10            | 10       | 3        | 3        | 1        | 1        | OEHHA 2015, Table 8.3  |
| AT, Average Time (years)  |                  | 70            | 70       | 70       | 70       | 70       | 70       | Averaging time for lifetime cancer risk  |
| FAH   |                  | 1.00          | 1.00     | 1.00     | 1.00     | 1.00     | 1.00     | OEHHA 2015, Table 8.4: Use FAH = 1 if a school is within the 1×10-6 (or greater) cancer risk isopl |
| ED, Exposure Duration (years)                                     | School           |               | 2.00     |          |          | 0        | 0        | OEHHA 2015, Table 6.3  |
| Adjustment Factor   |                  | 3.36          | 3.36     | 3.36     | 3.36     | 3.36     | 3.36     |  |
| Chronic Inhalation Reference Exposure Level                       |                  | 5             | 1        |          |          |          |          |  |

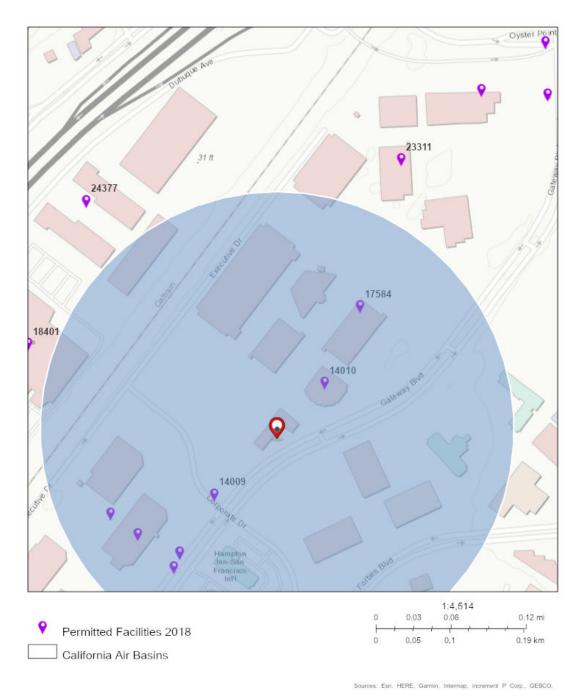


# Stationary Source Risk & Hazards Screening Report

# Area of Interest (AOI) Information

Area: 3,134,508.61 ft2

Jul 24 2020 14:42:19 Pacific Daylight Time



# Summary

| Name                      | Count | Area(ft²) | Length(ft) |
|---------------------------|-------|-----------|------------|
| Permitted Facilities 2018 | 8     | N/A       | N/A        |

# Permitted Facilities 2018

| # | FACID                                | Name  | Address               | City                | St |
|---|--------------------------------------|---|-----------------------|---------------------|----|
| 1 | 14009                                | Boston Properties                           | 651 Gateway Boulevard | South San Francisco | CA |
| 2 | 14010                                | Boston Properties                           | 601 Gateway Boulevard | South San Francisco | CA |
| 3 | 15916                                | Boston Properties                           | 611 Gateway Boulevard | South San Francisco | CA |
| 4 | 16024                                | 24 Genentech, Inc 611 Gateway Boulevard Sou |                       | South San Francisco | CA |
| 5 | 17584                                | Alexandria Real Estate Equities Inc 681 GA  |                       | S SAN FRAN          | CA |
| 6 | 17649                                | Alexandria Real Estate<br>Equities, Inc     | Gateway Boulevard     | South San Francisco | СА |
| 7 | 19179                                | MacroGenics West,Inc                        | One Corporate Drive   | South San Francisco | CA |
| 8 | 20236 Biotech Gateway - HCP c/o CBRE |   | 2 Corporate Drive     | South San Francisco | СА |

| # | Zip   | County    | Cancer | Hazard | PM_25 | Туре              | Count |
|---|-------|-----------|--------|--------|-------|-------------------|-------|
| 1 | 94080 | San Mateo | 20.250 | 0.030  | 0.330 | Contact<br>BAAQMD | 1     |
| 2 | 94080 | San Mateo | 0.780  | 0.000  | 0.000 | Generators        | 1     |
| 3 | 94080 | San Mateo | 1.770  | 0.000  | 0.000 | Contact<br>BAAQMD | 1     |
| 4 | 94080 | San Mateo | 2.730  | 0.010  | 0.000 | Generators        | 1     |
| 5 | 94080 | San Mateo | 2.380  | 0.000  | 0.000 | Generators        | 1     |
| 6 | 94080 | San Mateo | 9.310  | 0.010  | 0.010 | Generators        | 1     |
| 7 | 94080 | San Mateo | 39.610 | 0.020  | 0.050 | Generators        | 1     |
| 8 | 94080 | San Mateo | 1.660  | 0.000  | 0.000 | Generators        | 1     |

Note: The estimated risk and hazard impacts from these sources would be expected to be substantially lower when site specific Health Risk Screening Assessments are conducted.

The screening level map is not recommended for evaluating sensitive land uses such as schools, senior centers, day cares, and health facilities.

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Gasoline Dispensing Facility (GDF) Distance Multiplier Tool: This distance multiplier tool refines the screening values for cancer risk and chronic hazard index found in the District's Stationary Source Screening Analysis Tool for GDFs, to represent adjusted risk and hazard impacts that can be expected with farther distances from the source of emissions. Diesel Internal Combustion (IC) Engine Distance Multiplier Tool: This distance multiplier tool refines the screening values for cancer risk and PMs\_c concentrations found in the District's Stationary Source Screening Analysis Tool for permitted facilities which contain only diseal Cengines, to represent adjusted risk and hazard impacts that can be expected with farther distances from the source of emissions.

Generic Distance Multiplier Tool: This distance multiplier tool refines the screening values to represent adjusted risk and hazard impacts that can be expected with farther distances from the source of emissions.

|            | Gas Station    |                          |               |               |  |  |  |
|------------|----------------|--------------------------|---------------|---------------|--|--|--|
| Distance   | Distance       | Distance                 | Enter Risk or | Adjusted Risk |  |  |  |
| (meters)   | (feet)         | adjustment<br>multiplier | Hazard        | or Hazard     |  |  |  |
| 0          | 0.0            | 1.000                    |               | 0.0000        |  |  |  |
| 5          | 16.4           | 1.000                    |               | 0.0000        |  |  |  |
| 10         | 32.8           | 1.000                    |               | 0.0000        |  |  |  |
| 15         | 49.2           | 1.000                    |               | 0.0000        |  |  |  |
| 20         | 65.6           | 1.000                    |               | 0.0000        |  |  |  |
| 25<br>30   | 82.0<br>98.4   | 0.728<br>0.559           |               | 0.0000        |  |  |  |
| 35         | 114.8          | 0.445                    |               | 0.0000        |  |  |  |
| 40         | 131.2          | 0.365                    |               | 0.0000        |  |  |  |
| 45         | 147.6          | 0.305                    |               | 0.0000        |  |  |  |
| 50         | 164.0          | 0.260                    |               | 0.0000        |  |  |  |
| 55         | 180.4          | 0.225                    |               | 0.0000        |  |  |  |
| 60<br>65   | 196.9<br>213.3 | 0.197<br>0.174           |               | 0.0000        |  |  |  |
| 70         | 229.7          | 0.174                    |               | 0.0000        |  |  |  |
| 75         | 246.1          | 0.139                    |               | 0.0000        |  |  |  |
| 80         | 262.5          | 0.126                    |               | 0.0000        |  |  |  |
| 85         | 278.9          | 0.114                    |               | 0.0000        |  |  |  |
| 90         | 295.3          | 0.104                    |               | 0.0000        |  |  |  |
| 95         | 311.7          | 0.096                    |               | 0.0000        |  |  |  |
| 100        | 328.1          | 0.088                    |               | 0.0000        |  |  |  |
| 105        | 344.5          | 0.082                    |               | 0.0000        |  |  |  |
| 110<br>115 | 360.9<br>377.3 | 0.076<br>0.071           |               | 0.0000        |  |  |  |
| 120        | 393.7          | 0.066                    |               | 0.0000        |  |  |  |
| 125        | 410.1          | 0.062                    |               | 0.0000        |  |  |  |
| 130        | 426.5          | 0.058                    |               | 0.0000        |  |  |  |
| 135        | 442.9          | 0.055                    |               | 0.0000        |  |  |  |
| 140        | 459.3          | 0.052                    |               | 0.0000        |  |  |  |
| 145        | 475.7          | 0.049                    |               | 0.0000        |  |  |  |
| 150<br>155 | 492.1<br>508.5 | 0.046                    |               | 0.0000        |  |  |  |
| 160        | 524.9          | 0.044                    |               | 0.0000        |  |  |  |
| 165        | 541.3          | 0.042                    |               | 0.0000        |  |  |  |
| 170        | 557.7          | 0.038                    |               | 0.0000        |  |  |  |
| 175        | 574.1          | 0.036                    |               | 0.0000        |  |  |  |
| 180        | 590.6          | 0.034                    |               | 0.0000        |  |  |  |
| 185        | 607.0          | 0.033                    |               | 0.0000        |  |  |  |
| 190        | 623.4          | 0.031                    |               | 0.0000        |  |  |  |
| 195<br>200 | 639.8<br>656.2 | 0.030                    |               | 0.0000        |  |  |  |
| 205        | 672.6          | 0.029                    |               | 0.0000        |  |  |  |
| 210        | 689.0          | 0.027                    |               | 0.0000        |  |  |  |
| 215        | 705.4          | 0.026                    |               | 0.0000        |  |  |  |
| 220        | 721.8          | 0.025                    |               | 0.0000        |  |  |  |
| 225        | 738.2          | 0.024                    |               | 0.0000        |  |  |  |
| 230        | 754.6          | 0.023                    |               | 0.0000        |  |  |  |
| 235        | 771.0          | 0.022                    |               | 0.0000        |  |  |  |
| 240<br>245 | 787.4<br>803.8 | 0.022                    |               | 0.0000        |  |  |  |
| 250        | 820.2          | 0.021                    |               | 0.0000        |  |  |  |
| 255        | 836.6          | 0.020                    |               | 0.0000        |  |  |  |
| 260        | 853.0          | 0.019                    |               | 0.0000        |  |  |  |
| 265        | 869.4          | 0.018                    |               | 0.0000        |  |  |  |
| 270        | 885.8          | 0.018                    |               | 0.0000        |  |  |  |
| 275        | 902.2          | 0.017                    |               | 0.0000        |  |  |  |
| 280        | 918.6          | 0.017                    |               | 0.0000        |  |  |  |
| 285<br>290 | 935.0<br>951.4 | 0.016<br>0.016           |               | 0.0000        |  |  |  |
| 290        | 967.8          | 0.015                    |               | 0.0000        |  |  |  |
| 300        | 984.3          | 0.015                    |               | 0.0000        |  |  |  |
|            |                |                          |               |               |  |  |  |

|                      |                    | Diesel Ba                            | ckup G                  | ienerat                       | or                           |                                 |
|----------------------|--------------------|--------------------------------------|-------------------------|-------------------------------|------------------------------|---------------------------------|
| Distance<br>(meters) | Distance<br>(feet) | Distance<br>adjustment<br>multiplier | Enter Risk<br>or Hazard | Adjusted<br>Risk or<br>Hazard | Enter PM2.5<br>Concentration | Adjusted PM2.5<br>Concentration |
| 0                    | 0.0                | 1.000                                |                         | 0                             |                              | 0                               |
| 5                    | 16.4               | 1.000                                |                         | 0                             |                              | 0                               |
| 10                   | 32.8               | 1.000                                |                         | 0                             |                              | 0                               |
| 15                   | 49.2               | 1.000                                |                         | 0                             |                              | 0                               |
| 20                   | 65.6               | 1.000                                |                         | 0                             |                              | 0                               |
| 25                   | 82.0               | 0.85                                 |                         | 0                             |                              | 0                               |
| 30                   | 98.4               | 0.73                                 |                         | 0                             |                              | 0                               |
| 35                   | 114.8              | 0.64                                 |                         | 0                             |                              | 0                               |
| 40                   | 131.2              | 0.58                                 |                         | 0                             |                              | 0                               |
| 50                   | 164.0              | 0.5                                  |                         | 0                             |                              | 0                               |
| 60                   | 196.9              | 0.41                                 | 0.78                    | 0.3198                        | 0                            | 0                               |
| 70                   | 229.7              | 0.31                                 |                         | 0                             |                              | 0                               |
| 80                   | 262.5              | 0.28                                 |                         | 0                             |                              | 0                               |
| 90                   | 295.3              | 0.25                                 |                         | 0                             |                              | 0                               |
| 100                  | 328.1              | 0.22                                 |                         | 0                             |                              | 0                               |
| 110                  | 360.9              | 0.18                                 |                         | 0                             |                              | 0                               |
| 120                  | 393.7              | 0.16                                 |                         | 0                             |                              | 0                               |
| 130                  | 426.5              | 0.15                                 |                         | 0                             |                              | 0                               |
| 140                  | 459.3              | 0.14                                 |                         | 0                             |                              | 0                               |
| 150                  | 492.1              | 0.12                                 |                         | 0                             |                              | 0                               |
| 160                  | 524.9              | 0.1                                  | 27.13                   | 2.713                         | 0.33                         | 0.033                           |
| 180                  | 590.6              | 0.09                                 |                         | 0                             |                              | 0                               |
| 200                  | 656.2              | 0.08                                 | 10.97                   | 0.8776                        | 0.01                         | 0.0008                          |
| 220                  | 721.8              | 0.07                                 | 39.61                   | 2.7727                        | 0.05                         | 0.0035                          |
| 240                  | 787.4              | 0.06                                 |                         | 0                             |                              | 0                               |
| 260                  | 853.0              | 0.05                                 |                         | 0                             |                              | 0                               |
| 280                  | 918.6              | 0.04                                 |                         | 0                             |                              | 0                               |

| Gei        | าeric C        | ase            |
|------------|----------------|----------------|
| Distance   | Distance       |                |
| (meters)   | (feet)         | Multiplier     |
| 0          | 0.0            | 1.000          |
| 5          | 16.4           | 1.000          |
| 10         | 32.8           | 0.883          |
| 15         | 49.2           | 0.855          |
| 20         | 65.6           | 0.827          |
| 25<br>30   | 82.0<br>98.4   | 0.801<br>0.775 |
| 35         | 114.8          | 0.750          |
| 40         | 131.2          | 0.726          |
| 45         | 147.6          | 0.702          |
| 50         | 164.0          | 0.679          |
| 55         | 180.4          | 0.658          |
| 60         | 196.9          | 0.636          |
| 65         | 213.3          | 0.616          |
| 70         | 229.7          | 0.596          |
| 75<br>80   | 246.1<br>262.5 | 0.577          |
| 85         | 262.5          | 0.558<br>0.540 |
| 90         | 295.3          | 0.540          |
| 95         | 311.7          | 0.506          |
| 100        | 328.1          | 0.489          |
| 105        | 344.5          | 0.474          |
| 110        | 360.9          | 0.458          |
| 115        | 377.3          | 0.444          |
| 120        | 393.7          | 0.429          |
| 125        | 410.1          | 0.415          |
| 130<br>135 | 426.5<br>442.9 | 0.402          |
| 140        | 459.3          | 0.389          |
| 145        | 475.7          | 0.364          |
| 150        | 492.1          | 0.353          |
| 155        | 508.5          | 0.341          |
| 160        | 524.9          | 0.330          |
| 165        | 541.3          | 0.319          |
| 170        | 557.7          | 0.309          |
| 175        | 574.1          | 0.299          |
| 180<br>185 | 590.6<br>607.0 | 0.290          |
| 190        | 623.4          | 0.280<br>0.271 |
| 195        | 639.8          | 0.262          |
| 200        | 656.2          | 0.254          |
| 205        | 672.6          | 0.246          |
| 210        | 689.0          | 0.238          |
| 215        | 705.4          | 0.230          |
| 220        | 721.8          | 0.223          |
| 225        | 738.2          | 0.216<br>0.209 |
| 230        | 754.6          |                |
| 235<br>240 | 771.0          | 0.202          |
| 240        | 787.4<br>803.8 | 0.195          |
| 250        | 820.2          | 0.189          |
| 255        | 836.6          | 0.177          |
| 260        | 853.0          | 0.171          |
| 265        | 869.4          | 0.166          |
| 270        | 885.8          | 0.160          |
| 275        | 902.2          | 0.155          |
| 280        | 918.6          | 0.150          |
| 285        | 935.0          | 0.145          |
| 290        | 951.4          | 0.141          |
| 295<br>300 | 967.8<br>984.3 | 0.136<br>0.132 |
| 300        | 704.3          | 0.132          |

Appendix C Assembly Bill 52 Consultation Materials

# 751 Gateway Project - Assembly Bill 52 Consultation Log

|             |                  | Lead Agency    |                         |                     |                  |                             |                              |                    |        |                           |
|-------------|------------------|----------------|-------------------------|---------------------|------------------|-----------------------------|------------------------------|--------------------|--------|---------------------------|
| Date        |                  | Contact        | Contact                 | Address             | Phone #          | Email                       | Organization Affiliation     | Tribal Affiliation | Туре   | Subject                   |
|             | from the City of |                |                         |                     |                  |                             |                              |                    |        |                           |
|             | South San        | Adena          |                         | 789 Canada Road     |                  |                             |                              |                    |        | a letter requesting       |
|             | Francisco        | Friedman,      | Irenne Zweirlein,       | Woodside, CA        | 650.851.7489 (c) |                             | Amah Mutsun Tribal Band of   |                    |        | information regarding the |
| 1/15/2020   | California       | Senior Planner | Chairperson             | 94062               | 650.332.1526 (o) | amahmustsuntribal@gmail.com | Mission San Juan Bautista    | Costanoan          | Letter | project                   |
|             | from the City of |                |                         |                     |                  |                             |                              |                    |        |                           |
|             | South San        | Adena          |                         |                     |                  |                             |                              |                    |        | a letter requesting       |
|             | Francisco        | Friedman,      | Ann Marie Sayers,       | PO Box 28           |                  |                             | Indian Canyon Mutsun Band of |                    |        | information regarding the |
| 1/15/2020   | California       | Senior Planner | Chairperson             | Hollister, CA 95024 | 831.637.4238     | ams@indiancanyon.org        | Coastanoan                   | Costanoan          | Letter | project                   |
|             | from the City of |                |                         |                     |                  |                             |                              |                    |        |                           |
|             | South San        | Adena          |                         |                     |                  |                             |                              |                    |        | a letter requesting       |
|             | Francisco        | Friedman,      | Rosemary Cambra,        | P.O. Box 360791,    |                  |                             | Muwekma Ohlone Indian Tribe  |                    |        | information regarding the |
| 1/15/2020   | California       | Senior Planner | Chairperson             | Milpitas, CA 95036  | NA               |                             | of the SF Bay Area           | Costanoan          | Letter | project                   |
|             | from the City of |                |                         |                     |                  |                             |                              | Bay Miwok          |        |                           |
|             | South San        | Adena          |                         |                     |                  |                             |                              | Ohlone             |        | a letter requesting       |
|             | Francisco        | Friedman,      |                         | PO Box 3152         |                  |                             |                              | Patwin             |        | information regarding the |
| 1/15/2020   | California       | Senior Planner | Andrew Galvan           | Fremont, CA 94539   | 510.882.0527     | chochenyo@aol.com           | The Ohlone Indian Tribe      | Plains Miwok       | Letter | project                   |
| , , , , , , | from the City of |                |                         |                     |                  |                             |                              |                    |        |                           |
|             | South San        | Adena          |                         | 244 E 1st Street    |                  |                             |                              |                    |        | a letter requesting       |
|             | Francisco        | Friedman,      |                         | Pomona, CA          |                  |                             |                              |                    |        | information regarding the |
| 1/15/2020   | California       | Senior Planner | Tony Cerda, Chairperson | 91766               |                  |                             | Rumsen Carmel Tribe          | Costanoan          | Letter | project                   |



**CITY COUNCIL 2020** 

RICHARD GARBARINO, MAYOR MARK ADDIEGO, VICE MAYOR KARYL MATSUMOTO, COUNCILMEMBER MARK NAGALES, COUNCILMEMBER BUENAFLOR NICOLAS, COUNCILMEMBER

MIKE FUTRELL, CITY MANAGER

January 15, 2020

Amah Mutsun Tribal Band of Mission San Juan Bautista Irenne Zwierlein, Chairperson 789 Canada Road Woodside, CA 94062

RE: Tribal Cultural Resources under the California Environmental Quality Act, Assembly Bill 52 Formal Notification of Project Consideration and Notification of Consultation Opportunity, pursuant to Public Resources Code §21080.3.1

Dear Ms. Zwierlein:

The City of South San Francisco (City) has received a complete project application for the 751 Gateway Boulevard Project (project) and has begun environmental analysis of the project. While no notice has been formally requested under Public Resources Code (PRC) §21080.1(d), this letter has been sent upon the recommendation of the Native American Heritage Commission to tribes that are culturally and traditionally affiliated with the area.

Below and on the subsequent pages, please find a description of the project, a map showing the project site, and the name of our project point of contact, pursuant to PRC § 21080.3.1 (d).

#### **Project Description**

The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) consists of a 6-story, approximately 176,000-square foot office building at 701 Gateway Boulevard and a surface parking lot containing approximately 564 parking spaces. The project site is located in the Gateway Campus and is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west in the City of South San Francisco, California. The proposed project would be constructed on the site of an existing surface parking lot. The proposed project would construct a new 148-foot-tall, 7-story building with approximately 208,800 square feet of lab and office uses on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would be retained. The proposed project would also include surface parking lots with a total of 418 parking spaces (including 46 parking spaces in a lot north of the proposed building) that would be used by other buildings within the Gateway Campus. The

Subject: 751 Gateway

project would require grading or disturbing an area of approximately 149,000 square feet during construction and 1,850 cubic yards of soil would be excavated. The project would require a maximum depth of excavation reaching approximately 9 feet below ground surface. Figure 1, a map of the project location, is included with this letter.

The City would like to provide you with an opportunity to communicate concerns you might have regarding places within the project area that may be important to your community. The City requests your participation in the identification and protection of cultural resources, sacred lands or other heritage sites within the above described project area with the understanding that you or other members of the community might possess specialized knowledge of the area.

# Lead Agency Point of Contact

Attn: Adena Friedman, Senior Planner

City of South San Francisco

Department of Economic and Community Development

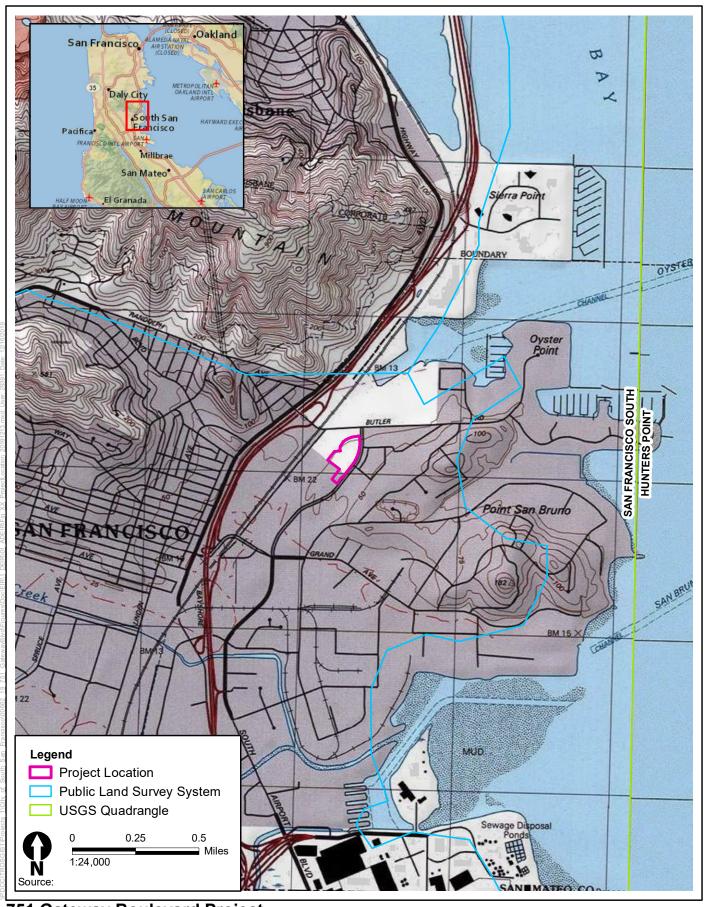
315 Maple Street

South San Francisco, CA 94080 Email: <a href="mailto:adena.friedman@ssf.net">adena.friedman@ssf.net</a>

Phone: 650-877-8535

Pursuant to PRC §21080.3.1 (b), you have 30 days from the receipt of this letter to request consultation, in writing, with the City of South San Francisco.

Very Respectfully,



751 Gateway Boulevard Project

Fig 1. Project Location Buri Buri Land Grant



January 15, 2020

Indian Canyon Mutsun Band of Costanoan Ann Marie Savers, Chairperson P.O. Box 28 Hollister, CA 95024

RE: Tribal Cultural Resources under the California Environmental Quality Act, Assembly Bill 52 Formal Notification of Project Consideration and Notification of Consultation Opportunity, pursuant to Public Resources Code §21080.3.1

Dear Ms. Savers:

The City of South San Francisco (City) has received a complete project application for the 751 Gateway Boulevard Project (project) and has begun environmental analysis of the project. While no notice has been formally requested under Public Resources Code (PRC) §21080.1(d), this letter has been sent upon the recommendation of the Native American Heritage Commission to tribes that are culturally and traditionally affiliated with the area.

Below and on the subsequent pages, please find a description of the project, a map showing the project site, and the name of our project point of contact, pursuant to PRC § 21080.3.1 (d).

#### **Project Description**

The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) consists of a 6-story, approximately 176,000-square foot office building at 701 Gateway Boulevard and a surface parking lot containing approximately 564 parking spaces. The project site is located in the Gateway Campus and is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west in the City of South San Francisco, California. The proposed project would be constructed on the site of an existing surface parking lot. The proposed project would construct a new 148-foot-tall, 7-story building with approximately 208,800 square feet of lab and office uses on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would be retained. The proposed project would also include surface parking lots with a total of 418 parking spaces (including 46 parking spaces in a lot north of the proposed building) that would be used by other buildings within the Gateway Campus. The

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MIKE FUTRELL, CITY MANAGER

Subject: 751 Gateway

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The City would like to provide you with an opportunity to communicate concerns you might have regarding places within the project area that may be important to your community. The City requests your participation in the identification and protection of cultural resources, sacred lands or other heritage sites within the above described project area with the understanding that you or other members of the community might possess specialized knowledge of the area.

# Lead Agency Point of Contact

Attn: Adena Friedman, Senior Planner

City of South San Francisco

Department of Economic and Community Development

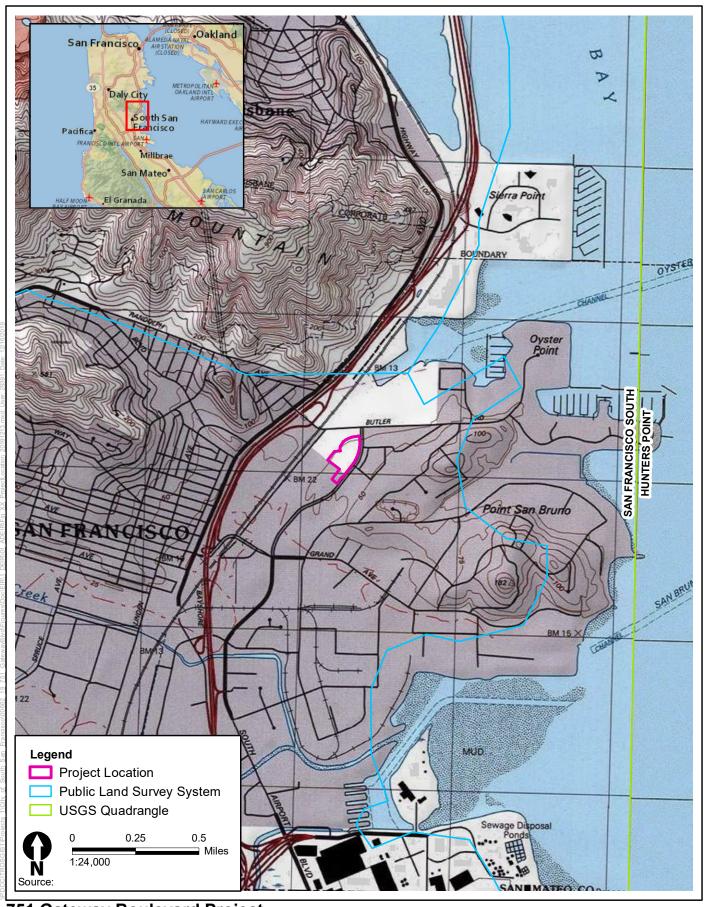
315 Maple Street

South San Francisco, CA 94080 Email: <a href="mailto:adena.friedman@ssf.net">adena.friedman@ssf.net</a>

Phone: 650-877-8535

Pursuant to PRC §21080.3.1 (b), you have 30 days from the receipt of this letter to request consultation, in writing, with the City of South San Francisco.

Very Respectfully,



751 Gateway Boulevard Project

Fig 1. Project Location Buri Buri Land Grant



January 15, 2020

Muwekma Ohlone Indian Tribe of the SF Bay Area Rosemary Cambra, Chairperson P.O. Box 360791 Milpitas, CA 95036

RE: Tribal Cultural Resources under the California Environmental Quality Act, Assembly Bill 52 Formal Notification of Project Consideration and Notification of Consultation Opportunity, pursuant to Public Resources Code §21080.3.1

Dear Ms. Cambra:

The City of South San Francisco (City) has received a complete project application for the 751 Gateway Boulevard Project (project) and has begun environmental analysis of the project. While no notice has been formally requested under Public Resources Code (PRC) §21080.1(d), this letter has been sent upon the recommendation of the Native American Heritage Commission to tribes that are culturally and traditionally affiliated with the area.

Below and on the subsequent pages, please find a description of the project, a map showing the project site, and the name of our project point of contact, pursuant to PRC § 21080.3.1 (d).

#### **Project Description**

The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) consists of a 6-story, approximately 176,000-square foot office building at 701 Gateway Boulevard and a surface parking lot containing approximately 564 parking spaces. The project site is located in the Gateway Campus and is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west in the City of South San Francisco, California. The proposed project would be constructed on the site of an existing surface parking lot. The proposed project would construct a new 148-foot-tall, 7-story building with approximately 208,800 square feet of lab and office uses on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would be retained. The proposed project would also include surface parking lots with a total of 418 parking spaces (including 46 parking spaces in a lot north of the proposed building) that would be used by other buildings within the Gateway Campus. The

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MIKE FUTRELL, CITY MANAGER

Subject: 751 Gateway

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The City would like to provide you with an opportunity to communicate concerns you might have regarding places within the project area that may be important to your community. The City requests your participation in the identification and protection of cultural resources, sacred lands or other heritage sites within the above described project area with the understanding that you or other members of the community might possess specialized knowledge of the area.

# Lead Agency Point of Contact

Attn: Adena Friedman, Senior Planner

City of South San Francisco

Department of Economic and Community Development

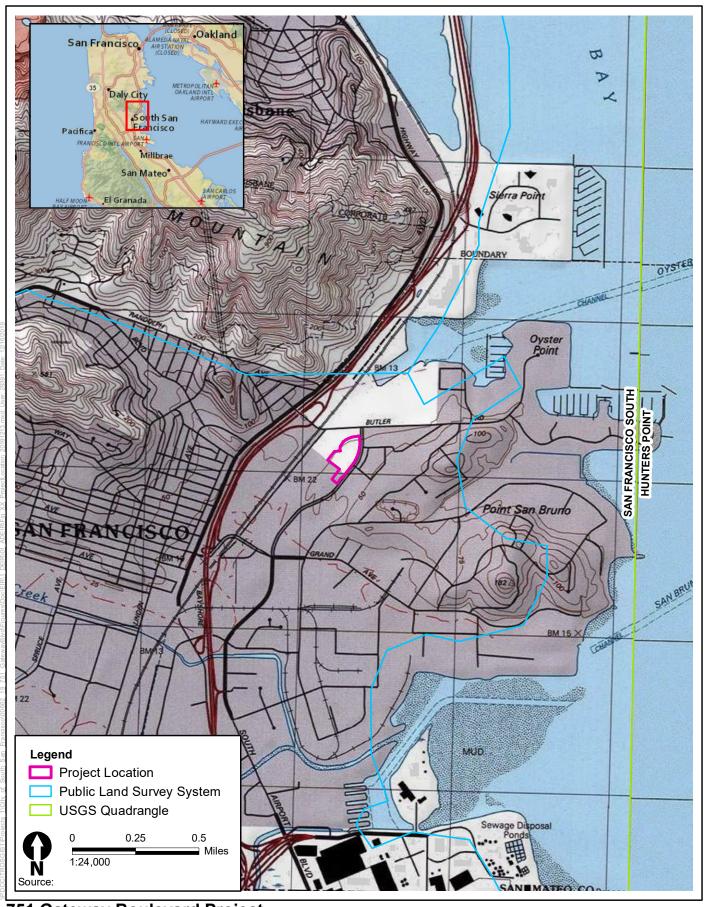
315 Maple Street

South San Francisco, CA 94080 Email: <a href="mailto:adena.friedman@ssf.net">adena.friedman@ssf.net</a>

Phone: 650-877-8535

Pursuant to PRC §21080.3.1 (b), you have 30 days from the receipt of this letter to request consultation, in writing, with the City of South San Francisco.

Very Respectfully,



751 Gateway Boulevard Project

Fig 1. Project Location Buri Buri Land Grant



January 15, 2020

The Ohlone Indian Tribe Andrew Galvan P.O. Box 3152 Fremont, CA 94539

RE: Tribal Cultural Resources under the California Environmental Quality Act, Assembly Bill 52 Formal Notification of Project Consideration and Notification of Consultation Opportunity, pursuant to Public Resources Code §21080.3.1

Dear Mr. Galvan:

The City of South San Francisco (City) has received a complete project application for the 751 Gateway Boulevard Project (project) and has begun environmental analysis of the project. While no notice has been formally requested under Public Resources Code (PRC) §21080.1(d), this letter has been sent upon the recommendation of the Native American Heritage Commission to tribes that are culturally and traditionally affiliated with the area.

Below and on the subsequent pages, please find a description of the project, a map showing the project site, and the name of our project point of contact, pursuant to PRC § 21080.3.1 (d).

#### **Project Description**

The 7.4-acre project site (Assessor's Parcel Numbers 015-024-290 and 015-024-360) consists of a 6-story, approximately 176,000-square foot office building at 701 Gateway Boulevard and a surface parking lot containing approximately 564 parking spaces. The project site is located in the Gateway Campus and is bounded by a commercial and office building (901 Gateway Boulevard) and a surface parking lot to the north, Gateway Boulevard to the east, a surface parking lot to the south, and commercial and office buildings to the west in the City of South San Francisco, California. The proposed project would be constructed on the site of an existing surface parking lot. The proposed project would construct a new 148-foot-tall, 7-story building with approximately 208,800 square feet of lab and office uses on the existing surface parking lot. The existing office building at 701 Gateway Boulevard would be retained. The proposed project would also include surface parking lots with a total of 418 parking spaces (including 46 parking spaces in a lot north of the proposed building) that would be used by other buildings within the Gateway Campus. The

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Subject: 751 Gateway

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# Lead Agency Point of Contact

Attn: Adena Friedman, Senior Planner

City of South San Francisco

Department of Economic and Community Development

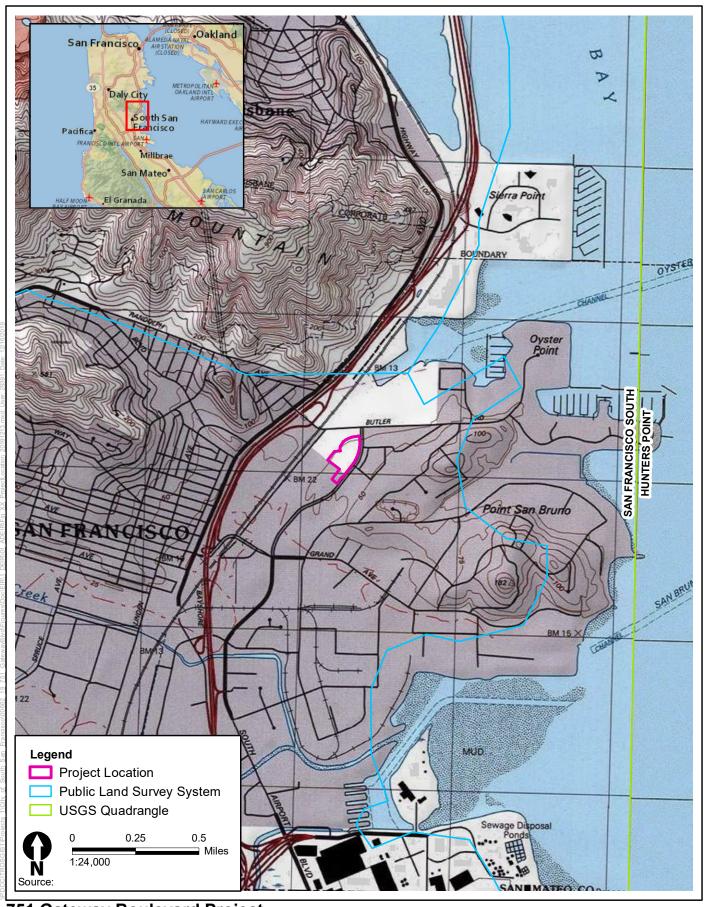
315 Maple Street

South San Francisco, CA 94080 Email: <a href="mailto:adena.friedman@ssf.net">adena.friedman@ssf.net</a>

Phone: 650-877-8535

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Very Respectfully,



751 Gateway Boulevard Project

Fig 1. Project Location Buri Buri Land Grant



CITY COUNCIL 2020

RICHARD GARBARINO, MAYOR MARK ADDIEGO, VICE MAYOR KARYL MATSUMOTO, COUNCILMEMBER MARK NAGALES, COUNCILMEMBER BUENAFLOR NICOLAS, COUNCILMEMBER

MIKE FUTRELL, CITY MANAGER

January 15, 2020

Coastanoan Rumsen Carmel Tribe Tony Cerda, Chairperson 244 E 1<sup>st</sup> Street, Pomona, CA 91766

RE: Tribal Cultural Resources under the California Environmental Quality Act, Assembly Bill 52 Formal Notification of Project Consideration and Notification of Consultation Opportunity, pursuant to Public Resources Code §21080.3.1

Dear Mr. Cerda:

The City of South San Francisco (City) has received a complete project application for the 751 Gateway Boulevard Project (project) and has begun environmental analysis of the project. While no notice has been formally requested under Public Resources Code (PRC) §21080.1(d), this letter has been sent upon the recommendation of the Native American Heritage Commission to tribes that are culturally and traditionally affiliated with the area.

Below and on the subsequent pages, please find a description of the project, a map showing the project site, and the name of our project point of contact, pursuant to PRC § 21080.3.1 (d).

#### **Project Description**

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Subject: 751 Gateway

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# Lead Agency Point of Contact

Attn: Adena Friedman, Senior Planner

City of South San Francisco

Department of Economic and Community Development

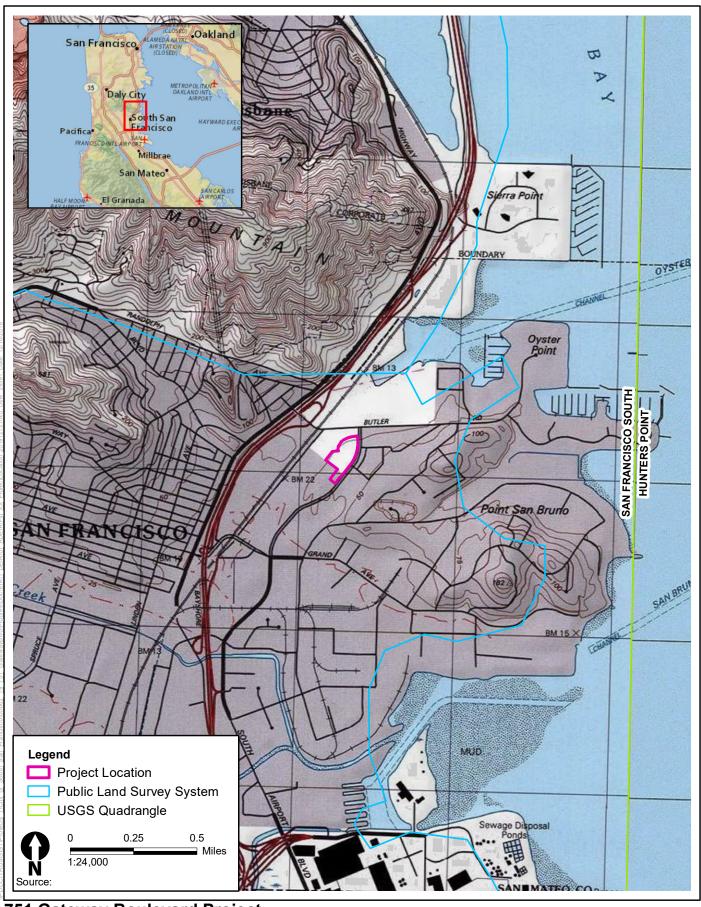
315 Maple Street

South San Francisco, CA 94080 Email: adena.friedman@ssf.net

Phone: 650-877-8535

Pursuant to PRC §21080.3.1 (b), you have 30 days from the receipt of this letter to request consultation, in writing, with the City of South San Francisco.

Very Respectfully,



751 Gateway Boulevard Project

Fig 1. Project Location Buri Buri Land Grant

Appendix D Transportation Impact Analysis

# 751 Gateway Boulevard

Final Transportation Impact Analysis

Prepared for:

**ICF** 

September 18, 2020

SF19-1078

FEHR PEERS

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## 1. Project Description

The transportation impact analysis (TIA) evaluates potential transportation impacts associated with the 751 Gateway Boulevard development project ("Project"). The Project involves construction of a 148-foot-tall, seven-story building with approximately 208,800 square feet of space (60 percent research and development [R&D] uses and 40 percent office uses) on the site of an existing northern surface parking lot on a 7.4-acre site in the City of South San Francisco's East of 101 employment area. The project site includes an existing 170,235 square foot office building at 701 Gateway Boulevard, which would remain under the Project.

The Project would also include a master parking plan for the portion of the Gateway Campus<sup>1</sup> consisting of 601 Gateway Boulevard, 611 Gateway Boulevard, 651 Gateway Boulevard, 681 – 685 Gateway Boulevard, 701 Gateway Boulevard, and 751 Gateway Boulevard. The master parking plan would provide 3,099 parking spaces, which would provide a ratio of 2.4 spaces/1,000 gross square feet (gsf) for this portion of the Gateway Campus. Of these spaces, 1,916 would serve 601, 611, and 651 Gateway Boulevard (office) in a shared parking arrangement (2.5 spaces/1,000 gsf), 289 would serve 681-685 Gateway Boulevard (lab) (2 spaces/1,000 gsf), 434 would serve 701 Gateway Boulevard (office)(2.5 spaces/1,000 gsf), and 418 would serve 751 Gateway Boulevard (lab) (2.00 spaces/1,000 gsf).

Primary bicycle, pedestrian, and motor vehicle site access is provided via the Gateway Boulevard frontage. Additional access is provided by an unnamed street that connects to Poletti Way. The project site design includes pedestrian connections between the neighboring Gateway Campus while maintaining the existing access drive that would curve around the proposed building.

## 1.1 Alternative Mode Share Target

The proposed project would maintain the existing zoning designation of Zone IV under the Gateway Specific Plan District (GSPD). The existing zoning allows for development at a floor area ratio (FAR) of 1.25, or a maximum of 402,930 square feet, within the project site. The building at 701 Gateway Boulevard is approximately 170,235 square feet. Based on the zoning, 232,695 square feet of unrealized FAR is associated with the project site. The proposed project would use a portion of the unrealized FAR associated with the project site. The total proposed FAR for the site, including both the existing building at 701 Gateway Boulevard and the proposed building at 751 Gateway Boulevard, would be 1.18.

The proposed project would require submittal of a TDM plan to the Planning Division for review and approval as part of the entitlement process, per the requirements of the South San Francisco Municipal Code (SSFMC) and the General Plan. The City's TDM program is intended to reduce the amount of traffic generated by new development, reduce the share of drive-alone traffic during peak periods, and incentivize

<sup>&</sup>lt;sup>1</sup> The project site is in an area referred to as the Gateway Campus (consisting of nine buildings at 601, 611, and 651 Gateway Boulevard; 681 to 685 Gateway Boulevard; 701 Gateway Boulevard; 801 Gateway Boulevard; and 901 to 951 Gateway Boulevard).



1

751 Gateway Boulevard Transportation Impact Analysis – Final September 18, 2020

the use of alternative modes of transportation. While SSFMC Section 20.400 does not call out a specific alternate mode-share (AMS) requirement for the Gateway Specific Plan District, similar zoning districts, and General Plan requirements in the East of 101 area require an AMS of 35 – 40% for development of a Floor Area Ratio of 1.0 – 1.25, and this standard would be applied to the 751 Gateway project, consistent with the City's requirements, and policies to increase AMS and decrease single occupancy vehicle traffic. While the City interprets the regulatory TDM requirements to require the project to achieve an AMS of 35 to 40 percent, this CEQA analysis assumes a higher drive-alone share and more conservative AMS of 26 percent consistent with the City/County Association of Governments of San Mateo County (C/CAG) travel demand model and analysis for other similar projects within the City and the region.. The City's TDM ordinance identifies several required and optional trip reduction measures for inclusion in a TDM Plan. The ordinance requires an annual employee mode share survey of the project site to ensure that desired transportation mode shares are achieved. Where the mode share target is not achieved, City officials may require program modifications intended to increase AMS or impose administrative penalties.







## 2. Environmental Setting

This section describes the existing transportation and circulation setting in the vicinity of the project site: the existing roadway network, transit network and service, pedestrian conditions, and bicycle conditions. A description of agencies with jurisdiction over transportation in South San Francisco and a summary of relevant plans and policies are provided in **Appendix B**.

## 2.1 Roadway Facilities

The project site is at the southwest corner of the Oyster Point Boulevard and Gateway Boulevard intersection in the City of South San Francisco's East of 101 employment area. Regional access to the project site is provided via US-101 and Oyster Point Boulevard to the north and, and US-101 and East Grand Avenue to the south. Relevant roadway plans and policies (e.g. South San Francisco General Plan, East of 101 Mobility 20/20 Plan, South San Francisco Complete Streets Plan) are discussed in **Appendix B. Figure 1-1** shows the Project location, study intersections, and the surrounding roadway system. Project site vehicular access is provided via two, two-way driveway that intersects Gateway Boulevard South of Oyster Point Boulevard. A dedicated pedestrian walkway parallels the driveway.

Study intersections are summarized in **Appendix C** and listed below:

- Gateway Boulevard / Gateway Business Park Driveway
- 2. Airport Boulevard / Grand Avenue
- 3. Gateway Boulevard / East Grand Avenue
- 4. Gateway Boulevard / Corporate Driveway
- 5. Dubuque Avenue / Oyster Point Boulevard
- 6. Gateway Boulevard / Oyster Point Boulevard
- 7. Airport Boulevard / Sister Cities Boulevard
- 8. Dubuque Avenue / US-101 Off-ramp

Key local roadways in the vicinity of the project site are described below:

- US-101 is an eight-lane freeway and principle north-south roadway connection between San Francisco, San Jose, and intermediate San Francisco Peninsula cities. In South San Francisco, US-101 is located approximately one mile west of the project site and serves the East of 101 area with three primary access points. Near the project site, US-101 carries about 220,000 vehicles per day and defines the East of 101 area's western edge and barrier to east-west bicycle and pedestrian connectivity. Access points include:
  - o Southern Access Gateway Boulevard: Northbound on- and off-ramps are at South Airport Boulevard/Wondercolor Lane; southbound on- and off-ramps are immediately south of the San Mateo Avenue/Produce Avenue/South Airport Boulevard intersection.
  - Central Access East Grand Avenue: Northbound off-ramps are at East Grand Avenue/Poletti Way and on-ramps are to the west at Grand Avenue/Airport Boulevard. Southbound off-ramps are at Airport Boulevard/Miller Avenue. There is no southbound freeway access at this location.



- Northern Access Oyster Point Boulevard: Northbound on- and off-ramps intersect
  Dubuque Avenue at and immediately south of Oyster Point Boulevard. Southbound onramps are at Dubuque Ave, adjacent to the Northbound off-ramp. The southbound offramp intersects Gateway Boulevard / Oyster Point Boulevard as the intersection's fifth leg.
- East Grand Avenue is an east-west arterial street. It has six travel lanes west of Gateway Boulevard, and four travel lanes east of Gateway Boulevard and two travel lanes east of Haskins Way. US-101 freeway ramps at East Grand Avenue enable Project access from the south. East Grand Avenue carries about 17,000 vehicles per day.
- Airport Boulevard runs roughly parallel to US-101 in South San Francisco. Freeway ramps south of Grand Avenue provide alternate Project access from the south. Airport Boulevard carries approximately 24,000 vehicles per day.
- Gateway Boulevard is a four-lane north-south arterial connecting East Grand Avenue with South Airport Boulevard and Oyster Point Boulevard. Class II bicycle lanes exist between East Grand Avenue and So. Airport Boulevard. The corridor provides Project access from the north via US-101 ramps at Oyster Point Boulevard. Gateway Boulevard carries approximately 12,000 vehicles per day.

#### 2.2 Transit Facilities and Service

The project site is not served directly by regional rail, ferry, or bus transit services; however, regional rail service (Caltrain and BART), ferry service (WETA), and bus service (SamTrans) is provided in the greater vicinity of the project site. BART and Caltrain stations and the WETA ferry terminal are located at a walking distance of approximately 2, 0.75, and 1 mile(s), respectively. No SamTrans bus service exists east of US-101 in South San Francisco at this time. The project site therefore relies on supplementary public shuttle services to connect employees with regional transit. Relevant transit plans and policies (e.g. South San Francisco General Plan, East of 101 Mobility 20/20 Plan, Caltrain Business Plan) are discussed in **Appendix B**. The existing transit services are shown on **Figure 2-1** and described in detail below.

#### 2.2.1 Regional Transit Service

The following transit services operate within South San Francisco and are accessible from the project site with a bicycle or first- and last-mile shuttle connection provided by Commute.org:

- Bay Area Rapid Transit (BART) provides regional rail service between the East Bay, San Francisco, and San Mateo County, 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 South San Francisco Station is located approximately three miles west of the project site at Mission Road and McLellan Drive. The San Bruno Station is located approximately two miles southwest of the project site near The Shops at Tanforan. BART trains operate on 15-minute headways during peak hours, and 20-minute headways during off-peak hours.
- Caltrain provides passenger rail service on the Peninsula 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 approximately 0.75 miles south of the project site at 590 Dubuque Avenue, on the east side of US-101, immediately north of East Grand Avenue. By the end of 2020, Caltrain plans to relocate the South San Francisco Caltrain Station several hundred feet to the south near the East Grand Avenue/Airport Boulevard intersection and provide more direct pedestrian access to the East of 101 area via a tunnel with access at East Grand Avenue and Poletti Way. The South San Francisco Caltrain Station serves local and limited trains, with 23 northbound and 23 southbound weekday trains. The South San Francisco Caltrain Station provides weekday service from 5:40 AM to 12:00 AM, with approximately 30-minute headways during peak times and 60-minute headways during off-peak times.

- Water Emergency Transportation Authority (WETA) provides weekday commuter ferry service between Oakland/Alameda ferry terminals and the South San Francisco Ferry Terminal at Oyster Point. There are three morning departures from Oakland/Alameda to South San Francisco, and three evening departures from South San Francisco to Oakland/Alameda. The South San Francisco Ferry terminal is located approximately one mile from the project site.
- San Mateo County Transit District (SamTrans) provides bus and rail service (through Caltrain) in San Mateo County but does not serve the East of 101 employment area. The closest bus stops to the project site are approximately 0.6 miles to the northwest near the intersection of Airport Boulevard and Sister Cities Boulevard and are served by Routes 292 and 397.

#### 2.2.2 East of 101 Commuter Shuttle Service

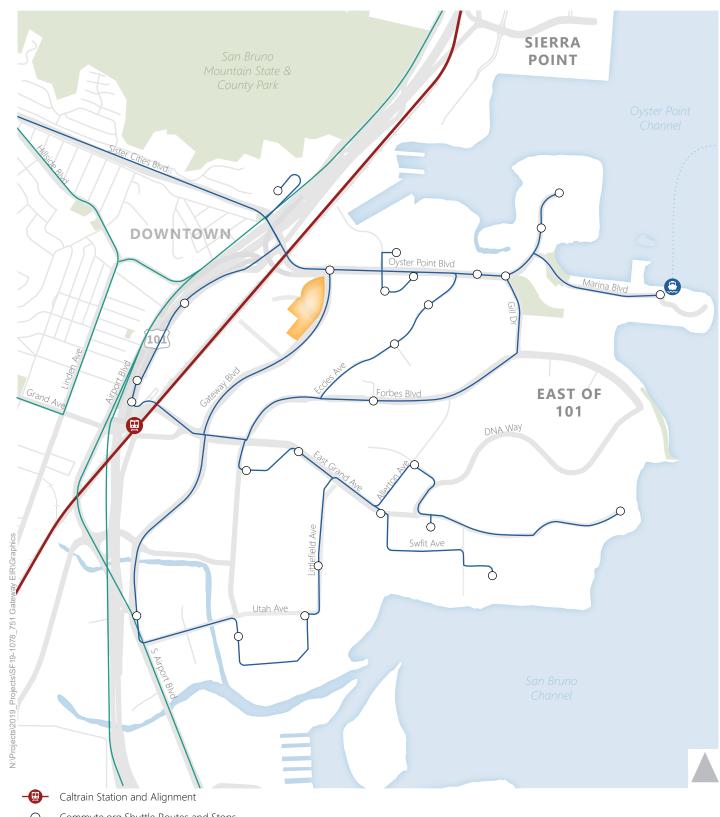
Peninsula Traffic Congestion Relief Alliance (Commute.org) shuttles provide weekday commute period first/last mile connections between BART and Caltrain stations and the WETA ferry terminal and local employers in the East of 101 Area, including the project site. Six weekday peak period, peak-direction routes serve the East of 101 area and are described in **Table 2.1**. Service is roughly distributed between the East of 101 area's north (Oyster Point area) and south (Utah/Grand area) geographic halves. Project shuttle access is provided by an existing stop 0.2 miles away at the intersection of Oyster Point Boulevard and Gateway Boulevard which is served by all Oyster Point area shuttles. These routes connect with Caltrain, BART, and the WETA ferry terminal.

Table 2.1. East of 101 Area Commute.org Shuttle Service

| Samisa Araa  | Regional Transit            | Peak Period Headway | Total Daily Weekday Trips |                |  |
|--------------|-----------------------------|---------------------|---------------------------|----------------|--|
| Service Area | Connection                  | (minutes)           | AM (6:30-10:00)           | PM (3:00-6:00) |  |
|              | Caltrain                    | 30-40               | 7                         | 7              |  |
| Oyster Point | Ferry Terminal              | 20-60               | 3                         | 3              |  |
|              | BART                        | 15-30               | 10                        | 9              |  |
|              | Caltrain                    | 30-40               | 8                         | 7              |  |
| Utah/Grand   | Ferry Terminal and Caltrain | 30-60               | 4                         | 3              |  |
|              | BART                        | 30                  | 8                         | 7              |  |

Note: Highlighted text denotes service that is walking distance to the project site from an existing shuttle stop.





Commute.org Shuttle Routes and Stops

SamTrans Routes

South San Francisco Ferry Terminal

Project Site



## 2.3 Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, trails, and pedestrian signals. In the Project vicinity, continuous sidewalks exist along both sides of Gateway Boulevard except South of Larkspur Landing driveway, where continuous sidewalks exist on the east side of the roadway for intermittent sections to East Grand Avenue.

At the intersection of Oyster Point Boulevard and Gateway Boulevard (a signal-controlled intersection immediately adjacent to the project site), marked crosswalks are provided on two of the four intersection legs. Sidewalks exist on the north side of Oyster Point Boulevard, which provides continuous pedestrian connectivity between the project site and the nearest existing Commute.org shuttle stop.

A segment of the San Francisco Bay Trail runs along the shoreline in the East of 101 area, providing a continuous off-street shared-use trail connection between Brisbane's Sierra Point to the north and South Airport Boulevard at the San Bruno Canal to the south. The Bay Trail is a public pedestrian and bicycle trail that is planned to extend around the entire San Francisco Bay. To the north of the project site, the Bay Trail connects to the South San Francisco Ferry Terminal to Oyster Point Boulevard, allowing bicyclists and pedestrians to access the Ferry Terminal. Currently, there are gaps in the trail to the north of Brisbane, and just south of South San Francisco.

Relevant pedestrian plans and policies (e.g. South San Francisco General Plan, East of 101 Mobility 20/20 Plan, South San Francisco Pedestrian Master Plan) are discussed in **Appendix B**.

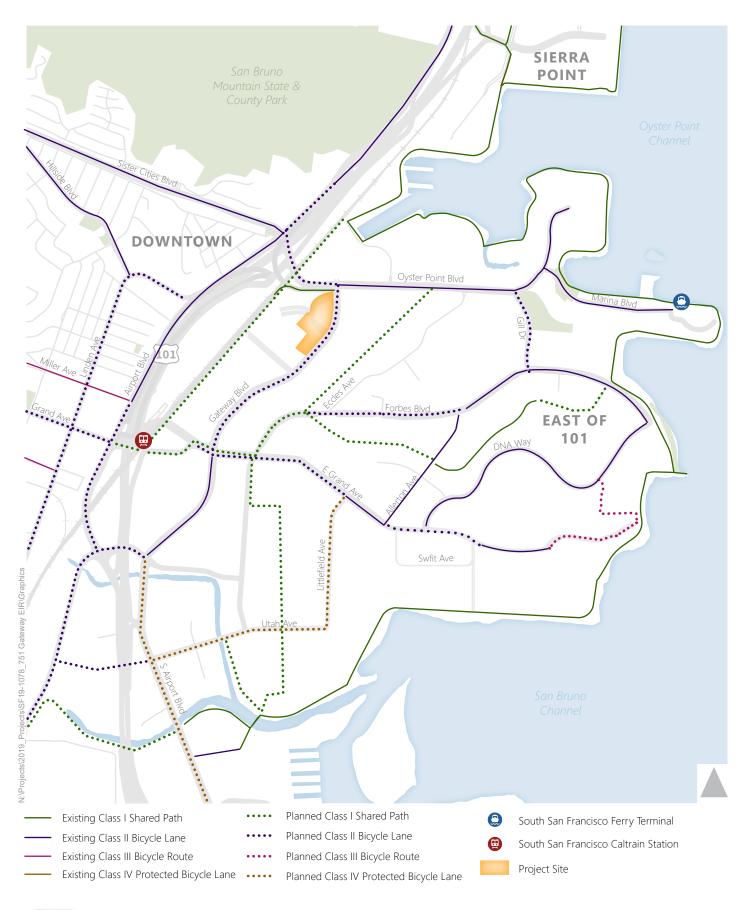
## 2.4 Bicycle Facilities

Bicycle facilities consist of separated bikeways, bicycle lanes, routes, trails, and paths, as well as bike parking, bike lockers, and showers for cyclists. Caltrans recognizes four classifications of bicycle facilities:

- Class I Shared-Use Pathway: Provides a completely separated right-of-way for the exclusive use
  of cyclists and pedestrians with crossflow minimized (e.g. off-street bicycle paths).
- Class II Bicycle Lanes: Provides a striped lane for one-way travel on a street or highway. May
  include a "buffer" zone consisting of a striped portion of roadway between the bicycle lane and the
  nearest vehicle travel lane.
- Class III Bicycle Route: Provides for shared use with motor vehicle traffic; however, are often signed or include a striped bicycle lane.
- Class IV Separated Bikeway: Provides a right-of-way designated exclusively for bicycle travel adjacent to a roadway and which are protected from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

The area surrounding the project site has a partially complete bicycle network that provides first- and last-mile connectivity to the South San Francisco Ferry Terminal but lacks dedicated bicycle connections to the Caltrain station and residential and commercial uses west of US-101. Current bicycle facilities in the Project vicinity, as designated by the South San Francisco Bicycle Master Plan (2011) and the draft Active South City Bicycle and Pedestrian Master Plan (ongoing), are shown in **Figure 2-2**, and discussed below.







- Gateway Boulevard has proposed Class II bicycle lanes between Oyster Point Boulevard and East
  Grand Avenue to connect to existing bicycle lanes on both roads; proposed bicycle lanes on
  Gateway Boulevard will provide direct access to the project site.
- Poletti Way has a short Class I mixed-use trail connection from the street's terminus to the Oyster Point Boulevard/Gateway Boulevard intersection; an extension of the trail is planned to the new Caltrain station to the south and the Bay Trail to the north (under the Oyster Point Boulevard overpass).
- Oyster Point Boulevard has Class II bicycle lanes between Gull Drive and Gateway Boulevard; Class
  II bicycle lanes are planned for the remainder of Oyster Point Boulevard to connect to existing
  bicycle lanes on Sister Cities Boulevard and Airport Boulevard.
- East Grand Avenue has intermittent Class II bicycle lanes in the East of 101 Area. A Class I trail is planned and will connect the new Caltrain station with planned trails near Forbes Boulevard, while Class II bicycle lanes are expected to be installed from Gateway Boulevard to DNA Way by summer 2020.
- The San Francisco Bay Trail (Bay Trail) is a Class I mixed-use trail along the Oyster Point shoreline and Point San Bruno, part of a planned 400-mile regional trail system encircling the San Francisco Bay shoreline.

Bicyclists primarily access the project site via Gateway Boulevard, Poletti Way, Oyster Point Boulevard, East Grand Avenue, and/or the Bay Trail. Commute trip lengths, lack of continuous low stress bicycle facilities, lack of connectivity to residences and transit stations, and topography present barriers to bicycle commuting to the East of 101 area today.

As noted in the prior section, the reconstructed South San Francisco Caltrain station features a bicycle and pedestrian undercrossing that connects the East of 101 area to the upgraded South San Francisco Caltrain station, Downtown South San Francisco, housing, and commercial services to the west. The undercrossing represents the first non-motorized connection spanning the Caltrain and US-101 corridors, which are substantial barriers to east-west bicycle and pedestrian travel.

Additional relevant bicycle plans and policies (e.g. South San Francisco General Plan, East of 101 Mobility 20/20 Plan, South San Francisco Bicycle Master Plan) are discussed in **Appendix B**.

## 2.5 Emergency Vehicle Access

Emergency vehicles typically use major streets through the study area when heading to and from an emergency and/or emergency facility. Arterial roadways allow emergency vehicles to travel at higher speeds and provide enough clearance space to permit other traffic to maneuver out of the path of the emergency vehicle and yield the right-of-way. The project site is located approximately one mile north of South San Francisco Fire Station 62 which is located at 249 Harbor Way. Emergency vehicle access to the project site is primarily from the two driveways on Gateway Boulevard, which has two travel lanes in each direction.



## 3. Transportation Analysis

This section includes analysis and findings of Project effects on transportation services and facilities, including motor vehicle travel and operations, transit service, pedestrian facilities, and bicycle facilities. The amount and distance of motor vehicle travel was analyzed using vehicle miles traveled (VMT),<sup>2</sup> while the motor vehicle operations analysis focused on weekday AM and PM peak hour queue conditions at freeway off-ramps. Other vehicle operations measures, such as level of service (LOS), are presented in **Appendix C** for informational purposes. Bicycle, pedestrian, and transit impacts were qualitatively assessed using transportation planning and engineering methods and practices.

## 3.1 Significance Criteria

The impacts of the Project related to transportation would be considered significant if any of the following Standards of Significance are exceeded, in accordance with Appendix G of the California Environmental Quality Act (CEQA) Guidelines:

- Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities;
- Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b) related to VMT;
- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Result in inadequate emergency access.

City of South San Francisco and City/County Association of Governments of San Mateo County (C/CAG) guidance was used to identify additional relevant thresholds of significance to determine whether implementation of the Project would result in significant environmental impacts and are described below.

The criteria of significance apply to all Project scenarios as measured against the corresponding No Project scenario.

#### 3.1.1 Vehicle Miles Traveled (VMT)

As a part of *Shape SSF*, the City of South San Francisco's General Plan Update, the City is updating its transportation impact thresholds. By July 1<sup>st</sup>, 2020, the City will adopt a VMT threshold in accordance with the Office of Planning and Research (OPR)'s guidance in implementing Senate Bill 743. Since the City has not yet adopted such a VMT threshold, an interim Project threshold was developed based on the metrics and methods described in **Appendix A**, Vehicle Miles Traveled Technical Overview. Analysis of greenhouse gas reduction goals performed by the California Air Resources Board (CARB) indicates that a

<sup>&</sup>lt;sup>2</sup> The Governor's Office of Planning and Research (OPR) has established new metrics for determining the significance of transportation impacts with VMT as the preferred transportation impact metric and applied their discretion to require its use statewide, as described in more detail in **Appendix A**.



reduction of at least 16.8 percent of light-duty vehicle VMT is necessary to reach statewide goals.<sup>3</sup> Light-duty VMT is appropriate for the Project because most Project trips are expected to be light duty vehicles (such as personal automobiles used for commuting).

Home-based work VMT (HBW VMT) per employee was identified as the Project analysis metric. This metric follows OPR guidance for measuring office project VMT and helps compare the Project's relative transportation efficiency to the regional average. OPR recommends using a regional geography for office projects. Neither the local city or county level geographic area is robust enough to capture the full length of most trips or evaluate the interaction of the Project in a regional setting, as many commute trips exceed the city and county borders. Accordingly, the nine-county Bay Area region was selected as the geographic boundary for the assessment (as shown in **Table 3.1**).

- A significant impact would occur should existing HBW VMT per employee in the travel demand model transportation analysis zone (TAZ) that encompasses the project result in greater than 11.8 HBW VMT per employee under existing conditions, based on a reduction of 16.8 percent below the existing regional average of 14.2 HBW VMT per employee as shown in **Table 3.1.**
- A significant impact would occur should cumulative HBW VMT per employee in the travel demand model transportation analysis zone (TAZ) that encompasses the project result in greater than 12.1 HBW VMT per employee under cumulative conditions, based on a reduction of 16.8 percent below the cumulative regional average of 14.6 HBW VMT per employee as shown in **Table 3.1.**

Table 3.1 Home-Based Work (HBW) VMT Per Employee – Thresholds

| Location                            | Total HBW VMT | Total Employees<br>(b) | HBW VMT per<br>Employee<br>(a) / (b) | VMT per Employee<br>Threshold<br>(16.8% Reduction) |
|-------------------------------------|---------------|------------------------|--------------------------------------|--|
| Bay Area Region,<br>Existing        | 63,336,200    | 4,461,670              | 14.2                                 | 11.8   |
| Bay Area Region, 2040<br>Cumulative | 78,980,240    | 5,406,190              | 14.6                                 | 12.1   |

Source: Fehr & Peers 2020; C/CAG-VTA Bi-County Transportation Demand Model, 2019.

#### 3.1.2 Freeway Ramp Queuing

While SB 743 notes that "traffic congestion shall not be considered a significant impact on the environment" the freeway on- and off-ramp vehicle queuing criteria was retained to assess potential hazards from Project traffic exceeding ramp storage capacities. Traffic in queue represents congested,

<sup>&</sup>lt;sup>3</sup> California Air Resources Board, 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals, January 2019. Available online at <a href="https://ww2.arb.ca.gov/resources/documents/carb-2017-scoping-plan-identified-vmt-reductions-and-relationship-state-climate">https://ww2.arb.ca.gov/resources/documents/carb-2017-scoping-plan-identified-vmt-reductions-and-relationship-state-climate</a>



stop-and-go conditions, and should queues interfere with through, free-moving traffic streams on the freeway mainline, hazards could arise due to the differences in speed.

 A significant impact would occur if the Project causes vehicle queues approaching a given movement downstream of Caltrans freeway facilities to exceed existing storage space for that movement or would considerably contribute to baseline vehicle queues that exceed storage space for that movement, resulting in a hazardous condition.

#### 3.1.3 Bicycle, Pedestrian, and Transit

- A significant impact would occur if Project traffic would produce a detrimental impact to existing bicycle or pedestrian facilities, or conflict with adopted plans and programs.
- A significant impact would occur if Project traffic would produce a detrimental impact to local transit or shuttle service or conflict with adopted plans and programs.

#### 3.1.4 Hazards

- A significant impact would occur if the Project substantially increases hazards due to a geometric design feature.
- A significant impact would occur if the Project substantially increases hazards by introducing an incompatible land use.

#### 3.1.5 Emergency Access

A significant impact would occur if the project would result in inadequate emergency access.

## 3.2 Analysis Scenarios

The impacts of the Project to the surrounding transportation system were evaluated for the four scenarios listed below:

Scenario 1: Existing Conditions

Scenario 2: Existing Plus Project Conditions

Scenario 3: Cumulative Conditions

Scenario 4: Cumulative Plus Project Conditions

A description of the methods used to estimate the amount of traffic and VMT generated by the Project is provided below. Project-specific impacts are described under Section 4, Project Impacts and Mitigation Measures.

#### 3.2.1 Existing Conditions

Existing conditions represent the baseline condition upon which Project impacts are measured. The baseline condition represents existing conditions as of 2019.



#### 3.2.2 Existing Plus Project Conditions

Existing Plus Project conditions represent the baseline condition with the addition of the Project. Traffic volumes for Existing Plus Project conditions include existing traffic volumes plus traffic generated by the Project. Existing Plus Project conditions were compared to Existing conditions to determine potential immediate project impacts.

#### 3.2.3 Cumulative Conditions

Cumulative conditions include transportation demand resulting from reasonably foreseeable land use changes and conditions associated with funded transportation projects at year 2040. Cumulative conditions are based on land use and transportation conditions included in Plan Bay Area 2040, as represented in the C/CAG-VTA Bi-County Transportation Demand Model (C/CAG model). The C/CAG model is a four-step trip-based travel demand model designed to forecast how land uses and transportation interact within San Mateo and Santa Clara Counties.

#### 3.2.4 Scenario 4: Cumulative Plus Project Conditions

Cumulative Plus Project conditions represent the cumulative condition with the addition of the Project to determine the extent to which the Project would contribute to long-term cumulative transportation impacts.

### 3.3 Vehicle Miles Traveled

Project-generated HBW VMT per employee is calculated based on average HBW VMT generated by employees working in the C/CAG travel demand model transportation analysis zone (TAZ) where the Project is located, divided by the number of jobs within the TAZ, as described in more detail in **Appendix A**. A TAZ is the smallest resolution available in the C/CAG model – somewhere between a census block group and a census tract in size. Each TAZ included in the model contains information related to the existing and proposed land uses and transportation options for zone. Therefore, the transportation properties of the Project's TAZ are an appropriate proxy for transportation properties of the Project itself.

Based on this methodology, the Project would generate 16.2 HBW VMT per employee under existing conditions. This total is above the regional average total of 14.2 HBW VMT per employee under existing conditions and is also above the VMT per employee threshold of 11.8 HBW VMT per employee under existing conditions (which represents the reduction of 16.8% below the existing regional average HBW VMT per employee).

The Project would generate 14.0 HBW VMT per employee under cumulative 2040 conditions. This total is similar to the cumulative regional average total of 14.6 HBW VMT per employee. The Project would generate HBW VMT per employee above the VMT per employee threshold of 12.1 BHW VMT per employee under cumulative conditions (which represents the reduction of 16.8% below the cumulative regional average HBW VMT per employee). The C/CAG model variables are presented in **Table 3.2**.

As discussed in Section 1, Project Description, the Project is required to include an TDM program designed to achieve a 35-40 percent non-drive alone mode share during peak periods under the City's current TDM



requirements and policy direction to reduce single-occupancy vehicle trips, which represent an approximately six percent reduction in non-drive alone mode share from baseline conditions (29%).<sup>4</sup> However, reductions in non-drive alone mode share are not necessarily interchangeable with VMT reductions on a percentage point for percentage point basis. This is due to several reasons. First, mode share targets do not necessarily correlate with trip generation and trip length: although many East of 101 employers meet their non-drive alone mode share targets, vehicle trip generation and trip lengths are similar to (if not slightly higher than) regional averages based on the C/CAG travel demand model outputs. Second, a non-drive alone mode share target includes passenger vehicle-based modes such as vanpools and carpools, which may dilute its effectiveness for VMT reductions. Third, VMT is a measure of daily activity for all trips, whereas accounting of non-drive alone mode share targets focuses only on commute trips. Therefore, Project HBW VMT per employee was not adjusted based on the Project TDM plan.

Table 3.2 Home-Based Work (HBW) VMT Per Employee - East of 101

| Location                             | Total HBW VMT | Total Employees<br>(b) | HBW VMT per<br>Employee<br>(a) / (b) | VMT per Employee<br>Threshold |
|--------------------------------------|---------------|------------------------|--------------------------------------|-------------------------------|
| East of 101 Area,<br>Existing        | 581,977       | 35,831                 | 16.2                                 | 11.8                          |
| East of 101 Area, 2040<br>Cumulative | 1,975,199     | 736,810                | 14.0                                 | 12.1                          |

Source: Fehr & Peers 2020; C/CAG-VTA Bi-County Transportation Demand Model, 2019.

The Project's effect on VMT describes changes in VMT generation from neighboring land uses by comparing area VMT for "no project" and "plus project" scenarios. Given the similarities in the Project land uses to those of the surrounding land uses (e.g., location that generates higher than average VMT for the region, single-use employment centers, and limited non-auto access), the analysis of Project-generated HBW VMT per employee based on East of 101 Area VMT provides a reasonable estimation of the environmental consequences associated with the Project's effect on VMT.

Overall, the existing land use and transportation characteristics of the East of 101 area contribute to the East of 101 Area's higher-than-average VMT per employee. As a single-use employment center, all home-based trips begin or end outside the East of 101 area, requiring longer travel along auto-oriented roadways or via transit service that is currently not competitive with the automobile. In contrast, mixed-use settings near transit can reduce trip generation and trip lengths while increasing the use of non-auto modes.

<sup>&</sup>lt;sup>4</sup> 2012-2016 five-year American Community Survey commute mode share estimates for the East of 101 employment area. Accessed via the Census Transportation Planning Products (CTPP).



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## 3.4 Trip Generation, Distribution, and Assignment

The amount of traffic added to the roadway system by the Project was estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of traffic that would be generated once the Project was built and fully occupied. The second step estimates the direction of travel to and from the project site. The third step assigns the Project trips to specific street segments and intersection turning movements. The results are described below.

#### 3.4.1 Project Trip Generation

Project traffic added to the surrounding roadway system was estimated using data collected in Fall 2019 for the existing office and research and development (R&D) campus adjacent to the project site. Local travel demand data was used instead of national averages because of the unique conditions in the East of 101 area, including peak period spreading, employment land use mix, and higher rates of participation in TDM programs. In contrast, national trip generation databases such as the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* is generally collected at suburban sites with limited non-auto access and less congestion.

Driveway count data was collected at nine driveways at the surrounding office/R&D campus representing trip generation for nine existing buildings<sup>5</sup> and 1.4 million square feet. A trip generation rate for the existing uses was developed and applied to the Project square footage to calculate Project travel demand. The sample site driveway traffic data is presented in **Appendix C**.

The Project trip generation rate was derived from the site-specific data and multiplied by the size of the Project (gross square feet) to determine daily and weekday morning and evening peak hour vehicle trip generation volume, shown in **Table 3.3**. Vehicle trips are summarized for the entire project site (including both the existing 701 Gateway building, which would remain, and the proposed 751 Gateway building), and for each building individually. The net new Project trips are for the proposed 751 Gateway only and subtract existing trips associated with the existing 701 Gateway building from the project site trips. According to this trip generation analysis, the new 208,800 square foot office building would generate approximately 1,784 daily, 206 AM peak hour (143 inbound and 64 outbound), and 172 PM peak hour (45 inbound and 127 outbound) net new trips.

<sup>&</sup>lt;sup>5</sup> The nine existing buildings on the Gateway Campus include a combination of office, R&D, and lab land uses at the following addresses: 681, 685, 701, 601, 611, 651, 801, 901, and 951 Gateway Boulevard.



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**Table 3.3 Project Trip Generation** 

| Size  |       | Daily A |      | AM Peak Hour |     | PM Peak Hour |      |    |     |       |      |
|---|-------|---------|------|--------------|-----|--------------|------|----|-----|-------|------|
| Land Use  | (KSF) | Total   | Rate | In           | Out | Total        | Rate | In | Out | Total | Rate |
| Total Trips for the project site (701 & 751 Gateway Boulevard buildings)        | 382.3 | 3,267   |      | 262          | 116 | 378          |      | 82 | 232 | 315   |      |
| Existing Trips for the 701<br>Gateway Boulevard building,<br>which would remain | 173.5 | 1,483   | 8.6  | 119          | 53  | 172          | 0.99 | 37 | 105 | 143   | 0.82 |
| Net New Trips for the proposed<br>751 Gateway Boulevard building                | 208.8 | 1,784   |      | 143          | 64  | 206          |      | 45 | 127 | 172   |      |

#### Notes:

#### 3.4.2 Project Trip Distribution

The directions of approach and departure for the Project traffic were estimated based on C/CAG's Travel Demand Model and the City of South San Francisco's Travel Demand Model, which has greater sensitivity to local travel patterns. **Figure 3-1**, Project Trip Distribution, shows the general trip distribution pattern for the Project. Most of the Project traffic is split between the north (33%) and south (49%) US-101 approaches to the East of 101 area. Within South San Francisco, approximately 16 percent of Project traffic is projected to come from west of US-101, while 2 percent is expected to come from within the East of 101 area.

#### 3.4.3 Project Trip Assignment

The Project trips were assigned to the roadway system based on the directions of approach and departure discussed above. The locations of complimentary land uses and local knowledge of the study area helped determine specific trip routes. **Figure 3-2** shows the expected increases in peak hour intersection turning movement volume due to the Project.

Project traffic would access the roadway network via two driveways along the Gateway Boulevard frontage, to the South of Oyster Point Boulevard. Inbound vehicular traffic accesses the project site via Gateway Boulevard from both sides and outbound traffic departs via Gateway Boulevard in the opposite direction.



<sup>1.</sup> Trip Generation rates based on 2019 driveway count data collected at the Gateway Campus in the East of 101 area. Source: Fehr & Peers 2020





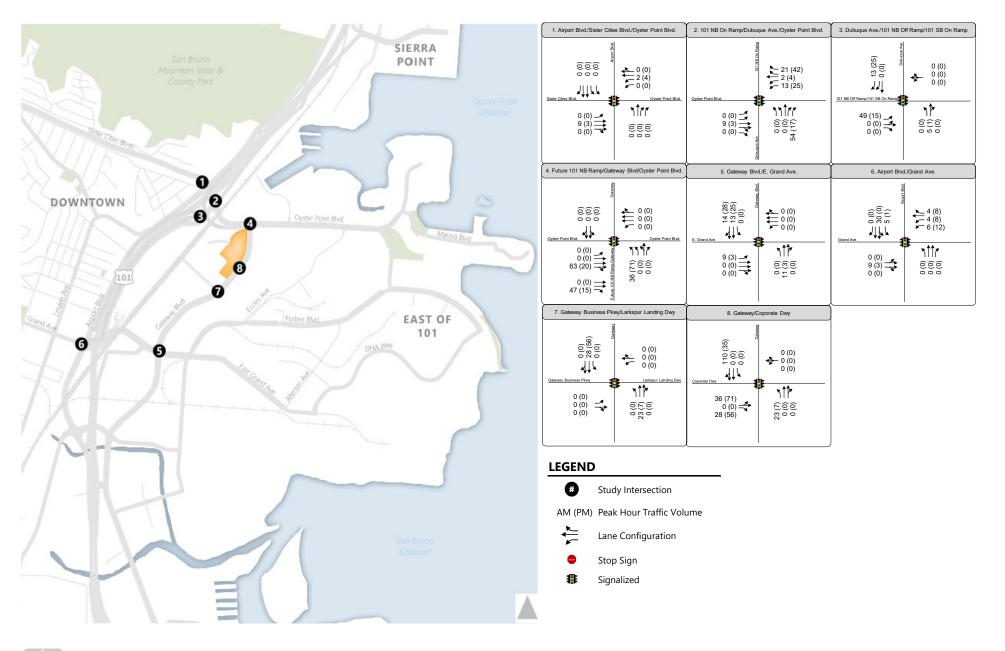




Figure 3-2 Project Trip Assignment

## 3.5 Freeway Ramp Queueing Analysis

Three freeway off-ramps were selected for analysis based on local traffic patterns, Project trip assignment forecasts, input from the City of South San Francisco, and engineering judgment, to assess conditions where the addition of Project trips may result in hazards to road users. The study locations are listed below.

- 1. US-101 Southbound Off-Ramp at Oyster Point Boulevard
- 2. US-101 Northbound Off-Ramp at East Grand Avenue
- 3. US-101 Northbound Off-Ramp at Dubuque Avenue

Traffic counts were collected at the approaches and departures to the three freeway off-ramps during the morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak periods in November 2019. During all counts, weather conditions were generally dry, no unusual traffic patterns were observed, and the South San Francisco Unified School District was in regular session.

**Table 3.4** presents weekday AM peak hour vehicle queues at the three US-101 off-ramp study locations. The AM peak hour was selected as the analysis period since the Project, and the East of 101 area generally generate the majority of "inbound" trips during the AM peak period where inbound trips would be using the freeway off-ramps. Conversely, during the PM peak period, study off-ramps have significantly lower volumes and very few project trips would use the off-ramps. Therefore, the off-ramps queuing analysis during the AM peak hour is expected to encompass all potential impacts. The Project would extend or contribute to queues longer than storage distances at study location #1, the US-101 Southbound Off-Ramp at Oyster Point Boulevard. Specifically, the queue would spill back from the eastbound right turn lane approaching the Oyster Point Boulevard / Gateway Boulevard Intersection. However, the queue would not interfere with the US-101 freeway mainline as the combined right turn and through queue lengths are less than the overall 3,100-foot ramp storage distance. The Project therefore would not result in a hazardous condition at this location.

Cumulative Plus Project traffic volumes are presented in **Appendix C** and the volume relevant to the freeway ramp queuing assessment is presented in **Table 3.5**. The Project would extend or contribute to queues longer than storage distances at study location #1, the US-101 Southbound Off-Ramp at Oyster Point Boulevard. Specifically, the queue would spill back from the eastbound right turn lane approaching the Oyster Point Boulevard / Gateway Boulevard Intersection. However, similar to under Existing Plus Project conditions, the queue would not interfere with the US-101 freeway mainline as the combined right turn and through queue lengths are less than the overall 3,100-foot ramp storage distance. Cumulative Plus Project traffic therefore would not result in a hazardous condition at this location.



Table 3.4 Existing Weekday AM Peak Hour 95th Percentile Queues

| Ammuo ah Lamas   | Storage      | itorage Existing    |                   | Existing Plus Project |              |  |  |
|--|--------------|---------------------|-------------------|-----------------------|--------------|--|--|
| Approach Lanes   | Distance     | Volume Queue Length |                   | Volume                | Queue Length |  |  |
| US-101 Southbound Off-Ramp at Oyster Point Boulevard (AM Peak) |              |                     |                   |                       |              |  |  |
| Through  | 3,100        | 704                 | 513               | 704                   | 513          |  |  |
| Right  | 350          | 319                 | 547               | 366                   | 650          |  |  |
| 2. US-101 I  | Northbound O | ff-Ramp at East Gra | nd Avenue (AM Pea | k)                    |              |  |  |
| Left   | 1,775        | 131                 | 200               | 131                   | 200          |  |  |
| Right  | 1,775        | 639                 | 1,020             | 639                   | 1,020        |  |  |
| 3. US-101 Northbound Off-Ramp at Dubuque Avenue (AM Peak)      |              |                     |                   |                       |              |  |  |
| Left/Through   | 1,000        | 891                 | 365               | 940                   | 386          |  |  |
| Right  | 300          | 74                  | 27                | 74                    | 27           |  |  |

Notes: Bold type indicates conditions where queue length exceeds intersection movement capacity. Queues do not take into account downstream spillover from adjacent intersections. Storage distance and queues in feet per lane. Source: Fehr & Peers, 2020

Table 3.5 Cumulative Weekday AM Peak Hour 95th Percentile Queues

| Storage<br>Approach Lanes                                      |               | Cumulative          |                     | Cumulative Plus Project |              |  |  |
|--|---------------|---------------------|---------------------|-------------------------|--------------|--|--|
| Approach Lanes   | Distance      |                     | Volume Queue Length |                         | Queue Length |  |  |
| US-101 Southbound Off-Ramp at Oyster Point Boulevard (AM Peak) |               |                     |                     |                         |              |  |  |
| Through  | 3,100         | 1,813               | 1,553               | 1,813                   | 1,553        |  |  |
| Right  | 350           | 654                 | 1,162               | 701                     | 1,255        |  |  |
| 2. US-101 I  | Northbound Of | f-Ramp at East Grar | nd Avenue (AM Peal  | <b>c</b> )              |              |  |  |
| Left   | 1,775         | 216                 | 330                 | 216                     | 330          |  |  |
| Right  | 1,775         | 683                 | 1,090               | 683                     | 1,090        |  |  |
| 3. US-101 Northbound Off-Ramp at Dubuque Avenue (AM Peak)      |               |                     |                     |                         |              |  |  |
| Left/Through   | 1,000         | 425                 | 1,317               | 1,366                   | 442          |  |  |
| Right  | 300           | 22                  | 374                 | 74                      | 321          |  |  |

Notes: Bold type indicates conditions where queue length exceeds intersection movement capacity. Queues do not take into account downstream spillover from adjacent intersections. Storage distance and queues in feet per lane. Source: Fehr & Peers, 2020

## 3.6 Bicycle, Pedestrian, and Transit

The Project would generate additional vehicle trips adjacent to existing sidewalks and bicycle facilities and would generate some new walking and bicycling trips. However, the Project would not worsen existing or planned bicycle or pedestrian facilities. The project would not create inconsistencies with adopted bicycle or pedestrian system plans, guidelines, or policy standards, as described in Appendix B.



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The Project includes both long-term protected (class I and short-term (class II) bicycle parking spaces in compliance with the City's code requirements. Class I bicycle parking spaces are typically lockers or restricted access parking rooms and are intended for employees. Class II bicycle parking spaces are standard bike racks and are mostly intended for visitors. Bike racks should be located near entrances where they are highly visible.

The Project would generate vehicle trips in the vicinity of existing transit services and would generate some new transit trips to existing routes. Commute.org shuttles travel along the Project's frontage on Gateway Boulevard and Caltrain operates less than one mile from the project site. The addition of 206 vehicle trips during the AM peak hour, or three to four new vehicles per minute, would not create a disruption to transit service surrounding the project site. Project-added vehicle trips represent approximately three percent of entering volumes at study intersections during the AM and PM peak hours. The Project may add net new transit trips to both Caltrain and Commute.org shuttles, but both operators are expected to be able to handle the additional ridership either through existing available capacity. The Project would not include features that would disrupt existing or planned transit routes or facilities. The Project's driveways would not cause disruptions to existing or planned transit service or transit stops. The Project would not conflict with any adopted transit system plans, guidelines, policies, or standards, as described in Appendix B.

The Project's effects under cumulative 2040 conditions would be similar to that of existing conditions. Improvements to Caltrain via the Peninsula Corridor Electrification Project and the South San Francisco Station Improvement Project would provide enhanced connectivity and capacity to accommodate project trips. There are no fully funded changes to bicycle, pedestrian, or transit conditions adjacent to the Project site.



## 4. Impacts and Mitigations

This section includes the evaluation of the Project's potential impacts under Existing Plus Project and Cumulative Plus Project conditions. This section also describes the associated mitigation measures required by the Project.

## **4.1 Vehicular Traffic**

This section includes the evaluation of the Project's potential VMT and freeway ramp queuing impacts.

#### 4.1.1 Vehicle Miles Traveled

#### **Impact TRANS-1:**

Home-based work (HBW) vehicle miles traveled (VMT) per employee in the travel demand model transportation analysis zone (TAZ) that encompasses the project result in greater than 16.8 percent below the regional average HBW VMT per employee under Existing Plus Project and Cumulative Plus Project conditions. (Significant; Significant and Unavoidable)

As documented in Section 3.3, using the average VMT in the East of 101 area, the Project would generate approximately 16.2 HBW VMT per employee under existing conditions, which is greater than the peremployee significance threshold of 11.8 HBW VMT (based on a VMT rate 16.8 percent below the regional average of 14.2 HBW VMT per employee). Therefore, the Project would have a significant impact on VMT under Existing Plus Project conditions.

Under Cumulative conditions, the Project would generate approximately 14.0 HBW VMT per employee, which is greater than the per-employee significance threshold of 12.1 HBW VMT (based on a VMT rate 16.8 percent below the regional average of 14.6 HBW VMT per employee). Therefore, the Project would be a cumulatively considerable contributor to a significant cumulative impact on VMT under Cumulative Plus Project conditions. A comparison between the Bay Area region and East of 101 per-employee VMT averages under Existing and Cumulative conditions are presented in **Table 4.1**.

**Table 4.1 VMT Impact Determination** 

| Location                             | Total HBW VMT | Total Employees | HBW VMT per<br>Employee<br>(a) / (b) | VMT per<br>Employee<br>Threshold | VMT Impact<br>Determination |
|--------------------------------------|---------------|-----------------|--------------------------------------|----------------------------------|-----------------------------|
| East of 101 Area,<br>Existing        | 581,977       | 35,831          | 16.2                                 | 11.8                             | Yes                         |
| East of 101 Area,<br>2040 Cumulative | 1,975,199     | 736,810         | 14.0                                 | 12.1                             | Yes                         |

Source: Fehr & Peers 2020; C/CAG-VTA Bi-County Transportation Demand Model, 2019.



#### **Mitigation Measures:**

First- and last-mile transit connections and active transportation improvements are likely to yield the greatest Project VMT reductions. The following mitigation measures support and enhance the effectiveness of the Project's TDM strategies, which as noted in Section 3.3 are unlikely to substantially reduce HBW VMT per-employee but will aid in reducing Project auto travel demand. Mitigation Measure TRANS-1 is appropriate under both Existing Plus Project and Cumulative Plus Project conditions. Components of Mitigation Measure TRANS-1 are shown in **Figure 4-1**.

**TRANS-1** The applicant shall provide funding toward the City's design and construction of the following off-site improvements to support the Project's first- and last-mile strategies necessary to support auto trip reduction measures.

- The Project shall provide a fair-share contribution towards the City's cost of facilities and improvements identified below for the purposes of upgrading Poletti Way sidewalk to a Class I shared-use bicycle and pedestrian pathway between the Caltrain Station at East Grand Avenue, and the street's northern terminus as identified in the Active South City: Bicycle and Pedestrian Master Plan (currently in draft form), or if said Master Plan is in the process of being amended or updated at the time of the first building permit for the Project, then the Project shall instead provide a fair-share contribution in an equivalent amount towards improvements and upgrades of equivalent design and purpose, as determined by the City's Chief Planner in his reasonable discretion. The Gateway Property Owners Association is currently in the process of dedicating the Poletti Way right-of-way to the City and the dedication is expected to be completed by the end of 2020. The improvement will include curb ramps, curb and gutter, signage, markings, and other changes necessary to meet Caltrans and City of South San Francisco Class I bikeway standards. Specific improvements will include upgrades at vehicular crossings (such as driveways and minor streets) to provide 10-foot minimum wide barrier-free accessible ramps that permit direct, two-way bicycle and pedestrian travel. Adequate warning and regulatory signage and markings will be provided to alert road users of potential conflicts per the California Manual on Uniform Traffic Control Devices (CAMUTCD). Existing pavement conditions will be assessed and reconstructed if necessary, per City of South San Francisco standards. The Project's obligation to pay a fair share contribution toward this improvement is contingent upon the City (i) adopting a final Active South City Bicycle and Pedestrian Master Plan that includes the improvement, or City approval of a plan for improvements of equivalent design and purpose; (ii) acquiring any necessary right of way; and (iii) implementing a program that will require fair share contributions from other developments in the East of 101 area that will benefit from the improvement.
- The Project shall provide a fair share contribution toward the City's cost of facilities and improvements identified below for the purposes of extending Class II bicycle lanes on Gateway Boulevard between East Grand Avenue and Oyster Point Boulevard, assuming 1,100 linear feet of frontage. This improvement will include striping new bicycle lanes and restriping existing lanes. Extending bicycle lanes will support enhanced bicycle access from south of the project site as identified in the *Active South City: Bicycle and Pedestrian Master Plan* (currently in draft form). If said Master Plan is in the process of being amended or updated at the time of the first building permit for the Project, then the Project shall



instead provide a fair-share contribution in an equivalent amount towards improvements and upgrades of equivalent design and purpose, as determined by the City's Chief Planner in his reasonable discretion.

- The Project shall participate in first-/last-mile shuttle program(s) to Caltrain, BART, and the ferry terminal. Shuttles may be operated by Commute.org and/or a future East of 101 transportation management agency. The Project may provide an on-site loading zone for potential future private shuttles or pick-up/drop-off operations; however public shuttle shall utilize on-street shuttle stops located adjacent to the project site in order to minimize additional travel time for shuttles.<sup>6</sup> Southbound shuttles on Gateway Boulevard shall use the existing shuttle stop at the intersection of Gateway Boulevard and the Gateway Business Park driveway (approximately 500 feet south of the project site) or the Project may construct a new southbound shuttle stop along the project frontage on Gateway Boulevard. A new shuttle stop shall accommodate small shuttles and larger buses and shall be designed in close coordination with the City and the shuttle operators taking into consideration planned roadway improvements, other new developments, and rider needs. Northbound shuttles on Gateway Boulevard shall use the future shuttle stop at the Gateway Business Park driveway (directly across the street from the project site) as proposed as part of the Gateway of Pacific project.
- The Project shall provide a more direct connection to on-street shuttle stops by adding directional curb ramps and high visibility crosswalks at the northern leg of the Gateway Boulevard/Gateway Business Park driveway/Project driveway intersection. Since no crosswalk currently existing across the northern leg of this intersection, the Project shall review existing intersection signal timing and adjust if necessary, to accommodate the new pedestrian phase. Add high-visibility crosswalks on the south side of the Oyster Point Boulevard / Gateway Boulevard intersection (southern and eastern legs of the intersection) to improve access to shuttle stops on Oyster Point Boulevard.

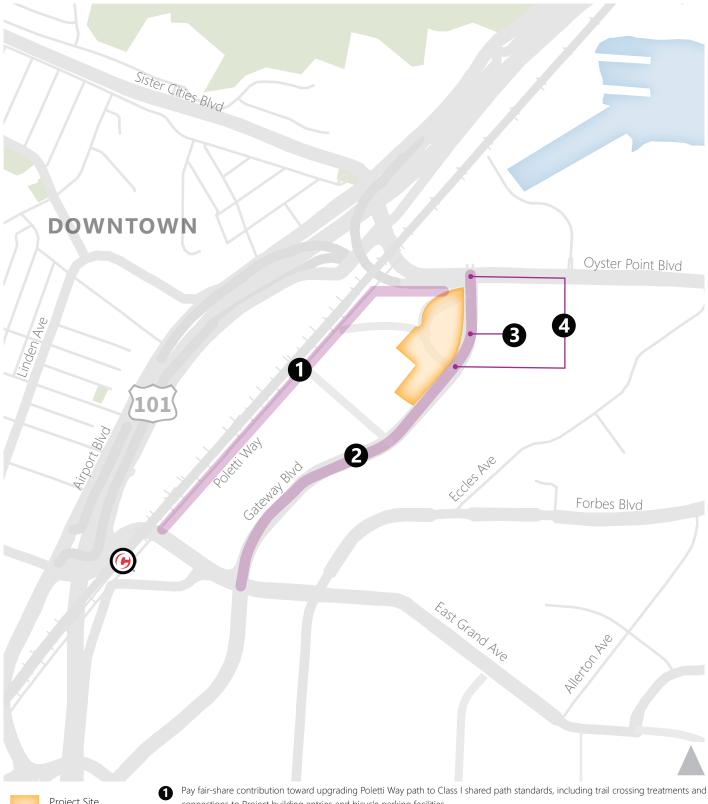
For those off-site improvements where a fair-share contribution is identified, the City will collect payment from the Project and will allocate those funds for the specific improvements identified prior to issuing the first building permit. Specific details of the fair-share contributions will be addressed in the Project's conditions of approval, but in any case will comply with the Mitigation Fee Act. Specific right of way needs for Mitigation Measure TRANS-1 are described as part of each off-site improvement's description above, if applicable. No secondary impacts are expected.

Significance after Mitigation: Implementation of Mitigation Measure TRANS-1 includes many off-site improvements that support and enable the first- and last-mile non-auto commute strategies. However, this mitigation measure includes some improvements that are not fully funded, and thus uncertain in their implementation timeline with regards to the Project's construction timeline. Additionally, the mitigation measure's effectiveness is unknown and is unlikely to reduce the Project's HBW VMT below the existing and cumulative thresholds, as shown in **Table 4.1**) to reach a less-than-significant level. Therefore, this impact would be significant and unavoidable.

<sup>&</sup>lt;sup>6</sup> "New shuttle stop locations on Gateway Boulevard and Oyster Point Boulevard should be designed to be consistent with the vocabulary of the existing stop at Gateway Boulevard subject to approval by The Gateway Association." Ken Kay Associates. *Gateway Business Park Master Plan*. May 2013.



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Improvement Areas

Caltrain Station

- connections to Project building entries and bicycle parking facilities.
- Pay fair-share contribution toward extending Class II bicycle lanes on Gateway Boulevard between East Grand Avenue and Oyster Point Boulevard
- 3 Participate in TMA or Commute.org shuttle program. Construct new southbound on-street shuttle stop, if desired by Project sponsor.
- Provide high visibility crosswalks and directional curb ramps at the Oyster Point Boulevard / Gateway Boulevard and Gateway Boulevard / Gateway Business Park intersections



Figure 4-1

#### 4.1.2 Freeway Ramp Queuing

#### **Impact TRANS-2:**

Development of the Project would not cause vehicle queues approaching a given movement downstream of Caltrans freeway facilities to exceed existing storage space for that movement or add vehicle trips to existing freeway off-ramp vehicle queues that exceed storage capacity resulting in a potentially hazardous condition under Existing Plus Project and Cumulative Plus Project conditions. (Less than Significant)

As documented in Section 3.5, Project vehicle trips that could interfere with the freeway mainline are concentrated at the US-101 Southbound off-ramp at Oyster Point Boulevard and the US-101 Northbound off-ramps at East Grand Avenue and Dubuque Avenue, but Project trips would not exceed ramp storage capacities and interfere with the freeway mainline. Therefore, the Project would have a less-than-significant impact on freeway ramp queuing under Existing Plus Project conditions and would not be a cumulatively considerable contributor to significant cumulative impacts under Cumulative Plus Project conditions.

Mitigation Measures: None required

### 4.2 Bicycle, Pedestrian, and Transit

#### **Impact TRANS-3:**

Development of the Project would not produce a detrimental impact to existing bicycle or pedestrian facilities, or conflict with adopted plans and programs under Existing Plus Project and Cumulative Plus Project conditions. (Less than Significant)

The Project would not produce a detrimental impact to existing bicycle or pedestrian facilities or conflict with adopted policies in adopted city plans summarized in Appendix B, Relevant Policies and Plans. Therefore, the Project's impacts to walking and biking are less-than-significant under Existing Plus Project conditions and the Project would not be a cumulatively considerable contributor to significant cumulative impacts under Cumulative Plus Project conditions.

**Mitigation Measures:** None required

Impact TRANS-4:

Project development or Project traffic may produce a detrimental impact to local transit or shuttle service under Existing Plus Project and Cumulative Plus Project conditions. (*Less than Significant with Mitigation*)

The Project's site plan identifies an on-site shuttle stop intended for use by private Gateway shuttles and public Commute.org shuttles. As described in Mitigation Measure TRANS-1, the Project may provide an on-site loading zone for private shuttles or pick-up/drop-off operations; however public shuttles serving the site shall use on-street shuttle stops. The on-site shuttle stop placement and access constraints has the potential to add several minutes to existing Commute.org shuttle routes:



- The current Oyster Point BART Shuttle and Oyster Point Ferry Shuttle would need to divert from its route in a one quarter mile loop, which would include two new traffic light cycles at the Oyster Point / Gateway Boulevard intersection and the Gateway Boulevard / Gateway Business Park driveway entrance. The Oyster Point / Gateway Boulevard intersection experiences congested traffic conditions, operating at LOS F in the existing AM peak hour and LOS F in the cumulative AM and PM peak hours, suggesting these shuttles may experience substantial delays. New routing and/or additional route creation for both routes are likely as public and private services consolidate to improve overall frequency and other efficiencies. New signal timing, new turn lanes and other street improvements planned may also improve conditions.
- The current Oyster Point Caltrain Shuttle would require an extensive route diversion for northbound shuttles since no access is provided via Gateway Boulevard, forcing shuttles to navigate through parking lots accessed via Poletti Way in order to access the shuttle stop. This diversion would be approximately ½ mile via slow speed parking aisles, suggesting this shuttle may also experience noticeably longer run times. Again, the potential new routing, new stop locations, and new routes are likely to minimize these additional delays.

Commute.org's existing shuttle routes already include numerous route diversions, the sum of these diversions results in longer travel times and wait times, which ultimately discourages transit ridership. Adding new such diversions should be avoided. The Project's site plan therefore may pose a significant impact to public shuttle operations. The Project should coordinate closely with shuttle operators. It should be noted that enhanced shuttle routes and stops could potentially look quite different than the existing commute.org network with the consolidation of private and public services.

**Mitigation Measures:** The applicant shall implement mitigation measure **TRANS-1** in order to improve pedestrian connections with existing and/or new public shuttle stops. Mitigation Measure TRANS-1 is appropriate under both Existing Plus Project and Cumulative Plus Project conditions.

Significance after mitigation: Implementation of Mitigation Measure TRANS-1 would enable the project to limit travel time effects on existing shuttle routes by eliminating additional route diversions. This Mitigation Measure would reduce Project transit impact impacts to less-than-significant under Existing Plus Project conditions and less than cumulatively considerable under Cumulative Plus Project conditions.

## 4.3 Hazards

**Impact TRANS-5:** 

Development of the Project would not substantially increase hazards due to a geometric design feature or incompatible uses under Existing Plus Project and Cumulative Plus Project conditions. (*Less than Significant*)

The Project design does not create any new or worsen any existing geometric design features that cause hazards. The Project provides two driveways off Gateway Boulevard (one is right-in right-out only, while the other is signalized and full access) but does not change the geometry of any of the adjacent roadways. Sight distance at the proposed driveways is not expected to change from what is available under existing conditions and is expected to be adequate for drivers exiting the project site and for pedestrians crossing



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the driveways. Any future vegetation located within the sight triangles at driveways should be maintained so as not to restrict drivers sight distance when exiting the driveways. The Project does not include any uses that are incompatible with the surrounding land use or the existing roadway system. Therefore, the Project is expected not to result in a substantial increase to hazards, and the Project's impacts to hazards are less-than-significant under Existing Plus Project conditions and less than cumulatively considerable under Cumulative Plus Project conditions.

Mitigation Measures: None required

## **4.4 Emergency Access**

Impact TRANS-6: Development of the Project would not result in inadequate emergency access

under Existing Plus Project and Cumulative Plus Project conditions. (Less than

Significant)

Vehicle trips generated by the Project would represent a very small percentage of overall daily and peak hour traffic on roadways and freeways in the study area. The Project generates 206 AM peak hour and 172 PM peak hour net new vehicle trips which are distributed to study intersections. Project-added vehicle trips represent approximately three percent of entering volumes at study intersections during the peak hours. The Project does not include features that would alter emergency vehicle access routes or roadway facilities; fire and police vehicles would continue to have access to all facilities around the entire city. Upon construction, emergency vehicles would have full access to the project site. Therefore, the Project is expected not to result in inadequate emergency access, and the Project's impacts to emergency access are less-than-significant under Existing Plus Project conditions and less than cumulatively considerable under Cumulative Plus Project conditions.

Mitigation Measures: None required



# **Appendix A: VMT Technical Context**

Senate Bill 743 (Stats. 2013, ch. 386) (SB 743) is intended to better align CEQA transportation impact analysis practices and mitigation outcomes with the State's goals to reduce greenhouse gas (GHG) emissions, encourage infill development, and improve public health through more active transportation. The law creates several key statewide changes to the California Environmental Quality Act (CEQA).

First, the law requires the Governor's Office of Planning and Research (OPR) to establish new metrics for determining the significance of transportation impacts of projects within transit priority areas (TPAs) and allows OPR to extend use of the metrics beyond TPAs. OPR selected vehicle miles of travel (VMT) as the preferred transportation impact metric and applied their discretion to require its use statewide.

Second, this legislation establishes that aesthetic and parking impacts of a residential, mixed-use residential, or employment center projects on an infill site within a TPA shall not be considered significant impacts on the environment.

Third, the new CEQA Guidelines that implement this legislation state that generally, vehicle miles traveled is the most appropriate measure of transportation impacts, and that as of July 1, 2020, this requirement shall apply statewide, but that until that date, lead agencies may elect to rely on VMT rather than LOS to analyze transportation impacts.

Finally, the law establishes a new CEQA exemption for a residential, mixed-use, and employment center project a) within a transit priority area, b) consistent with a specific plan for which an EIR has been certified, and c) consistent with a Sustainable Communities Strategy (SCS). This exemption requires further review if the project or circumstances changes significantly.

To aid in SB 743 implementation, the following state guidance has been produced:

- Technical Advisory on Evaluating Transportation Impacts in CEQA, California Governor's Office of Planning and Research, December 2018<sup>1</sup>
- California Air Resources Board (CARB) 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals, California Air Resources Board, January 2019<sup>2</sup>
- Local Development Intergovernmental Review Program Interim Guidance, Implementing Caltrans Strategic Management Plan 2015-2020 Consistent with SB 743, Caltrans, November 9, 2016<sup>3</sup>

The California Air Resources Board 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals provides recommendations for VMT reduction thresholds that would be necessary to achieve the State's GHG reduction goals. CARB finds per-capita light-duty vehicle travel would need to be

<sup>&</sup>lt;sup>1</sup> http://opr.ca.gov/docs/20190122-743 Technical Advisory.pdf

<sup>&</sup>lt;sup>2</sup> https://ww2.arb.ca.gov/sites/default/files/2019-01/2017 sp vmt reductions jan19.pdf

https://dot.ca.gov/programs/transportation-planning/office-of-smart-mobility-climate-change/sb-743

approximately 16.8 percent lower than existing by 2050, and overall per-capita vehicle travel would need to be approximately 14.3 percent lower than existing levels by 2050 under that scenario. CARB also acknowledges that the SCS targets are not sufficient to meet climate goals. As stated in the report, "...the full reduction needed to meet our climate goals is an approximately 25 percent reduction in statewide per capita on-road light-duty transportation-related GHG emissions by 2035 relative to 2005."

OPR considered this research when developing recommended VMT thresholds. In the *Technical Advisory* on *Evaluating Transportation Impacts in CEQA* (December 2018), OPR recommends that a per capita or per employee VMT that is 15 percent below that of existing development may be a reasonable threshold. This threshold is based on the above-mentioned research documents from CARB as well as evidence that suggests a 15 percent reduction in VMT is achievable at the project level in a variety of place types<sup>4</sup> and would help the State towards achieving its climate goals. However, each jurisdiction must apply the statewide VMT analysis guidance based on available travel data and tools.

#### **Application of Statewide Guidance for Project Analysis**

Home-based work VMT (HBW VMT) per employee was identified as the appropriate Project analysis metric. This metric follows OPR guidance for measuring office project VMT and helps compare the Project's relative transportation efficiency to the regional average. OPR recommends using a regional geography for office projects. Neither the local city or county level geographic area is robust enough to capture the full length of most trips or evaluate the interaction of the Project in a regional setting. Accordingly, the nine-county Bay Area region was selected as the geographic boundary for the assessment. The nine-county Bay Area region will capture the full length of work trips and would be most consistent with OPR's guidance.

For office projects, OPR recommends using a tour-based VMT accounting method which is based on a chain of trips including multiple stops. The Metropolitan Transportation Commission (MTC) model is the sole tour-based travel demand model available for South San Francisco. However, the MTC model lacks the level of roadway network and land use detail that is necessary for this assessment. Instead, existing per capita VMT data, expressed as HBW VMT per employee, was extracted from similar existing land uses in the East of 101 area as a proxy for the Project to reasonably assess the Project VMT. The C/CAG bi-county travel demand model was used to obtain employee population data and total HBW VMT from the appropriate East of 101 transportation analysis zone (TAZ). Updates were made to the C/CAG Model to calibrate existing population and employment data in South San Francisco, consistent with the *Shape SSF* General Plan analysis.

<sup>&</sup>lt;sup>4</sup> CAPCOA (2010) Quantifying Greenhouse Gas Mitigation Measures, p. 55, available at <a href="http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf">http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf</a>

# **Appendix B: Relevant Plans & Policies**

# Agencies with Jurisdiction over Transportation in South San Francisco

The City of South San Francisco has jurisdiction over all local City streets and City-operated traffic signals within the study area. Several regional agencies, including the City/County Association of Governments of San Mateo County (C/CAG), the Congestion Management Agency in San Mateo County, and the Metropolitan Transportation Commission (MTC), coordinate and establish funding priorities for regional transportation improvement programs. Freeways serving South San Francisco (U.S. 101, I-380, and I-280), associated local freeway ramps, and local surface highway segments (SR-82) are under the jurisdiction of the State of California Department of Transportation (Caltrans). Transit service providers such as BART, Caltrain, SamTrans, and the Water Emergency Transportation Authority (ferry service), have jurisdiction over their respective services. These agencies, their responsibilities, and funding sources are more specifically described below.

### City of South San Francisco

The City of South San Francisco is responsible for planning, constructing, and maintaining local public-serving transportation facilities, including all City streets, City-operated traffic signals, sidewalks, and bicycle facilities. These local services are funded primarily by gas-tax revenue and land development Impact Fees.

## San Mateo City/County Association of Governments (C/CAG)

C/CAG is the Congestion Management Agency (CMA) for San Mateo County authorized to set State and federal funding priorities for improvements affecting the San Mateo County Congestion Management Program (CMP) roadway system. The C/CAG-designated CMP roadway system in South San Francisco include SR 82 (El Camino Real), U.S. 101, I-380, and I-280. C/CAG has set the level of service standards for U.S. 101 segments in the vicinity of the Project site.

C/CAG has adopted guidelines to reduce the number of net new vehicle trips generated by new land development. These guidelines apply to all developments that generate 100 or more net new peak-hour vehicular trips on the CMP network and are subject to CEQA review. The goal of the guidelines is that the developer and/or tenants will reduce the demand for all new peak hour trips (including the first 100 trips) projected to be generated by the development.

### Peninsula Traffic Congestion Relief Alliance (Commute.org)

The Alliance is a joint powers authority dedicated to implementing transportation demand management programs in San Mateo County and providing alternatives to single-occupant auto travel, including both commuter and community shuttles. A Board of Directors consisting of elected officials from each of its 17-

member cities and one representative from the County Board of Supervisors governs the Alliance. The Alliance manages 26 shuttle routes in San Mateo County. In South San Francisco, the Alliance runs seven first- and last-mile weekday peak hour and direction commuter routes that connect the South San Francisco Caltrain and BART stations, and the South San Francisco Bay Ferry (WETA) terminal with the East of 101 employment area.

### California Department of Transportation (Caltrans)

Caltrans has authority over the State highway system, including mainline facilities, interchanges, and arterial State routes. Caltrans approves the planning and design of improvements for all State-controlled facilities. Caltrans facilities in South San Francisco include US-101 and its interchanges, I-280 and its interchanges, and SR 82 (El Camino Real).

#### **SamTrans**

The San Mateo County Transit District (SamTrans) is the primary public transportation provider in San Mateo County. SamTrans manages local and regional bus service, paratransit services, and Caltrain commuter rail. There are over 50 routes in the county that can be categorized as community, express, BART connection, Caltrain connection, and BART and Caltrain connection routes. SamTrans buses do not serve the Project site nor the East of 101 employment area.

### 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 and directions. Caltrain is governed through the Peninsula Corridor Joint Powers Board and managed by SamTrans. On weekdays, Caltrain operates approximately 100 trains per day of local, limited stop, and Baby Bullet express service in both directions. The South San Francisco station is currently served by two limited-stop trains per hour during peak weekday commute periods and directions.

### Water Emergency Transit Agency (WETA)

The San Francisco Bay Area Water Emergency Transportation Authority (WETA) operates the San Francisco Bay Ferry, a regional ferry service on the San Francisco Bay and coordinates water transit response to regional emergencies. WETA provides public ferry service to the cities of Alameda, Oakland, San Francisco, South San Francisco, and Vallejo.

## Relevant Plans and Policies

#### State of California Senate Bill 743

Discussed in Appendix A.

#### **City of South San Francisco General Plan Transportation Chapter**

The City of South San Francisco General Plan (1999) defines transportation and land use policies for the City. The General Plan establishes transportation policies pertinent to the Project, including:

- 4.2-G-1: Undertake efforts to enhance transportation capacity, especially in growth and emerging employment areas such as in the East of 101 area.
- 4.2-G-10 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.
- 4.2-1-10: Design roadway improvements and evaluate development proposals based on LOS standards.
- 4.3-I-16 Favor Transportation Systems Management programs that limit vehicle use over those that extend the commute hour.

The City of South San Francisco's General Plan is currently being updated through the *Shape SSF General Plan 2040* public engagement process and is targeted for adoption in late 2021. Since the update is underway, this document refers to policies and programs from the approved 1999 general plan and relevant adopted amendments.

### South San Francisco East of 101 Mobility 20/20 Plan

The City of South San Francisco Mobility 20/20 Plan (2019) analyzed existing and future land use in the East of 101 Area, with the goal of providing a framework for multimodal improvements to the area's transportation network. Its findings and recommendations will be incorporated into *Shape SSF*, the City's 2040 General Plan Update. The plan envisions reducing vehicle miles traveled and drive-alone mode share while expanding throughput capacity along major corridors serving the area's core employment areas.

Key identified project opportunities include US-101 interchange improvements and secondary north-south arterial connections to Brisbane's Sierra Point to the north and the San Francisco International Airport area to the south via a new causeway spanning San Bruno Channel. The bicycle and pedestrian network would be substantially upgraded with separated bikeways, expanded sidewalks, and new pedestrian crosswalks. Transit enhancements include transit-only lanes along the Oyster Point Boulevard corridor complimented by new or upgraded direct service connections between job centers and regional transit stations.

#### **South San Francisco Complete Streets Policy**

The City of South San Francisco adopted its Complete Streets Policy (2012) to serve all street users:

 Resolution 86-2012: Create and maintain complete streets that provide safe, comfortable, and convenient travel along and across streets including streets, roads, highways, bridges, and other portions of the transportation system through a comprehensive, integrated transportation network that serves all categories of users, including pedestrians, bicyclists, persons with disabilities, motorists, movers of commercial goods, users and operators of public transportation, seniors, children, youth, and families.

•

• The Complete Streets Policy was incorporated into the amended General Plan and includes the following policy related to the Project:

•

• 4.2-I-11: In all street projects include infrastructure that improves transportation options for pedestrians, bicyclists, and users of public transportation of all ages and abilities. Incorporate this infrastructure into all construction, reconstruction, retrofit, maintenance, alteration, and repair of streets, bridges, and other portions of the transportation network.

#### **South San Francisco Bicycle Master Plan**

The City of South San Francisco Bicycle Master Plan (2011) identifies and prioritizes street improvements to enhance bicycle access. The plan analyzes bicycle demand and gaps in bicycle facilities and recommends improvements and programs for implementation. The Bicycle Master Plan establishes the following policy related to the Project:

• 3.2-1: All development projects shall be required to conform to the Bicycle Transportation Plan goals, policies and implementation measures.

#### South San Francisco Pedestrian Master Plan

The City of South San Francisco Pedestrian Master Plan (2012) identifies and prioritizes street improvements to enhance pedestrian access. The plan analyzes pedestrian demand and gaps in pedestrian facilities and recommends improvements and programs for implementation. The Pedestrian Master Plan establishes the following policy related to the Project:

 Policy 3.2: Pedestrian facilities and amenities should be provided at schools, parks, and transit stops, and shall be required to be provided at private developments, including places of work, commercial shopping establishments, parks, community facilities and other pedestrian destinations.

#### **South San Francisco Transportation Demand Management Ordinance**

The City of South San Francisco TDM Ordinance (Ord. 1432 § 2, 2010) seeks to reduce the amount of traffic generated by nonresidential development and minimize drive-alone commute trips. The ordinance establishes a performance target of 28 percent minimum alternative mode share for all nonresidential projects resulting in more than 100 average daily trips and identifies a higher threshold for projects requesting a floor area ratio (FAR) bonus.

All projects are required to submit annual mode share surveys and FAR bonus project sponsors are required to submit triennial reports assessing project compliance with the required alternative mode share target. Where targets are not achieved, the report must include program modification recommendations and City officials may impose administrative penalties should subsequent triennial reports indicate mode share

targets remain unachieved. As documented in Section 1, Project Description, while SSFMC Section 20.400 does not call out a specific alternate mode-share (AMS) requirement for the Gateway Specific Plan District, similar zoning districts, and General Plan requirements in the East of 101 area require an AMS of 35 - 40 percent for development of a Floor Area Ratio of 1.0 - 1.25, and this standard would be applied to the 751 Gateway project, consistent with the City's requirements and policies to increase AMS and decrease single occupancy vehicle traffic.

#### **C/CAG Congestion Management Program Guidelines**

C/CAG has adopted guidelines as a part of its Congestion Management Program (CMP), which are intended to reduce the regional traffic impacts of substantive new developments. The guidelines apply to all projects in San Mateo County that will generate 100 or more net new peak-hour trips on the CMP network and are subject to CEQA review. C/CAG calls for projects that meet the criteria to determine if a combination of acceptable measures is possible that has the capacity to "fully reduce," through the use of a trip credit system, the demand for net new trips that the project is anticipated to generate on the CMP roadway network (including the first 100 trips). C/CAG has published a list of mitigation options in a memorandum. South San Francisco's TDM ordinance is consistent with CCAG's ordinance, so be adhering to the City's ordinance, the Project would also be compliant with CCAG's guidelines.

#### **Caltrain Business Plan**

Caltrain is developing a Business Plan to provide guidance for the rail corridor's growth through year 2040. The Caltrain Business Plan includes both policy and technical recommendations and will help define how Caltrain service should grow and evolve in the near-term and long-term to best serve existing and future passengers. The Peninsula Corridor Joint Powers Board, Caltrain's board of directors, adopted a 2040 service plan vision in October 2019 that calls for increasing peak commute service to a minimum of eight trains per direction per hour and increased off-peak and weekend service.

# Appendix C: Traffic Operations Analysis

This traffic operations analysis studies the vehicle congestion effects of the Project at signalized and unsignalized intersections using level of service (LOS). LOS is a quantitative description of an intersection's performance based on the average delay per vehicle. Intersection levels of service range from LOS A, which indicates free flow or excellent vehicle flow conditions with short delays, to LOS F, which indicates congested or overloaded vehicle flow conditions with extremely long delays. The City of South San Francisco General Plan establishes LOS A through LOS D as acceptable operations, while LOS E and LOS F are considered unsatisfactory unless there is no mitigation feasible, except at intersections within ½ mile of rail stations or ferry terminals where LOS does not apply. LOS for the study intersections were analyzed using the Highway Capacity Manual (HCM) 2000 and 6th Edition methodology and the Synchro traffic analysis software to maintain consistency with previous studies. Due to the relatively small Project size, detailed freeway analysis was not performed unless Project trips exceeded one percent of capacity.

While HCM methodology and Synchro traffic analysis software represent the state of the practice in evaluating isolated intersection operations, this methodology presents some limitations for both signalized and unsignalized intersections within a congested network. Under highly congested conditions, use of deterministic traffic modeling tools such as Synchro may not fully reflect the extent of vehicular queuing and spillover effects between intersections. To partially account for these conditions, saturated flow rates were manually adjusted based on field observations and traffic monitoring data. Similarly, these tools cannot anticipate how drivers may react to day-to-day variations in traffic conditions. Finally, this analysis is predicated on data collected on specific days; while existing conditions were counted on "typical" weekdays, traffic flows may vary by up to ten percent from day to day.

The analysis results are presented for information only and are not intended to inform the environmental review process. As documented in Appendix A, VMT Technical Analysis, Senate Bill 743 stipulates that vehicle LOS and similar measures related to auto delay shall not be used as the sole basis for determining the significance of transportation impacts under the California Environmental Quality Act (CEQA). However, local agencies may continue to use vehicle congestion metrics for non-CEQA transportation planning and evaluation.

# Signalized Intersections

The method from Chapter 16 of the *Highway Capacity Manual* (HCM) 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 C.1** summarizes the relationship between average delay per vehicle and LOS for signalized intersections according to the HCM 6<sup>th</sup> Edition methodology.

**Table C-1 Signalized Intersection LOS Criteria** 

| Level of<br>Service | Description  | Average Control Delay Per Vehicle (Seconds) |
|---------------------|--|---|
| Α                   | Operations with very low delay occurring with favorable progression and/or short cycle length.   | ≤ 10  |
| В                   | Operations with low delay occurring with good progression and/or short cycle lengths.  | > 10 and ≤ 20                               |
| С                   | Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.   |   |
| 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. |   |
| E                   | Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.  | > 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, 2016. Highway Capacity Manual 6th Edition

# Unsignalized Intersections

Traffic conditions at the unsignalized study intersections (stop sign and yield sign-controlled intersections) were evaluated using the method from Chapter 17 of the HCM. With this method, operations are defined by the average control delay per vehicle (measured in seconds) for each stop-controlled approach 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 C.2** summarizes the relationship between delay and LOS for unsignalized intersections.

**Table C-2 Unsignalized Intersection LOS Criteria** 

| Level o | f Description   | Average Control Delay Per Vehicle (Seconds) |
|---------|---|---|
| Α       | Little or no traffic delays.                                | ≤ 10  |
| В       | Short traffic delays.                                       | > 10 and ≤ 15                               |
| С       | 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, 2016. Highway Capacity Manual 6th Edition

# **Traffic Operations Policy**

The City of South San Francisco's General Plan includes the following traffic operations polices relevant to the Project traffic operations analysis, including:

- 4.2-G-15 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.
- 4.2-G-16 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.
- 4.2-G-17 Exempt development within one-quarter mile of a Caltrain or BART station, or a City-designated ferry terminal, from LOS standards.

# **Analysis Scenarios**

This analysis evaluates weekday AM peak hour traffic period between 7:00 AM and 9:00 AM and the weekday PM peak hour traffic periods between 4:00 PM and 6:00 PM. Counts were conducted during November 2019 while freeway counts were based on the Caltrans Performance Measurement System (PeMS) for the same time period. Study intersections were evaluated for the following scenarios:

- Existing Conditions: Existing November 2019 traffic volumes for local roadways.
- Plus Project Conditions: Existing traffic volumes plus new traffic from the Project.
- Cumulative No Project Conditions: Projected conditions in 2040 without the Project.
- Cumulative Plus Project Conditions: Projected conditions in 2040 with the Project.

While this analysis intends to be representative of existing conditions at the time of the Notice of Preparation, transportation conditions have continued to change while this analysis occurred. In particular, ongoing construction in the downtown area and along Oyster Point Boulevard and East Grand Avenue have

temporarily disrupted traffic patterns. As some of these developments have been completed since traffic counts were taken in Novemebr 2019, peak hour traffic volumes may have changed. However, while these new developments are not fully captured in the existing conditions analysis, they are reflected in the cumulative analysis.

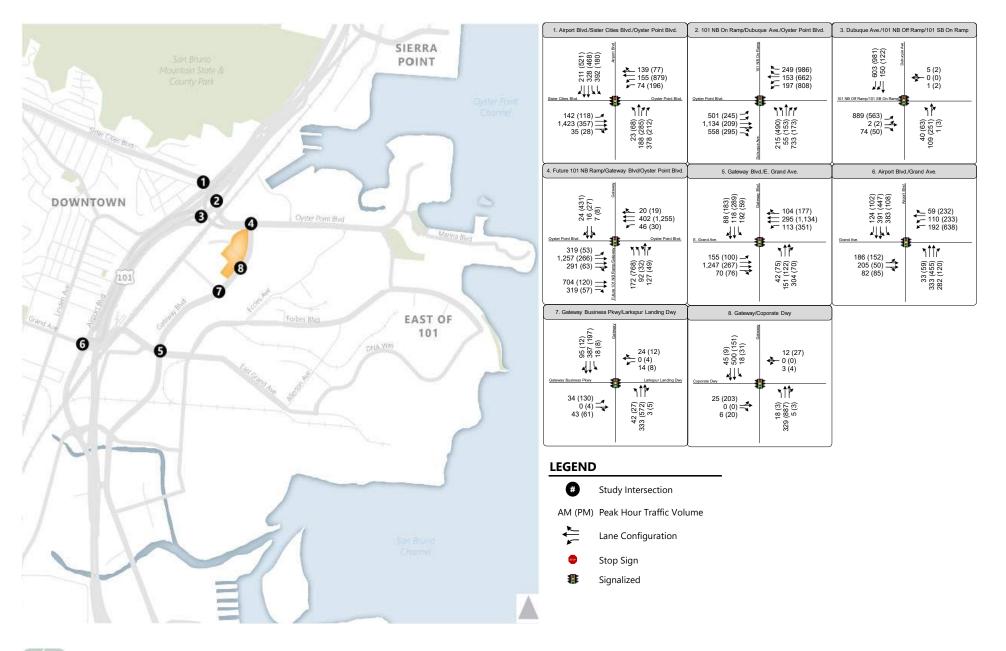
# **Study Locations**

Study locations were selected for evaluation for the Project. The study area for the traffic analysis was selected based on local traffic patterns, trip assignment forecasts, input from the City of South San Francisco, and engineering judgment, to capture the transportation facilities where motorists are likely to experience impacts due to a net increase of trips associated with the Project. The study intersections are listed below and shown on **Figure 1-1** and listed below.

- Gateway Boulevard / Gateway Business Park Driveway
- 2. Airport Boulevard / Grand Avenue
- 3. Gateway Boulevard / East Grand Avenue
- 4. Gateway Boulevard / Corporate Driveway
- 5. Dubuque Avenue / Oyster Point Boulevard
- 6. Gateway Boulevard / Oyster Point Boulevard
- 7. Airport Boulevard / Sister Cities Boulevard
- 8. Dubuque Avenue / US-101 Off-ramp

# **Existing Conditions**

The existing conditions section include the existing no project and existing plus project scenarios. **Figure C-1**, Existing Traffic Volume, shows the existing lane configuration, traffic control, and weekday AM and PM peak hour traffic volume breakdown by movement at each of the eight study intersections.





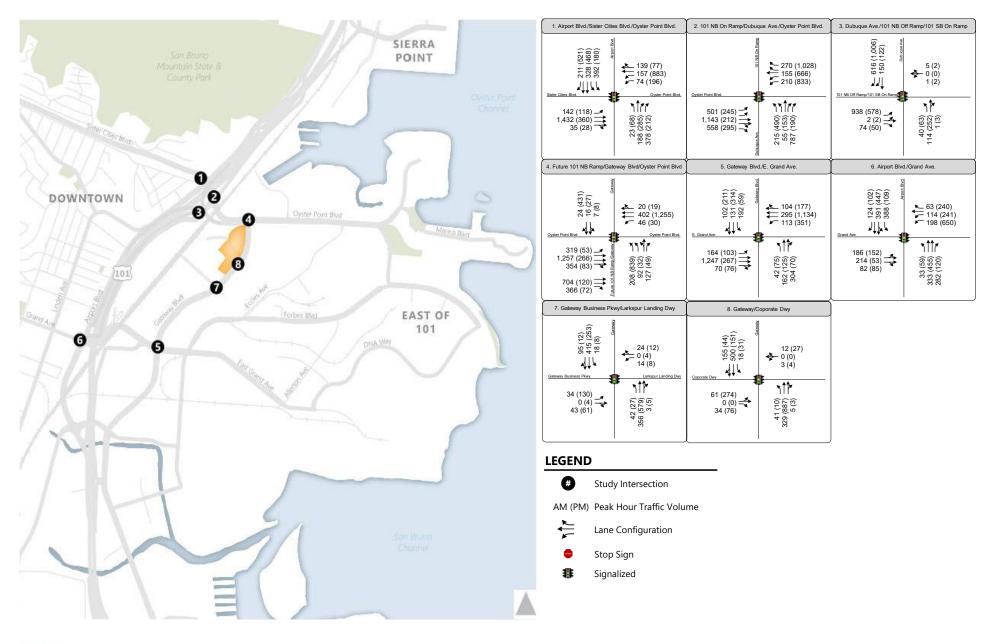
# Vehicle Trip Generation, Distribution, Assignment and Level of Service

The Project trip generation and distribution estimates and methodologies are presented in Section 3, Transportation Analysis. The trip distribution assumptions, as described in Section 3.4, were used as the basis for assigning Project-generated vehicle trips to the local transportation network and eight study intersections. **Figure 3-3**, Project Trip Assignment, presents vehicle trip assignment at the eight study intersections and **Figure C-2**, Existing Plus Project Traffic Volume, shows the sum of Project trips and existing traffic volume. **Table C-3** presents level of service conditions for the study intersections.

Table C-3 Peak Hour Intersection Levels of Service: Existing Conditions Scenarios

|         |                             | Traffic  | Peak | Existing Con | ditions          | Existing Plus | Project |
|---------|-----------------------------|--|------|--------------|------------------|---------------|---------|
| Interse | ection                      | Control         Hour Delay           rd / Gateway Zeway         Signal           rd / Grand Grand         Signal           rd / Grand Signal         AM 36 PM 45           pard / East Signal         AM 48 PM 45           plevard / Signal         AM < 10 PM 21           pard / Outbox         AM 25 |      | LOS          | Average<br>Delay | LOS           |         |
| 1       | Gateway Boulevard / Gateway | Cianal   | AM   | <10          | Α                | <10           | Α       |
| 1       | Business Park Driveway      | Signal   | PM   | 12           | В                | 12            | В       |
| 2       | Airport Boulevard / Grand   | Cianal   | AM   | 36           | D                | 36            | D       |
| 2       | Avenue                      | Signai   | PM   | 45           | D                | 45            | D       |
| 2       | Gateway Boulevard / East    | C' I   | AM   | 48           | D                | 49            | D       |
| 3       | Grand Avenue                | Signal   | PM   | 45           | D                | 45            | D       |
| _       | Gateway Boulevard /         | c: 1   | AM   | <10          | Α                | 10            | В       |
| 4       | Corporate Driveway          | Signai   | PM   | 21           | С                | 26            | С       |
| _       | Dubuque Avenue / Oyster     | c: 1   | AM   | 25           | С                | 26            | С       |
| 5       | Point Boulevard             | Signal   | PM   | 34           | С                | 35            | D       |
|         | Gateway Boulevard / Oyster  | C:I  | AM   | >80          | F                | >80           | F       |
| 6       | Point Boulevard             | Signal   | PM   | 53           | D                | 55            | D       |
| _       | Airport Boulevard / Sister  | Signal   | AM   | 48           | D                | 49            | D       |
| 7       | Cities Boulevard            |  | PM   | 42           | D                | 42            | D       |
| 0       | Dubuque Avenue / US-101     | C:I  | AM   | 13           | В                | 13            | В       |
| 8       | Off-Ramp                    | Signal   | PM   | 14           | В                | 14            | В       |

Notes: **Bold** indicates unacceptable LOS E or F. Delay reported as seconds per vehicle. LOS based on the methodology in the Highway Capacity Manual 6<sup>th</sup> Edition. Intersections 2, 6, and 8 were analyzed based on HCM 2000. Signalized intersections, the delay shown in the weighted average for all movements in seconds per vehicle. Calculations based on signal timing provided by the City of South San Francisco from November 2019.





All intersections operate under LOS D or better during AM and PM peak hours in both scenarios except for intersection #6 Gateway Boulevard / Oyster Point Boulevard. Intersection #6, Gateway Boulevard / Oyster Point Boulevard operates at LOS F during the AM peak hour under existing and existing plus project conditions. Project traffic does not cause any intersection to operate at LOS E or F that was not already operating at these levels. Project trips assigned to the US-101 freeway mainline were compared to existing capacity figures and found to be less than one percent of capacity along all northbound and southbound freeway segments in the vicinity of the Project. Accordingly, a detailed freeway operations analysis was not performed.

### Freeway On-Ramp Queuing

**Table C-4** shows estimated 95<sup>th</sup> percentile PM peak hour queue lengths for two US-101 on ramps that are anticipated to receive the largest share of Project vehicle trips: the Northbound US-101 on-ramp at Oyster Point Boulevard, the Southbound US-101 on-ramp at Oyster Point Boulevard, and the Southbound US-101 on-ramp at Produce Avenue. This analysis determines if freeway on-ramp vehicle queue lengths exceed storage capacity and interfere with local streets upstream from the ramp. The weekday PM peak hour was analyzed since the East of 101's employment uses result in imbalanced peak direction traffic flow in the outbound direction. Queue lengths exceed storage capacities at the US-101 northbound on-ramp at Oyster Point Boulevard in both the existing and existing plus project scenarios.

Table C-4 PM Peak Hour US-101 On-Ramp 95th Percentile Queues: Existing Conditions

| 115-101 | US-101 Freeway On-Ramp             |                    | Storage | Existing Condi |                 | itions Existing Plus Pro |                 |
|---------|------------------------------------|--------------------|---------|----------------|-----------------|--------------------------|-----------------|
| Locatio |                                    | amp<br>Lanes       | Length  | Volume         | Queue<br>Length | Volume                   | Queue<br>Length |
| 1       | Oyster Point Boule<br>(Northbound) | evard 2 + 1<br>HOV | 500     | 1,384          | >500            | 1,426                    | >500            |
| 2       | Oyster Point Boule<br>(Southbound) | evard 2            | 980     | 1,044          | 228             | 1,069                    | 433             |
| 3       | Produce Avenue                     | 2                  | 1500    | 1,806          | 196             | 1,843                    | 214             |

Notes: Bold type indicates conditions where queue length exceeds storage capacity. Storage distance and queues in feet per lane. Source: Fehr & Peers, 2020

# **Cumulative Conditions**

The cumulative conditions section includes the cumulative no project and cumulative plus project scenarios. **Figure C-3**, Cumulative Traffic Volume, shows cumulative no project weekday AM and PM peak hour traffic volumes that were obtained from the City of South San Francisco travel model for the year 2040. **Figure C-4**, Cumulative Plus Project Traffic Volume, shows the sum of Project trips and cumulative no project traffic volume during weekday AM and PM peak hours. **Table C-5** presents level of service at the eight study intersections.

**Table C.5 Peak Hour Intersection Levels of Service: Cumulative Conditions Scenarios** 

|        |                             | Traffic Peak |      | Cumulative       | Conditions | Cumulative Plus Project |     |  |
|--------|-----------------------------|--------------|------|------------------|------------|-------------------------|-----|--|
| Inters | section                     | Control      | Hour | Average<br>Delay | LOS        | Average<br>Delay        | LOS |  |
| 1      | Gateway Boulevard / Gateway | Cianal       | AM   | 13               | В          | 13                      | В   |  |
| 1      | Business Park Driveway      | Signal       | PM   | 19               | В          | 19                      | В   |  |
| 2      | Airport Boulevard / Grand   | Cianal       | AM   | >80              | F          | >80                     | F   |  |
| 2      | Avenue                      | Signal       | PM   | >80              | F          | >80                     | F   |  |
| 2      | Gateway Boulevard / East    | C' I         | AM   | >80              | F          | >80                     | F   |  |
| 3      | Grand Avenue                | Signal       | PM   | >80              | F          | >80                     | F   |  |
| _      | Gateway Boulevard /         | c. I         | AM   | <10              | Α          | 12                      | В   |  |
| 4      | Corporate Driveway          | Signal       | PM   | 26               | С          | 43                      | D   |  |
| _      | Dubuque Avenue / Oyster     | C' I         | AM   | >80              | F          | >80                     | F   |  |
| 5      | Point Boulevard             | Signal       | PM   | >80              | F          | >80                     | F   |  |
|        | Gateway Boulevard / Oyster  |              | AM   | >80              | F          | >80                     | F   |  |
| 6      | Point Boulevard             | Signal       | PM   | >80              | F          | >80                     | F   |  |
| _      | Airport Boulevard / Sister  | G. 1         | AM   | 78               | E          | 79                      | E   |  |
| 7      | Cities Boulevard            | Signal       | PM   | 65               | E          | 65                      | E   |  |
| _      | Dubuque Avenue / US-101     | G: 1         | AM   | 13               | В          | 13                      | В   |  |
| 8      | Off-Ramp                    | Signal       | PM   | 20               | С          | 20                      | С   |  |

Notes: **Bold** indicates LOS E or F. Delay reported as seconds per vehicle. LOS is based on the methodology in the Highway Capacity Manual 6<sup>th</sup> Edition. Intersections 2, 6, and 8 were analyzed based on HCM 2000. Signalized intersections, the delay shown in the weighted average for all movements in seconds per vehicle. Calculations based on signal timing provided by the City of South San Francisco from November 2019.

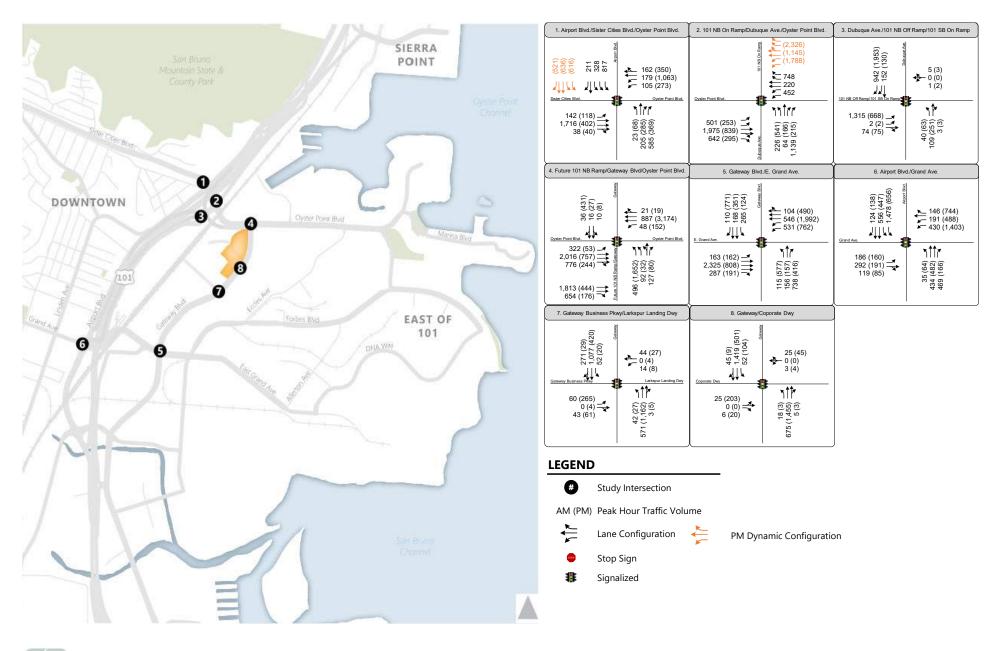




Figure C-3 Cumulative Traffic Volumes

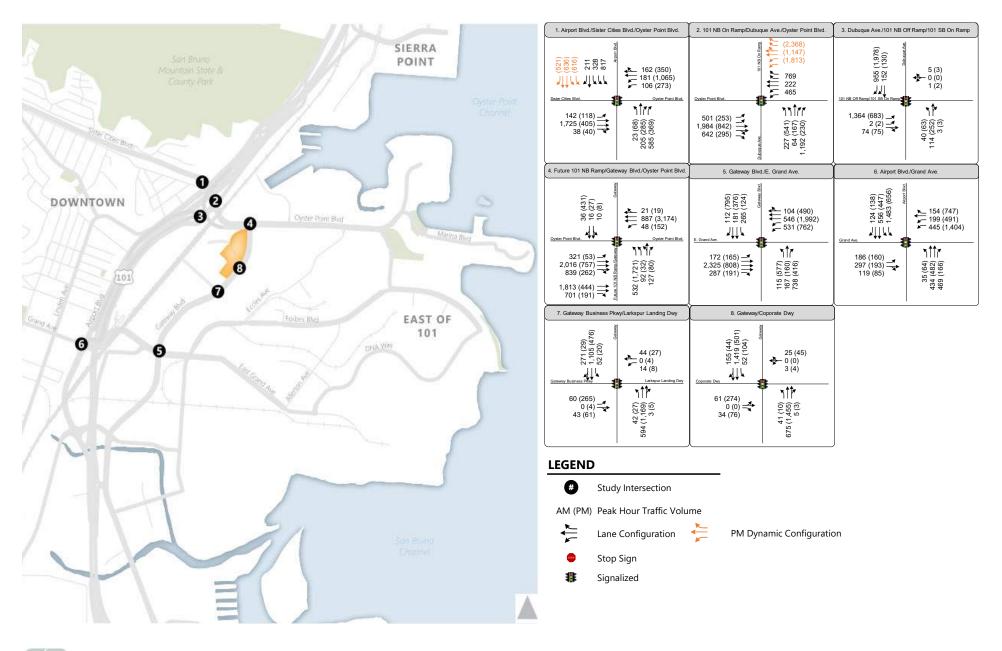




Figure C-4 Cumulative Plus Project Traffic Volumes

## Freeway On-Ramp Queuing

**Table C-6** shows estimated 95<sup>th</sup> percentile PM peak hour queue lengths for two US-101 on ramps that are anticipated to receive the largest share of Project vehicle trips: the Northbound US-101 on-ramp at Oyster Point Boulevard, the Southbound US-101 on-ramp at Oyster Point Boulevard, and the Southbound US-101 on-ramp at Produce Avenue. As described in the existing conditions section, the PM peak hour is the peak direction of outbound travel for the East of 101 area and is therefore the focus of the analysis. At the US-101 northbound on-ramp at Oyster Point Boulevard, queue lengths exceed storage capacity under cumulative no project and cumulative plus project scenarios.

Table C-6 PM Peak Hour US-101 On-Ramp 95th Percentile Queues: Cumulative Conditions

| US-101 | Northbound Freeway                  |              | Storage | Cumulative C | conditions      | Cumulative Plus Project |                 |  |
|--------|-------------------------------------|--------------|---------|--------------|-----------------|-------------------------|-----------------|--|
|        | mp Location                         | Lanes        | Length  | Volume       | Queue<br>Length | Volume                  | Queue<br>Length |  |
| 1      | Oyster Point Boulevard (Northbound) | 2 + 1<br>HOV | 500     | 2,745        | >500            | 2,788                   | >500            |  |
| 2      | Oyster Point Boulevard (Southbound) | 2            | 980     | 2,016        | 949             | 2,041                   | 952             |  |
| 3      | Produce Avenue                      | 2            | 1500    | 3,254        | 856             | 3,291                   | 980             |  |

Notes: Bold type indicates conditions where queue length exceeds storage capacity. Storage distance and queues in feet per lane. Source: Fehr & Peers, 2020

# **Appendix D: Synchro Reports**

| ntersection              |      |
|--------------------------|------|
| ntersection Delay, s/veh | 12.4 |
| ntersection LOS          | В    |

| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations        |      | ર્ન  | 7    | ħ    | î»   |      |      | ર્ન  | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 5    | 324  | 114  | 194  | 76   | 1    | 57   | 16   | 135  | 0    | 2    | 0    |
| Future Vol, veh/h          | 5    | 324  | 114  | 194  | 76   | 1    | 57   | 16   | 135  | 0    | 2    | 0    |
| Peak Hour Factor           | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles, %          | 4    | 4    | 4    | 10   | 10   | 10   | 16   | 16   | 16   | 50   | 50   | 50   |
| Mvmt Flow                  | 5    | 345  | 121  | 206  | 81   | 1    | 61   | 17   | 144  | 0    | 2    | 0    |
| Number of Lanes            | 0    | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      |      | SB   |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      |      | NB   |      |
| Opposing Lanes             | 2    |      |      | 2    |      |      | 1    |      |      |      | 2    |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      |      | WB   |      |
| Conflicting Lanes Left     | 1    |      |      | 2    |      |      | 2    |      |      |      | 2    |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      |      | EB   |      |
| Conflicting Lanes Right    | 2    |      |      | 1    |      |      | 2    |      |      |      | 2    |      |
| HCM Control Delay          | 13.5 |      |      | 12   |      |      | 10.8 |      |      |      | 10.9 |      |
| HCM LOS                    | В    |      |      | В    |      |      | В    |      |      |      | В    |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 |  |
|------------------------|-------|-------|-------|-------|-------|-------|-------|--|
| Vol Left, %            | 78%   | 0%    | 2%    | 0%    | 100%  | 0%    | 0%    |  |
| Vol Thru, %            | 22%   | 0%    | 98%   | 0%    | 0%    | 99%   | 100%  |  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 1%    | 0%    |  |
| Sign Control           | Stop  |  |
| Traffic Vol by Lane    | 73    | 135   | 329   | 114   | 194   | 77    | 2     |  |
| LT Vol                 | 57    | 0     | 5     | 0     | 194   | 0     | 0     |  |
| Through Vol            | 16    | 0     | 324   | 0     | 0     | 76    | 2     |  |
| RT Vol                 | 0     | 135   | 0     | 114   | 0     | 1     | 0     |  |
| Lane Flow Rate         | 78    | 144   | 350   | 121   | 206   | 82    | 2     |  |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6     |  |
| Degree of Util (X)     | 0.154 | 0.24  | 0.553 | 0.167 | 0.37  | 0.135 | 0.005 |  |
| Departure Headway (Hd) | 7.119 | 6.015 | 5.686 | 4.971 | 6.456 | 5.941 | 7.802 |  |
| Convergence, Y/N       | Yes   |  |
| Сар                    | 505   | 597   | 637   | 723   | 557   | 605   | 459   |  |
| Service Time           | 4.853 | 3.748 | 3.412 | 2.697 | 4.186 | 3.67  | 5.849 |  |
| HCM Lane V/C Ratio     | 0.154 | 0.241 | 0.549 | 0.167 | 0.37  | 0.136 | 0.004 |  |
| HCM Control Delay      | 11.2  | 10.6  | 15.2  | 8.7   | 12.9  | 9.6   | 10.9  |  |
| HCM Lane LOS           | В     | В     | С     | Α     | В     | Α     | В     |  |
| HCM 95th-tile Q        | 0.5   | 0.9   | 3.4   | 0.6   | 1.7   | 0.5   | 0     |  |

# HCM 6th Signalized Intersection Summary 1: Gateway & Gatewa Business Pkwy/Larkspur Landing Dwy

|                              | ۶         | <b>→</b> | •         | •         | <b>←</b> | •         | 4         | <b>†</b>   | /        | <b>&gt;</b> | ļ          | 4    |
|------------------------------|-----------|----------|-----------|-----------|----------|-----------|-----------|------------|----------|-------------|------------|------|
| Movement                     | EBL       | EBT      | EBR       | WBL       | WBT      | WBR       | NBL       | NBT        | NBR      | SBL         | SBT        | SBR  |
| Lane Configurations          | ¥         | ֔        |           | ň         | f)       |           | 7         | <b>∱</b> } |          | Ť           | <b>∱</b> β |      |
| Traffic Volume (veh/h)       | 34        | 0        | 43        | 14        | 0        | 24        | 42        | 333        | 3        | 18          | 387        | 95   |
| Future Volume (veh/h)        | 34        | 0        | 43        | 14        | 0        | 24        | 42        | 333        | 3        | 18          | 387        | 95   |
| Initial Q (Qb), veh          | 0         | 0        | 0         | 0         | 0        | 0         | 0         | 0          | 0        | 0           | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.96      |          | 0.95      | 0.96      |          | 0.95      | 1.00      |            | 0.96     | 1.00        |            | 0.96 |
| Parking Bus, Adj             | 1.00      | 1.00     | 1.00      | 1.00      | 1.00     | 1.00      | 1.00      | 1.00       | 1.00     | 1.00        | 1.00       | 1.00 |
| Work Zone On Approach        |           | No       |           |           | No       |           |           | No         |          |             | No         |      |
| Adj Sat Flow, veh/h/ln       | 1826      | 1826     | 1826      | 1781      | 1781     | 1781      | 1796      | 1796       | 1796     | 1767        | 1767       | 1767 |
| Adj Flow Rate, veh/h         | 35        | 0        | 5         | 14        | 0        | 2         | 43        | 343        | 3        | 19          | 399        | 83   |
| Peak Hour Factor             | 0.97      | 0.97     | 0.97      | 0.97      | 0.97     | 0.97      | 0.97      | 0.97       | 0.97     | 0.97        | 0.97       | 0.97 |
| Percent Heavy Veh, %         | 5         | 5        | 5         | 8         | 8        | 8         | 7         | 7          | 7        | 9           | 9          | 9    |
| Cap, veh/h                   | 261       | 0        | 186       | 254       | 0        | 182       | 108       | 2274       | 20       | 59          | 1726       | 355  |
| Arrive On Green              | 0.13      | 0.00     | 0.13      | 0.13      | 0.00     | 0.13      | 0.06      | 0.66       | 0.66     | 0.03        | 0.63       | 0.63 |
| Sat Flow, veh/h              | 1319      | 0        | 1477      | 1284      | 0        | 1441      | 1711      | 3465       | 30       | 1682        | 2748       | 565  |
| Grp Volume(v), veh/h         | 35        | 0        | 5         | 14        | 0        | 2         | 43        | 169        | 177      | 19          | 242        | 240  |
| Grp Sat Flow(s), veh/h/ln    | 1319      | 0        | 1477      | 1284      | 0        | 1441      | 1711      | 1706       | 1789     | 1682        | 1678       | 1635 |
| Q Serve(g_s), s              | 1.8       | 0.0      | 0.2       | 0.7       | 0.0      | 0.1       | 1.8       | 2.8        | 2.8      | 0.8         | 4.7        | 4.8  |
| Cycle Q Clear(g_c), s        | 1.9       | 0.0      | 0.2       | 0.9       | 0.0      | 0.1       | 1.8       | 2.8        | 2.8      | 0.8         | 4.7        | 4.8  |
| Prop In Lane                 | 1.00      | 0.0      | 1.00      | 1.00      | 0.0      | 1.00      | 1.00      | 2.0        | 0.02     | 1.00        | 7.7        | 0.35 |
| Lane Grp Cap(c), veh/h       | 261       | 0        | 186       | 254       | 0        | 182       | 108       | 1120       | 1174     | 59          | 1054       | 1027 |
| V/C Ratio(X)                 | 0.13      | 0.00     | 0.03      | 0.06      | 0.00     | 0.01      | 0.40      | 0.15       | 0.15     | 0.32        | 0.23       | 0.23 |
| Avail Cap(c_a), veh/h        | 620       | 0.00     | 589       | 604       | 0.00     | 575       | 237       | 1120       | 1174     | 233         | 1054       | 1027 |
| HCM Platoon Ratio            | 1.00      | 1.00     | 1.00      | 1.00      | 1.00     | 1.00      | 1.00      | 1.00       | 1.00     | 1.00        | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00      | 0.00     | 1.00      | 1.00      | 0.00     | 1.00      | 1.00      | 1.00       | 1.00     | 0.99        | 0.99       | 0.99 |
| Uniform Delay (d), s/veh     | 29.5      | 0.0      | 28.7      | 29.1      | 0.00     | 28.7      | 33.8      | 4.9        | 4.9      | 35.3        | 6.1        | 6.1  |
| Incr Delay (d2), s/veh       | 0.1       | 0.0      | 0.0       | 0.0       | 0.0      | 0.0       | 0.9       | 0.3        | 0.3      | 1.2         | 0.1        | 0.1  |
| Initial Q Delay(d3),s/veh    | 0.0       | 0.0      | 0.0       | 0.0       | 0.0      | 0.0       | 0.0       | 0.0        | 0.0      | 0.0         | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 0.6       | 0.0      | 0.0       | 0.0       | 0.0      | 0.0       | 0.8       | 0.0        | 0.0      | 0.0         | 1.5        | 1.5  |
| Unsig. Movement Delay, s/veh |           | 0.0      | 0.1       | 0.2       | 0.0      | 0.0       | 0.0       | 0.9        | 0.3      | 0.5         | 1.0        | 1.0  |
| LnGrp Delay(d),s/veh         | 29.6      | 0.0      | 28.8      | 29.2      | 0.0      | 28.7      | 34.6      | 5.2        | 5.2      | 36.5        | 6.6        | 6.6  |
| LnGrp LOS                    | 29.0<br>C | 0.0<br>A | 20.0<br>C | 29.2<br>C | Α        | 20.7<br>C | 34.0<br>C | 3.2<br>A   | 3.2<br>A | 30.5<br>D   | 0.0<br>A   | Α    |
| <u> </u>                     |           |          |           |           |          |           |           |            |          | U           |            |      |
| Approach Vol, veh/h          |           | 40       |           |           | 16       |           |           | 389        |          |             | 501        |      |
| Approach Delay, s/veh        |           | 29.5     |           |           | 29.1     |           |           | 8.4        |          |             | 7.7        |      |
| Approach LOS                 |           | С        |           |           | С        |           |           | Α          |          |             | Α          |      |
| Timer - Assigned Phs         | 1         | 2        |           | 4         | 5        | 6         |           | 8          |          |             |            |      |
| Phs Duration (G+Y+Rc), s     | 6.6       | 54.3     |           | 14.1      | 8.7      | 52.2      |           | 14.1       |          |             |            |      |
| Change Period (Y+Rc), s      | 4.0       | 5.1      |           | 4.6       | 4.0      | 5.1       |           | 4.6        |          |             |            |      |
| Max Green Setting (Gmax), s  | 10.4      | 21.0     |           | 29.9      | 10.4     | 21.0      |           | 29.9       |          |             |            |      |
| Max Q Clear Time (g_c+I1), s | 2.8       | 4.8      |           | 3.9       | 3.8      | 6.8       |           | 2.9        |          |             |            |      |
| Green Ext Time (p_c), s      | 0.0       | 1.2      |           | 0.0       | 0.0      | 1.7       |           | 0.0        |          |             |            |      |
| Intersection Summary         |           |          |           |           |          |           |           |            |          |             |            |      |
| HCM 6th Ctrl Delay           |           |          | 9.3       |           |          |           |           |            |          |             |            |      |
| HCM 6th LOS                  |           |          | A         |           |          |           |           |            |          |             |            |      |
| Notes                        |           |          |           |           |          |           |           |            |          |             |            |      |

User approved pedestrian interval to be less than phase max green.

|                              | -           | •    | •    | ←          | 1    | ~    |      |  |
|------------------------------|-------------|------|------|------------|------|------|------|--|
| Movement                     | EBT         | EBR  | WBL  | WBT        | NBL  | NBR  |      |  |
| Lane Configurations          | <b>ተ</b> ተኈ |      | ሻ    | <b>^</b> ^ | ሻ    | 77   |      |  |
| Traffic Volume (veh/h)       | 833         | 54   | 12   | 413        | 131  | 639  |      |  |
| Future Volume (veh/h)        | 833         | 54   | 12   | 413        | 131  | 639  |      |  |
| Initial Q (Qb), veh          | 45          | 0    | 0    | 0          | 10   | 51   |      |  |
| Ped-Bike Adj(A_pbT)          |             | 0.96 | 1.00 |            | 1.00 | 1.00 |      |  |
| Parking Bus, Adj             | 1.00        | 1.00 | 1.00 | 1.00       | 1.00 | 1.00 |      |  |
| Work Zone On Approach        | No          |      |      | No         | No   |      |      |  |
| Adj Sat Flow, veh/h/ln       | 1841        | 1841 | 1707 | 1707       | 1811 | 1811 |      |  |
| Adj Flow Rate, veh/h         | 905         | 52   | 13   | 449        | 142  | 0    |      |  |
| Peak Hour Factor             | 0.92        | 0.92 | 0.92 | 0.92       | 0.92 | 0.92 |      |  |
| Percent Heavy Veh, %         | 4           | 4    | 13   | 13         | 6    | 6    |      |  |
| Cap, veh/h                   | 3602        | 195  | 30   | 3719       | 214  |      |      |  |
| Arrive On Green              | 0.51        | 0.51 | 0.02 | 0.82       | 0.10 | 0.00 |      |  |
| Sat Flow, veh/h              | 5014        | 278  | 1626 | 4815       | 1725 | 2701 |      |  |
| Grp Volume(v), veh/h         | 625         | 332  | 13   | 449        | 142  | 0    |      |  |
| Grp Sat Flow(s),veh/h/ln     | 1675        | 1776 | 1626 | 1554       | 1725 | 1351 |      |  |
| Q Serve(g_s), s              | 10.5        | 10.5 | 0.8  | 2.0        | 8.0  | 0.0  |      |  |
| Cycle Q Clear(g_c), s        | 10.5        | 10.5 | 0.8  | 2.0        | 8.0  | 0.0  |      |  |
| Prop In Lane                 |             | 0.16 | 1.00 |            | 1.00 | 1.00 |      |  |
| Lane Grp Cap(c), veh/h       | 2479        | 1320 | 30   | 3719       | 214  |      |      |  |
| V/C Ratio(X)                 | 0.25        | 0.25 | 0.44 | 0.12       | 0.66 |      |      |  |
| Avail Cap(c_a), veh/h        | 2542        | 1347 | 130  | 3808       | 517  |      |      |  |
| HCM Platoon Ratio            | 0.67        | 0.67 | 1.00 | 1.00       | 1.00 | 1.00 |      |  |
| Upstream Filter(I)           | 0.98        | 0.98 | 0.99 | 0.99       | 1.00 | 0.00 |      |  |
| Uniform Delay (d), s/veh     | 10.7        | 10.5 | 48.6 | 2.4        | 42.9 | 0.0  |      |  |
| Incr Delay (d2), s/veh       | 0.2         | 0.4  | 3.7  | 0.1        | 3.5  | 0.0  |      |  |
| Initial Q Delay(d3),s/veh    | 1.4         | 1.2  | 0.0  | 0.0        | 46.7 | 0.0  |      |  |
| %ile BackOfQ(50%),veh/ln     | 6.3         | 6.6  | 0.4  | 0.5        | 7.3  | 0.0  |      |  |
| Unsig. Movement Delay, s/vel |             |      |      |            |      |      |      |  |
| LnGrp Delay(d),s/veh         | 12.3        | 12.2 | 52.3 | 2.5        | 93.1 | 0.0  |      |  |
| LnGrp LOS                    | В           | В    | D    | Α          | F    |      |      |  |
| Approach Vol, veh/h          | 957         |      |      | 462        | 142  | Α    |      |  |
| Approach Delay, s/veh        | 12.3        |      |      | 3.9        | 93.1 |      |      |  |
| Approach LOS                 | В           |      |      | Α          | F    |      |      |  |
| Timer - Assigned Phs         | 1           | 2    |      |            |      | 6    | 8    |  |
| Phs Duration (G+Y+Rc), s     | 5.8         | 79.9 |      |            |      | 85.7 | 14.3 |  |
| Change Period (Y+Rc), s      | 4.0         | 4.0  |      |            |      | 4.0  | 4.0  |  |
| Max Green Setting (Gmax), s  | 8.0         | 50.0 |      |            |      | 62.0 | 30.0 |  |
| Max Q Clear Time (g_c+l1), s |             | 12.5 |      |            |      | 4.0  | 10.0 |  |
| Green Ext Time (p_c), s      | 0.0         | 4.5  |      |            |      | 2.2  | 0.5  |  |
| Intersection Summary         |             |      |      |            |      |      |      |  |
| HCM 6th Ctrl Delay           |             |      | 17.2 |            |      |      |      |  |
| HCM 6th LOS                  |             |      | В    |            |      |      |      |  |
| Notes                        |             |      |      |            |      |      |      |  |

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

|  | ۶            | <b>→</b>     | •            | •            | <b>+</b>     | •            | 1            | <b>†</b>     | <b>/</b> | <b>/</b>  | <b>+</b>   | 4    |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------|-----------|------------|------|
| Movement   | EBL          | EBT          | EBR          | WBL          | WBT          | WBR          | NBL          | NBT          | NBR      | SBL       | SBT        | SBR  |
| Lane Configurations                                | ሻ            | <b>↑</b> ↑₽  |              | ሻ            | <b>↑</b> ↑₽  |              | ሻ            | <b>ተ</b> ኈ   |          | ሻ         | <b>∱</b> ∱ |      |
| Traffic Volume (veh/h)                             | 155          | 1247         | 70           | 113          | 295          | 104          | 42           | 151          | 304      | 192       | 118        | 88   |
| Future Volume (veh/h)                              | 155          | 1247         | 70           | 113          | 295          | 104          | 42           | 151          | 304      | 192       | 118        | 88   |
| Initial Q (Qb), veh                                | 5            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0        | 0         | 0          | 0    |
| Ped-Bike Adj(A_pbT)                                | 1.00         |              | 0.97         | 1.00         |              | 0.98         | 1.00         |              | 1.00     | 1.00      |            | 1.00 |
| Parking Bus, Adj                                   | 1.00         | 1.00         | 1.00         | 1.00         | 1.00         | 1.00         | 1.00         | 1.00         | 1.00     | 1.00      | 1.00       | 1.00 |
| Work Zone On Approach                              | 1011         | No           | 1011         | 4000         | No           | 4000         | 4750         | No           | 4750     | 4707      | No         | 4707 |
| Adj Sat Flow, veh/h/ln                             | 1841         | 969          | 1841         | 1633         | 1633         | 1633         | 1752         | 1752         | 1752     | 1767      | 1767       | 1767 |
| Adj Flow Rate, veh/h                               | 163          | 1313         | 71           | 119          | 311          | 76           | 44           | 159          | 0        | 202       | 124        | 0    |
| Peak Hour Factor                                   | 0.95         | 0.95         | 0.95         | 0.95         | 0.95         | 0.95         | 0.95         | 0.95         | 0.95     | 0.95      | 0.95       | 0.95 |
| Percent Heavy Veh, %                               | 4            | 4            | 4            | 18           | 18           | 18           | 10           | 10           | 10       | 9         | 9          | 9    |
| Cap, veh/h   | 202          | 1479         | 80           | 138          | 1981         | 461          | 131          | 273          | 0.00     | 225       | 461        | 0.00 |
| Arrive On Green                                    | 0.11         | 0.58         | 0.58         | 0.09         | 0.56         | 0.56         | 0.08         | 0.08         | 0.00     | 0.13      | 0.14       | 0.00 |
| Sat Flow, veh/h                                    | 1753         | 2564         | 139          | 1555         | 3597         | 838          | 1668         | 3416         | 0        | 1682      | 3445       | 0    |
| Grp Volume(v), veh/h                               | 163          | 903          | 481          | 119          | 254          | 133          | 44           | 159          | 0        | 202       | 124        | 0    |
| Grp Sat Flow(s),veh/h/ln                           | 1753         | 882          | 939          | 1555         | 1486         | 1462         | 1668         | 1664         | 0        | 1682      | 1678       | 0    |
| Q Serve(g_s), s                                    | 13.7         | 66.6         | 66.6         | 11.3         | 6.2          | 6.6          | 3.7          | 6.9          | 0.0      | 17.7      | 5.0        | 0.0  |
| Cycle Q Clear(g_c), s                              | 13.7         | 66.6         | 66.6         | 11.3         | 6.2          | 6.6          | 3.7          | 6.9          | 0.0      | 17.7      | 5.0        | 0.0  |
| Prop In Lane                                       | 1.00         | 4040         | 0.15         | 1.00         | 4007         | 0.57         | 1.00         | 070          | 0.00     | 1.00      | 404        | 0.00 |
| Lane Grp Cap(c), veh/h                             | 202          | 1018         | 542          | 138          | 1637         | 805          | 131          | 273          |          | 225       | 461        |      |
| V/C Ratio(X)                                       | 0.81         | 0.89         | 0.89         | 0.86         | 0.16         | 0.16         | 0.34         | 0.58         |          | 0.90      | 0.27       |      |
| Avail Cap(c_a), veh/h                              | 270          | 1018         | 542          | 170          | 1663         | 818          | 157          | 710          | 1.00     | 371       | 1141       | 1.00 |
| HCM Platoon Ratio                                  | 1.00<br>0.85 | 1.00         | 1.00<br>0.85 | 1.00<br>0.96 | 1.00<br>0.96 | 1.00<br>0.96 | 1.00         | 1.00<br>1.00 | 1.00     | 1.00      | 1.00       | 1.00 |
| Upstream Filter(I)                                 | 65.6         | 0.85<br>27.5 | 27.5         | 67.5         | 16.6         | 16.7         | 1.00<br>65.4 | 66.4         | 0.00     | 64.0      | 58.0       | 0.00 |
| Uniform Delay (d), s/veh<br>Incr Delay (d2), s/veh | 7.9          | 9.9          | 16.7         | 25.2         | 0.2          | 0.4          | 0.6          | 0.7          | 0.0      | 9.4       | 0.1        | 0.0  |
| Initial Q Delay(d3),s/veh                          | 23.1         | 0.0          | 0.0          | 0.0          | 0.2          | 0.4          | 0.0          | 0.0          | 0.0      | 0.0       | 0.1        | 0.0  |
| %ile BackOfQ(50%),veh/ln                           | 8.7          | 15.0         | 17.1         | 5.5          | 2.2          | 2.4          | 1.6          | 3.0          | 0.0      | 8.2       | 2.1        | 0.0  |
| Unsig. Movement Delay, s/veh                       |              | 13.0         | 17.1         | 0.0          | ۷.۷          | 2.4          | 1.0          | 3.0          | 0.0      | 0.2       | 2.1        | 0.0  |
| LnGrp Delay(d),s/veh                               | 96.6         | 37.4         | 44.2         | 92.6         | 16.8         | 17.1         | 66.0         | 67.1         | 0.0      | 73.4      | 58.1       | 0.0  |
| LnGrp LOS  | 50.0<br>F    | 57.4<br>D    | 74.2<br>D    | 52.0<br>F    | 10.0<br>B    | В            | 60.0<br>E    | 67.1<br>E    | 0.0      | 73.4<br>E | 50.1<br>E  | 0.0  |
| Approach Vol, veh/h                                |              | 1547         |              |              | 506          |              |              | 203          | Α        | <u> </u>  | 326        | A    |
| Approach Delay, s/veh                              |              | 45.8         |              |              | 34.7         |              |              | 66.9         | A        |           | 67.5       | A    |
| Approach LOS                                       |              | 45.0<br>D    |              |              | C C          |              |              | 60.9<br>E    |          |           | 67.5<br>E  |      |
|  |              |              |              |              |              |              |              |              |          |           |            |      |
| Timer - Assigned Phs                               | 1            | 2            | 3            | 4            | 5            | 6            | 7            | 8            |          |           |            |      |
| Phs Duration (G+Y+Rc), s                           | 17.3         | 91.5         | 15.8         | 25.5         | 19.9         | 88.8         | 24.1         | 17.2         |          |           |            |      |
| Change Period (Y+Rc), s                            | 4.0          | 4.9          | 4.0          | * 4.9        | 4.0          | 4.9          | 4.0          | 4.9          |          |           |            |      |
| Max Green Setting (Gmax), s                        | 16.4         | 50.7         | 14.1         | * 51         | 23.1         | 44.0         | 33.1         | 32.0         |          |           |            |      |
| Max Q Clear Time (g_c+l1), s                       | 13.3         | 68.6         | 5.7          | 7.0          | 15.7         | 8.6          | 19.7         | 8.9          |          |           |            |      |
| Green Ext Time (p_c), s                            | 0.1          | 0.0          | 0.0          | 0.5          | 0.2          | 1.7          | 0.3          | 0.6          |          |           |            |      |
| Intersection Summary                               |              |              |              |              |              |              |              |              |          |           |            |      |
| HCM 6th Ctrl Delay                                 |              |              | 48.0         |              |              |              |              |              |          |           |            |      |
| HCM 6th LOS  |              |              | D            |              |              |              |              |              |          |           |            |      |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|  | ٠           | <b>→</b>     | •           | •          | <b>←</b>    | •          | 1          | <b>†</b>    | <b>/</b>   | <b>/</b>    | Ţ          | 4          |
|--|-------------|--------------|-------------|------------|-------------|------------|------------|-------------|------------|-------------|------------|------------|
| Movement                                 | EBL         | EBT          | EBR         | WBL        | WBT         | WBR        | NBL        | NBT         | NBR        | SBL         | SBT        | SBR        |
| Lane Configurations                      | 1,1         | <b>∱</b> ∱   |             | ሻ          | <b>∱</b> ∱  |            | 7          | र्स         | 7          | 7           | f)         | 7          |
| Traffic Volume (veh/h)                   | 378         | 1225         | 140         | 34         | 337         | 17         | 79         | 114         | 173        | 104         | 84         | 96         |
| Future Volume (veh/h)                    | 378         | 1225         | 140         | 34         | 337         | 17         | 79         | 114         | 173        | 104         | 84         | 96         |
| Initial Q (Qb), veh                      | 0           | 0            | 0           | 0          | 0           | 0          | 0          | 0           | 0          | 0           | 0          | 0          |
| Ped-Bike Adj(A_pbT)                      | 1.00        | 4.00         | 0.97        | 1.00       | 4.00        | 0.89       | 1.00       | 4.00        | 0.98       | 1.00        | 1.00       | 0.96       |
| Parking Bus, Adj                         | 1.00        | 1.00         | 1.00        | 1.00       | 1.00        | 1.00       | 1.00       | 1.00        | 1.00       | 1.00        | 1.00       | 1.00       |
| Work Zone On Approach                    | 1011        | No           | 1011        | 1010       | No          | 4040       | 4750       | No          | 4750       | 4000        | No         | 4000       |
| Adj Sat Flow, veh/h/ln                   | 1811<br>394 | 1811<br>1276 | 1811<br>146 | 1618<br>35 | 1618<br>351 | 1618<br>16 | 1752<br>82 | 1752<br>119 | 1752<br>14 | 1663<br>108 | 1663<br>88 | 1663<br>17 |
| Adj Flow Rate, veh/h<br>Peak Hour Factor | 0.96        | 0.96         | 0.96        | 0.96       | 0.96        | 0.96       | 0.96       | 0.96        | 0.96       | 0.96        | 0.96       | 0.96       |
| Percent Heavy Veh, %                     | 0.90        | 0.90         | 0.90        | 19         | 19          | 19         | 10         | 10          | 10         | 16          | 16         | 16         |
| Cap, veh/h                               | 1510        | 1867         | 213         | 110        | 643         | 29         | 148        | 156         | 129        | 182         | 192        | 156        |
| Arrive On Green                          | 0.45        | 0.60         | 0.60        | 0.07       | 0.22        | 0.22       | 0.09       | 0.09        | 0.09       | 0.12        | 0.12       | 0.12       |
| Sat Flow, veh/h                          | 3346        | 3104         | 353         | 1541       | 2977        | 135        | 1668       | 1752        | 1448       | 1584        | 1663       | 1350       |
| Grp Volume(v), veh/h                     | 394         | 705          | 717         | 35         | 180         | 187        | 82         | 119         | 14         | 108         | 88         | 17         |
| Grp Sat Flow(s), veh/h/ln                | 1673        | 1721         | 1737        | 1541       | 1537        | 1575       | 1668       | 1752        | 1448       | 1584        | 1663       | 1350       |
| Q Serve(g_s), s                          | 11.0        | 41.4         | 42.1        | 3.2        | 15.6        | 15.8       | 7.1        | 10.0        | 1.3        | 9.7         | 7.4        | 1.7        |
| Cycle Q Clear(g_c), s                    | 11.0        | 41.4         | 42.1        | 3.2        | 15.6        | 15.8       | 7.1        | 10.0        | 1.3        | 9.7         | 7.4        | 1.7        |
| Prop In Lane                             | 1.00        |              | 0.20        | 1.00       |             | 0.09       | 1.00       |             | 1.00       | 1.00        |            | 1.00       |
| Lane Grp Cap(c), veh/h                   | 1510        | 1035         | 1045        | 110        | 332         | 340        | 148        | 156         | 129        | 182         | 192        | 156        |
| V/C Ratio(X)                             | 0.26        | 0.68         | 0.69        | 0.32       | 0.54        | 0.55       | 0.55       | 0.76        | 0.11       | 0.59        | 0.46       | 0.11       |
| Avail Cap(c_a), veh/h                    | 1510        | 1035         | 1045        | 144        | 332         | 340        | 301        | 316         | 262        | 433         | 455        | 369        |
| HCM Platoon Ratio                        | 1.00        | 1.00         | 1.00        | 1.00       | 1.00        | 1.00       | 1.00       | 1.00        | 1.00       | 1.00        | 1.00       | 1.00       |
| Upstream Filter(I)                       | 0.09        | 0.09         | 0.09        | 1.00       | 1.00        | 1.00       | 1.00       | 1.00        | 1.00       | 1.00        | 1.00       | 1.00       |
| Uniform Delay (d), s/veh                 | 25.6        | 20.2         | 20.3        | 66.1       | 52.2        | 52.3       | 65.5       | 66.8        | 62.9       | 63.0        | 62.0       | 59.5       |
| Incr Delay (d2), s/veh                   | 0.0         | 0.3          | 0.3         | 0.6        | 6.3         | 6.2        | 1.2        | 2.9         | 0.1        | 1.1         | 0.6        | 0.1        |
| Initial Q Delay(d3),s/veh                | 0.0         | 0.0          | 0.0         | 0.0        | 0.0         | 0.0        | 0.0        | 0.0         | 0.0        | 0.0         | 0.0        | 0.0        |
| %ile BackOfQ(50%),veh/ln                 | 4.4         | 16.2         | 16.6        | 1.3        | 6.7         | 6.9        | 3.1        | 4.6         | 0.5        | 4.0         | 3.2        | 0.6        |
| Unsig. Movement Delay, s/veh             |             | 22 -         |             |            |             |            |            |             |            | 0.1.0       |            |            |
| LnGrp Delay(d),s/veh                     | 25.6        | 20.5         | 20.6        | 66.7       | 58.5        | 58.5       | 66.7       | 69.7        | 63.0       | 64.2        | 62.6       | 59.6       |
| LnGrp LOS                                | С           | С            | С           | <u>E</u>   | E           | E          | E          | <u>E</u>    | <u>E</u>   | E           | E          | E          |
| Approach Vol, veh/h                      |             | 1816         |             |            | 402         |            |            | 215         |            |             | 213        |            |
| Approach Delay, s/veh                    |             | 21.7         |             |            | 59.2        |            |            | 68.1        |            |             | 63.2       |            |
| Approach LOS                             |             | С            |             |            | Е           |            |            | Е           |            |             | Е          |            |
| Timer - Assigned Phs                     | 1           | 2            |             | 4          | 5           | 6          |            | 8           |            |             |            |            |
| Phs Duration (G+Y+Rc), s                 | 72.6        | 37.3         |             | 22.2       | 14.7        | 95.1       |            | 17.9        |            |             |            |            |
| Change Period (Y+Rc), s                  | 4.9         | * 4.9        |             | 4.9        | 4.0         | 4.9        |            | 4.6         |            |             |            |            |
| Max Green Setting (Gmax), s              | 31.1        | * 32         |             | 41.0       | 14.0        | 50.0       |            | 27.1        |            |             |            |            |
| Max Q Clear Time (g_c+l1), s             | 13.0        | 17.8         |             | 11.7       | 5.2         | 44.1       |            | 12.0        |            |             |            |            |
| Green Ext Time (p_c), s                  | 1.7         | 1.2          |             | 0.6        | 0.0         | 4.1        |            | 0.5         |            |             |            |            |
| Intersection Summary                     |             |              |             |            |             |            |            |             |            |             |            |            |
| HCM 6th Ctrl Delay                       |             |              | 34.5        |            |             |            |            |             |            |             |            |            |
| HCM 6th LOS                              |             |              | С           |            |             |            |            |             |            |             |            |            |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                                       | ᄼ    | <b>→</b> | $\rightarrow$ | •    | <b>←</b> | •     | •    | <b>†</b>    | <b>/</b> | <b>&gt;</b> | ļ       | 4    |
|---------------------------------------|------|----------|---------------|------|----------|-------|------|-------------|----------|-------------|---------|------|
| Movement                              | EBL  | EBT      | EBR           | WBL  | WBT      | WBR   | NBL  | NBT         | NBR      | SBL         | SBT     | SBR  |
| Lane Configurations                   | Ť    | 1>       | 7             | ሻ    | 1>       |       | 44   | <b>∱</b> 1≽ |          | ሻ           | <b></b> | 7    |
| Traffic Volume (veh/h)                | 96   | 314      | 368           | 29   | 159      | 18    | 330  | 456         | 349      | 22          | 116     | 187  |
| Future Volume (veh/h)                 | 96   | 314      | 368           | 29   | 159      | 18    | 330  | 456         | 349      | 22          | 116     | 187  |
| Initial Q (Qb), veh                   | 0    | 13       | 0             | 0    | 0        | 0     | 0    | 0           | 0        | 0           | 0       | 0    |
| Ped-Bike Adj(A_pbT)                   | 1.00 |          | 0.98          | 1.00 |          | 0.97  | 1.00 |             | 1.00     | 1.00        |         | 0.95 |
| Parking Bus, Adj                      | 1.00 | 1.00     | 1.00          | 1.00 | 1.00     | 1.00  | 1.00 | 1.00        | 1.00     | 1.00        | 1.00    | 1.00 |
| Work Zone On Approach                 |      | No       |               |      | No       |       |      | No          |          |             | No      |      |
| Adj Sat Flow, veh/h/ln                | 1722 | 1722     | 1722          | 1574 | 1574     | 1574  | 1811 | 1811        | 1811     | 1663        | 1663    | 1663 |
| Adj Flow Rate, veh/h                  | 103  | 338      | 116           | 31   | 171      | 15    | 355  | 490         | 0        | 24          | 125     | 13   |
| Peak Hour Factor                      | 0.93 | 0.93     | 0.93          | 0.93 | 0.93     | 0.93  | 0.93 | 0.93        | 0.93     | 0.93        | 0.93    | 0.93 |
| Percent Heavy Veh, %                  | 12   | 12       | 12            | 22   | 22       | 22    | 6    | 6           | 6        | 16          | 16      | 16   |
| Cap, veh/h                            | 226  | 408      | 339           | 85   | 213      | 19    | 1441 | 1482        |          | 164         | 172     | 139  |
| Arrive On Green                       | 0.04 | 0.07     | 0.07          | 0.06 | 0.15     | 0.15  | 0.45 | 0.45        | 0.00     | 0.10        | 0.10    | 0.10 |
| Sat Flow, veh/h                       | 1640 | 1722     | 1430          | 1499 | 1422     | 125   | 3346 | 3532        | 0        | 1584        | 1663    | 1338 |
| Grp Volume(v), veh/h                  | 103  | 338      | 116           | 31   | 0        | 186   | 355  | 490         | 0        | 24          | 125     | 13   |
| Grp Sat Flow(s), veh/h/ln             | 1640 | 1722     | 1430          | 1499 | 0        | 1546  | 1673 | 1721        | 0        | 1584        | 1663    | 1338 |
| Q Serve(g_s), s                       | 6.5  | 20.4     | 8.1           | 2.1  | 0.0      | 12.2  | 6.9  | 9.7         | 0.0      | 1.4         | 7.7     | 0.9  |
| Cycle Q Clear(g_c), s                 | 6.5  | 20.4     | 8.1           | 2.1  | 0.0      | 12.2  | 6.9  | 9.7         | 0.0      | 1.4         | 7.7     | 0.9  |
| Prop In Lane                          | 1.00 |          | 1.00          | 1.00 |          | 0.08  | 1.00 |             | 0.00     | 1.00        |         | 1.00 |
| Lane Grp Cap(c), veh/h                | 226  | 408      | 339           | 85   | 0        | 232   | 1441 | 1482        |          | 164         | 172     | 139  |
| V/C Ratio(X)                          | 0.46 | 0.83     | 0.34          | 0.36 | 0.00     | 0.80  | 0.25 | 0.33        |          | 0.15        | 0.73    | 0.09 |
| Avail Cap(c_a), veh/h                 | 201  | 426      | 354           | 144  | 0        | 364   | 1492 | 1535        |          | 353         | 371     | 298  |
| HCM Platoon Ratio                     | 0.33 | 0.33     | 0.33          | 1.00 | 1.00     | 1.00  | 1.00 | 1.00        | 1.00     | 1.00        | 1.00    | 1.00 |
| Upstream Filter(I)                    | 0.89 | 0.89     | 0.89          | 1.00 | 0.00     | 1.00  | 1.00 | 1.00        | 0.00     | 1.00        | 1.00    | 1.00 |
| Uniform Delay (d), s/veh              | 46.3 | 47.9     | 40.7          | 47.7 | 0.0      | 43.1  | 19.1 | 19.9        | 0.0      | 42.8        | 45.6    | 42.6 |
| Incr Delay (d2), s/veh                | 0.6  | 10.9     | 0.4           | 1.0  | 0.0      | 3.1   | 0.4  | 0.6         | 0.0      | 0.2         | 2.2     | 0.1  |
| Initial Q Delay(d3),s/veh             | 0.0  | 42.8     | 0.0           | 0.0  | 0.0      | 0.0   | 0.0  | 0.0         | 0.0      | 0.0         | 0.0     | 0.0  |
| %ile BackOfQ(50%),veh/ln              | 2.8  | 17.0     | 3.0           | 0.8  | 0.0      | 4.8   | 2.8  | 4.0         | 0.0      | 0.6         | 3.3     | 0.3  |
| Unsig. Movement Delay, s/veh          |      |          |               |      |          |       |      |             |          |             |         |      |
| LnGrp Delay(d),s/veh                  | 46.9 | 101.5    | 41.1          | 48.7 | 0.0      | 46.2  | 19.5 | 20.5        | 0.0      | 43.0        | 47.8    | 42.7 |
| LnGrp LOS                             | D    | F        | D             | D    | Α        | D     | В    | С           |          | D           | D       | D    |
| Approach Vol, veh/h                   |      | 557      |               |      | 217      |       |      | 845         | А        |             | 162     |      |
| Approach Delay, s/veh                 |      | 78.8     |               |      | 46.6     |       |      | 20.0        |          |             | 46.7    |      |
| Approach LOS                          |      | Е        |               |      | D        |       |      | С           |          |             | D       |      |
| Timer - Assigned Phs                  | 1    | 2        |               | 4    | 5        | 6     |      | 8           |          |             |         |      |
| Phs Duration (G+Y+Rc), s              | 10.0 | 27.8     |               | 51.4 | 17.4     | 20.3  |      | 15.8        |          |             |         |      |
| \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | 4.0  |          |               |      |          | * 4.6 |      | 4.9         |          |             |         |      |
| Change Period (Y+Rc), s               | 10.1 | 4.6      |               | 4.6  | 4.6      | * 25  |      | 23.4        |          |             |         |      |
| Max Green Setting (Gmax), s           |      | 26.0     |               | 27.4 | 11.4     |       |      |             |          |             |         |      |
| Max Q Clear Time (g_c+l1), s          | 4.1  | 22.4     |               | 11.7 | 8.5      | 14.2  |      | 9.7         |          |             |         |      |
| Green Ext Time (p_c), s               | 0.0  | 0.7      |               | 2.8  | 0.0      | 0.4   |      | 0.4         |          |             |         |      |
| Intersection Summary                  |      |          |               |      |          |       |      |             |          |             |         |      |
| HCM 6th Ctrl Delay                    |      |          | 44.1          |      |          |       |      |             |          |             |         |      |
| HCM 6th LOS                           |      |          | D             |      |          |       |      |             |          |             |         |      |

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|  | ۶           | <b>→</b>   | •    | •          | <b>←</b>   | •     | 4          | <b>†</b>   | /    | -          | ţ          | 1    |
|--|-------------|------------|------|------------|------------|-------|------------|------------|------|------------|------------|------|
| Movement   | EBL         | EBT        | EBR  | WBL        | WBT        | WBR   | NBL        | NBT        | NBR  | SBL        | SBT        | SBR  |
| Lane Configurations                                  | ሻ           | 4₽         | 7    | ሻ          | 4₽         | 7     | ሻ          | <b>∱</b> ∱ |      | ሻ          | <b>^</b>   | 7    |
| Traffic Volume (veh/h)                               | 122         | 182        | 147  | 307        | 167        | 168   | 160        | 39         | 404  | 202        | 644        | 98   |
| Future Volume (veh/h)                                | 122         | 182        | 147  | 307        | 167        | 168   | 160        | 39         | 404  | 202        | 644        | 98   |
| Initial Q (Qb), veh                                  | 0           | 0          | 0    | 0          | 0          | 0     | 0          | 0          | 0    | 0          | 0          | 0    |
| Ped-Bike Adj(A_pbT)                                  | 1.00        |            | 1.00 | 1.00       |            | 1.00  | 1.00       |            | 1.00 | 1.00       |            | 1.00 |
| Parking Bus, Adj                                     | 1.00        | 1.00       | 1.00 | 1.00       | 1.00       | 1.00  | 1.00       | 1.00       | 1.00 | 1.00       | 1.00       | 1.00 |
| Work Zone On Approach                                |             | No         |      |            | No         |       | .=         | No         |      |            | No         |      |
| Adj Sat Flow, veh/h/ln                               | 1441        | 1441       | 1441 | 1618       | 1618       | 1618  | 1796       | 1796       | 1796 | 1811       | 1811       | 1811 |
| Adj Flow Rate, veh/h                                 | 107         | 222        | 0    | 323        | 176        | 0     | 168        | 41         | 0    | 213        | 678        | 0    |
| Peak Hour Factor                                     | 0.95        | 0.95       | 0.95 | 0.95       | 0.95       | 0.95  | 0.95       | 0.95       | 0.95 | 0.95       | 0.95       | 0.95 |
| Percent Heavy Veh, %                                 | 31          | 31         | 31   | 19         | 19         | 19    | 7          | 7          | 7    | 6          | 6          | 6    |
| Cap, veh/h   | 148         | 311        | 0.00 | 471        | 247        | 0.00  | 198        | 870        | 0.00 | 523        | 1551       | 0.00 |
| Arrive On Green                                      | 0.11        | 0.11       | 0.00 | 0.05       | 0.05       | 0.00  | 0.12       | 0.25       | 0.00 | 0.30       | 0.45       | 0.00 |
| Sat Flow, veh/h                                      | 1372        | 2881       | 1221 | 3083       | 1618       | 1372  | 1711       | 3503       | 0    | 1725       | 3441       | 1535 |
| Grp Volume(v), veh/h                                 | 107         | 222        | 0    | 323        | 176        | 0     | 168        | 41         | 0    | 213        | 678        | 0    |
| Grp Sat Flow(s),veh/h/ln                             | 1372        | 1441       | 1221 | 1541       | 1618       | 1372  | 1711       | 1706       | 0    | 1725       | 1721       | 1535 |
| Q Serve(g_s), s                                      | 7.9         | 7.8        | 0.0  | 10.8       | 11.2       | 0.0   | 10.1       | 1.0        | 0.0  | 10.3       | 14.2       | 0.0  |
| Cycle Q Clear(g_c), s                                | 7.9         | 7.8        | 0.0  | 10.8       | 11.2       | 0.0   | 10.1       | 1.0        | 0.0  | 10.3       | 14.2       | 0.0  |
| Prop In Lane   | 1.00        | 044        | 1.00 | 1.00       | 0.47       | 1.00  | 1.00       | 070        | 0.00 | 1.00       | 4554       | 1.00 |
| Lane Grp Cap(c), veh/h                               | 148         | 311        |      | 471        | 247        |       | 198        | 870        |      | 523        | 1551       |      |
| V/C Ratio(X)   | 0.72        | 0.71       |      | 0.69       | 0.71       |       | 0.85       | 0.05       |      | 0.41       | 0.44       |      |
| Avail Cap(c_a), veh/h                                | 289         | 606        | 4.00 | 611        | 321        | 0.00  | 293        | 870        | 4.00 | 523        | 1551       | 4.00 |
| HCM Platoon Ratio                                    | 1.00        | 1.00       | 1.00 | 0.33       | 0.33       | 0.33  | 1.00       | 1.00       | 1.00 | 1.00       | 1.00       | 1.00 |
| Upstream Filter(I)                                   | 1.00        | 1.00       | 0.00 | 0.88       | 0.88       | 0.00  | 1.00       | 1.00       | 0.00 | 1.00       | 1.00       | 0.00 |
| Uniform Delay (d), s/veh                             | 45.3<br>2.5 | 45.3       | 0.0  | 47.4       | 47.6       | 0.0   | 45.5       | 29.5       | 0.0  | 29.1       | 19.7       | 0.0  |
| Incr Delay (d2), s/veh                               | 0.0         | 1.1        | 0.0  | 1.9        | 4.5<br>0.0 | 0.0   | 9.5<br>0.0 | 0.0        | 0.0  | 0.2<br>0.0 | 0.9        | 0.0  |
| Initial Q Delay(d3),s/veh                            | 2.8         | 0.0<br>2.8 | 0.0  | 0.0<br>4.6 | 5.2        | 0.0   | 4.7        | 0.0<br>0.4 | 0.0  | 4.2        | 0.0<br>5.6 | 0.0  |
| %ile BackOfQ(50%),veh/ln                             |             | 2.0        | 0.0  | 4.0        | 5.2        | 0.0   | 4.7        | 0.4        | 0.0  | 4.2        | 5.0        | 0.0  |
| Unsig. Movement Delay, s/veh<br>LnGrp Delay(d),s/veh | 47.8        | 46.4       | 0.0  | 49.3       | 52.0       | 0.0   | 55.0       | 29.5       | 0.0  | 29.3       | 20.6       | 0.0  |
| LnGrp LOS  | 47.0<br>D   | 40.4<br>D  | 0.0  | 49.3<br>D  | 52.0<br>D  | 0.0   | 55.0<br>D  | 29.5<br>C  | 0.0  | 29.3<br>C  | 20.0<br>C  | 0.0  |
| Approach Vol, veh/h                                  | <u> </u>    | 329        | ٨    | U          | 499        | A     | U          | 209        | A    |            | 891        | A    |
|  |             | 46.8       | Α    |            | 50.2       | А     |            | 50.0       | А    |            | 22.7       | А    |
| Approach Delay, s/veh Approach LOS                   |             | 40.0<br>D  |      |            | 50.2<br>D  |       |            | 50.0<br>D  |      |            | 22.7<br>C  |      |
|  |             |            |      |            | U          |       |            |            |      |            | C          |      |
| Timer - Assigned Phs                                 | 1           | 2          |      | 4          | 5          | 6     |            | 8          |      |            |            |      |
| Phs Duration (G+Y+Rc), s                             | 16.2        | 52.2       |      | 15.9       | 36.7       | 31.7  |            | 20.7       |      |            |            |      |
| Change Period (Y+Rc), s                              | 4.0         | 4.9        |      | 4.6        | 4.9        | * 4.9 |            | 4.6        |      |            |            |      |
| Max Green Setting (Gmax), s                          | 18.0        | 26.0       |      | 22.1       | 19.1       | * 25  |            | 20.8       |      |            |            |      |
| Max Q Clear Time (g_c+l1), s                         | 12.1        | 16.2       |      | 9.9        | 12.3       | 3.0   |            | 13.2       |      |            |            |      |
| Green Ext Time (p_c), s                              | 0.2         | 3.5        |      | 0.9        | 0.2        | 0.1   |            | 1.6        |      |            |            |      |
| Intersection Summary                                 |             |            |      |            |            |       |            |            |      |            |            |      |
| HCM 6th Ctrl Delay                                   |             |            | 36.9 |            |            |       |            |            |      |            |            |      |
| HCM 6th LOS  |             |            | D    |            |            |       |            |            |      |            |            |      |

#### Notes

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|   | ۶           | <b>→</b> | •           | •    | <b>←</b> | •    | 1           | <b>†</b>     | ~        | <b>/</b>    | <b>+</b>     |              |
|---|-------------|----------|-------------|------|----------|------|-------------|--------------|----------|-------------|--------------|--------------|
| Movement                                    | EBL         | EBT      | EBR         | WBL  | WBT      | WBR  | NBL         | NBT          | NBR      | SBL         | SBT          | SBR          |
| Lane Configurations                         |             | 4        | 7           |      | - ↔      |      | ሻ           | ተኈ           |          | ሻ           | Φ₽           |              |
| Traffic Volume (veh/h)                      | 25          | 0        | 6           | 3    | 0        | 12   | 18          | 329          | 5        | 18          | 500          | 45           |
| Future Volume (veh/h)                       | 25          | 0        | 6           | 3    | 0        | 12   | 18          | 329          | 5        | 18          | 500          | 45           |
| Initial Q (Qb), veh                         | 0           | 0        | 0           | 0    | 0        | 0    | 0           | 0            | 0        | 0           | 0            | 0            |
| Ped-Bike Adj(A_pbT)                         | 0.95        | 4.00     | 1.00        | 0.95 | 4.00     | 1.00 | 1.00        | 4.00         | 0.96     | 1.00        | 4.00         | 0.96         |
| Parking Bus, Adj                            | 1.00        | 1.00     | 1.00        | 1.00 | 1.00     | 1.00 | 1.00        | 1.00         | 1.00     | 1.00        | 1.00         | 1.00         |
| Work Zone On Approach                       | 4750        | No       | 4750        | 4500 | No       | 4500 | 4707        | No           | 4707     | 4700        | No           | 4700         |
| Adj Sat Flow, veh/h/ln                      | 1752        | 1752     | 1752        | 1500 | 1500     | 1500 | 1707        | 1707         | 1707     | 1796        | 1796         | 1796         |
| Adj Flow Rate, veh/h                        | 27          | 0        | 0           | 3    | 0        | 0    | 19          | 354          | 5        | 19          | 538          | 45           |
| Peak Hour Factor                            | 0.93        | 0.93     | 0.93        | 0.93 | 0.93     | 0.93 | 0.93        | 0.93         | 0.93     | 0.93        | 0.93         | 0.93         |
| Percent Heavy Veh, %                        | 10          | 10       | 10          | 27   | 27       | 27   | 13          | 13           | 13       | 7           | 7            | 7            |
| Cap, veh/h                                  | 264         | 0        | 194         | 245  | 0        | 0    | 28          | 2230         | 31       | 30          | 2165         | 181          |
| Arrive On Green                             | 0.13        | 0.00     | 0.00        | 0.13 | 0.00     | 0.00 | 0.02        | 0.68         | 0.68     | 0.02        | 0.68         | 0.68         |
| Sat Flow, veh/h                             | 1266        | 0        | 1485        | 1123 | 0        | 0    | 1626        | 3273         | 46       | 1711        | 3178         | 265          |
| Grp Volume(v), veh/h                        | 27          | 0        | 0           | 3    | 0        | 0    | 19          | 175          | 184      | 19          | 288          | 295          |
| Grp Sat Flow(s),veh/h/ln                    | 1266        | 0        | 1485        | 1123 | 0        | 0    | 1626        | 1622         | 1697     | 1711        | 1706         | 1736         |
| Q Serve(g_s), s                             | 1.2         | 0.0      | 0.0         | 0.0  | 0.0      | 0.0  | 0.9         | 2.8          | 2.8      | 0.8         | 4.8          | 4.8          |
| Cycle Q Clear(g_c), s                       | 1.4         | 0.0      | 0.0         | 0.1  | 0.0      | 0.0  | 0.9         | 2.8          | 2.8      | 0.8         | 4.8          | 4.8          |
| Prop In Lane                                | 1.00        | ^        | 1.00        | 1.00 | ^        | 0.00 | 1.00        | 4405         | 0.03     | 1.00        | 4400         | 0.15         |
| Lane Grp Cap(c), veh/h                      | 264         | 0        | 194         | 245  | 0        | 0    | 28          | 1105         | 1156     | 30          | 1163         | 1183         |
| V/C Ratio(X)                                | 0.10        | 0.00     | 0.00        | 0.01 | 0.00     | 0.00 | 0.67        | 0.16         | 0.16     | 0.63        | 0.25         | 0.25         |
| Avail Cap(c_a), veh/h                       | 511<br>1.00 | 1.00     | 486<br>1.00 | 458  | 1.00     | 1.00 | 532<br>1.00 | 1105         | 1156     | 559<br>1.00 | 1163<br>1.00 | 1183<br>1.00 |
| HCM Platoon Ratio                           | 1.00        | 1.00     | 0.00        | 1.00 | 0.00     | 0.00 | 1.00        | 1.00<br>1.00 | 1.00     | 1.00        | 1.00         | 1.00         |
| Upstream Filter(I) Uniform Delay (d), s/veh | 28.3        | 0.00     | 0.00        | 27.8 | 0.00     | 0.00 | 35.8        | 4.2          | 4.2      | 35.8        | 4.5          | 4.5          |
| Incr Delay (d2), s/veh                      | 0.1         | 0.0      | 0.0         | 0.0  | 0.0      | 0.0  | 9.6         | 0.3          | 0.3      | 8.0         | 0.5          | 0.5          |
| Initial Q Delay(d3),s/veh                   | 0.0         | 0.0      | 0.0         | 0.0  | 0.0      | 0.0  | 0.0         | 0.0          | 0.0      | 0.0         | 0.0          | 0.0          |
| %ile BackOfQ(50%),veh/ln                    | 0.4         | 0.0      | 0.0         | 0.0  | 0.0      | 0.0  | 0.4         | 0.8          | 0.8      | 0.4         | 1.4          | 1.4          |
| Unsig. Movement Delay, s/veh                |             | 0.0      | 0.0         | 0.0  | 0.0      | 0.0  | 0.4         | 0.0          | 0.0      | 0.4         | 1.4          | 1.4          |
| LnGrp Delay(d),s/veh                        | 28.4        | 0.0      | 0.0         | 27.8 | 0.0      | 0.0  | 45.4        | 4.5          | 4.5      | 43.8        | 5.0          | 5.0          |
| LnGrp LOS                                   | 20.4<br>C   | Α        | Α           | C C  | Α        | Α    | 75.7<br>D   | 4.5<br>A     | 4.5<br>A | 45.0<br>D   | A            | 3.0<br>A     |
| Approach Vol, veh/h                         |             | 27       |             |      | 3        |      |             | 378          |          |             | 602          |              |
| Approach Delay, s/veh                       |             | 28.4     |             |      | 27.8     |      |             | 6.5          |          |             | 6.2          |              |
| Approach LOS                                |             | C C      |             |      | C C      |      |             | Α            |          |             | Α            |              |
|   |             |          |             |      |          |      |             |              |          |             | А            |              |
| Timer - Assigned Phs                        | 1           | 2        |             | 4    | 5        | 6    |             | 8            |          |             |              |              |
| Phs Duration (G+Y+Rc), s                    | 5.3         | 54.5     |             | 13.6 | 5.3      | 54.5 |             | 13.6         |          |             |              |              |
| Change Period (Y+Rc), s                     | 4.0         | 4.5      |             | 4.0  | 4.0      | 4.5  |             | 4.0          |          |             |              |              |
| Max Green Setting (Gmax), s                 | 24.0        | 30.0     |             | 24.0 | 24.0     | 50.0 |             | 24.0         |          |             |              |              |
| Max Q Clear Time (g_c+l1), s                | 2.8         | 4.8      |             | 3.4  | 2.9      | 6.8  |             | 2.1          |          |             |              |              |
| Green Ext Time (p_c), s                     | 0.0         | 1.4      |             | 0.0  | 0.0      | 2.5  |             | 0.0          |          |             |              |              |
| Intersection Summary                        |             |          |             |      |          |      |             |              |          |             |              |              |
| HCM 6th Ctrl Delay                          |             |          | 7.0         |      |          |      |             |              |          |             |              |              |
| HCM 6th LOS                                 |             |          | Α           |      |          |      |             |              |          |             |              |              |

|                              | ၨ     | <b>→</b>                                | •                                       | •    | <b>←</b>                                | •    | •    | <b>†</b>                                | /    | <b>&gt;</b> | ļ   | ∢   |
|------------------------------|-------|---|---|------|---|------|------|---|------|-------------|-----|-----|
| Movement                     | EBL   | EBT                                     | EBR                                     | WBL  | WBT                                     | WBR  | NBL  | NBT                                     | NBR  | SBL         | SBT | SBR |
| Lane Configurations          | ሻሻ    | <b>∱</b> }                              | 7                                       | 1/1  | <b>†</b>                                | 77   | 44   | <b>†</b>                                | 77   |             |     |     |
| Traffic Volume (veh/h)       | 501   | 1134                                    | 558                                     | 197  | 153                                     | 249  | 215  | 55                                      | 733  | 0           | 0   | 0   |
| Future Volume (veh/h)        | 501   | 1134                                    | 558                                     | 197  | 153                                     | 249  | 215  | 55                                      | 733  | 0           | 0   | 0   |
| Initial Q (Qb), veh          | 16    | 8                                       | 16                                      | 0    | 0                                       | 0    | 0    | 0                                       | 10   |             |     |     |
| Ped-Bike Adj(A_pbT)          | 1.00  |   | 0.97                                    | 1.00 |   | 1.00 | 1.00 |   | 1.00 |             |     |     |
| Parking Bus, Adj             | 1.00  | 1.00                                    | 1.00                                    | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00                                    | 1.00 |             |     |     |
| Work Zone On Approach        |       | No                                      |   |      | No                                      |      |      | No                                      |      |             |     |     |
| Adj Sat Flow, veh/h/ln       | 1870  | 1870                                    | 1870                                    | 1648 | 1648                                    | 1648 | 1856 | 1856                                    | 1856 |             |     |     |
| Adj Flow Rate, veh/h         | 516   | 1169                                    | 287                                     | 203  | 158                                     | 89   | 222  | 57                                      | 756  |             |     |     |
| Peak Hour Factor             | 0.97  | 0.97                                    | 0.97                                    | 0.97 | 0.97                                    | 0.97 | 0.97 | 0.97                                    | 0.97 |             |     |     |
| Percent Heavy Veh, %         | 2     | 2                                       | 2                                       | 17   | 17                                      | 17   | 3    | 3                                       | 3    |             |     |     |
| Cap, veh/h                   | 723   | 1687                                    | 694                                     | 294  | 564                                     | 841  | 991  | 536                                     | 1067 |             |     |     |
| Arrive On Green              | 0.19  | 0.45                                    | 0.45                                    | 0.10 | 0.36                                    | 0.36 | 0.29 | 0.29                                    | 0.29 |             |     |     |
| Sat Flow, veh/h              | 3563  | 3741                                    | 1542                                    | 3045 | 1648                                    | 2458 | 3428 | 1856                                    | 2768 |             |     |     |
| Grp Volume(v), veh/h         | 516   | 1169                                    | 287                                     | 203  | 158                                     | 89   | 222  | 57                                      | 756  |             |     |     |
| Grp Sat Flow(s), veh/h/ln    | 1781  | 1870                                    | 1542                                    | 1522 | 1648                                    | 1229 | 1714 | 1856                                    | 1384 |             |     |     |
| Q Serve(g_s), s              | 10.4  | 18.8                                    | 9.5                                     | 4.9  | 5.1                                     | 1.8  | 3.7  | 1.7                                     | 17.5 |             |     |     |
| Cycle Q Clear(g_c), s        | 10.4  | 18.8                                    | 9.5                                     | 4.9  | 5.1                                     | 1.8  | 3.7  | 1.7                                     | 17.5 |             |     |     |
| Prop In Lane                 | 1.00  |   | 1.00                                    | 1.00 | • | 1.00 | 1.00 |   | 1.00 |             |     |     |
| Lane Grp Cap(c), veh/h       | 723   | 1687                                    | 694                                     | 294  | 564                                     | 841  | 991  | 536                                     | 1067 |             |     |     |
| V/C Ratio(X)                 | 0.71  | 0.69                                    | 0.41                                    | 0.69 | 0.28                                    | 0.11 | 0.22 | 0.11                                    | 0.71 |             |     |     |
| Avail Cap(c_a), veh/h        | 1371  | 1886                                    | 777                                     | 1091 | 831                                     | 1239 | 1228 | 665                                     | 1259 |             |     |     |
| HCM Platoon Ratio            | 1.00  | 1.00                                    | 1.00                                    | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00                                    | 1.00 |             |     |     |
| Upstream Filter(I)           | 1.00  | 1.00                                    | 1.00                                    | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00                                    | 1.00 |             |     |     |
| Uniform Delay (d), s/veh     | 28.9  | 17.0                                    | 15.5                                    | 33.4 | 18.5                                    | 17.4 | 20.6 | 19.9                                    | 20.3 |             |     |     |
| Incr Delay (d2), s/veh       | 1.0   | 1.1                                     | 0.6                                     | 1.1  | 0.4                                     | 0.1  | 0.0  | 0.0                                     | 1.1  |             |     |     |
| Initial Q Delay(d3),s/veh    | 12.3  | 0.5                                     | 6.5                                     | 0.0  | 0.0                                     | 0.0  | 0.0  | 0.0                                     | 2.2  |             |     |     |
| %ile BackOfQ(50%),veh/ln     | 6.4   | 8.4                                     | 6.1                                     | 1.8  | 2.0                                     | 0.5  | 1.5  | 0.7                                     | 11.9 |             |     |     |
| Unsig. Movement Delay, s/veh |       | • | • |      |   | 0.0  |      | • |      |             |     |     |
| LnGrp Delay(d),s/veh         | 42.2  | 18.6                                    | 22.6                                    | 34.5 | 18.9                                    | 17.5 | 20.7 | 19.9                                    | 23.6 |             |     |     |
| LnGrp LOS                    | D     | В                                       | C                                       | C    | В                                       | В    | C    | В                                       | C    |             |     |     |
| Approach Vol, veh/h          |       | 1972                                    |   |      | 450                                     |      |      | 1035                                    |      |             |     |     |
| Approach Delay, s/veh        |       | 25.4                                    |   |      | 25.7                                    |      |      | 22.8                                    |      |             |     |     |
| Approach LOS                 |       | 23.4<br>C                               |   |      | C C                                     |      |      | C                                       |      |             |     |     |
|                              |       |   |   |      |   |      |      |   |      |             |     |     |
| Timer - Assigned Phs         | 1 100 | 2                                       |   | 4    | 5                                       | 6    |      |   |      |             |     |     |
| Phs Duration (G+Y+Rc), s     | 10.8  | 39.0                                    |   | 25.6 | 17.7                                    | 32.1 |      |   |      |             |     |     |
| Change Period (Y+Rc), s      | 3.5   | 5.0                                     |   | 4.0  | 3.5                                     | 5.0  |      |   |      |             |     |     |
| Max Green Setting (Gmax), s  | 27.0  | 38.0                                    |   | 27.0 | 29.0                                    | 38.0 |      |   |      |             |     |     |
| Max Q Clear Time (g_c+I1), s | 6.9   | 20.8                                    |   | 19.5 | 12.4                                    | 7.1  |      |   |      |             |     |     |
| Green Ext Time (p_c), s      | 0.5   | 13.2                                    |   | 2.1  | 1.9                                     | 2.6  |      |   |      |             |     |     |
| Intersection Summary         |       |   |   |      |   |      |      |   |      |             |     |     |
| HCM 6th Ctrl Delay           |       |   | 24.6                                    |      |   |      |      |   |      |             |     |     |
| HCM 6th LOS                  |       |   | С                                       |      |   |      |      |   |      |             |     |     |
| Notes                        |       |   |   |      |   |      |      |   |      |             |     |     |

User approved volume balancing among the lanes for turning movement.

|                                    | ۶            | <b>→</b>     | •            | •                                       | <b>←</b>   | •           | 1          | <b>†</b>    | <b>/</b> | <b>/</b>   | <b>+</b> |      |
|------------------------------------|--------------|--------------|--------------|---|------------|-------------|------------|-------------|----------|------------|----------|------|
| Movement                           | EBL          | EBT          | EBR          | WBL                                     | WBT        | WBR         | NBL        | NBT         | NBR      | SBL        | SBT      | SBR  |
| Lane Configurations                | ሻሻ           | ŧβ           |              | 7                                       | ħβ         |             | ሻ          | f)          |          |            | 4        | 11   |
| Traffic Volume (veh/h)             | 386          | 1615         | 94           | 4                                       | 317        | 25          | 59         | 4           | 6        | 36         | 2        | 92   |
| Future Volume (veh/h)              | 386          | 1615         | 94           | 4                                       | 317        | 25          | 59         | 4           | 6        | 36         | 2        | 92   |
| Initial Q (Qb), veh                | 0            | 32           | 0            | 0                                       | 26         | 0           | 0          | 0           | 0        | 0          | 0        | 0    |
| Ped-Bike Adj(A_pbT)                | 1.00         | 4.00         | 0.96         | 1.00                                    | 4.00       | 0.99        | 1.00       | 4.00        | 1.00     | 1.00       | 4.00     | 1.00 |
| Parking Bus, Adj                   | 1.00         | 1.00         | 1.00         | 1.00                                    | 1.00       | 1.00        | 1.00       | 1.00        | 1.00     | 1.00       | 1.00     | 1.00 |
| Work Zone On Approach              | 1050         | No           | 4050         | 4574                                    | No         | 4574        | 4000       | No          | 4000     | 4070       | No       | 4070 |
| Adj Sat Flow, veh/h/ln             | 1856         | 1856         | 1856         | 1574                                    | 1574       | 1574        | 1366       | 1366        | 1366     | 1678       | 1678     | 1678 |
| Adj Flow Rate, veh/h               | 420          | 1755         | 100          | 4                                       | 345        | 24          | 64         | 4           | 0        | 39         | 2        | 0    |
| Peak Hour Factor                   | 0.92         | 0.92         | 0.92         | 0.92                                    | 0.92       | 0.92        | 0.92       | 0.92        | 0.92     | 0.92       | 0.92     | 0.92 |
| Percent Heavy Veh, %               | 3            | 3            | 3            | 22                                      | 22         | 22          | 36         | 36          | 36       | 15         | 15       | 15   |
| Cap, veh/h                         | 494          | 2333         | 117          | 9                                       | 1558       | 100         | 156        | 163<br>0.12 | 0        | 59<br>0.04 | 3        | 97   |
| Arrive On Green                    | 0.14         | 0.68<br>3384 | 0.68<br>191  | 0.01                                    | 0.55       | 0.55<br>196 | 0.12       | 1366        | 0.00     | 1523       | 0.04     | 0.00 |
| Sat Flow, veh/h                    | 3428         |              |              | 1499                                    | 2835       |             | 1301       |             |          |            | 78       | 2502 |
| Grp Volume(v), veh/h               | 420          | 906          | 949          | 4                                       | 181        | 188         | 64         | 4200        | 0        | 41         | 0        | 0    |
| Grp Sat Flow(s),veh/h/ln           | 1714         | 1763         | 1812<br>38.2 | 1499                                    | 1495       | 1535        | 1301       | 1366        | 0        | 1602       | 0        | 1251 |
| Q Serve(g_s), s                    | 13.1<br>13.1 | 36.7         | 38.2         | 0.3                                     | 6.9<br>6.9 | 7.0<br>7.0  | 5.0<br>5.0 | 0.3         | 0.0      | 2.8<br>2.8 | 0.0      | 0.0  |
| Cycle Q Clear(g_c), s Prop In Lane | 1.00         | 36.7         | 0.11         | 1.00                                    | 0.9        | 0.13        | 1.00       | 0.3         | 0.00     | 0.95       | 0.0      | 1.00 |
| Lane Grp Cap(c), veh/h             | 494          | 1206         | 1243         | 9                                       | 817        | 840         | 1.00       | 163         | 0.00     | 62         | 0        | 97   |
| V/C Ratio(X)                       | 0.85         | 0.75         | 0.76         | 0.43                                    | 0.22       | 0.22        | 0.41       | 0.02        | 0.00     | 0.66       | 0.00     | 0.00 |
| Avail Cap(c_a), veh/h              | 686          | 1206         | 1240         | 123                                     | 817        | 839         | 367        | 385         | 0.00     | 160        | 0.00     | 250  |
| HCM Platoon Ratio                  | 1.00         | 1.00         | 1.00         | 1.00                                    | 1.00       | 1.00        | 1.00       | 1.00        | 1.00     | 1.00       | 1.00     | 1.00 |
| Upstream Filter(I)                 | 0.09         | 0.09         | 0.09         | 1.00                                    | 1.00       | 1.00        | 1.00       | 1.00        | 0.00     | 1.00       | 0.00     | 0.00 |
| Uniform Delay (d), s/veh           | 45.9         | 12.6         | 12.7         | 54.5                                    | 13.9       | 13.8        | 44.8       | 42.8        | 0.0      | 52.1       | 0.0      | 0.00 |
| Incr Delay (d2), s/veh             | 0.5          | 0.4          | 0.4          | 10.9                                    | 0.6        | 0.6         | 0.6        | 0.0         | 0.0      | 4.3        | 0.0      | 0.0  |
| Initial Q Delay(d3),s/veh          | 0.0          | 5.1          | 5.0          | 0.0                                     | 2.3        | 2.2         | 0.0        | 0.0         | 0.0      | 0.0        | 0.0      | 0.0  |
| %ile BackOfQ(50%),veh/ln           | 5.5          | 16.8         | 17.7         | 0.1                                     | 4.3        | 4.4         | 1.7        | 0.1         | 0.0      | 1.2        | 0.0      | 0.0  |
| Unsig. Movement Delay, s/veh       | 0.0          |              |              | • |            |             |            | •           | 0.0      |            | 0.0      | 0.0  |
| LnGrp Delay(d),s/veh               | 46.4         | 18.1         | 18.2         | 65.4                                    | 16.8       | 16.7        | 45.5       | 42.8        | 0.0      | 56.4       | 0.0      | 0.0  |
| LnGrp LOS                          | D            | В            | В            | E                                       | В          | В           | D          | D           | Α        | Е          | Α        | Α    |
| Approach Vol, veh/h                |              | 2275         |              |   | 373        |             |            | 68          |          |            | 41       |      |
| Approach Delay, s/veh              |              | 23.4         |              |   | 17.3       |             |            | 45.3        |          |            | 56.4     |      |
| Approach LOS                       |              | С            |              |   | В          |             |            | D           |          |            | E        |      |
| Timer - Assigned Phs               | 1            | 2            |              | 4                                       | 5          | 6           |            | 8           |          |            |          |      |
| Phs Duration (G+Y+Rc), s           | 19.9         | 64.7         |              | 17.2                                    | 4.7        | 79.9        |            | 8.3         |          |            |          |      |
| Change Period (Y+Rc), s            | 4.0          | 4.6          |              | 4.0                                     | 4.0        | 4.6         |            | 4.0         |          |            |          |      |
| Max Green Setting (Gmax), s        | 22.0         | 29.4         |              | 31.0                                    | 9.0        | 42.4        |            | 11.0        |          |            |          |      |
| Max Q Clear Time (g_c+l1), s       | 15.1         | 9.0          |              | 7.0                                     | 2.3        | 40.2        |            | 4.8         |          |            |          |      |
| Green Ext Time (p_c), s            | 0.7          | 1.9          |              | 0.1                                     | 0.0        | 1.7         |            | 0.0         |          |            |          |      |
| Intersection Summary               |              |              |              |   |            |             |            |             |          |            |          |      |
| HCM 6th Ctrl Delay                 |              |              | 23.6         |   |            |             |            |             |          |            |          |      |
| HCM 6th LOS                        |              |              | С            |   |            |             |            |             |          |            |          |      |

| Movement   EBL   EBT   EBR   WBL   WBL   WBT   WBR   NBL   NBT   NBR   SBL   SBT   SBR   Lane Configurations   1   |                                       | ۶    | <b>→</b> | •    | •    | <b>←</b>   | •    | 1    | <b>†</b> | <b>/</b> | <b>/</b> | <b>↓</b> | 4    |
|--|---------------------------------------|------|----------|------|------|------------|------|------|----------|----------|----------|----------|------|
| Traffic Volume (veh/h)   | Movement                              | EBL  | EBT      | EBR  | WBL  | WBT        | WBR  | NBL  | NBT      | NBR      |          | SBT      | SBR  |
| Future Volume (veh/h)  142 1423 35 74 155 139 23 188 378 392 328 241  Initial Q (Qb), veh 0 0 50 0 0 0 0 0 0 0 10 0 100 1.00 1.00  |                                       |      |          |      | ሻሻ   | <b>∱</b> ∱ |      |      |          | 77       |          |          |      |
| Initial Q (Qb), veh  |                                       |      |          |      |      | 155        |      |      |          |          |          |          |      |
| Pect-Bisk Adji(A_pbT)  | Future Volume (veh/h)                 | 142  |          | 35   | 74   | 155        | 139  |      | 188      |          |          |          |      |
| Parking Bus   Adj  |                                       |      | 50       |      |      | 0          |      |      | 0        |          |          | 24       |      |
| Mork Zone On Approach  |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Adj Sale Flow, veh/hi/ln         1885         1885         1885         1885         1885         1826         1820         1870         1870         1826         1826         1826         Adj Flow Rate, veh/h         149         1498         349         47         24         198         398         413         345         47           Percent Heavy Veh, %         1         1         1         5         5         5         2         2         2         5         5         5         5         2         2         2         5         5         5         5         5         2         2         2         5         5         5         5         5         2         2         2         5         5         5         5         5         2         2         2         5   |                                       | 1.00 |          | 1.00 | 1.00 |            | 1.00 | 1.00 |          | 1.00     | 1.00     |          | 1.00 |
| Adj Flow Rate, veh/h 149 1498 1498 134 78 163 147 24 198 398 413 345 47 Peak Hour Factor 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95   |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Peak Hour Factor 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95   |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Percent Heavy Veh, % 1 1 1 5 5 5 5 2 2 2 2 5 5 5 5 Cap, veh/h 186 1895 28 325 984 275 83 272 687 549 848 387 Arrive On Green 0.10 0.36 0.36 0.12 0.39 0.39 0.05 0.14 0.14 0.15 0.24 0.24 Sat Flow, veh/h 1795 5174 117 3374 2677 749 1781 1870 2790 3374 3469 1501 Grp Volume(v), veh/h 149 993 539 78 104 106 24 198 388 413 345 47 Grp Sat Flow(s), veh/h/ln 1795 1716 1861 1687 1735 1691 1781 1870 1395 1687 1735 1501 Q Serve(g. s), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Cycle Q Clear(g. c), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Prop In Lane 1.00 0.06 1.00 0.06 1.00 0.44 1.00 1.00 1.00 1.00 1.00 1.00  |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Cap, veh/h         186         1895         28         325         984         275         83         272         687         549         848         387           Arrive On Green         0.10         0.36         0.36         0.12         0.39         0.05         0.14         0.14         0.15         0.24         0.24           Sat Flow, veh/h         1795         5174         117         3374         2677         749         1781         1870         2790         3374         3469         1501           Gry Sat Flow(s), veh/h         149         993         539         78         104         106         24         198         398         413         345         47           Gry Sat Flow(s), veh/h         1795         1716         1861         1687         1735         1691         1781         1870         1395         1687         1735         1601           QSeve(g.s.)         6.5         20.8         20.8         1.7         3.1         3.3         1.0         8.2         2.6         9.5         6.7         2.0           Cycle Q Clear(g.s.)         6.5         20.8         20.8         1.7         3.1         3.3         1.0 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<> |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Arrive On Green 0.10 0.36 0.36 0.12 0.39 0.39 0.05 0.14 0.14 0.15 0.24 0.24 Sat Flow, yeh/h 1795 5174 117 3374 2677 749 1781 1870 2790 3374 3469 1501 Grp Volume(v), yeh/h 149 993 539 78 104 106 24 198 398 413 345 47 Grp Sat Flow(s), yeh/h/h 1795 1716 1861 1687 1735 1691 1781 1870 1395 1687 1735 1501 Q Serve(g. s), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Cycle Q Clear(g. c), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Cycle Q Clear(g. c), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Cycle Q Clear(g. c), yeh/h 186 1244 678 325 638 622 83 272 687 549 848 387 V/C Ratio(X) 0.80 0.80 0.80 0.24 0.16 0.17 0.29 0.73 0.58 0.75 0.41 0.12 Avail Cap(c. a), yeh/h 292 1244 675 3394 673 656 200 304 779 590 821 355 HCM Platon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0   |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Sat Flow, veh/h         1795         5174         117         3374         2677         749         1781         1870         2790         3374         3469         1501           Grp Volume(v), veh/h         149         993         539         78         104         106         24         198         398         413         345         47           Grp Sat Flow(s), veh/h/ln         1795         1716         1861         1687         1735         1691         1781         1870         1395         1687         1735         1501           Oserve(g. s), s         6.5         20.8         20.8         1.7         3.1         3.3         1.0         8.2         2.6         9.5         6.7         2.0           Cycle Q Clear(g. c), s         6.5         20.8         20.8         1.7         3.1         3.3         1.0         8.2         2.6         9.5         6.7         2.0           Prop In Lane         1.00         0.06         1.00         0.04         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00  |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Grp Volume(v), veh/h         149         993         539         78         104         106         24         198         398         413         345         47           Grp Sat Flow(s), veh/h/ln         1795         1716         1861         1687         1735         1691         1781         1870         1395         1687         1735         1501           Q Serve(g_s), s         6.5         20.8         20.8         1.7         3.1         3.3         1.0         8.2         2.6         9.5         6.7         2.0           Cycle Q Clear(g_c), s         6.5         20.8         20.8         1.7         3.1         3.3         1.0         8.2         2.6         9.5         6.7         2.0           Prop In Lane         1.00         0.06         1.00         0.44         1.00         1.00         1.00         1.00           Lane Grp Cap(c), veh/h         186         1244         678         325         638         622         83         272         687         549         848         387           V/C Ratio(X)         0.80         0.80         0.80         0.24         0.16         0.17         0.29         0.73         0.58         0.75   |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Grp Sat Flow(s), veh/h/ln 1795 1716 1861 1687 1735 1691 1781 1870 1395 1687 1735 1501 Q Serve(g_s), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Cycle Q Clear(g_c), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Cycle Q Clear(g_c), s 6.5 20.8 20.8 1.7 3.1 3.3 1.0 8.2 2.6 9.5 6.7 2.0 Cycle Q Clear(g_c), veh/h 186 1244 678 325 638 622 83 272 687 549 848 387 V/C Ratio(X) 0.80 0.80 0.80 0.24 0.16 0.17 0.29 0.73 0.58 0.75 0.41 0.12 Avail Cap(c_a), veh/h 292 1244 675 394 673 656 200 304 779 590 821 355 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0   | Sat Flow, veh/h                       | 1795 | 5174     |      | 3374 | 2677       | 749  | 1781 | 1870     | 2790     | 3374     | 3469     |      |
| Q Serve(g_s), s  | Grp Volume(v), veh/h                  | 149  | 993      |      |      |            | 106  | 24   |          | 398      |          |          |      |
| Cycle Q Clear(g_c), s         6.5         20.8         20.8         1.7         3.1         3.3         1.0         8.2         2.6         9.5         6.7         2.0           Prop In Lane         1.00         0.06         1.00         0.44         1.00         1.00         1.00         1.00           Lane Grp Cap(c), veh/h         186         1244         678         325         638         622         83         272         687         549         848         387           V/C Ratio(X)         0.80         0.80         0.80         0.24         0.16         0.17         0.29         0.73         0.58         0.75         0.41         0.12           Avail Cap(c_a), veh/h         292         1244         675         394         673         656         200         304         779         590         821         355           HCM Platoon Ratio         1.00  | Grp Sat Flow(s),veh/h/ln              | 1795 | 1716     | 1861 | 1687 |            | 1691 | 1781 | 1870     | 1395     | 1687     | 1735     | 1501 |
| Prop In Lane 1.00 0.06 1.00 0.44 1.00 1.00 1.00 1.00 1.00 1.00   | Q Serve(g_s), s                       |      | 20.8     | 20.8 |      |            |      |      |          |          | 9.5      |          |      |
| Lane Grp Cap(c), veh/h   | Cycle Q Clear(g_c), s                 | 6.5  | 20.8     | 20.8 | 1.7  | 3.1        | 3.3  | 1.0  | 8.2      | 2.6      | 9.5      | 6.7      | 2.0  |
| V/C Ratio(X)         0.80         0.80         0.80         0.24         0.16         0.17         0.29         0.73         0.58         0.75         0.41         0.12           Avail Cap(c_a), veh/h         292         1244         675         394         673         656         200         304         779         590         821         355           HCM Platoon Ratio         1.00  | Prop In Lane                          | 1.00 |          |      |      |            |      |      |          | 1.00     | 1.00     |          |      |
| Avail Cap(c_a), veh/h Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0   | Lane Grp Cap(c), veh/h                | 186  | 1244     | 678  | 325  | 638        | 622  | 83   | 272      | 687      | 549      | 848      | 387  |
| HCM Platoon Ratio  | V/C Ratio(X)                          | 0.80 | 0.80     | 0.80 | 0.24 | 0.16       | 0.17 | 0.29 | 0.73     | 0.58     | 0.75     | 0.41     |      |
| Upstream Filter(I)   | Avail Cap(c_a), veh/h                 | 292  | 1244     | 675  | 394  | 673        | 656  | 200  | 304      | 779      | 590      | 821      | 355  |
| Uniform Delay (d), s/veh 35.0 24.3 24.1 33.5 17.0 17.1 36.9 32.7 11.6 33.0 26.2 22.8 Incr Delay (d2), s/veh 3.7 5.4 9.4 0.1 0.5 0.6 0.7 6.0 0.4 4.3 0.1 0.1 Initial Q Delay(d3), s/veh 0.0 25.7 21.3 0.0 0.0 0.0 0.0 0.0 0.0 5.2 55.8 9.7 0.0 %ile BackOfQ(50%), veh/ln 3.0 15.1 16.1 0.7 1.3 1.3 0.5 3.9 2.4 9.2 4.7 0.7 Unsig. Movement Delay, s/veh  LnGrp Delay(d), s/veh 38.8 55.4 54.7 33.6 17.6 17.7 37.6 38.7 17.2 93.1 36.1 22.9 LnGrp LOS D E D C B B D D B F D C Approach Vol, veh/h 1681 288 620 805  Approach LOS D C C C E  Timer - Assigned Phs 1 2 3 4 5 6 7 8  Phs Duration (G+Y+Rc), s 7.7 23.9 12.3 36.1 15.8 15.8 14.3 34.0 Change Period (Y+Rc), s 4.0 5.0 4.0 5.0 4.0 5.0 5.0 *5  Max Green Setting (Gmax), s 9.0 18.0 13.0 22.0 14.0 13.0 6.0 *29  Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3  | HCM Platoon Ratio                     | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00     | 1.00     | 1.00     | 1.00 |
| Incr Delay (d2), s/veh   3.7   5.4   9.4   0.1   0.5   0.6   0.7   6.0   0.4   4.3   0.1   0.1     Initial Q Delay(d3), s/veh   0.0   25.7   21.3   0.0   0.0   0.0   0.0   0.0   0.0   5.2   55.8   9.7   0.0     Wile BackOfQ(50%), veh/ln   3.0   15.1   16.1   0.7   1.3   1.3   0.5   3.9   2.4   9.2   4.7   0.7     Unsig. Movement Delay, s/veh  | Upstream Filter(I)                    | 1.00 | 1.00     | 1.00 | 0.98 | 0.98       | 0.98 | 1.00 | 1.00     | 1.00     | 1.00     | 1.00     | 1.00 |
| Initial Q Delay(d3),s/veh  | Uniform Delay (d), s/veh              | 35.0 | 24.3     | 24.1 | 33.5 | 17.0       | 17.1 | 36.9 | 32.7     | 11.6     | 33.0     | 26.2     | 22.8 |
| %ile BackOfQ(50%),veh/ln       3.0       15.1       16.1       0.7       1.3       1.3       0.5       3.9       2.4       9.2       4.7       0.7         Unsig. Movement Delay, s/veh       LnGrp Delay(d),s/veh       38.8       55.4       54.7       33.6       17.6       17.7       37.6       38.7       17.2       93.1       36.1       22.9         LnGrp LOS       D       E       D       C       B       B       D       D       B       F       D       C         Approach Vol, veh/h       1681       288       620       805         Approach Delay, s/veh       53.7       22.0       24.9       64.6         Approach LOS       D       C       C       C       E         Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       7.7       23.9       12.3       36.1       15.8       15.8       14.3       34.0         Change Period (Y+Rc), s       4.0       5.0       4.0       5.0       5.0       5.0       *5         Max Green Setting (Gmax), s       9.0       18.0       13.0       22.0       14.0 <td< td=""><td>Incr Delay (d2), s/veh</td><td>3.7</td><td>5.4</td><td>9.4</td><td>0.1</td><td>0.5</td><td>0.6</td><td>0.7</td><td>6.0</td><td>0.4</td><td>4.3</td><td>0.1</td><td>0.1</td></td<>                          | Incr Delay (d2), s/veh                | 3.7  | 5.4      | 9.4  | 0.1  | 0.5        | 0.6  | 0.7  | 6.0      | 0.4      | 4.3      | 0.1      | 0.1  |
| Unsig. Movement Delay, s/veh  LnGrp Delay(d),s/veh 38.8 55.4 54.7 33.6 17.6 17.7 37.6 38.7 17.2 93.1 36.1 22.9  LnGrp LOS D E D C B B D D B F D C  Approach Vol, veh/h 1681 288 620 805  Approach Delay, s/veh 53.7 22.0 24.9 64.6  Approach LOS D C C E  Timer - Assigned Phs 1 2 3 4 5 6 7 8  Phs Duration (G+Y+Rc), s 7.7 23.9 12.3 36.1 15.8 15.8 14.3 34.0  Change Period (Y+Rc), s 4.0 5.0 4.0 5.0 4.0 5.0 5.0 *5  Max Green Setting (Gmax), s 9.0 18.0 13.0 22.0 14.0 13.0 6.0 *29  Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3   | Initial Q Delay(d3),s/veh             | 0.0  | 25.7     | 21.3 | 0.0  |            | 0.0  | 0.0  | 0.0      | 5.2      | 55.8     | 9.7      | 0.0  |
| LnGrp Delay(d),s/veh         38.8         55.4         54.7         33.6         17.6         17.7         37.6         38.7         17.2         93.1         36.1         22.9           LnGrp LOS         D         E         D         C         B         B         D         D         B         F         D         C           Approach Vol, veh/h         1681         288         620         805         A         Approach Delay, s/veh         53.7         22.0         24.9         64.6         A         Approach LOS         D         C         C         C         E         E         D         C         C         E         E         D         C         C         E         E         D         C         C         E         E         D         C         C         E         E         D         C         T         A         S         A         5         6         7         8         B         D         D         A         A         5         6         7         8         A         A         5         6         7         8         A         A         5         0         5.0         A         A         5   | %ile BackOfQ(50%),veh/ln              | 3.0  | 15.1     | 16.1 | 0.7  | 1.3        | 1.3  | 0.5  | 3.9      | 2.4      | 9.2      | 4.7      | 0.7  |
| LnGrp LOS         D         E         D         C         B         B         D         D         B         F         D         C           Approach Vol, veh/h         1681         288         620         805           Approach Delay, s/veh         53.7         22.0         24.9         64.6           Approach LOS         D         C         C         E           Timer - Assigned Phs         1         2         3         4         5         6         7         8           Phs Duration (G+Y+Rc), s         7.7         23.9         12.3         36.1         15.8         15.8         14.3         34.0           Change Period (Y+Rc), s         4.0         5.0         4.0         5.0         5.0         * 5           Max Green Setting (Gmax), s         9.0         18.0         13.0         22.0         14.0         13.0         6.0         * 29           Max Q Clear Time (g_c+l1), s         3.0         8.7         8.5         5.3         11.5         10.2         3.7         22.8           Green Ext Time (p_c), s         0.0         1.0         0.1         0.6         0.3         0.6         0.0         3.8   Intersection Sum  | Unsig. Movement Delay, s/veh          | l    |          |      |      |            |      |      |          |          |          |          |      |
| Approach Vol, veh/h       1681       288       620       805         Approach Delay, s/veh       53.7       22.0       24.9       64.6         Approach LOS       D       C       C       E         Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       7.7       23.9       12.3       36.1       15.8       15.8       14.3       34.0         Change Period (Y+Rc), s       4.0       5.0       4.0       5.0       5.0       * 5         Max Green Setting (Gmax), s       9.0       18.0       13.0       22.0       14.0       13.0       6.0       * 29         Max Q Clear Time (g_c+l1), s       3.0       8.7       8.5       5.3       11.5       10.2       3.7       22.8         Green Ext Time (p_c), s       0.0       1.0       0.1       0.6       0.3       0.6       0.0       3.8         Intersection Summary         HCM 6th Ctrl Delay       48.3  | LnGrp Delay(d),s/veh                  | 38.8 | 55.4     | 54.7 | 33.6 | 17.6       | 17.7 | 37.6 | 38.7     | 17.2     | 93.1     | 36.1     | 22.9 |
| Approach Delay, s/veh 53.7 22.0 24.9 64.6 Approach LOS D C C E  Timer - Assigned Phs 1 2 3 4 5 6 7 8  Phs Duration (G+Y+Rc), s 7.7 23.9 12.3 36.1 15.8 15.8 14.3 34.0  Change Period (Y+Rc), s 4.0 5.0 4.0 5.0 5.0 *5  Max Green Setting (Gmax), s 9.0 18.0 13.0 22.0 14.0 13.0 6.0 *29  Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3   | LnGrp LOS                             | D    | Е        | D    | С    | В          | В    | D    | D        | В        | F        | D        | С    |
| Approach LOS D C C E  Timer - Assigned Phs 1 2 3 4 5 6 7 8  Phs Duration (G+Y+Rc), s 7.7 23.9 12.3 36.1 15.8 15.8 14.3 34.0  Change Period (Y+Rc), s 4.0 5.0 4.0 5.0 5.0 *5  Max Green Setting (Gmax), s 9.0 18.0 13.0 22.0 14.0 13.0 6.0 *29  Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3   | Approach Vol, veh/h                   |      | 1681     |      |      | 288        |      |      | 620      |          |          | 805      |      |
| Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       7.7       23.9       12.3       36.1       15.8       15.8       14.3       34.0         Change Period (Y+Rc), s       4.0       5.0       4.0       5.0       5.0       * 5         Max Green Setting (Gmax), s       9.0       18.0       13.0       22.0       14.0       13.0       6.0       * 29         Max Q Clear Time (g_c+l1), s       3.0       8.7       8.5       5.3       11.5       10.2       3.7       22.8         Green Ext Time (p_c), s       0.0       1.0       0.1       0.6       0.3       0.6       0.0       3.8         Intersection Summary         HCM 6th Ctrl Delay       48.3  |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| Phs Duration (G+Y+Rc), s 7.7 23.9 12.3 36.1 15.8 15.8 14.3 34.0  Change Period (Y+Rc), s 4.0 5.0 4.0 5.0 5.0 *5  Max Green Setting (Gmax), s 9.0 18.0 13.0 22.0 14.0 13.0 6.0 *29  Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3   |                                       |      | D        |      |      |            |      |      | С        |          |          | Е        |      |
| Phs Duration (G+Y+Rc), s 7.7 23.9 12.3 36.1 15.8 15.8 14.3 34.0  Change Period (Y+Rc), s 4.0 5.0 4.0 5.0 5.0 *5  Max Green Setting (Gmax), s 9.0 18.0 13.0 22.0 14.0 13.0 6.0 *29  Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3   | Timer - Assigned Phs                  | 1    | 2        | 3    | 4    | 5          | 6    | 7    | 8        |          |          |          |      |
| Change Period (Y+Rc), s 4.0 5.0 4.0 5.0 4.0 5.0 5.0 *5  Max Green Setting (Gmax), s 9.0 18.0 13.0 22.0 14.0 13.0 6.0 *29  Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3  | · · · · · · · · · · · · · · · · · · · | 7.7  |          |      |      |            |      |      |          |          |          |          |      |
| Max Green Setting (Gmax), s       9.0       18.0       13.0       22.0       14.0       13.0       6.0       * 29         Max Q Clear Time (g_c+l1), s       3.0       8.7       8.5       5.3       11.5       10.2       3.7       22.8         Green Ext Time (p_c), s       0.0       1.0       0.1       0.6       0.3       0.6       0.0       3.8         Intersection Summary         HCM 6th Ctrl Delay       48.3   | Change Period (Y+Rc), s               | 4.0  |          |      |      |            |      |      | * 5      |          |          |          |      |
| Max Q Clear Time (g_c+I1), s 3.0 8.7 8.5 5.3 11.5 10.2 3.7 22.8  Green Ext Time (p_c), s 0.0 1.0 0.1 0.6 0.3 0.6 0.0 3.8  Intersection Summary  HCM 6th Ctrl Delay 48.3  |                                       |      |          |      |      |            |      |      | * 29     |          |          |          |      |
| Green Ext Time (p_c), s       0.0       1.0       0.1       0.6       0.3       0.6       0.0       3.8         Intersection Summary         HCM 6th Ctrl Delay       48.3   | • ,                                   |      |          |      |      |            |      |      | 22.8     |          |          |          |      |
| HCM 6th Ctrl Delay 48.3  |                                       |      |          |      |      |            |      |      |          |          |          |          |      |
| HCM 6th Ctrl Delay 48.3  | Intersection Summary                  |      |          |      |      |            |      |      |          |          |          |          |      |
|  |                                       |      |          | 48.3 |      |            |      |      |          |          |          |          |      |
|  | HCM 6th LOS                           |      |          | D    |      |            |      |      |          |          |          |          |      |

#### Notes

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier. User approved changes to right turn type.

|                              | ၨ    | <b>→</b>  | •        | •         | <b>←</b>  | •    | •    | <b>†</b>  | ~    | <b>&gt;</b> | ļ       | 4    |
|------------------------------|------|-----------|----------|-----------|-----------|------|------|-----------|------|-------------|---------|------|
| Movement                     | EBL  | EBT       | EBR      | WBL       | WBT       | WBR  | NBL  | NBT       | NBR  | SBL         | SBT     | SBR  |
| Lane Configurations          | ř    | 4         | 7        |           | 4         |      | ř    | f)        |      |             | <b></b> | 77   |
| Traffic Volume (veh/h)       | 889  | 2         | 74       | 1         | 0         | 5    | 40   | 109       | 1    | 2           | 150     | 603  |
| Future Volume (veh/h)        | 889  | 2         | 74       | 1         | 0         | 5    | 40   | 109       | 1    | 2           | 150     | 603  |
| Initial Q (Qb), veh          | 24   | 0         | 0        | 0         | 0         | 0    | 0    | 0         | 0    | 0           | 0       | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |           | 1.00     | 1.00      |           | 1.00 | 1.00 |           | 1.00 | 0.99        |         | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00      | 1.00     | 1.00      | 1.00      | 1.00 | 1.00 | 1.00      | 1.00 | 1.00        | 1.00    | 1.00 |
| Work Zone On Approach        |      | No        |          |           | No        |      |      | No        |      |             | No      |      |
| Adj Sat Flow, veh/h/ln       | 1856 | 1856      | 1856     | 1411      | 1411      | 1411 | 1781 | 1781      | 1781 | 1767        | 1767    | 1767 |
| Adj Flow Rate, veh/h         | 967  | 0         | 40       | 1         | 0         | 0    | 43   | 118       | 0    | 2           | 163     | 465  |
| Peak Hour Factor             | 0.92 | 0.92      | 0.92     | 0.92      | 0.92      | 0.92 | 0.92 | 0.92      | 0.92 | 0.92        | 0.92    | 0.92 |
| Percent Heavy Veh, %         | 3    | 3         | 3        | 33        | 33        | 33   | 8    | 8         | 8    | 9           | 9       | 9    |
| Cap, veh/h                   | 1375 | 0         | 612      | 3         | 0         | 0    | 65   | 656       | 0    | 94          | 447     | 1695 |
| Arrive On Green              | 0.37 | 0.00      | 0.37     | 0.00      | 0.00      | 0.00 | 0.04 | 0.38      | 0.00 | 0.26        | 0.26    | 0.26 |
| Sat Flow, veh/h              | 3534 | 0         | 1572     | 1344      | 0         | 0    | 1697 | 1781      | 0    | 5           | 1759    | 2635 |
| Grp Volume(v), veh/h         | 967  | 0         | 40       | 1         | 0         | 0    | 43   | 118       | 0    | 165         | 0       | 465  |
| Grp Sat Flow(s), veh/h/ln    | 1767 | 0         | 1572     | 1344      | 0         | 0    | 1697 | 1781      | 0    | 1764        | 0       | 1317 |
| Q Serve(g_s), s              | 9.0  | 0.0       | 0.6      | 0.0       | 0.0       | 0.0  | 1.0  | 1.7       | 0.0  | 0.0         | 0.0     | 3.0  |
| Cycle Q Clear(g_c), s        | 9.0  | 0.0       | 0.6      | 0.0       | 0.0       | 0.0  | 1.0  | 1.7       | 0.0  | 2.9         | 0.0     | 3.0  |
| Prop In Lane                 | 1.00 | 0.0       | 1.00     | 1.00      | 0.0       | 0.00 | 1.00 | 1.7       | 0.00 | 0.01        | 0.0     | 1.00 |
| Lane Grp Cap(c), veh/h       | 1375 | 0         | 612      | 3         | 0         | 0.00 | 65   | 656       | 0.00 | 541         | 0       | 1695 |
| V/C Ratio(X)                 | 0.70 | 0.00      | 0.07     | 0.29      | 0.00      | 0.00 | 0.67 | 0.18      | 0.00 | 0.30        | 0.00    | 0.27 |
| Avail Cap(c_a), veh/h        | 2776 | 0.00      | 1235     | 704       | 0.00      | 0.00 | 889  | 2706      | 0.00 | 1707        | 0.00    | 3393 |
| HCM Platoon Ratio            | 1.00 | 1.00      | 1.00     | 1.00      | 1.00      | 1.00 | 1.00 | 1.00      | 1.00 | 1.00        | 1.00    | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00      | 1.00     | 1.00      | 0.00      | 0.00 | 1.00 | 1.00      | 0.00 | 1.00        | 0.00    | 1.00 |
| Uniform Delay (d), s/veh     | 10.6 | 0.0       | 7.5      | 19.8      | 0.0       | 0.0  | 18.9 | 8.6       | 0.0  | 12.3        | 0.0     | 3.0  |
| Incr Delay (d2), s/veh       | 0.2  | 0.0       | 0.0      | 41.7      | 0.0       | 0.0  | 11.2 | 0.1       | 0.0  | 0.3         | 0.0     | 0.1  |
| Initial Q Delay(d3),s/veh    | 7.4  | 0.0       | 0.0      | 0.0       | 0.0       | 0.0  | 0.0  | 0.0       | 0.0  | 0.0         | 0.0     | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 4.6  | 0.0       | 0.2      | 0.0       | 0.0       | 0.0  | 0.5  | 0.5       | 0.0  | 1.0         | 0.0     | 1.5  |
| Unsig. Movement Delay, s/veh |      | 0.0       | 0.2      | 0.0       | 0.0       | 0.0  | 0.5  | 0.0       | 0.0  | 1.0         | 0.0     | 1.0  |
| LnGrp Delay(d),s/veh         | 18.2 | 0.0       | 7.6      | 61.5      | 0.0       | 0.0  | 30.1 | 8.7       | 0.0  | 12.6        | 0.0     | 3.1  |
| LnGrp LOS                    | В    | Α         | 7.0<br>A | 01.5<br>E | Α         | Α    | C    | Α         | Α    | 12.0<br>B   | Α       | Α    |
| Approach Vol, veh/h          |      | 1007      |          | <u> </u>  | 1         |      |      | 161       |      |             | 630     |      |
|                              |      | 17.8      |          |           | 61.5      |      |      | 14.4      |      |             | 5.6     |      |
| Approach LOS                 |      | 17.0<br>B |          |           | 61.5<br>E |      |      | 14.4<br>B |      |             |         |      |
| Approach LOS                 |      | D         |          |           | Е         |      |      | D         |      |             | Α       |      |
| Timer - Assigned Phs         | 1    | 2         |          | 4         |           | 6    |      | 8         |      |             |         |      |
| Phs Duration (G+Y+Rc), s     | 4.5  | 13.5      |          | 3.0       |           | 18.0 |      | 17.2      |      |             |         |      |
| Change Period (Y+Rc), s      | 3.0  | 3.5       |          | 3.0       |           | 3.5  |      | 3.0       |      |             |         |      |
| Max Green Setting (Gmax), s  | 20.0 | 35.0      |          | 20.0      |           | 58.0 |      | 30.0      |      |             |         |      |
| Max Q Clear Time (g_c+l1), s | 3.0  | 5.0       |          | 2.0       |           | 3.7  |      | 11.0      |      |             |         |      |
| Green Ext Time (p_c), s      | 0.1  | 2.7       |          | 0.0       |           | 0.3  |      | 3.1       |      |             |         |      |
| Intersection Summary         |      |           |          |           |           |      |      |           |      |             |         |      |
| HCM 6th Ctrl Delay           |      |           | 13.3     |           |           |      |      |           |      |             |         |      |
| HCM 6th LOS                  |      |           | В        |           |           |      |      |           |      |             |         |      |
| Notes                        |      |           |          |           |           |      |      |           |      |             |         |      |

User approved volume balancing among the lanes for turning movement.

|                                  | ၨ        | <b>→</b> | $\rightarrow$ | •     | <b>←</b>   | •          | •       | <b>†</b> | <b>/</b> | <b>&gt;</b> | ļ    | 1    |
|----------------------------------|----------|----------|---------------|-------|------------|------------|---------|----------|----------|-------------|------|------|
| Movement                         | EBL      | EBT      | EBR           | WBL   | WBT        | WBR        | NBL     | NBT      | NBR      | SBL         | SBT  | SBR  |
| Lane Configurations              |          | €Î}      |               | 77    | <b>†</b>   | 7          | ሻ       | <b>^</b> | 7        | ሻ           | 414  | 7    |
| Traffic Volume (vph)             | 186      | 205      | 82            | 192   | 110        | 59         | 33      | 333      | 282      | 383         | 391  | 124  |
| Future Volume (vph)              | 186      | 205      | 82            | 192   | 110        | 59         | 33      | 333      | 282      | 383         | 391  | 124  |
| Ideal Flow (vphpl)               | 1900     | 1900     | 1900          | 1900  | 1900       | 1900       | 1900    | 1900     | 1900     | 1900        | 1900 | 1900 |
| Total Lost time (s)              |          | 4.0      |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      | 4.9      | 4.9         | 4.9  | 4.9  |
| Lane Util. Factor                |          | 0.95     |               | 0.97  | 1.00       | 1.00       | 1.00    | 0.95     | 1.00     | 0.91        | 0.91 | 1.00 |
| Frpb, ped/bikes                  |          | 0.98     |               | 1.00  | 1.00       | 1.00       | 1.00    | 1.00     | 1.00     | 1.00        | 1.00 | 0.92 |
| Flpb, ped/bikes                  |          | 1.00     |               | 1.00  | 1.00       | 1.00       | 1.00    | 1.00     | 1.00     | 1.00        | 1.00 | 1.00 |
| Frt                              |          | 0.97     |               | 1.00  | 1.00       | 0.85       | 1.00    | 1.00     | 0.85     | 1.00        | 1.00 | 0.85 |
| Flt Protected                    |          | 0.98     |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00     | 0.95        | 0.99 | 1.00 |
| Satd. Flow (prot)                |          | 2996     |               | 2814  | 1527       | 1298       | 1464    | 2927     | 1309     | 1421        | 2956 | 1281 |
| FIt Permitted                    |          | 0.98     |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00     | 0.95        | 0.99 | 1.00 |
| Satd. Flow (perm)                |          | 2996     |               | 2814  | 1527       | 1298       | 1464    | 2927     | 1309     | 1421        | 2956 | 1281 |
| 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)                  | 196      | 216      | 86            | 202   | 116        | 62         | 35      | 351      | 297      | 403         | 412  | 131  |
| RTOR Reduction (vph)             | 0        | 18       | 0             | 0     | 0          | 56         | 0       | 0        | 0        | 0           | 0    | 85   |
| Lane Group Flow (vph)            | 0        | 480      | 0             | 202   | 116        | 6          | 35      | 351      | 297      | 266         | 549  | 46   |
| Confl. Peds. (#/hr)              |          |          | 58            |       |            |            |         |          |          |             |      | 20   |
| Confl. Bikes (#/hr)              |          |          | 9             |       |            |            |         |          | 3        |             |      | 3    |
| Heavy Vehicles (%)               | 2%       | 2%       | 2%            | 12%   | 12%        | 12%        | 11%     | 11%      | 11%      | 4%          | 4%   | 4%   |
| Turn Type                        | Split    | NA       |               | Split | NA         | Perm       | Split   | NA       | custom   | Split       | NA   | Perm |
| Protected Phases                 | 4        | 4        |               | . 7   | 7          |            | 6       | 6        | 2 6 7!   | 2!          | 2    |      |
| Permitted Phases                 |          |          |               |       |            | 7          |         |          |          |             |      | 2    |
| Actuated Green, G (s)            |          | 22.6     |               | 11.0  | 11.0       | 11.0       | 16.2    | 16.2     | 73.5     | 36.5        | 36.5 | 36.5 |
| Effective Green, g (s)           |          | 22.6     |               | 11.0  | 11.0       | 11.0       | 16.2    | 16.2     | 73.5     | 36.5        | 36.5 | 36.5 |
| Actuated g/C Ratio               |          | 0.22     |               | 0.10  | 0.10       | 0.10       | 0.15    | 0.15     | 0.70     | 0.35        | 0.35 | 0.35 |
| Clearance Time (s)               |          | 4.0      |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      |          | 4.9         | 4.9  | 4.9  |
| Vehicle Extension (s)            |          | 2.0      |               | 3.0   | 3.0        | 3.0        | 2.5     | 2.5      |          | 2.0         | 2.0  | 2.0  |
| Lane Grp Cap (vph)               |          | 644      |               | 294   | 159        | 135        | 225     | 451      | 916      | 493         | 1027 | 445  |
| v/s Ratio Prot                   |          | c0.16    |               | 0.07  | c0.08      |            | 0.02    | c0.12    | 0.23     | c0.19       | 0.19 |      |
| v/s Ratio Perm                   |          |          |               |       |            | 0.01       |         |          |          |             |      | 0.04 |
| v/c Ratio                        |          | 0.75     |               | 0.69  | 0.73       | 0.05       | 0.16    | 0.78     | 0.32     | 0.54        | 0.53 | 0.10 |
| Uniform Delay, d1                |          | 38.5     |               | 45.3  | 45.6       | 42.3       | 38.5    | 42.7     | 6.1      | 27.5        | 27.4 | 23.2 |
| 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            |          | 4.1      |               | 6.5   | 15.4       | 0.1        | 0.2     | 7.9      | 0.2      | 4.2         | 2.0  | 0.5  |
| Delay (s)                        |          | 42.6     |               | 51.9  | 61.0       | 42.4       | 38.7    | 50.6     | 6.3      | 31.7        | 29.4 | 23.6 |
| Level of Service                 |          | D        |               | D     | Е          | D          | D       | D        | Α        | С           | С    | С    |
| Approach Delay (s)               |          | 42.6     |               |       | 53.1       |            |         | 30.7     |          |             | 29.3 |      |
| Approach LOS                     |          | D        |               |       | D          |            |         | С        |          |             | С    |      |
| Intersection Summary             |          |          |               |       |            |            |         |          |          |             |      |      |
| HCM 2000 Control Delay           |          |          | 35.9          | Н     | CM 2000    | Level of S | Service |          | D        |             |      |      |
| HCM 2000 Volume to Capacity      | y ratio  |          | 0.66          |       |            |            |         |          |          |             |      |      |
| Actuated Cycle Length (s)        |          |          | 105.0         | S     | um of lost | t time (s) |         |          | 18.7     |             |      |      |
| Intersection Capacity Utilizatio | n        |          | 72.1%         | IC    | CU Level   | of Service |         |          | С        |             |      |      |
| Analysis Period (min)            |          |          | 15            |       |            |            |         |          |          |             |      |      |
| ! Phase conflict between lan     | e groups | 3.       |               |       |            |            |         |          |          |             |      |      |
| c Critical Lane Group            |          |          |               |       |            |            |         |          |          |             |      |      |

|                                | ۶          | <b>→</b> | •               | •    | <b>&gt;</b> | 4              |    |      |
|--------------------------------|------------|----------|-----------------|------|-------------|----------------|----|------|
| Movement                       | EBL        | EBT      | WBT             | WBR  | SBL         | SBR            |    |      |
| Lane Configurations            | ሻ          | <b>^</b> | <del>ተ</del> ተጉ |      | ሻ           | 7              |    |      |
| Traffic Volume (vph)           | 37         | 833      | 504             | 40   | 54          | 19             |    |      |
| Future Volume (vph)            | 37         | 833      | 504             | 40   | 54          | 19             |    |      |
| Ideal Flow (vphpl)             | 1900       | 1900     | 1900            | 1900 | 1900        | 1900           |    |      |
| Total Lost time (s)            | 4.0        | 4.9      | 4.9             |      | 4.2         | 4.2            |    |      |
| Lane Util. Factor              | 1.00       | 0.91     | 0.91            |      | 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)              | 1736       | 4988     | 4540            |      | 1703        | 1524           |    |      |
| Flt Permitted                  | 0.95       | 1.00     | 1.00            |      | 0.95        | 1.00           |    |      |
| Satd. Flow (perm)              | 1736       | 4988     | 4540            |      | 1703        | 1524           |    |      |
| Peak-hour factor, PHF          | 0.93       | 0.93     | 0.93            | 0.93 | 0.93        | 0.93           |    |      |
| Adj. Flow (vph)                | 40         | 896      | 542             | 43   | 58          | 20             |    |      |
| RTOR Reduction (vph)           | 0          | 0        | 3               | 0    | 0           | 18             |    |      |
| Lane Group Flow (vph)          | 40         | 896      | 582             | 0    | 58          | 2              |    |      |
| Heavy Vehicles (%)             | 4%         | 4%       | 13%             | 13%  | 6%          | 6%             |    |      |
| Turn Type                      | Prot       | NA       | NA              |      | Prot        | Perm           | •  |      |
| Protected Phases               | 5          | 2        | 6               |      | 3           |                |    |      |
| Permitted Phases               |            |          |                 |      |             | 3              |    |      |
| Actuated Green, G (s)          | 5.5        | 81.3     | 71.8            |      | 9.6         | 9.6            |    |      |
| Effective Green, g (s)         | 5.5        | 81.3     | 71.8            |      | 9.6         | 9.6            |    |      |
| Actuated g/C Ratio             | 0.06       | 0.81     | 0.72            |      | 0.10        | 0.10           |    |      |
| Clearance Time (s)             | 4.0        | 4.9      | 4.9             |      | 4.2         | 4.2            |    |      |
| Vehicle Extension (s)          | 2.0        | 2.0      | 2.0             |      | 2.0         | 2.0            |    |      |
| Lane Grp Cap (vph)             | 95         | 4055     | 3259            |      | 163         | 146            |    |      |
| v/s Ratio Prot                 | c0.02      | c0.18    | 0.13            |      | c0.03       |                |    |      |
| v/s Ratio Perm                 |            |          |                 |      |             | 0.00           |    |      |
| v/c Ratio                      | 0.42       | 0.22     | 0.18            |      | 0.36        | 0.01           |    |      |
| Uniform Delay, d1              | 45.7       | 2.1      | 4.6             |      | 42.3        | 40.9           |    |      |
| Progression Factor             | 1.00       | 1.00     | 0.96            |      | 1.00        | 1.00           |    |      |
| Incremental Delay, d2          | 1.1        | 0.1      | 0.1             |      | 0.5         | 0.0            |    |      |
| Delay (s)                      | 46.8       | 2.3      | 4.5             |      | 42.8        | 40.9           |    |      |
| Level of Service               | D          | Α        | Α               |      | D           | D              |    |      |
| Approach Delay (s)             |            | 4.2      | 4.5             |      | 42.3        |                |    |      |
| Approach LOS                   |            | Α        | Α               |      | D           |                |    |      |
| Intersection Summary           |            |          |                 |      |             |                |    |      |
| HCM 2000 Control Delay         |            |          | 6.1             | H    | CM 2000     | Level of Servi | ce | Α    |
| HCM 2000 Volume to Capac       | city ratio |          | 0.27            |      |             |                |    |      |
| Actuated Cycle Length (s)      |            |          | 100.0           | Sı   | um of lost  | t time (s)     |    | 17.1 |
| Intersection Capacity Utilizat | tion       |          | 40.9%           |      |             | of Service     |    | Α    |
| Analysis Period (min)          |            |          | 15              |      |             |                |    |      |
| c Critical Lane Group          |            |          |                 |      |             |                |    |      |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway 图标识题 Oyster Po

|                                 | <b></b>   | ۶     | <b>→</b> | •    | •         | <b>+</b>   | 4        | •     | †     | <i>&gt;</i> | <b>\</b> | <del> </del> |
|---------------------------------|-----------|-------|----------|------|-----------|------------|----------|-------|-------|-------------|----------|--------------|
| Movement                        | EBU       | EBL   | EBT      | EBR  | WBL2      | WBT        | WBR      | NBL   | NBT   | NBR         | SBL      | SBT          |
| Lane Configurations             |           | ă     | ተተኈ      |      | ٦         | ተተኈ        |          | 1,4   | ર્ન   | 7           |          | 4Th          |
| Traffic Volume (vph)            | 1         | 318   | 1257     | 291  | 46        | 402        | 20       | 172   | 92    | 127         | 7        | 16           |
| Future Volume (vph)             | 1         | 318   | 1257     | 291  | 46        | 402        | 20       | 172   | 92    | 127         | 7        | 16           |
| Ideal Flow (vphpl)              | 1900      | 1900  | 1900     | 1900 | 1900      | 1900       | 1900     | 1900  | 1900  | 1900        | 1900     | 1900         |
| Total Lost time (s)             |           | 4.0   | 4.6      |      | 4.0       | 4.6        |          | 4.0   | 4.0   | 4.0         |          | 4.0          |
| Lane Util. Factor               |           | 1.00  | 0.91     |      | 1.00      | 0.91       |          | 0.91  | 0.91  | 1.00        |          | 0.95         |
| Frpb, ped/bikes                 |           | 1.00  | 1.00     |      | 1.00      | 1.00       |          | 1.00  | 1.00  | 0.93        |          | 0.99         |
| Flpb, ped/bikes                 |           | 1.00  | 1.00     |      | 1.00      | 1.00       |          | 1.00  | 1.00  | 1.00        |          | 1.00         |
| Frt                             |           | 1.00  | 0.97     |      | 1.00      | 0.99       |          | 1.00  | 1.00  | 0.85        |          | 0.92         |
| Flt Protected                   |           | 0.95  | 1.00     |      | 0.95      | 1.00       |          | 0.95  | 0.99  | 1.00        |          | 0.99         |
| Satd. Flow (prot)               |           | 1752  | 4877     |      | 1480      | 4213       |          | 3042  | 1588  | 1395        |          | 2789         |
| Flt Permitted                   |           | 0.95  | 1.00     |      | 0.95      | 1.00       |          | 0.95  | 0.99  | 1.00        |          | 0.99         |
| Satd. Flow (perm)               |           | 1752  | 4877     |      | 1480      | 4213       |          | 3042  | 1588  | 1395        |          | 2789         |
| Peak-hour factor, PHF           | 0.92      | 0.88  | 0.88     | 0.88 | 0.88      | 0.88       | 0.88     | 0.88  | 0.88  | 0.88        | 0.88     | 0.88         |
| Adj. Flow (vph)                 | 1         | 361   | 1428     | 331  | 52        | 457        | 23       | 195   | 105   | 144         | 8        | 18           |
| RTOR Reduction (vph)            | 0         | 0     | 0        | 0    | 0         | 4          | 0        | 0     | 0     | 116         | 0        | 51           |
| Lane Group Flow (vph)           | 0         | 362   | 1759     | 0    | 52        | 476        | 0        | 175   | 125   | 28          | 0        | 2            |
| Confl. Peds. (#/hr)             |           |       |          |      |           |            | 9        |       |       | 51          |          |              |
| Confl. Bikes (#/hr)             |           |       |          | 9    |           |            | 1        |       |       | 4           |          |              |
| Heavy Vehicles (%)              | 2%        | 3%    | 3%       | 3%   | 22%       | 22%        | 22%      | 8%    | 8%    | 8%          | 17%      | 17%          |
| Turn Type                       | Prot      | Prot  | NA       |      | Prot      | NA         |          | Split | NA    | Perm        | Split    | NA           |
| Protected Phases                | 1         | 1     | 6        |      | 5         | 2          |          | 4     | 4     |             | . 7      | 7            |
| Permitted Phases                |           |       |          |      |           |            |          |       |       | 4           |          |              |
| Actuated Green, G (s)           |           | 14.6  | 36.4     |      | 7.3       | 29.1       |          | 22.8  | 22.8  | 22.8        |          | 3.4          |
| Effective Green, g (s)          |           | 14.6  | 36.4     |      | 7.3       | 29.1       |          | 22.8  | 22.8  | 22.8        |          | 3.4          |
| Actuated g/C Ratio              |           | 0.12  | 0.31     |      | 0.06      | 0.24       |          | 0.19  | 0.19  | 0.19        |          | 0.03         |
| Clearance Time (s)              |           | 4.0   | 4.6      |      | 4.0       | 4.6        |          | 4.0   | 4.0   | 4.0         |          | 4.0          |
| Vehicle Extension (s)           |           | 2.0   | 3.0      |      | 2.0       | 3.0        |          | 2.0   | 2.0   | 2.0         |          | 2.0          |
| Lane Grp Cap (vph)              |           | 214   | 1491     |      | 90        | 1030       |          | 582   | 304   | 267         |          | 79           |
| v/s Ratio Prot                  |           | c0.21 | c0.36    |      | 0.04      | 0.11       |          | 0.06  | c0.08 |             |          | c0.00        |
| v/s Ratio Perm                  |           |       |          |      |           |            |          |       |       | 0.02        |          |              |
| v/c Ratio                       |           | 1.69  | 1.18     |      | 0.58      | 0.46       |          | 0.30  | 0.41  | 0.10        |          | 0.02         |
| Uniform Delay, d1               |           | 52.2  | 41.3     |      | 54.4      | 38.3       |          | 41.3  | 42.2  | 39.7        |          | 56.2         |
| Progression Factor              |           | 1.00  | 1.00     |      | 1.00      | 1.00       |          | 1.00  | 1.00  | 1.00        |          | 1.00         |
| Incremental Delay, d2           |           | 330.6 | 88.2     |      | 5.5       | 0.3        |          | 0.1   | 0.3   | 0.1         |          | 0.0          |
| Delay (s)                       |           | 382.8 | 129.5    |      | 59.8      | 38.6       |          | 41.4  | 42.5  | 39.7        |          | 56.2         |
| Level of Service                |           | F     | F        |      | Е         | D          |          | D     | D     | D           |          | Е            |
| Approach Delay (s)              |           |       | 172.7    |      |           | 40.7       |          |       | 41.2  |             |          | 56.2         |
| Approach LOS                    |           |       | F        |      |           | D          |          |       | D     |             |          | Е            |
| Intersection Summary            |           |       |          |      |           |            |          |       |       |             |          |              |
| HCM 2000 Control Delay          |           |       | 111.9    | H    | ICM 2000  | Level of   | Service  |       | F     |             |          |              |
| HCM 2000 Volume to Capac        | ity ratio |       | 1.00     | •    | 2000      | 2010.0.    | 0011100  |       |       |             |          |              |
| Actuated Cycle Length (s)       | ,         |       | 119.0    | S    | um of los | t time (s) |          |       | 21.1  |             |          |              |
| Intersection Capacity Utilizati | ion       |       | 97.9%    |      | CU Level  |            | <u> </u> |       | F     |             |          |              |
| Analysis Period (min)           |           |       | 15       |      | 2 20101   | 501 VIOC   |          |       | •     |             |          |              |
| c Critical Lane Group           |           |       |          |      |           |            |          |       |       |             |          |              |
|                                 |           |       |          |      |           |            |          |       |       |             |          |              |

# HCM Signalized Intersection Capacity Analysis 17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway 图标识题 Oyster Po

|                                  | 4    | /     | 4     |
|----------------------------------|------|-------|-------|
| Movement                         | SBR2 | NER   | NER2  |
| Lanciconfigurations              |      | 77    | 7     |
| Traffic Volume (vph)             | 24   | 704   | 319   |
| Future Volume (vph)              | 24   | 704   | 319   |
| Ideal Flow (vphpl)               | 1900 | 1990  | 1900  |
| Total Lost time (s)              |      | 4.5   | 4.5   |
| Lane Util. Factor                |      | *0.95 | 1.00  |
| Frpb, ped/bikes                  |      | 1.00  | 1.00  |
| Flpb, ped/bikes                  |      | 1.00  | 1.00  |
| Frt                              |      | 1.00  | 0.85  |
| Flt Protected                    |      | 1.00  | 1.00  |
| Satd. Flow (prot)                |      | 3781  | 1615  |
| Flt Permitted                    |      | 1.00  | 1.00  |
| Satd. Flow (perm)                |      | 3781  | 1615  |
| Peak-hour factor, PHF            | 0.88 | 0.88  | 0.88  |
| Adj. Flow (vph)                  | 27   | 800   | 362   |
| RTOR Reduction (vph)             | 0    | 0     | 0     |
| Lane Group Flow (vph)            | 0    | 800   | 363   |
| Confl. Peds. (#/hr)              | •    |       | 63    |
| Confl. Bikes (#/hr)              | 2    |       |       |
| Heavy Vehicles (%)               | 17%  | 0%    | 0%    |
| Turn Type                        | , ,  | Prot  | Prot  |
| Protected Phases                 |      | 3     | 3     |
| Permitted Phases                 |      | U     | U     |
| Actuated Green, G (s)            |      | 28.0  | 28.0  |
| Effective Green, g (s)           |      | 28.0  | 28.0  |
| Actuated g/C Ratio               |      | 0.24  | 0.24  |
| Clearance Time (s)               |      | 4.5   | 4.5   |
| Vehicle Extension (s)            |      | 2.0   | 2.0   |
| Lane Grp Cap (vph)               |      | 889   | 380   |
| v/s Ratio Prot                   |      | 0.21  | c0.22 |
| v/s Ratio Prot<br>v/s Ratio Perm |      | 0.21  | 60.22 |
| v/c Ratio                        |      | 0.90  | 0.96  |
| Uniform Delay, d1                |      | 44.1  | 44.9  |
|                                  |      |       |       |
| Progression Factor               |      | 1.00  | 1.00  |
| Incremental Delay, d2            |      | 11.6  | 34.1  |
| Delay (s)                        |      | 55.7  | 79.0  |
| Level of Service                 |      | E     | Е     |
| Approach Delay (s)               |      |       |       |
| Approach LOS                     |      |       |       |
| Intersection Summary             |      |       |       |
|                                  |      |       |       |

|                               | ۶          | <b>→</b>   | •     | •    | <b>←</b>    | 4          | 4       | <b>†</b> | ~    | <b>/</b> | <b>↓</b> | 4    |
|-------------------------------|------------|------------|-------|------|-------------|------------|---------|----------|------|----------|----------|------|
| Movement                      | EBL        | EBT        | EBR   | WBL  | WBT         | WBR        | NBL     | NBT      | NBR  | SBL      | SBT      | SBR  |
| Lane Configurations           | ሻ          | <b>∱</b> } |       | ሻ    | <b>∱</b> 1≽ |            |         | 4        |      |          | <b>†</b> | 7    |
| Traffic Volume (vph)          | 135        | 477        | 3     | 1    | 116         | 24         | 2       | 2        | 0    | 51       | 2        | 70   |
| Future Volume (vph)           | 135        | 477        | 3     | 1    | 116         | 24         | 2       | 2        | 0    | 51       | 2        | 70   |
| Ideal Flow (vphpl)            | 1900       | 1900       | 1900  | 1900 | 1900        | 1900       | 1900    | 1900     | 1900 | 1900     | 1900     | 1900 |
| Total Lost time (s)           | 4.0        | 4.0        |       | 4.0  | 4.0         |            |         | 4.0      |      |          | 4.0      | 4.0  |
| Lane Util. Factor             | 1.00       | 0.95       |       | 1.00 | 0.95        |            |         | 1.00     |      |          | 1.00     | 1.00 |
| Frpb, ped/bikes               | 1.00       | 1.00       |       | 1.00 | 0.99        |            |         | 1.00     |      |          | 1.00     | 1.00 |
| Flpb, ped/bikes               | 1.00       | 1.00       |       | 1.00 | 1.00        |            |         | 1.00     |      |          | 1.00     | 1.00 |
| Frt                           | 1.00       | 1.00       |       | 1.00 | 0.97        |            |         | 1.00     |      |          | 1.00     | 0.85 |
| Flt Protected                 | 0.95       | 1.00       |       | 0.95 | 1.00        |            |         | 0.98     |      |          | 0.95     | 1.00 |
| Satd. Flow (prot)             | 1752       | 3502       |       | 1378 | 2670        |            |         | 1854     |      |          | 1523     | 1357 |
| Flt Permitted                 | 0.95       | 1.00       |       | 0.95 | 1.00        |            |         | 1.00     |      |          | 0.73     | 1.00 |
| Satd. Flow (perm)             | 1752       | 3502       |       | 1378 | 2670        |            |         | 1900     |      |          | 1167     | 1357 |
| 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)               | 157        | 555        | 3     | 1    | 135         | 28         | 2       | 2        | 0    | 59       | 2        | 81   |
| RTOR Reduction (vph)          | 0          | 0          | 0     | 0    | 0           | 0          | 0       | 0        | 0    | 0        | 0        | 71   |
| Lane Group Flow (vph)         | 157        | 558        | 0     | 1    | 163         | 0          | 0       | 4        | 0    | 0        | 61       | 10   |
| Confl. Peds. (#/hr)           |            |            |       |      |             | 11         |         |          |      |          |          |      |
| Confl. Bikes (#/hr)           |            |            | 1     |      |             | 1          |         |          |      |          |          |      |
| Heavy Vehicles (%)            | 3%         | 3%         | 3%    | 31%  | 31%         | 31%        | 0%      | 0%       | 0%   | 19%      | 19%      | 19%  |
| Turn Type                     | Prot       | NA         |       | Prot | NA          |            | Perm    | NA       |      | Perm     | NA       | Perm |
| Protected Phases              | 5          | 2          |       | 1    | 6           |            |         | 3        |      |          | 4        |      |
| Permitted Phases              | •          |            |       |      | -           |            | 3       |          |      | 4        |          | 4    |
| Actuated Green, G (s)         | 9.1        | 27.5       |       | 0.6  | 19.0        |            |         | 0.6      |      |          | 6.2      | 6.2  |
| Effective Green, g (s)        | 9.1        | 27.5       |       | 0.6  | 19.0        |            |         | 0.6      |      |          | 6.2      | 6.2  |
| Actuated g/C Ratio            | 0.18       | 0.54       |       | 0.01 | 0.37        |            |         | 0.01     |      |          | 0.12     | 0.12 |
| Clearance Time (s)            | 4.0        | 4.0        |       | 4.0  | 4.0         |            |         | 4.0      |      |          | 4.0      | 4.0  |
| Vehicle Extension (s)         | 2.0        | 2.5        |       | 2.0  | 2.5         |            |         | 2.0      |      |          | 2.0      | 2.0  |
| Lane Grp Cap (vph)            | 313        | 1892       |       | 16   | 996         |            |         | 22       |      |          | 142      | 165  |
| v/s Ratio Prot                | c0.09      | c0.16      |       | 0.00 | 0.06        |            |         |          |      |          |          | 100  |
| v/s Ratio Perm                | 00.00      | 00.10      |       | 0.00 | 0.00        |            |         | c0.00    |      |          | c0.05    | 0.01 |
| v/c Ratio                     | 0.50       | 0.29       |       | 0.06 | 0.16        |            |         | 0.18     |      |          | 0.43     | 0.06 |
| Uniform Delay, d1             | 18.9       | 6.4        |       | 24.9 | 10.6        |            |         | 24.9     |      |          | 20.7     | 19.8 |
| Progression Factor            | 1.00       | 1.00       |       | 1.00 | 1.00        |            |         | 1.00     |      |          | 1.00     | 1.00 |
| Incremental Delay, d2         | 0.5        | 0.1        |       | 0.6  | 0.1         |            |         | 1.4      |      |          | 0.8      | 0.1  |
| Delay (s)                     | 19.3       | 6.5        |       | 25.5 | 10.7        |            |         | 26.4     |      |          | 21.5     | 19.8 |
| Level of Service              | В          | A          |       | C    | В           |            |         | C        |      |          | C        | В    |
| Approach Delay (s)            |            | 9.3        |       |      | 10.8        |            |         | 26.4     |      |          | 20.5     |      |
| Approach LOS                  |            | A          |       |      | В           |            |         | С        |      |          | C        |      |
| Intersection Summary          |            |            |       |      |             |            |         |          |      |          |          |      |
| HCM 2000 Control Delay        |            |            | 11.2  | Н    | CM 2000     | Level of   | Service |          | В    |          |          |      |
| HCM 2000 Volume to Capa       | city ratio |            | 0.39  |      |             |            |         |          |      |          |          |      |
| Actuated Cycle Length (s)     |            |            | 50.9  | S    | um of lost  | time (s)   |         |          | 16.0 |          |          |      |
| Intersection Capacity Utiliza | ition      |            | 35.2% | IC   | CU Level    | of Service | 1       |          | Α    |          |          |      |
| Analysis Period (min)         |            |            | 15    |      |             |            |         |          |      |          |          |      |
| c Critical Lane Group         |            |            |       |      |             |            |         |          |      |          |          |      |

| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations        |      | ર્ન  | 7    | 7    | ĵ»   |      |      | ર્ન  | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 3    | 79   | 24   | 104  | 419  | 2    | 318  | 0    | 73   | 0    | 1    | 0    |
| Future Vol, veh/h          | 3    | 79   | 24   | 104  | 419  | 2    | 318  | 0    | 73   | 0    | 1    | 0    |
| Peak Hour Factor           | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles, %          | 22   | 22   | 22   | 10   | 10   | 10   | 7    | 7    | 7    | 100  | 100  | 100  |
| Mvmt Flow                  | 3    | 83   | 25   | 109  | 441  | 2    | 335  | 0    | 77   | 0    | 1    | 0    |
| Number of Lanes            | 0    | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      |      | SB   |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      |      | NB   |      |
| Opposing Lanes             | 2    |      |      | 2    |      |      | 1    |      |      |      | 2    |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      |      | WB   |      |
| Conflicting Lanes Left     | 1    |      |      | 2    |      |      | 2    |      |      |      | 2    |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      |      | EB   |      |
| Conflicting Lanes Right    | 2    |      |      | 1    |      |      | 2    |      |      |      | 2    |      |
| HCM Control Delay          | 11   |      |      | 24.1 |      |      | 19.9 |      |      |      | 12.2 |      |
| HCM LOS                    | В    |      |      | С    |      |      | С    |      |      |      | В    |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 |  |
|------------------------|-------|-------|-------|-------|-------|-------|-------|--|
| Vol Left, %            | 100%  | 0%    | 4%    | 0%    | 100%  | 0%    | 0%    |  |
| Vol Thru, %            | 0%    | 0%    | 96%   | 0%    | 0%    | 100%  | 100%  |  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 0%    | 0%    |  |
| Sign Control           | Stop  |  |
| Traffic Vol by Lane    | 318   | 73    | 82    | 24    | 104   | 421   | 1     |  |
| LT Vol                 | 318   | 0     | 3     | 0     | 104   | 0     | 0     |  |
| Through Vol            | 0     | 0     | 79    | 0     | 0     | 419   | 1     |  |
| RT Vol                 | 0     | 73    | 0     | 24    | 0     | 2     | 0     |  |
| Lane Flow Rate         | 335   | 77    | 86    | 25    | 109   | 443   | 1     |  |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6     |  |
| Degree of Util (X)     | 0.656 | 0.125 | 0.173 | 0.045 | 0.207 | 0.773 | 0.003 |  |
| Departure Headway (Hd) | 7.059 | 5.846 | 7.199 | 6.464 | 6.791 | 6.28  | 9.069 |  |
| Convergence, Y/N       | Yes   |  |
| Сар                    | 512   | 612   | 497   | 552   | 529   | 576   | 393   |  |
| Service Time           | 4.808 | 3.595 | 4.966 | 4.23  | 4.535 | 4.025 | 7.152 |  |
| HCM Lane V/C Ratio     | 0.654 | 0.126 | 0.173 | 0.045 | 0.206 | 0.769 | 0.003 |  |
| HCM Control Delay      | 22.3  | 9.4   | 11.5  | 9.5   | 11.3  | 27.3  | 12.2  |  |
| HCM Lane LOS           | С     | Α     | В     | Α     | В     | D     | В     |  |
| HCM 95th-tile Q        | 4.7   | 0.4   | 0.6   | 0.1   | 0.8   | 7.1   | 0     |  |

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b> | •    | •    | <b>†</b>   | ~    | <b>/</b> | <b>+</b>   | ✓        |
|------------------------------|------|----------|------|------|----------|------|------|------------|------|----------|------------|----------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT        | NBR  | SBL      | SBT        | SBR      |
| Lane Configurations          | 7    | <b>₽</b> |      | 7    | 4î       |      | Ţ    | <b>∱</b> ⊅ |      | 7        | <b>∱</b> β | _        |
| Traffic Volume (veh/h)       | 130  | 4        | 61   | 8    | 4        | 12   | 27   | 572        | 5    | 8        | 197        | 12       |
| Future Volume (veh/h)        | 130  | 4        | 61   | 8    | 4        | 12   | 27   | 572        | 5    | 8        | 197        | 12       |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 22         | 0    | 0        | 0          | 0        |
| Ped-Bike Adj(A_pbT)          | 0.96 |          | 0.96 | 0.96 |          | 0.95 | 1.00 |            | 0.97 | 1.00     |            | 0.97     |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00     | 1.00       | 1.00     |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No         |      |          | No         |          |
| Adj Sat Flow, veh/h/ln       | 1885 | 1885     | 1885 | 1648 | 1648     | 1648 | 1796 | 1796       | 1796 | 1811     | 1811       | 1811     |
| Adj Flow Rate, veh/h         | 141  | 4        | 6    | 9    | 4        | 1    | 29   | 622        | 5    | 9        | 214        | 10       |
| Peak Hour Factor             | 0.92 | 0.92     | 0.92 | 0.92 | 0.92     | 0.92 | 0.92 | 0.92       | 0.92 | 0.92     | 0.92       | 0.92     |
| Percent Heavy Veh, %         | 1    | 1        | 1    | 17   | 17       | 17   | 7    | 7          | 7    | 6        | 6          | 6        |
| Cap, veh/h                   | 334  | 117      | 176  | 301  | 222      | 56   | 83   | 2160       | 17   | 31       | 1979       | 92       |
| Arrive On Green              | 0.18 | 0.18     | 0.18 | 0.18 | 0.18     | 0.18 | 0.05 | 0.62       | 0.62 | 0.02     | 0.59       | 0.59     |
| Sat Flow, veh/h              | 1370 | 664      | 996  | 1193 | 1257     | 314  | 1711 | 3469       | 28   | 1725     | 3342       | 155      |
| Grp Volume(v), veh/h         | 141  | 0        | 10   | 9    | 0        | 5    | 29   | 306        | 321  | 9        | 110        | 114      |
| Grp Sat Flow(s),veh/h/ln     | 1370 | 0        | 1660 | 1193 | 0        | 1572 | 1711 | 1706       | 1790 | 1725     | 1721       | 1777     |
| Q Serve(g_s), s              | 7.1  | 0.0      | 0.4  | 0.5  | 0.0      | 0.2  | 1.2  | 6.2        | 6.2  | 0.4      | 2.1        | 2.1      |
| Cycle Q Clear(g_c), s        | 7.3  | 0.0      | 0.4  | 0.8  | 0.0      | 0.2  | 1.2  | 6.2        | 6.2  | 0.4      | 2.1        | 2.1      |
| Prop In Lane                 | 1.00 |          | 0.60 | 1.00 |          | 0.20 | 1.00 |            | 0.02 | 1.00     |            | 0.09     |
| Lane Grp Cap(c), veh/h       | 334  | 0        | 293  | 301  | 0        | 278  | 83   | 1062       | 1114 | 31       | 1019       | 1052     |
| V/C Ratio(X)                 | 0.42 | 0.00     | 0.03 | 0.03 | 0.00     | 0.02 | 0.35 | 0.29       | 0.29 | 0.29     | 0.11       | 0.11     |
| Avail Cap(c_a), veh/h        | 657  | 0        | 684  | 582  | 0        | 647  | 237  | 1062       | 1114 | 239      | 1019       | 1052     |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00     | 1.00       | 1.00     |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00     | 1.00       | 1.00     |
| Uniform Delay (d), s/veh     | 28.5 | 0.0      | 25.6 | 25.9 | 0.0      | 25.5 | 34.5 | 7.0        | 6.9  | 36.3     | 6.7        | 6.7      |
| Incr Delay (d2), s/veh       | 0.3  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.9  | 0.7        | 0.7  | 1.8      | 0.2        | 0.2      |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 1.1        | 1.0  | 0.0      | 0.0        | 0.0      |
| %ile BackOfQ(50%),veh/ln     | 2.3  | 0.0      | 0.1  | 0.1  | 0.0      | 0.1  | 0.5  | 3.1        | 3.2  | 0.2      | 0.7        | 0.7      |
| Unsig. Movement Delay, s/veh |      |          |      |      |          | _    | _    |            |      |          |            |          |
| LnGrp Delay(d),s/veh         | 28.8 | 0.0      | 25.6 | 25.9 | 0.0      | 25.5 | 35.5 | 8.7        | 8.6  | 38.2     | 6.9        | 6.9      |
| LnGrp LOS                    | С    | A        | С    | С    | A        | С    | D    | A          | A    | D        | A          | <u>A</u> |
| Approach Vol, veh/h          |      | 151      |      |      | 14       |      |      | 656        |      |          | 233        |          |
| Approach Delay, s/veh        |      | 28.6     |      |      | 25.8     |      |      | 9.8        |      |          | 8.1        |          |
| Approach LOS                 |      | С        |      |      | С        |      |      | Α          |      |          | Α          |          |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8          |      |          |            |          |
| Phs Duration (G+Y+Rc), s     | 5.4  | 51.8     |      | 17.9 | 7.6      | 49.5 |      | 17.9       |      |          |            |          |
| Change Period (Y+Rc), s      | 4.0  | 5.1      |      | 4.6  | 4.0      | 5.1  |      | 4.6        |      |          |            |          |
| Max Green Setting (Gmax), s  | 10.4 | 20.0     |      | 30.9 | 10.4     | 20.0 |      | 30.9       |      |          |            |          |
| Max Q Clear Time (g_c+l1), s | 2.4  | 8.2      |      | 9.3  | 3.2      | 4.1  |      | 2.8        |      |          |            |          |
| Green Ext Time (p_c), s      | 0.0  | 2.1      |      | 0.2  | 0.0      | 0.7  |      | 0.0        |      |          |            |          |
| Intersection Summary         |      |          |      |      |          |      |      |            |      |          |            |          |
| HCM 6th Ctrl Delay           |      |          | 12.4 |      |          |      |      |            |      |          |            |          |
| HCM 6th LOS                  |      |          | В    |      |          |      |      |            |      |          |            |          |

|  | <b>→</b> | •        | •         | <b>←</b> | •         | ~    |      |
|--|----------|----------|-----------|----------|-----------|------|------|
| Movement   | EBT      | EBR      | WBL       | WBT      | NBL       | NBR  |      |
| Lane Configurations                                | <b>1</b> | LDIT     | ሻ         | <b>^</b> | ሻ         | 77   |      |
| Traffic Volume (veh/h)                             | 214      | 28       | 11        | 1381     | 233       | 229  |      |
| Future Volume (veh/h)                              | 214      | 28       | 11        | 1381     | 233       | 229  |      |
| Initial Q (Qb), veh                                | 0        | 0        | 0         | 0        | 5         | 0    |      |
| Ped-Bike Adj(A_pbT)                                | U        | 0.96     | 1.00      | U        | 1.00      | 1.00 |      |
| Parking Bus, Adj                                   | 1.00     | 1.00     | 1.00      | 1.00     | 1.00      | 1.00 |      |
| Work Zone On Approach                              | No       | 1.00     | 1.00      | No       | No        | 1.00 |      |
| Adj Sat Flow, veh/h/ln                             | 1781     | 1781     | 1856      | 1856     | 1781      | 1781 |      |
| Adj Flow Rate, veh/h                               | 216      | 19       | 11        | 1395     | 235       | 0    |      |
| Peak Hour Factor                                   | 0.99     | 0.99     | 0.99      | 0.99     | 0.99      | 0.99 |      |
| Percent Heavy Veh, %                               | 8        | 8        | 3         | 3        | 8         | 8    |      |
| Cap, veh/h   | 3136     | 269      | 28        | 3778     | 296       |      |      |
| Arrive On Green                                    | 1.00     | 1.00     | 0.02      | 0.76     | 0.16      | 0.00 |      |
| Sat Flow, veh/h                                    | 4706     | 390      | 1767      | 5233     | 1697      | 2657 |      |
| Grp Volume(v), veh/h                               | 152      | 83       | 11        | 1395     | 235       | 0    |      |
| Grp Sat Flow(s), veh/h/ln                          | 1621     | 1693     | 1767      | 1689     | 1697      | 1329 |      |
| Q Serve(g_s), s                                    | 0.0      | 0.0      | 0.6       | 9.3      | 13.4      | 0.0  |      |
| Cycle Q Clear(g_c), s                              | 0.0      | 0.0      | 0.6       | 9.3      | 13.4      | 0.0  |      |
| Prop In Lane                                       | 0.0      | 0.0      | 1.00      | 9.3      | 1.00      | 1.00 |      |
| Lane Grp Cap(c), veh/h                             | 2237     | 1168     | 28        | 3778     | 296       | 1.00 |      |
| V/C Ratio(X)                                       | 0.07     | 0.07     | 0.39      | 0.37     | 0.79      |      |      |
| Avail Cap(c_a), veh/h                              | 2272     | 1186     | 141       | 3832     | 696       |      |      |
| HCM Platoon Ratio                                  | 2.00     | 2.00     | 1.00      | 1.00     | 1.00      | 1.00 |      |
| Jpstream Filter(I)                                 | 1.00     | 1.00     | 0.84      | 0.84     | 1.00      | 0.00 |      |
|  | 0.1      | 0.1      | 48.7      | 4.6      | 40.1      | 0.00 |      |
| Uniform Delay (d), s/veh                           | 0.1      | 0.1      | 2.8       | 0.2      | 4.8       | 0.0  |      |
| Incr Delay (d2), s/veh                             | 0.1      | 0.0      | 0.0       | 0.2      | 10.0      | 0.0  |      |
| Initial Q Delay(d3),s/veh %ile BackOfQ(50%),veh/ln | 0.0      | 0.0      | 0.0       | 2.8      | 7.2       | 0.0  |      |
| Unsig. Movement Delay, s/veh                       |          | 0.0      | 0.5       | 2.0      | 1.2       | 0.0  |      |
| •  | 0.2      | 0.2      | 51.5      | 4.0      | 55 O      | 0.0  |      |
| LnGrp Delay(d),s/veh<br>LnGrp LOS                  | 0.2<br>A | 0.2<br>A | 51.5<br>D | 4.9<br>A | 55.0<br>E | 0.0  |      |
|  |          | A        | U         |          |           | ٨    |      |
| Approach Vol, veh/h                                | 235      |          |           | 1406     | 235       | Α    |      |
| Approach Delay, s/veh                              | 0.2      |          |           | 5.2      | 55.0      |      |      |
| Approach LOS                                       | Α        |          |           | Α        | Е         |      |      |
| Fimer - Assigned Phs                               | 1        | 2        |           |          |           | 6    | 8    |
| Phs Duration (G+Y+Rc), s                           | 5.6      | 74.1     |           |          |           | 79.6 | 20.4 |
| Change Period (Y+Rc), s                            | 4.0      | 4.0      |           |          |           | 4.0  | 4.0  |
| Max Green Setting (Gmax), s                        | 8.0      | 39.0     |           |          |           | 51.0 | 41.0 |
| Max Q Clear Time (g_c+I1), s                       | 2.6      | 2.0      |           |          |           | 11.3 | 15.4 |
| Green Ext Time (p_c), s                            | 0.0      | 0.9      |           |          |           | 8.4  | 0.9  |
| ntersection Summary                                |          |          |           |          |           |      |      |
| HCM 6th Ctrl Delay                                 |          |          | 10.8      |          |           |      |      |
| HCM 6th LOS  |          |          | В         |          |           |      |      |
| Notes  |          |          |           |          |           |      |      |

|                              | ۶        | <b>→</b>    | •    | •     | <b>—</b>    | •     | 1    | <b>†</b>   | <i>&gt;</i> | <b>/</b> | ţ          | √    |
|------------------------------|----------|-------------|------|-------|-------------|-------|------|------------|-------------|----------|------------|------|
| Movement                     | EBL      | EBT         | EBR  | WBL   | WBT         | WBR   | NBL  | NBT        | NBR         | SBL      | SBT        | SBR  |
| Lane Configurations          | <b>ነ</b> | <b>↑</b> ↑₽ |      | ሻ     | <b>↑</b> ↑₽ |       | ሻ    | <b>∱</b> ⊅ |             | ሻ        | <b>∱</b> ∱ |      |
| Traffic Volume (veh/h)       | 100      | 267         | 76   | 351   | 1134        | 177   | 75   | 122        | 70          | 59       | 289        | 183  |
| Future Volume (veh/h)        | 100      | 267         | 76   | 351   | 1134        | 177   | 75   | 122        | 70          | 59       | 289        | 183  |
| Initial Q (Qb), veh          | 0        | 0           | 0    | 0     | 34          | 0     | 0    | 0          | 0           | 0        | 32         | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00     |             | 0.99 | 1.00  |             | 0.95  | 1.00 |            | 1.00        | 1.00     |            | 1.00 |
| Parking Bus, Adj             | 1.00     | 1.00        | 1.00 | 1.00  | 1.00        | 1.00  | 1.00 | 1.00       | 1.00        | 1.00     | 1.00       | 1.00 |
| Work Zone On Approach        |          | No          |      |       | No          |       |      | No         |             |          | No         |      |
| Adj Sat Flow, veh/h/ln       | 1722     | 1722        | 1722 | 1870  | 1870        | 1870  | 1767 | 1767       | 1767        | 1856     | 1856       | 1856 |
| Adj Flow Rate, veh/h         | 103      | 275         | 51   | 362   | 1169        | 171   | 77   | 126        | 0           | 61       | 298        | 0    |
| Peak Hour Factor             | 0.97     | 0.97        | 0.97 | 0.97  | 0.97        | 0.97  | 0.97 | 0.97       | 0.97        | 0.97     | 0.97       | 0.97 |
| Percent Heavy Veh, %         | 12       | 12          | 12   | 2     | 2           | 2     | 9    | 9          | 9           | 3        | 3          | 3    |
| Cap, veh/h                   | 415      | 1728        | 308  | 381   | 1776        | 219   | 151  | 502        |             | 152      | 505        |      |
| Arrive On Green              | 0.28     | 0.46        | 0.46 | 0.43  | 0.77        | 0.77  | 0.09 | 0.12       | 0.00        | 0.09     | 0.11       | 0.00 |
| Sat Flow, veh/h              | 1640     | 4003        | 714  | 1781  | 4461        | 652   | 1682 | 3445       | 0           | 1767     | 3618       | 0    |
| Grp Volume(v), veh/h         | 103      | 213         | 113  | 362   | 892         | 448   | 77   | 126        | 0           | 61       | 298        | 0    |
| Grp Sat Flow(s),veh/h/ln     | 1640     | 1567        | 1583 | 1781  | 1702        | 1710  | 1682 | 1678       | 0           | 1767     | 1763       | 0    |
| Q Serve(g_s), s              | 7.2      | 5.9         | 6.2  | 29.4  | 18.7        | 18.7  | 6.5  | 5.1        | 0.0         | 4.9      | 12.3       | 0.0  |
| Cycle Q Clear(g_c), s        | 7.2      | 5.9         | 6.2  | 29.4  | 18.7        | 18.7  | 6.5  | 5.1        | 0.0         | 4.9      | 12.3       | 0.0  |
| Prop In Lane                 | 1.00     |             | 0.45 | 1.00  |             | 0.38  | 1.00 |            | 0.00        | 1.00     |            | 0.00 |
| Lane Grp Cap(c), veh/h       | 415      | 1353        | 683  | 381   | 1316        | 669   | 151  | 502        |             | 152      | 505        |      |
| V/C Ratio(X)                 | 0.25     | 0.16        | 0.17 | 0.95  | 0.68        | 0.67  | 0.51 | 0.25       |             | 0.40     | 0.59       |      |
| Avail Cap(c_a), veh/h        | 463      | 1444        | 729  | 539   | 1316        | 661   | 214  | 866        |             | 225      | 917        |      |
| HCM Platoon Ratio            | 1.00     | 1.00        | 1.00 | 2.00  | 2.00        | 2.00  | 1.00 | 1.00       | 1.00        | 1.00     | 1.00       | 1.00 |
| Upstream Filter(I)           | 0.99     | 0.99        | 0.99 | 0.67  | 0.67        | 0.67  | 1.00 | 1.00       | 0.00        | 1.00     | 1.00       | 0.00 |
| Uniform Delay (d), s/veh     | 44.9     | 26.3        | 26.4 | 42.1  | 13.5        | 13.3  | 65.1 | 56.6       | 0.0         | 64.9     | 62.6       | 0.0  |
| Incr Delay (d2), s/veh       | 0.1      | 0.2         | 0.5  | 14.4  | 1.9         | 3.6   | 1.0  | 0.1        | 0.0         | 0.6      | 0.4        | 0.0  |
| Initial Q Delay(d3),s/veh    | 0.0      | 0.0         | 0.0  | 0.0   | 6.6         | 6.3   | 0.0  | 0.0        | 0.0         | 0.0      | 70.3       | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 3.1      | 2.4         | 2.6  | 12.5  | 7.1         | 7.3   | 2.9  | 2.1        | 0.0         | 2.2      | 12.9       | 0.0  |
| Unsig. Movement Delay, s/veh |          |             |      |       |             |       |      |            |             |          |            |      |
| LnGrp Delay(d),s/veh         | 45.0     | 26.5        | 26.9 | 56.5  | 22.0        | 23.1  | 66.1 | 56.7       | 0.0         | 65.5     | 133.3      | 0.0  |
| LnGrp LOS                    | D        | С           | С    | E     | С           | С     | E    | E          |             | E        | F          |      |
| Approach Vol, veh/h          |          | 429         |      |       | 1702        |       |      | 203        | Α           |          | 359        | Α    |
| Approach Delay, s/veh        |          | 31.1        |      |       | 29.6        |       |      | 60.3       |             |          | 121.8      |      |
| Approach LOS                 |          | С           |      |       | С           |       |      | Е          |             |          | F          |      |
| Timer - Assigned Phs         | 1        | 2           | 3    | 4     | 5           | 6     | 7    | 8          |             |          |            |      |
| Phs Duration (G+Y+Rc), s     | 36.1     | 74.0        | 18.3 | 21.5  | 47.2        | 62.9  | 16.9 | 23.0       |             |          |            |      |
| Change Period (Y+Rc), s      | 4.0      | 4.9         | 4.9  | * 4.6 | 4.9         | * 4.9 | 4.0  | 4.9        |             |          |            |      |
| Max Green Setting (Gmax), s  | 45.4     | 29.0        | 19.1 | * 39  | 16.4        | * 58  | 19.1 | 38.7       |             |          |            |      |
| Max Q Clear Time (g_c+l1), s | 31.4     | 8.2         | 8.5  | 14.3  | 9.2         | 20.7  | 6.9  | 7.1        |             |          |            |      |
| Green Ext Time (p_c), s      | 0.7      | 1.3         | 0.1  | 1.1   | 0.1         | 7.3   | 0.1  | 0.5        |             |          |            |      |
| Intersection Summary         |          |             |      |       |             |       |      |            |             |          |            |      |
| HCM 6th Ctrl Delay           |          |             | 44.5 |       |             |       |      |            |             |          |            |      |
| HCM 6th LOS                  |          |             | D    |       |             |       |      |            |             |          |            |      |

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|                              | ۶    | <b>→</b>   | •    | •    | <b>←</b>   | •     | 4    | <b>†</b> | <b>/</b> | <b>/</b> | ļ    | 4    |
|------------------------------|------|------------|------|------|------------|-------|------|----------|----------|----------|------|------|
| Movement                     | EBL  | EBT        | EBR  | WBL  | WBT        | WBR   | NBL  | NBT      | NBR      | SBL      | SBT  | SBR  |
| Lane Configurations          | 1,4  | <b>∱</b> ∱ |      | ሻ    | <b>∱</b> ∱ |       | ሻ    | 4        | 7        | ሻ        | ₽    | 7    |
| Traffic Volume (veh/h)       | 109  | 216        | 71   | 86   | 1100       | 14    | 188  | 34       | 29       | 36       | 186  | 374  |
| Future Volume (veh/h)        | 109  | 216        | 71   | 86   | 1100       | 14    | 188  | 34       | 29       | 36       | 186  | 374  |
| Initial Q (Qb), veh          | 0    | 0          | 0    | 0    | 0          | 0     | 0    | 0        | 0        | 0        | 0    | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |            | 0.98 | 1.00 |            | 0.88  | 1.00 |          | 0.97     | 1.00     |      | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00       | 1.00 | 1.00 | 1.00       | 1.00  | 1.00 | 1.00     | 1.00     | 1.00     | 1.00 | 1.00 |
| Work Zone On Approach        |      | No         |      |      | No         |       |      | No       |          |          | No   |      |
| Adj Sat Flow, veh/h/ln       | 1663 | 1663       | 1663 | 1856 | 1856       | 1856  | 1767 | 1767     | 1767     | 1826     | 1826 | 1826 |
| Adj Flow Rate, veh/h         | 115  | 227        | 75   | 91   | 1158       | 14    | 224  | 0        | 2        | 38       | 196  | 166  |
| Peak Hour Factor             | 0.95 | 0.95       | 0.95 | 0.95 | 0.95       | 0.95  | 0.95 | 0.95     | 0.95     | 0.95     | 0.95 | 0.95 |
| Percent Heavy Veh, %         | 16   | 16         | 16   | 3    | 3          | 3     | 9    | 9        | 9        | 5        | 5    | 5    |
| Cap, veh/h                   | 916  | 1266       | 406  | 161  | 1189       | 14    | 302  | 0        | 130      | 278      | 291  | 238  |
| Arrive On Green              | 0.20 | 0.36       | 0.36 | 0.09 | 0.33       | 0.33  | 0.09 | 0.00     | 0.09     | 0.16     | 0.16 | 0.16 |
| Sat Flow, veh/h              | 3072 | 2341       | 751  | 1767 | 3561       | 43    | 3365 | 0        | 1452     | 1739     | 1826 | 1493 |
| Grp Volume(v), veh/h         | 115  | 151        | 151  | 91   | 573        | 599   | 224  | 0        | 2        | 38       | 196  | 166  |
| Grp Sat Flow(s),veh/h/ln     | 1536 | 1580       | 1512 | 1767 | 1763       | 1841  | 1682 | 0        | 1452     | 1739     | 1826 | 1493 |
| Q Serve(g_s), s              | 4.6  | 9.8        | 10.2 | 7.4  | 48.1       | 48.2  | 9.7  | 0.0      | 0.2      | 2.8      | 15.2 | 15.8 |
| Cycle Q Clear(g_c), s        | 4.6  | 9.8        | 10.2 | 7.4  | 48.1       | 48.2  | 9.7  | 0.0      | 0.2      | 2.8      | 15.2 | 15.8 |
| Prop In Lane                 | 1.00 |            | 0.50 | 1.00 |            | 0.02  | 1.00 |          | 1.00     | 1.00     |      | 1.00 |
| Lane Grp Cap(c), veh/h       | 916  | 854        | 818  | 161  | 589        | 615   | 302  | 0        | 130      | 278      | 291  | 238  |
| V/C Ratio(X)                 | 0.13 | 0.18       | 0.18 | 0.56 | 0.97       | 0.97  | 0.74 | 0.00     | 0.02     | 0.14     | 0.67 | 0.70 |
| Avail Cap(c_a), veh/h        | 916  | 854        | 818  | 284  | 589        | 615   | 628  | 0        | 271      | 475      | 499  | 408  |
| HCM Platoon Ratio            | 0.67 | 0.67       | 0.67 | 1.00 | 1.00       | 1.00  | 1.00 | 1.00     | 1.00     | 1.00     | 1.00 | 1.00 |
| Upstream Filter(I)           | 0.98 | 0.98       | 0.98 | 1.00 | 1.00       | 1.00  | 1.00 | 0.00     | 1.00     | 1.00     | 1.00 | 1.00 |
| Uniform Delay (d), s/veh     | 44.0 | 25.1       | 25.2 | 65.3 | 49.3       | 49.3  | 66.6 | 0.0      | 62.2     | 54.2     | 59.3 | 59.6 |
| Incr Delay (d2), s/veh       | 0.1  | 0.4        | 0.5  | 1.2  | 31.1       | 30.4  | 1.4  | 0.0      | 0.0      | 0.1      | 1.0  | 1.4  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0        | 0.0  | 0.0  | 0.0        | 0.0   | 0.0  | 0.0      | 0.0      | 0.0      | 0.0  | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 1.8  | 4.0        | 4.0  | 3.4  | 26.2       | 27.3  | 4.2  | 0.0      | 0.1      | 1.3      | 7.1  | 6.0  |
| Unsig. Movement Delay, s/veh |      |            |      |      |            | _, _, |      |          |          |          |      |      |
| LnGrp Delay(d),s/veh         | 44.0 | 25.5       | 25.7 | 66.5 | 80.4       | 79.7  | 67.9 | 0.0      | 62.3     | 54.2     | 60.3 | 61.0 |
| LnGrp LOS                    | D    | С          | С    | E    | F          | E     | E    | Α        | E        | D        | E    | E    |
| Approach Vol, veh/h          |      | 417        |      |      | 1263       |       |      | 226      |          |          | 400  |      |
| Approach Delay, s/veh        |      | 30.7       |      |      | 79.1       |       |      | 67.9     |          |          | 60.0 |      |
| Approach LOS                 |      | C          |      |      | E          |       |      | E        |          |          | E    |      |
|                              |      |            |      |      |            |       |      |          |          |          |      |      |
| Timer - Assigned Phs         | 1    | 2          |      | 4    | 5          | 6     |      | 8        |          |          |      |      |
| Phs Duration (G+Y+Rc), s     | 48.7 | 55.0       |      | 27.9 | 18.6       | 85.1  |      | 18.3     |          |          |      |      |
| Change Period (Y+Rc), s      | 4.0  | 4.9        |      | 4.0  | 4.9        | 4.0   |      | 4.9      |          |          |      |      |
| Max Green Setting (Gmax), s  | 13.1 | 50.1       |      | 41.0 | 24.1       | 39.1  |      | 28.0     |          |          |      |      |
| Max Q Clear Time (g_c+l1), s | 6.6  | 50.2       |      | 17.8 | 9.4        | 12.2  |      | 11.7     |          |          |      |      |
| Green Ext Time (p_c), s      | 0.2  | 0.0        |      | 1.2  | 0.1        | 1.7   |      | 0.5      |          |          |      |      |
| Intersection Summary         |      |            |      |      |            |       |      |          |          |          |      |      |
| HCM 6th Ctrl Delay           |      |            | 65.9 |      |            |       |      |          |          |          |      |      |
| HCM 6th LOS                  |      |            | Е    |      |            |       |      |          |          |          |      |      |
| Notes                        |      |            |      |      |            |       |      |          |          |          |      |      |

| Lane Configurations         T         F         T |                                       | •    | <b>→</b> | $\rightarrow$ | •    | <b>←</b> | •     | •    | <b>†</b> | /    | <b>&gt;</b> | ţ     | 4            |
|---|---------------------------------------|------|----------|---------------|------|----------|-------|------|----------|------|-------------|-------|--------------|
| Traffic Volume (veh/h) 50 100 391 58 355 14 486 192 61 5 189 52   | Movement                              |      | EBT      | EBR           | WBL  | WBT      | WBR   |      |          | NBR  | SBL         | SBT   | SBR          |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 7            |
| Future Volume (veh/h) 50 100 391 58 355 14 486 192 61 5 189 52  | ,                                     |      |          |               |      |          |       |      |          |      |             |       | 521          |
|   | Future Volume (veh/h)                 | 50   | 100      | 391           | 58   | 355      | 14    | 486  | 192      | 61   | 5           | 189   | 521          |
|   |                                       |      | 0        |               |      | 25       |       |      | 0        |      |             | 72    | 0            |
| $\lambda$ – $\lambda$   |                                       |      |          |               |      |          |       |      |          |      |             |       | 0.95         |
|   |                                       | 1.00 |          | 1.00          | 1.00 |          | 1.00  | 1.00 |          | 1.00 | 1.00        |       | 1.00         |
| Work Zone On Approach No No No No   | • •                                   | 4704 |          | 4704          | 1011 |          | 1011  | 4707 |          | 4707 | 4044        |       | 4044         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 1841         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 319          |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 0.94         |
|   |                                       |      |          |               |      |          |       |      |          | 9    |             |       | 222          |
|   |                                       |      |          |               |      |          |       |      |          | 0.00 |             |       | 332<br>0.22  |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 1489         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       |              |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 319          |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 1489         |
| (O= /·  |                                       |      |          |               |      |          |       |      |          |      |             |       | 22.2<br>22.2 |
| <b>7</b>  |                                       |      | 7.0      |               |      | 0.0      |       |      | 4.0      |      |             | 10.0  | 1.00         |
|   | •                                     |      | 101      |               |      | 0        |       |      | 956      | 0.00 |             | 410   | 332          |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 0.96         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 332          |
| $1 \times 2 \times 2$   |                                       |      |          |               |      |          |       |      |          | 1.00 |             |       | 1.00         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 1.00         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 40.3         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 38.7         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 0.0          |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | 11.6         |
| Unsig. Movement Delay, s/veh  |                                       |      |          |               |      |          |       |      |          |      |             |       |              |
|   |                                       |      | 30.6     | 30.9          | 47.0 | 0.0      | 134.5 | 38.1 | 31.7     | 0.0  | 31.8        | 443.5 | 79.1         |
|   |                                       |      |          |               |      |          |       |      |          |      |             |       | Е            |
| Approach Vol, veh/h 327 453 721 A 525   |                                       |      | 327      |               |      | 453      |       |      | 721      | А    |             | 525   |              |
| Approach Delay, s/veh 33.4 122.5 36.3 218.1   |                                       |      |          |               |      |          |       |      |          |      |             |       |              |
| Approach LOS C F D F  |                                       |      | С        |               |      |          |       |      | D        |      |             |       |              |
| Timer - Assigned Phs 1 2 4 5 6 8  | Timer - Assigned Phs                  | 1    | 2        |               | 4    | 5        | 6     |      | 8        |      |             |       |              |
| Phs Duration (G+Y+Rc), s 12.4 29.0 35.3 11.9 29.5 28.3  |                                       |      |          |               |      |          |       |      |          |      |             |       |              |
| Change Period (Y+Rc), s 4.0 4.6 4.6 4.0 4.6 4.9   | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ |      |          |               |      |          |       |      |          |      |             |       |              |
| Max Green Setting (Gmax), s 11.1 29.0 23.4 11.1 29.0 23.4   |                                       |      |          |               |      |          |       |      |          |      |             |       |              |
| Max Q Clear Time (g_c+l1), s 5.6 9.8 16.0 5.1 24.2 24.2   | <b>3</b> ( )                          |      |          |               |      |          |       |      |          |      |             |       |              |
| Green Ext Time (p_c), s 0.0 1.0 1.5 0.0 0.7 0.0   |                                       |      |          |               |      |          |       |      |          |      |             |       |              |
| Intersection Summary  | . ,                                   |      |          |               |      |          |       |      |          |      |             |       |              |
| HCM 6th Ctrl Delay 102.2  |                                       |      |          | 102.2         |      |          |       |      |          |      |             |       |              |
| HCM 6th LOS F   |                                       |      |          |               |      |          |       |      |          |      |             |       |              |

User approved volume balancing among the lanes for turning movement.

|  | •           | <b>→</b>    | •    | •           | <b>←</b>    | •     | 4            | <b>†</b>     | ~    | -           | ţ           | 1    |
|--|-------------|-------------|------|-------------|-------------|-------|--------------|--------------|------|-------------|-------------|------|
| Movement   | EBL         | EBT         | EBR  | WBL         | WBT         | WBR   | NBL          | NBT          | NBR  | SBL         | SBT         | SBR  |
| Lane Configurations                                | ሻ           | 41          | 7    | ሻ           | 4₽          | 7     | ሻ            | <b>∱</b> ∱   |      | ሻ           |             | 7    |
| Traffic Volume (veh/h)                             | 169         | 169         | 200  | 760         | 224         | 378   | 101          | 15           | 269  | 158         | 827         | 130  |
| Future Volume (veh/h)                              | 169         | 169         | 200  | 760         | 224         | 378   | 101          | 15           | 269  | 158         | 827         | 130  |
| Initial Q (Qb), veh                                | 0           | 0           | 0    | 0           | 0           | 0     | 0            | 0            | 0    | 0           | 0           | 0    |
| Ped-Bike Adj(A_pbT)                                | 1.00        |             | 1.00 | 1.00        |             | 1.00  | 1.00         |              | 1.00 | 1.00        |             | 1.00 |
| Parking Bus, Adj                                   | 1.00        | 1.00        | 1.00 | 1.00        | 1.00        | 1.00  | 1.00         | 1.00         | 1.00 | 1.00        | 1.00        | 1.00 |
| Work Zone On Approach                              |             | No          |      |             | No          |       |              | No           |      |             | No          |      |
| Adj Sat Flow, veh/h/ln                             | 1811        | 1811        | 1811 | 1811        | 1811        | 1811  | 1678         | 1678         | 1678 | 1856        | 1856        | 1856 |
| Adj Flow Rate, veh/h                               | 199         | 148         | 0    | 800         | 236         | 0     | 106          | 16           | 0    | 166         | 871         | 0    |
| Peak Hour Factor                                   | 0.95        | 0.95        | 0.95 | 0.95        | 0.95        | 0.95  | 0.95         | 0.95         | 0.95 | 0.95        | 0.95        | 0.95 |
| Percent Heavy Veh, %                               | 6           | 6           | 6    | 6           | 6           | 6     | 15           | 15           | 15   | 3           | 3           | 3    |
| Cap, veh/h   | 381         | 200         | 0.00 | 878         | 461         | 0.00  | 142          | 821          | 0.00 | 387         | 1393        | 0.00 |
| Arrive On Green                                    | 0.11        | 0.11        | 0.00 | 0.25        | 0.25        | 0.00  | 0.09         | 0.26         | 0.00 | 0.22        | 0.40        | 0.00 |
| Sat Flow, veh/h                                    | 3450        | 1811        | 1535 | 3450        | 1811        | 1535  | 1598         | 3272         | 0    | 1767        | 3526        | 1572 |
| Grp Volume(v), veh/h                               | 199         | 148         | 0    | 800         | 236         | 0     | 106          | 16           | 0    | 166         | 871         | 0    |
| Grp Sat Flow(s),veh/h/ln                           | 1725        | 1811        | 1535 | 1725        | 1811        | 1535  | 1598         | 1594         | 0    | 1767        | 1763        | 1572 |
| Q Serve(g_s), s                                    | 6.5         | 9.5         | 0.0  | 27.0        | 13.4        | 0.0   | 7.8          | 0.4          | 0.0  | 9.7         | 23.8        | 0.0  |
| Cycle Q Clear(g_c), s                              | 6.5         | 9.5         | 0.0  | 27.0        | 13.4        | 0.0   | 7.8          | 0.4          | 0.0  | 9.7         | 23.8        | 0.0  |
| Prop In Lane                                       | 1.00        | 000         | 1.00 | 1.00        | 101         | 1.00  | 1.00         | 004          | 0.00 | 1.00        | 4000        | 1.00 |
| Lane Grp Cap(c), veh/h                             | 381         | 200         |      | 878         | 461         |       | 142          | 821          |      | 387         | 1393        |      |
| V/C Ratio(X)                                       | 0.52        | 0.74        |      | 0.91        | 0.51        |       | 0.75         | 0.02         |      | 0.43        | 0.63        |      |
| Avail Cap(c_a), veh/h                              | 635         | 334         | 4.00 | 914         | 480         | 4.00  | 160          | 821          | 4.00 | 387         | 1393        | 4.00 |
| HCM Platoon Ratio                                  | 1.00        | 1.00        | 1.00 | 1.00        | 1.00        | 1.00  | 1.00         | 1.00         | 1.00 | 1.00        | 1.00        | 1.00 |
| Upstream Filter(I)                                 | 1.00        | 1.00        | 0.00 | 0.47        | 0.47        | 0.00  | 1.00         | 1.00         | 0.00 | 1.00        | 1.00        | 0.00 |
| Uniform Delay (d), s/veh                           | 50.4<br>0.4 | 51.7<br>2.0 | 0.0  | 43.4<br>6.8 | 38.3<br>0.4 | 0.0   | 53.3<br>12.7 | 33.2<br>0.0  | 0.0  | 40.4<br>0.3 | 29.1<br>2.1 | 0.0  |
| Incr Delay (d2), s/veh                             | 0.4         | 0.0         | 0.0  | 0.0         | 0.4         | 0.0   | 0.0          | 0.0          | 0.0  | 0.0         | 0.0         | 0.0  |
| Initial Q Delay(d3),s/veh %ile BackOfQ(50%),veh/ln | 2.8         | 4.4         | 0.0  | 12.4        | 6.1         | 0.0   | 3.6          | 0.0          | 0.0  | 4.2         | 10.3        | 0.0  |
| Unsig. Movement Delay, s/veh                       |             | 4.4         | 0.0  | 12.4        | 0.1         | 0.0   | 3.0          | 0.2          | 0.0  | 4.2         | 10.3        | 0.0  |
| LnGrp Delay(d),s/veh                               | 50.8        | 53.7        | 0.0  | 50.2        | 38.8        | 0.0   | 66.0         | 33.3         | 0.0  | 40.6        | 31.3        | 0.0  |
| LnGrp LOS  | 50.0<br>D   | 55.7<br>D   | 0.0  | 50.2<br>D   | 50.0<br>D   | 0.0   | 00.0<br>E    | 00.0<br>C    | 0.0  | 40.0<br>D   | 31.3<br>C   | 0.0  |
| Approach Vol, veh/h                                | <u> </u>    | 347         | Α    | U           | 1036        | А     | <u> </u>     | 122          | А    | U           | 1037        | Α    |
| Approach Delay, s/veh                              |             | 52.1        | А    |             | 47.6        | А     |              | 61.7         | A    |             | 32.8        | A    |
| Approach LOS                                       |             | 52.1<br>D   |      |             | 47.0<br>D   |       |              | 61. <i>T</i> |      |             | 32.0<br>C   |      |
|  |             |             |      |             |             |       |              |              |      |             | U           |      |
| Timer - Assigned Phs                               | 1           | 2           |      | 4           | 5           | 6     |              | 8            |      |             |             |      |
| Phs Duration (G+Y+Rc), s                           | 14.7        | 52.3        |      | 17.8        | 31.2        | 35.8  |              | 35.1         |      |             |             |      |
| Change Period (Y+Rc), s                            | 4.0         | 4.9         |      | 4.6         | 4.9         | * 4.9 |              | 4.6          |      |             |             |      |
| Max Green Setting (Gmax), s                        | 12.0        | 36.0        |      | 22.1        | 17.1        | * 31  |              | 31.8         |      |             |             |      |
| Max Q Clear Time (g_c+I1), s                       | 9.8         | 25.8        |      | 11.5        | 11.7        | 2.4   |              | 29.0         |      |             |             |      |
| Green Ext Time (p_c), s                            | 0.0         | 4.6         |      | 0.8         | 0.1         | 0.0   |              | 1.5          |      |             |             |      |
| Intersection Summary                               |             |             |      |             |             |       |              |              |      |             |             |      |
| HCM 6th Ctrl Delay                                 |             |             | 42.8 |             |             |       |              |              |      |             |             |      |
| HCM 6th LOS  |             |             | D    |             |             |       |              |              |      |             |             |      |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                              | ၨ    | <b>→</b> | •    | •    | <b>←</b> | •    | 4    | <b>†</b>   | /    | <b>&gt;</b> | ļ          | 4    |
|------------------------------|------|----------|------|------|----------|------|------|------------|------|-------------|------------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT        | NBR  | SBL         | SBT        | SBR  |
| Lane Configurations          |      | €Î       | 7    |      | 4        |      | ሻ    | <b>↑</b> ↑ |      | 7           | <b>∱</b> β |      |
| Traffic Volume (veh/h)       | 203  | Ō        | 20   | 4    | 0        | 27   | 3    | 887        | 3    | 31          | 151        | 9    |
| Future Volume (veh/h)        | 203  | 0        | 20   | 4    | 0        | 27   | 3    | 887        | 3    | 31          | 151        | 9    |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 44         | 0    | 0           | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.99 |          | 0.99 | 0.99 |          | 0.99 | 1.00 |            | 0.99 | 1.00        |            | 0.99 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No         |      |             | No         |      |
| Adj Sat Flow, veh/h/ln       | 1900 | 1900     | 1900 | 1900 | 1900     | 1900 | 1841 | 1841       | 1841 | 1796        | 1796       | 1796 |
| Adj Flow Rate, veh/h         | 231  | 0        | 3    | 5    | 0        | 4    | 3    | 1008       | 3    | 35          | 172        | 5    |
| Peak Hour Factor             | 0.88 | 0.88     | 0.88 | 0.88 | 0.88     | 0.88 | 0.88 | 0.88       | 0.88 | 0.88        | 0.88       | 0.88 |
| Percent Heavy Veh, %         | 0    | 0        | 0    | 0    | 0        | 0    | 4    | 4          | 4    | 7           | 7          | 7    |
| Cap, veh/h                   | 359  | 0        | 387  | 96   | 19       | 38   | 6    | 2074       | 5    | 46          | 2042       | 59   |
| Arrive On Green              | 0.24 | 0.00     | 0.24 | 0.24 | 0.00     | 0.24 | 0.00 | 0.58       | 0.58 | 0.03        | 0.60       | 0.60 |
| Sat Flow, veh/h              | 1120 | 0        | 1594 | 119  | 77       | 157  | 1753 | 3577       | 11   | 1711        | 3385       | 98   |
| Grp Volume(v), veh/h         | 231  | 0        | 3    | 9    | 0        | 0    | 3    | 493        | 518  | 35          | 86         | 91   |
| Grp Sat Flow(s),veh/h/ln     | 1120 | 0        | 1594 | 353  | 0        | 0    | 1753 | 1749       | 1839 | 1711        | 1706       | 1777 |
| Q Serve(g_s), s              | 0.0  | 0.0      | 0.1  | 0.1  | 0.0      | 0.0  | 0.1  | 13.7       | 13.7 | 1.7         | 1.8        | 1.8  |
| Cycle Q Clear(g_c), s        | 17.3 | 0.0      | 0.1  | 17.4 | 0.0      | 0.0  | 0.1  | 13.7       | 13.7 | 1.7         | 1.8        | 1.8  |
| Prop In Lane                 | 1.00 |          | 1.00 | 0.56 |          | 0.44 | 1.00 |            | 0.01 | 1.00        |            | 0.06 |
| Lane Grp Cap(c), veh/h       | 359  | 0        | 387  | 153  | 0        | 0    | 6    | 1014       | 1066 | 46          | 1029       | 1072 |
| V/C Ratio(X)                 | 0.64 | 0.00     | 0.01 | 0.06 | 0.00     | 0.00 | 0.53 | 0.49       | 0.49 | 0.77        | 0.08       | 0.08 |
| Avail Cap(c_a), veh/h        | 426  | 0        | 462  | 223  | 0        | 0    | 508  | 1014       | 1066 | 495         | 1029       | 1072 |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 0.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Uniform Delay (d), s/veh     | 30.3 | 0.0      | 23.8 | 25.4 | 0.0      | 0.0  | 41.3 | 11.4       | 11.4 | 40.1        | 6.9        | 6.9  |
| Incr Delay (d2), s/veh       | 1.4  | 0.0      | 0.0  | 0.1  | 0.0      | 0.0  | 25.8 | 1.7        | 1.6  | 9.5         | 0.2        | 0.2  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 6.6        | 6.0  | 0.0         | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 4.4  | 0.0      | 0.0  | 0.1  | 0.0      | 0.0  | 0.1  | 9.0        | 9.1  | 0.8         | 0.6        | 0.6  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |      |      |            |      |             |            |      |
| LnGrp Delay(d),s/veh         | 31.7 | 0.0      | 23.8 | 25.4 | 0.0      | 0.0  | 67.1 | 19.7       | 18.9 | 49.6        | 7.0        | 7.0  |
| LnGrp LOS                    | С    | Α        | С    | С    | Α        | Α    | Е    | В          | В    | D           | Α          | Α    |
| Approach Vol, veh/h          |      | 234      |      |      | 9        |      |      | 1014       |      |             | 212        |      |
| Approach Delay, s/veh        |      | 31.6     |      |      | 25.4     |      |      | 19.4       |      |             | 14.1       |      |
| Approach LOS                 |      | С        |      |      | С        |      |      | В          |      |             | В          |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8          |      |             |            |      |
| Phs Duration (G+Y+Rc), s     | 6.2  | 52.6     |      | 24.1 | 4.3      | 54.5 |      | 24.1       |      |             |            |      |
| Change Period (Y+Rc), s      | 4.0  | 4.5      |      | 4.0  | 4.0      | 4.5  |      | 4.0        |      |             |            |      |
| Max Green Setting (Gmax), s  | 24.0 | 30.0     |      | 24.0 | 24.0     | 50.0 |      | 24.0       |      |             |            |      |
| Max Q Clear Time (g_c+l1), s | 3.7  | 15.7     |      | 19.3 | 2.1      | 3.8  |      | 19.4       |      |             |            |      |
| Green Ext Time (p_c), s      | 0.0  | 3.9      |      | 0.3  | 0.0      | 0.7  |      | 0.0        |      |             |            |      |
| Intersection Summary         |      |          |      |      |          |      |      |            |      |             |            |      |
| HCM 6th Ctrl Delay           |      |          | 20.6 |      |          |      |      |            |      |             |            |      |
| HCM 6th LOS                  |      |          | С    |      |          |      |      |            |      |             |            |      |
| Notes                        |      |          |      |      |          |      |      |            |      |             |            |      |

User approved pedestrian interval to be less than phase max green.

|                              | ۶    | <b>→</b>   | •    | •    | •         | •    | •     | <b>†</b>  | ~    | <b>&gt;</b> | <b>↓</b> | 4   |
|------------------------------|------|------------|------|------|-----------|------|-------|-----------|------|-------------|----------|-----|
| Movement                     | EBL  | EBT        | EBR  | WBL  | WBT       | WBR  | NBL   | NBT       | NBR  | SBL         | SBT      | SBR |
| Lane Configurations          | ሻሻ   | <b>∱</b> β | 7    | 1,1  | <b>†</b>  | 77   | 14.54 | <b>†</b>  | 77   |             |          |     |
| Traffic Volume (veh/h)       | 245  | 209        | 295  | 808  | 662       | 986  | 490   | 153       | 173  | 0           | 0        | 0   |
| Future Volume (veh/h)        | 245  | 209        | 295  | 808  | 662       | 986  | 490   | 153       | 173  | 0           | 0        | 0   |
| Initial Q (Qb), veh          | 0    | 0          | 0    | 32   | 16        | 0    | 10    | 0         | 5    |             |          |     |
| Ped-Bike Adj(A_pbT)          | 1.00 |            | 0.97 | 1.00 |           | 1.00 | 1.00  |           | 1.00 |             |          |     |
| Parking Bus, Adj             | 1.00 | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 | 1.00  | 1.00      | 1.00 |             |          |     |
| Work Zone On Approach        |      | No         |      |      | No        |      |       | No        |      |             |          |     |
| Adj Sat Flow, veh/h/ln       | 1841 | 1841       | 1841 | 1870 | 1870      | 1870 | 1826  | 1826      | 1826 |             |          |     |
| Adj Flow Rate, veh/h         | 258  | 220        | 80   | 851  | 697       | 642  | 516   | 161       | 182  |             |          |     |
| Peak Hour Factor             | 0.95 | 0.95       | 0.95 | 0.95 | 0.95      | 0.95 | 0.95  | 0.95      | 0.95 |             |          |     |
| Percent Heavy Veh, %         | 4    | 4          | 4    | 2    | 2         | 2    | 5     | 5         | 5    |             |          |     |
| Cap, veh/h                   | 387  | 1062       | 434  | 1048 | 868       | 1328 | 741   | 441       | 1377 |             |          |     |
| Arrive On Green              | 0.11 | 0.31       | 0.31 | 0.29 | 0.49      | 0.49 | 0.21  | 0.21      | 0.21 |             |          |     |
| Sat Flow, veh/h              | 3506 | 3681       | 1508 | 3456 | 1870      | 2790 | 3374  | 1826      | 2723 |             |          |     |
| Grp Volume(v), veh/h         | 258  | 220        | 80   | 851  | 697       | 642  | 516   | 161       | 182  |             |          |     |
| Grp Sat Flow(s), veh/h/ln    | 1753 | 1841       | 1508 | 1728 | 1870      | 1395 | 1687  | 1826      | 1362 |             |          |     |
| Q Serve(g_s), s              | 4.8  | 3.0        | 2.6  | 15.7 | 20.5      | 10.3 | 9.7   | 5.2       | 2.4  |             |          |     |
| Cycle Q Clear(g_c), s        | 4.8  | 3.0        | 2.6  | 15.7 | 20.5      | 10.3 | 9.7   | 5.2       | 2.4  |             |          |     |
| Prop In Lane                 | 1.00 | 0.0        | 1.00 | 1.00 | 20.0      | 1.00 | 1.00  | 0.2       | 1.00 |             |          |     |
| Lane Grp Cap(c), veh/h       | 387  | 1062       | 434  | 1048 | 868       | 1328 | 741   | 441       | 1377 |             |          |     |
| V/C Ratio(X)                 | 0.67 | 0.21       | 0.18 | 0.81 | 0.80      | 0.48 | 0.70  | 0.37      | 0.13 |             |          |     |
| Avail Cap(c_a), veh/h        | 1496 | 2059       | 843  | 1373 | 1046      | 1560 | 1340  | 726       | 1877 |             |          |     |
| HCM Platoon Ratio            | 1.00 | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 | 1.00  | 1.00      | 1.00 |             |          |     |
| Upstream Filter(I)           | 1.00 | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 | 1.00  | 1.00      | 1.00 |             |          |     |
| Uniform Delay (d), s/veh     | 31.4 | 20.0       | 19.9 | 26.6 | 19.3      | 13.3 | 25.3  | 22.9      | 9.1  |             |          |     |
| Incr Delay (d2), s/veh       | 1.5  | 0.1        | 0.3  | 2.2  | 4.3       | 0.4  | 0.4   | 0.2       | 0.0  |             |          |     |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0        | 0.0  | 35.8 | 12.4      | 0.0  | 4.3   | 0.0       | 0.1  |             |          |     |
| %ile BackOfQ(50%),veh/ln     | 2.2  | 1.4        | 1.0  | 14.3 | 15.9      | 3.4  | 4.7   | 2.3       | 2.6  |             |          |     |
| Unsig. Movement Delay, s/veh |      | •••        | 1.0  | 11.0 | 10.0      | 0.1  | 101   | 2.0       | 2.0  |             |          |     |
| LnGrp Delay(d),s/veh         | 32.9 | 20.2       | 20.2 | 64.6 | 36.0      | 13.6 | 30.0  | 23.1      | 9.2  |             |          |     |
| LnGrp LOS                    | C    | C          | C    | E    | D         | В    | C     | C         | A    |             |          |     |
| Approach Vol, veh/h          |      | 558        |      |      | 2190      |      |       | 859       |      |             |          |     |
| Approach Delay, s/veh        |      | 26.0       |      |      | 40.6      |      |       | 24.3      |      |             |          |     |
| Approach LOS                 |      | 20.0<br>C  |      |      | 40.0<br>D |      |       | 24.5<br>C |      |             |          |     |
|                              |      |            |      |      |           |      |       | <u> </u>  |      |             |          |     |
| Timer - Assigned Phs         | 1    | 2          |      | 4    | 5         | 6    |       |           |      |             |          |     |
| Phs Duration (G+Y+Rc), s     | 23.3 | 26.2       |      | 18.4 | 11.2      | 38.4 |       |           |      |             |          |     |
| Change Period (Y+Rc), s      | 3.5  | 5.0        |      | 4.0  | 3.5       | 5.0  |       |           |      |             |          |     |
| Max Green Setting (Gmax), s  | 27.0 | 38.0       |      | 27.0 | 29.0      | 38.0 |       |           |      |             |          |     |
| Max Q Clear Time (g_c+l1), s | 17.7 | 5.0        |      | 11.7 | 6.8       | 22.5 |       |           |      |             |          |     |
| Green Ext Time (p_c), s      | 2.1  | 3.4        |      | 2.7  | 0.9       | 10.8 |       |           |      |             |          |     |
| Intersection Summary         |      |            |      |      |           |      |       |           |      |             |          |     |
| HCM 6th Ctrl Delay           |      |            | 34.4 |      |           |      |       |           |      |             |          |     |
| HCM 6th LOS                  |      |            | С    |      |           |      |       |           |      |             |          |     |
| Notes                        |      |            |      |      |           |      |       |           |      |             |          |     |

|                                   | ۶          | <b>→</b>   | •          | •          | <b>←</b>     | 4         | 1         | <b>†</b>  | ~        | <b>/</b>   | <b>†</b> | 1        |
|-----------------------------------|------------|------------|------------|------------|--------------|-----------|-----------|-----------|----------|------------|----------|----------|
| Movement                          | EBL        | EBT        | EBR        | WBL        | WBT          | WBR       | NBL       | NBT       | NBR      | SBL        | SBT      | SBR      |
| Lane Configurations               | ሻሻ         | <b>∱</b> ∱ |            | 7          | <b>∱</b> ∱   |           | ሻ         | ₽         |          |            | 4        | 77       |
| Traffic Volume (veh/h)            | 121        | 292        | 30         | 5          | 931          | 41        | 99        | 1         | 18       | 27         | 0        | 274      |
| Future Volume (veh/h)             | 121        | 292        | 30         | 5          | 931          | 41        | 99        | 1         | 18       | 27         | 0        | 274      |
| Initial Q (Qb), veh               | 0          | 32         | 0          | 0          | 140          | 0         | 0         | 0         | 0        | 0          | 0        | 0        |
| Ped-Bike Adj(A_pbT)               | 1.00       |            | 0.96       | 1.00       |              | 0.99      | 1.00      |           | 1.00     | 1.00       |          | 1.00     |
| Parking Bus, Adj                  | 1.00       | 1.00       | 1.00       | 1.00       | 1.00         | 1.00      | 1.00      | 1.00      | 1.00     | 1.00       | 1.00     | 1.00     |
| Work Zone On Approach             |            | No         |            |            | No           |           |           | No        |          |            | No       |          |
| Adj Sat Flow, veh/h/ln            | 1678       | 1678       | 1678       | 1870       | 1870         | 1870      | 1841      | 1841      | 1841     | 1870       | 1870     | 1870     |
| Adj Flow Rate, veh/h              | 133        | 321        | 30         | 5          | 1023         | 43        | 109       | 1         | 0        | 30         | 0        | 0        |
| Peak Hour Factor                  | 0.91       | 0.91       | 0.91       | 0.91       | 0.91         | 0.91      | 0.91      | 0.91      | 0.91     | 0.91       | 0.91     | 0.91     |
| Percent Heavy Veh, %              | 15         | 15         | 15         | 2          | 2            | 2         | 4         | 4         | 4        | 2          | 2        | 2        |
| Cap, veh/h                        | 176        | 2172       | 189        | 11         | 2410         | 73        | 195       | 204       | 0        | 53         | 0        | 82       |
| Arrive On Green                   | 0.06       | 0.73       | 0.73       | 0.01       | 0.68         | 0.68      | 0.11      | 0.11      | 0.00     | 0.03       | 0.00     | 0.00     |
| Sat Flow, veh/h                   | 3100       | 2937       | 272        | 1781       | 3473         | 146       | 1753      | 1841      | 0        | 1781       | 0        | 2790     |
| Grp Volume(v), veh/h              | 133        | 173        | 178        | 5          | 523          | 543       | 109       | 1         | 0        | 30         | 0        | 0        |
| Grp Sat Flow(s),veh/h/ln          | 1550       | 1594       | 1615       | 1781       | 1777         | 1842      | 1753      | 1841      | 0        | 1781       | 0        | 1395     |
| Q Serve(g_s), s                   | 5.9        | 4.5        | 4.6        | 0.4        | 18.5         | 18.5      | 8.3       | 0.1       | 0.0      | 2.3        | 0.0      | 0.0      |
| Cycle Q Clear(g_c), s             | 5.9        | 4.5        | 4.6        | 0.4        | 18.5         | 18.5      | 8.3       | 0.1       | 0.0      | 2.3        | 0.0      | 0.0      |
| Prop In Lane                      | 1.00       |            | 0.17       | 1.00       | 1010         | 0.08      | 1.00      | 22.1      | 0.00     | 1.00       |          | 1.00     |
| Lane Grp Cap(c), veh/h            | 176        | 1171       | 1189       | 11         | 1216         | 1265      | 195       | 204       | 0        | 53         | 0        | 82       |
| V/C Ratio(X)                      | 0.76       | 0.15       | 0.15       | 0.44       | 0.43         | 0.43      | 0.56      | 0.00      | 0.00     | 0.57       | 0.00     | 0.00     |
| Avail Cap(c_a), veh/h             | 221        | 1171       | 1187       | 102        | 1216         | 1260      | 388       | 408       | 0        | 140        | 0        | 219      |
| HCM Platoon Ratio                 | 1.00       | 1.00       | 1.00       | 1.00       | 1.00         | 1.00      | 1.00      | 1.00      | 1.00     | 1.00       | 1.00     | 1.00     |
| Upstream Filter(I)                | 0.99       | 0.99       | 0.99       | 1.00       | 1.00         | 1.00      | 1.00      | 1.00      | 0.00     | 1.00       | 0.00     | 0.00     |
| Uniform Delay (d), s/veh          | 65.1       | 6.4        | 6.3        | 69.3       | 14.8         | 14.6      | 59.0      | 55.3      | 0.0      | 67.1       | 0.0      | 0.0      |
| Incr Delay (d2), s/veh            | 7.8        | 0.3        | 0.3        | 9.9        | 1.1<br>41.9  | 1.1       | 0.9       | 0.0       | 0.0      | 3.6        | 0.0      | 0.0      |
| Initial Q Delay(d3),s/veh         | 0.0<br>2.5 | 1.6        | 1.5<br>4.0 | 0.0<br>0.2 |              | 38.6      | 0.0       | 0.0       | 0.0      | 0.0<br>1.1 | 0.0      | 0.0      |
| %ile BackOfQ(50%),veh/ln          |            | 3.9        | 4.0        | 0.2        | 32.9         | 32.5      | 3.8       | 0.0       | 0.0      | 1.1        | 0.0      | 0.0      |
| Unsig. Movement Delay, s/veh      | 72.9       | 8.2        | 8.1        | 79.2       | 57.9         | 54.2      | 59.9      | 55.3      | 0.0      | 70.6       | 0.0      | 0.0      |
| LnGrp Delay(d),s/veh<br>LnGrp LOS | 72.9<br>E  | 0.2<br>A   | 0.1<br>A   | 79.2<br>E  | 57.9<br>E    | 54.2<br>D | 59.9<br>E | 55.5<br>E | 0.0<br>A | 70.6<br>E  | 0.0<br>A | 0.0<br>A |
|                                   |            | 484        | A          |            |              | U         |           | 110       | A        |            | 30       | A        |
| Approach Vol, veh/h               |            | 26.0       |            |            | 1071<br>56.1 |           |           | 59.9      |          |            | 70.6     |          |
| Approach LOS                      |            |            |            |            | _            |           |           | _         |          |            |          |          |
| Approach LOS                      |            | С          |            |            | Е            |           |           | Е         |          |            | Е        |          |
| Timer - Assigned Phs              | 1          | 2          |            | 4          | 5            | 6         |           | 8         |          |            |          |          |
| Phs Duration (G+Y+Rc), s          | 11.9       | 100.4      |            | 19.6       | 4.9          | 107.4     |           | 8.1       |          |            |          |          |
| Change Period (Y+Rc), s           | 4.0        | 4.6        |            | 4.0        | 4.0          | 4.6       |           | 4.0       |          |            |          |          |
| Max Green Setting (Gmax), s       | 10.0       | 71.4       |            | 31.0       | 8.0          | 73.4      |           | 11.0      |          |            |          |          |
| Max Q Clear Time (g_c+I1), s      | 7.9        | 20.5       |            | 10.3       | 2.4          | 6.6       |           | 4.3       |          |            |          |          |
| Green Ext Time (p_c), s           | 0.1        | 8.2        |            | 0.2        | 0.0          | 2.1       |           | 0.0       |          |            |          |          |
| Intersection Summary              |            |            |            |            |              |           |           |           |          |            |          |          |
| HCM 6th Ctrl Delay                |            |            | 48.0       |            |              |           |           |           |          |            |          |          |
| HCM 6th LOS                       |            |            | D          |            |              |           |           |           |          |            |          |          |

|                              | ۶         | <b>→</b>        | •         | •         | <b>←</b>   | •    | 4         | <b>†</b>  | /    | <b>&gt;</b> | ļ         | 4         |
|------------------------------|-----------|-----------------|-----------|-----------|------------|------|-----------|-----------|------|-------------|-----------|-----------|
| Movement                     | EBL       | EBT             | EBR       | WBL       | WBT        | WBR  | NBL       | NBT       | NBR  | SBL         | SBT       | SBR       |
| Lane Configurations          | *         | ተተ <sub>ጉ</sub> |           | ሻሻ        | <b>↑</b> ↑ |      | ሻ         | <b>^</b>  | 77   | ሻሻ          | <b>^</b>  | 7         |
| Traffic Volume (veh/h)       | 118       | 357             | 28        | 196       | 879        | 77   | 68        | 285       | 212  | 180         | 468       | 521       |
| Future Volume (veh/h)        | 118       | 357             | 28        | 196       | 879        | 77   | 68        | 285       | 212  | 180         | 468       | 521       |
| Initial Q (Qb), veh          | 0         | 0               | 0         | 0         | 10         | 0    | 0         | 0         | 32   | 0           | 36        | 18        |
| Ped-Bike Adj(A_pbT)          | 1.00      |                 | 0.98      | 1.00      |            | 0.98 | 1.00      |           | 1.00 | 1.00        |           | 0.96      |
| Parking Bus, Adj             | 1.00      | 1.00            | 1.00      | 1.00      | 1.00       | 1.00 | 1.00      | 1.00      | 1.00 | 1.00        | 1.00      | 1.00      |
| Work Zone On Approach        |           | No              |           |           | No         |      |           | No        |      |             | No        |           |
| Adj Sat Flow, veh/h/ln       | 1870      | 1870            | 1870      | 1885      | 1885       | 1885 | 1870      | 1870      | 1870 | 1870        | 1870      | 1870      |
| Adj Flow Rate, veh/h         | 120       | 364             | 23        | 200       | 897        | 75   | 69        | 291       | 216  | 184         | 478       | 224       |
| Peak Hour Factor             | 0.98      | 0.98            | 0.98      | 0.98      | 0.98       | 0.98 | 0.98      | 0.98      | 0.98 | 0.98        | 0.98      | 0.98      |
| Percent Heavy Veh, %         | 2         | 2               | 2         | 1         | 1          | 1    | 2         | 2         | 2    | 2           | 2         | 2         |
| Cap, veh/h                   | 150       | 1739            | 109       | 389       | 1284       | 100  | 114       | 365       | 851  | 574         | 1088      | 468       |
| Arrive On Green              | 0.08      | 0.35            | 0.35      | 0.11      | 0.38       | 0.38 | 0.06      | 0.18      | 0.18 | 0.18        | 0.31      | 0.31      |
| Sat Flow, veh/h              | 1781      | 4906            | 306       | 3483      | 3340       | 279  | 1781      | 1870      | 2790 | 3456        | 3554      | 1529      |
| Grp Volume(v), veh/h         | 120       | 251             | 136       | 200       | 481        | 491  | 69        | 291       | 216  | 184         | 478       | 224       |
| Grp Sat Flow(s), veh/h/ln    | 1781      | 1702            | 1808      | 1742      | 1791       | 1828 | 1781      | 1870      | 1395 | 1728        | 1777      | 1529      |
| Q Serve(g_s), s              | 7.3       | 5.7             | 5.8       | 6.0       | 25.0       | 25.0 | 4.1       | 16.6      | 0.0  | 5.1         | 11.9      | 10.0      |
| Cycle Q Clear(g_c), s        | 7.3       | 5.7             | 5.8       | 6.0       | 25.0       | 25.0 | 4.1       | 16.6      | 0.0  | 5.1         | 11.9      | 10.0      |
| Prop In Lane                 | 1.00      | 0.1             | 0.17      | 1.00      | 20.0       | 0.15 | 1.00      | 10.0      | 1.00 | 1.00        | 11.0      | 1.00      |
| Lane Grp Cap(c), veh/h       | 150       | 1207            | 641       | 389       | 684        | 699  | 114       | 365       | 851  | 574         | 1088      | 468       |
| V/C Ratio(X)                 | 0.80      | 0.21            | 0.21      | 0.51      | 0.70       | 0.70 | 0.61      | 0.80      | 0.25 | 0.32        | 0.44      | 0.48      |
| Avail Cap(c_a), veh/h        | 162       | 1207            | 641       | 412       | 684        | 698  | 130       | 493       | 1047 | 624         | 1088      | 468       |
| HCM Platoon Ratio            | 1.00      | 1.00            | 1.00      | 1.00      | 1.00       | 1.00 | 1.00      | 1.00      | 1.00 | 1.00        | 1.00      | 1.00      |
| Upstream Filter(I)           | 1.00      | 1.00            | 1.00      | 0.61      | 0.61       | 0.61 | 1.00      | 1.00      | 1.00 | 1.00        | 1.00      | 1.00      |
| Uniform Delay (d), s/veh     | 49.4      | 24.7            | 24.8      | 46.0      | 29.3       | 29.2 | 50.1      | 42.3      | 30.6 | 40.5        | 32.4      | 19.1      |
| Incr Delay (d2), s/veh       | 20.2      | 0.4             | 0.8       | 0.2       | 3.7        | 3.6  | 3.4       | 16.5      | 0.7  | 0.1         | 1.3       | 3.5       |
| Initial Q Delay(d3),s/veh    | 0.0       | 0.0             | 0.0       | 0.0       | 1.3        | 1.2  | 0.0       | 0.0       | 13.6 | 0.0         | 14.1      | 20.4      |
| %ile BackOfQ(50%),veh/ln     | 4.1       | 2.4             | 2.6       | 2.5       | 11.8       | 12.0 | 1.9       | 9.0       | 5.0  | 2.2         | 9.5       | 8.3       |
| Unsig. Movement Delay, s/veh |           | ۷.٦             | 2.0       | 2.0       | 11.0       | 12.0 | 1.0       | 5.0       | 0.0  | ۷.۷         | 5.5       | 0.0       |
| LnGrp Delay(d),s/veh         | 69.6      | 25.1            | 25.5      | 46.3      | 34.3       | 34.0 | 53.5      | 58.8      | 44.9 | 40.6        | 47.7      | 43.0      |
| LnGrp LOS                    | 03.0<br>E | 23.1<br>C       | 23.5<br>C | 70.5<br>D | C          | C    | 55.5<br>D | 50.0<br>E | D    | 70.0<br>D   | D         | 43.0<br>D |
| Approach Vol, veh/h          | <u> </u>  | 507             |           |           | 1172       |      |           | 576       |      |             | 886       |           |
| · ·                          |           | 35.8            |           |           | 36.2       |      |           | 52.9      |      |             | 45.1      |           |
| Approach LOS                 |           | 33.0<br>D       |           |           | 30.2<br>D  |      |           | 52.9<br>D |      |             | 45.1<br>D |           |
| Approach LOS                 |           | U               |           |           | U          |      |           | U         |      |             | U         |           |
| Timer - Assigned Phs         | 1         | 2               | 3         | 4         | 5          | 6    | 7         | 8         |      |             |           |           |
| Phs Duration (G+Y+Rc), s     | 11.0      | 38.7            | 13.3      | 47.0      | 24.9       | 24.9 | 16.3      | 44.0      |      |             |           |           |
| Change Period (Y+Rc), s      | 4.0       | 5.0             | 4.0       | 5.0       | 5.0        | * 5  | 4.0       | 5.0       |      |             |           |           |
| Max Green Setting (Gmax), s  | 8.0       | 32.0            | 10.0      | 42.0      | 11.0       | * 29 | 13.0      | 39.0      |      |             |           |           |
| Max Q Clear Time (g_c+l1), s | 6.1       | 13.9            | 9.3       | 27.0      | 7.1        | 18.6 | 8.0       | 7.8       |      |             |           |           |
| Green Ext Time (p_c), s      | 0.0       | 2.5             | 0.0       | 3.2       | 0.2        | 1.2  | 0.2       | 1.7       |      |             |           |           |
| Intersection Summary         |           |                 |           |           |            |      |           |           |      |             |           |           |
| HCM 6th Ctrl Delay           |           |                 | 41.7      |           |            |      |           |           |      |             |           |           |
| HCM 6th LOS                  |           |                 | D         |           |            |      |           |           |      |             |           |           |
| Notes                        |           |                 |           |           |            |      |           |           |      |             |           |           |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                              | ၨ         | <b>→</b> | •         | •         | <b>←</b> | •    | 4          | <b>†</b> | <i>&gt;</i> | <b>&gt;</b> | ļ       | 4    |
|------------------------------|-----------|----------|-----------|-----------|----------|------|------------|----------|-------------|-------------|---------|------|
| Movement                     | EBL       | EBT      | EBR       | WBL       | WBT      | WBR  | NBL        | NBT      | NBR         | SBL         | SBT     | SBR  |
| Lane Configurations          | ř         | र्स      | 7         |           | 4        |      | Ť          | Ą.       |             |             | <b></b> | 77   |
| Traffic Volume (veh/h)       | 563       | 2        | 50        | 2         | 0        | 2    | 63         | 251      | 3           | 0           | 122     | 981  |
| Future Volume (veh/h)        | 563       | 2        | 50        | 2         | 0        | 2    | 63         | 251      | 3           | 0           | 122     | 981  |
| Initial Q (Qb), veh          | 0         | 0        | 0         | 0         | 0        | 0    | 12         | 12       | 0           | 0           | 0       | 24   |
| Ped-Bike Adj(A_pbT)          | 1.00      |          | 1.00      | 1.00      |          | 1.00 | 1.00       |          | 0.95        | 1.00        |         | 1.00 |
| Parking Bus, Adj             | 1.00      | 1.00     | 1.00      | 1.00      | 1.00     | 1.00 | 1.00       | 1.00     | 1.00        | 1.00        | 1.00    | 1.00 |
| Work Zone On Approach        |           | No       |           |           | No       |      |            | No       |             |             | No      |      |
| Adj Sat Flow, veh/h/ln       | 1841      | 1841     | 1841      | 1900      | 1900     | 1900 | 1841       | 1841     | 1841        | 0           | 1856    | 1856 |
| Adj Flow Rate, veh/h         | 594       | 0        | 19        | 2         | 0        | 0    | 66         | 264      | 2           | 0           | 128     | 674  |
| Peak Hour Factor             | 0.95      | 0.95     | 0.95      | 0.95      | 0.95     | 0.95 | 0.95       | 0.95     | 0.95        | 0.95        | 0.95    | 0.95 |
| Percent Heavy Veh, %         | 4         | 4        | 4         | 0         | 0        | 0    | 4          | 4        | 4           | 0           | 3       | 3    |
| Cap, veh/h                   | 903       | 0        | 402       | 5         | 0        | 0    | 140        | 862      | 6           | 0           | 586     | 1587 |
| Arrive On Green              | 0.26      | 0.00     | 0.26      | 0.00      | 0.00     | 0.00 | 0.05       | 0.45     | 0.45        | 0.00        | 0.31    | 0.31 |
| Sat Flow, veh/h              | 3506      | 0        | 1560      | 1809      | 0        | 0    | 1753       | 1824     | 14          | 0           | 1856    | 2768 |
| Grp Volume(v), veh/h         | 594       | 0        | 19        | 2         | 0        | 0    | 66         | 0        | 266         | 0           | 128     | 674  |
| Grp Sat Flow(s), veh/h/ln    | 1753      | 0        | 1560      | 1810      | 0        | 0    | 1753       | 0        | 1837        | 0           | 1856    | 1384 |
| Q Serve(g_s), s              | 5.0       | 0.0      | 0.3       | 0.0       | 0.0      | 0.0  | 1.2        | 0.0      | 3.1         | 0.0         | 1.7     | 4.6  |
| Cycle Q Clear(g_c), s        | 5.0       | 0.0      | 0.3       | 0.0       | 0.0      | 0.0  | 1.2        | 0.0      | 3.1         | 0.0         | 1.7     | 4.6  |
| Prop In Lane                 | 1.00      | 0.0      | 1.00      | 1.00      | 0.0      | 0.00 | 1.00       | 0.0      | 0.01        | 0.00        | 1.7     | 1.00 |
| Lane Grp Cap(c), veh/h       | 903       | 0        | 402       | 5         | 0        | 0.00 | 140        | 0        | 849         | 0.00        | 586     | 1587 |
| V/C Ratio(X)                 | 0.66      | 0.00     | 0.05      | 0.38      | 0.00     | 0.00 | 0.47       | 0.00     | 0.31        | 0.00        | 0.22    | 0.42 |
| Avail Cap(c_a), veh/h        | 3146      | 0.00     | 1400      | 1083      | 0.00     | 0.00 | 1049       | 0.00     | 3188        | 0.00        | 1943    | 3625 |
| HCM Platoon Ratio            | 1.00      | 1.00     | 1.00      | 1.00      | 1.00     | 1.00 | 1.00       | 1.00     | 1.00        | 1.00        | 1.00    | 1.00 |
| Upstream Filter(I)           | 1.00      | 0.00     | 1.00      | 1.00      | 0.00     | 0.00 | 1.00       | 0.00     | 1.00        | 0.00        | 1.00    | 1.00 |
| Uniform Delay (d), s/veh     | 12.9      | 0.00     | 10.9      | 19.1      | 0.00     | 0.00 | 17.9       | 0.00     | 6.3         | 0.00        | 9.3     | 4.9  |
| Incr Delay (d2), s/veh       | 0.3       | 0.0      | 0.0       | 39.5      | 0.0      | 0.0  | 2.5        | 0.0      | 0.2         | 0.0         | 0.2     | 0.2  |
| Initial Q Delay(d3),s/veh    | 0.0       | 0.0      | 0.0       | 0.0       | 0.0      | 0.0  | 100.2      | 0.0      | 2.1         | 0.0         | 0.2     | 2.9  |
| %ile BackOfQ(50%),veh/ln     | 1.9       | 0.0      | 0.0       | 0.0       | 0.0      | 0.0  | 5.5        | 0.0      | 2.1         | 0.0         | 0.6     | 3.8  |
| Unsig. Movement Delay, s/veh |           | 0.0      | 0.1       | 0.1       | 0.0      | 0.0  | 5.5        | 0.0      | ۷.۱         | 0.0         | 0.0     | 3.0  |
|                              | 13.2      | 0.0      | 10.9      | 58.5      | 0.0      | 0.0  | 120.5      | 0.0      | 8.5         | 0.0         | 9.5     | 8.0  |
| LnGrp Delay(d),s/veh         | 13.2<br>B | 0.0<br>A | 10.9<br>B | 36.3<br>E |          |      | 120.5<br>F |          | 0.5<br>A    | 0.0<br>A    |         |      |
| LnGrp LOS                    | <u>D</u>  |          |           |           | A        | A    |            | A        | A           | A           | A       | A    |
| Approach Vol, veh/h          |           | 613      |           |           | 2        |      |            | 332      |             |             | 802     |      |
| Approach Delay, s/veh        |           | 13.2     |           |           | 58.5     |      |            | 30.8     |             |             | 8.2     |      |
| Approach LOS                 |           | В        |           |           | Е        |      |            | С        |             |             | А       |      |
| Timer - Assigned Phs         | 1         | 2        |           | 4         |          | 6    |            | 8        |             |             |         |      |
| Phs Duration (G+Y+Rc), s     | 4.8       | 13.7     |           | 3.1       |          | 18.6 |            | 11.8     |             |             |         |      |
| Change Period (Y+Rc), s      | 3.0       | 3.5      |           | 3.0       |          | 3.5  |            | 3.0      |             |             |         |      |
| Max Green Setting (Gmax), s  | 20.0      | 35.0     |           | 20.0      |          | 58.0 |            | 30.0     |             |             |         |      |
| Max Q Clear Time (g_c+l1), s | 3.2       | 6.6      |           | 2.0       |          | 5.1  |            | 7.0      |             |             |         |      |
| Green Ext Time (p_c), s      | 0.1       | 3.6      |           | 0.0       |          | 0.8  |            | 1.8      |             |             |         |      |
| Intersection Summary         |           |          |           |           |          |      |            |          |             |             |         |      |
| HCM 6th Ctrl Delay           |           |          | 14.3      |           |          |      |            |          |             |             |         |      |
| HCM 6th LOS                  |           |          | 14.3<br>B |           |          |      |            |          |             |             |         |      |
|                              |           |          | D         |           |          |      |            |          |             |             |         |      |
| Notes                        |           |          |           |           |          |      |            |          |             |             |         |      |

|                                   | ۶         | -     | •     | •     | <b>←</b>  | •          | <b>1</b> | <b>†</b> | _      | -     | ļ     | 4    |
|-----------------------------------|-----------|-------|-------|-------|-----------|------------|----------|----------|--------|-------|-------|------|
| Movement                          | EBL       | EBT   | EBR   | WBL   | WBT       | WBR        | NBL      | NBT      | NBR    | SBL   | SBT   | SBR  |
| Lane Configurations               |           | €Î}   |       | 1/1   | <b>^</b>  | 7          | ሻ        | <b>^</b> | 7      | ሻ     | 41≯   | 7    |
| Traffic Volume (vph)              | 152       | 50    | 85    | 638   | 233       | 232        | 59       | 455      | 120    | 108   | 447   | 102  |
| Future Volume (vph)               | 152       | 50    | 85    | 638   | 233       | 232        | 59       | 455      | 120    | 108   | 447   | 102  |
| Ideal Flow (vphpl)                | 1900      | 1900  | 1900  | 1900  | 1900      | 1900       | 1900     | 1900     | 1900   | 1900  | 1900  | 1900 |
| Total Lost time (s)               |           | 4.0   |       | 4.9   | 4.9       | 4.9        | 4.9      | 4.9      | 4.9    | 4.9   | 4.9   | 4.9  |
| Lane Util. Factor                 |           | 0.95  |       | 0.97  | 1.00      | 1.00       | 1.00     | 0.95     | 1.00   | 0.91  | 0.91  | 1.00 |
| Frpb, ped/bikes                   |           | 0.97  |       | 1.00  | 1.00      | 0.98       | 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     | 1.00   | 1.00  | 1.00  | 1.00 |
| Frt                               |           | 0.96  |       | 1.00  | 1.00      | 0.85       | 1.00     | 1.00     | 0.85   | 1.00  | 1.00  | 0.85 |
| Flt Protected                     |           | 0.97  |       | 0.95  | 1.00      | 1.00       | 0.95     | 1.00     | 1.00   | 0.95  | 1.00  | 1.00 |
| Satd. Flow (prot)                 |           | 2893  |       | 3060  | 1660      | 1387       | 1547     | 3094     | 1384   | 1408  | 2961  | 1333 |
| Flt Permitted                     |           | 0.97  |       | 0.95  | 1.00      | 1.00       | 0.95     | 1.00     | 1.00   | 0.95  | 1.00  | 1.00 |
| Satd. Flow (perm)                 |           | 2893  |       | 3060  | 1660      | 1387       | 1547     | 3094     | 1384   | 1408  | 2961  | 1333 |
| 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)                   | 157       | 52    | 88    | 658   | 240       | 239        | 61       | 469      | 124    | 111   | 461   | 105  |
| RTOR Reduction (vph)              | 0         | 41    | 0     | 0     | 0         | 175        | 0        | 0        | 0      | 0     | 0     | 81   |
| Lane Group Flow (vph)             | 0         | 256   | 0     | 658   | 240       | 64         | 61       | 469      | 124    | 100   | 472   | 24   |
| Confl. Peds. (#/hr)               |           |       | 74    |       |           |            |          |          |        |       |       | 5    |
| Confl. Bikes (#/hr)               |           |       | 2     |       |           | 6          |          |          | 4      |       |       |      |
| Heavy Vehicles (%)                | 1%        | 1%    | 1%    | 3%    | 3%        | 3%         | 5%       | 5%       | 5%     | 5%    | 5%    | 5%   |
| Turn Type                         | Split     | NA    |       | Split | NA        | Perm       | Split    | NA       | custom | Split | NA    | Perm |
| Protected Phases                  | 4         | 4     |       | 7     | 7         |            | 6        | 6        | 2 6 7! | 2!    | 2     |      |
| Permitted Phases                  |           |       |       |       |           | 7          |          |          |        |       |       | 2    |
| Actuated Green, G (s)             |           | 20.5  |       | 32.2  | 32.2      | 32.2       | 21.0     | 21.0     | 90.6   | 27.6  | 27.6  | 27.6 |
| Effective Green, g (s)            |           | 20.5  |       | 32.2  | 32.2      | 32.2       | 21.0     | 21.0     | 90.6   | 27.6  | 27.6  | 27.6 |
| Actuated g/C Ratio                |           | 0.17  |       | 0.27  | 0.27      | 0.27       | 0.18     | 0.18     | 0.75   | 0.23  | 0.23  | 0.23 |
| Clearance Time (s)                |           | 4.0   |       | 4.9   | 4.9       | 4.9        | 4.9      | 4.9      |        | 4.9   | 4.9   | 4.9  |
| Vehicle Extension (s)             |           | 3.0   |       | 3.0   | 3.0       | 3.0        | 2.5      | 2.5      |        | 2.0   | 2.0   | 2.0  |
| Lane Grp Cap (vph)                |           | 494   |       | 821   | 445       | 372        | 270      | 541      | 1044   | 323   | 681   | 306  |
| v/s Ratio Prot                    |           | c0.09 |       | c0.22 | 0.14      |            | 0.04     | c0.15    | 0.09   | 0.07  | c0.16 |      |
| v/s Ratio Perm                    |           |       |       |       |           | 0.05       |          |          |        |       |       | 0.02 |
| v/c Ratio                         |           | 0.52  |       | 0.80  | 0.54      | 0.17       | 0.23     | 0.87     | 0.12   | 0.31  | 0.69  | 0.08 |
| Uniform Delay, d1                 |           | 45.2  |       | 40.9  | 37.6      | 33.7       | 42.5     | 48.1     | 4.0    | 38.3  | 42.3  | 36.2 |
| 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             |           | 0.9   |       | 5.7   | 1.3       | 0.2        | 0.3      | 13.6     | 0.0    | 2.5   | 5.7   | 0.5  |
| Delay (s)                         |           | 46.2  |       | 46.6  | 38.8      | 33.9       | 42.8     | 61.7     | 4.0    | 40.8  | 48.1  | 36.7 |
| Level of Service                  |           | D     |       | D     | D         | С          | D        | E        | A      | D     | D     | D    |
| Approach Delay (s)                |           | 46.2  |       |       | 42.3      |            |          | 49.0     |        |       | 45.2  |      |
| Approach LOS                      |           | D     |       |       | D         |            |          | D        |        |       | D     |      |
| Intersection Summary              |           |       |       |       |           |            |          |          |        |       |       |      |
| HCM 2000 Control Delay            |           |       | 45.0  | H     | CM 2000   | Level of S | Service  |          | D      |       |       |      |
| HCM 2000 Volume to Capacit        | ty ratio  |       | 0.73  | _     |           | ( (° / . ) |          |          | 40.7   |       |       |      |
| Actuated Cycle Length (s)         | _         |       | 120.0 |       | um of los |            |          |          | 18.7   |       |       |      |
| Intersection Capacity Utilization | on        |       | 84.7% | IC    | U Level   | of Service |          |          | Е      |       |       |      |
| Analysis Period (min)             |           |       | 15    |       |           |            |          |          |        |       |       |      |
| ! Phase conflict between lan      | ie groups | i.    |       |       |           |            |          |          |        |       |       |      |
| c Critical Lane Group             |           |       |       |       |           |            |          |          |        |       |       |      |

|  | •           | <b>→</b> | <b>←</b> | •     | <b>\</b>   | 4             |      |      |  |
|--|-------------|----------|----------|-------|------------|---------------|------|------|--|
| Movement                                   | EBL         | EBT      | WBT      | WBR   | SBL        | SBR           |      |      |  |
| Lane Configurations                        | *           | <b>^</b> | <b>^</b> | 11511 | <u> </u>   | 7             |      |      |  |
| Traffic Volume (vph)                       | 66          | 212      | 1498     | 116   | 30         | 60            |      |      |  |
| Future Volume (vph)                        | 66          | 212      | 1498     | 116   | 30         | 60            |      |      |  |
| Ideal Flow (vphpl)                         | 1900        | 1900     | 1900     | 1900  | 1900       | 1900          |      |      |  |
| Total Lost time (s)                        | 4.0         | 4.9      | 4.9      | 1000  | 4.2        | 4.2           |      |      |  |
| Lane Util. Factor                          | 1.00        | 0.91     | 0.91     |       | 1.00       | 1.00          |      |      |  |
| Frpb, ped/bikes                            | 1.00        | 1.00     | 1.00     |       | 1.00       | 1.00          |      |      |  |
| Flpb, ped/bikes                            | 1.00        | 1.00     | 1.00     |       | 1.00       | 1.00          |      |      |  |
| Frt  | 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)                          | 1687        | 4848     | 2700     |       | 1770       | 1583          |      |      |  |
| Flt Permitted                              | 0.95        | 1.00     | 1.00     |       | 0.95       | 1.00          |      |      |  |
| Satd. Flow (perm)                          | 1687        | 4848     | 5022     |       | 1770       | 1583          |      |      |  |
| Peak-hour factor, PHF                      | 0.98        | 0.98     | 0.98     | 0.98  | 0.98       | 0.98          |      |      |  |
| ,  | 67          | 216      | 1529     | 118   | 31         | 61            |      |      |  |
| Adj. Flow (vph)                            | 0           | 210      | 1529     |       | 0          | 55            |      |      |  |
| RTOR Reduction (vph) Lane Group Flow (vph) | 67          | 216      | 1642     | 0     | 31         | 6             |      |      |  |
| Confl. Peds. (#/hr)                        | 70          | ∠10      | 1042     | 0     | 31         | Ö             |      |      |  |
| ` ,  |             |          |          |       |            |               |      |      |  |
| Confl. Bikes (#/hr)                        | 7%          | 70/      | 2%       | 6     | 2%         | 2%            |      |      |  |
| Heavy Vehicles (%)                         |             | 7%       |          | 2%    |            |               |      |      |  |
| Turn Type                                  | Prot        | NA       | NA       |       | Prot       | Perm          |      |      |  |
| Protected Phases                           | 5           | 2        | 6        |       | 3          | •             |      |      |  |
| Permitted Phases                           | 0.0         | 70.0     | 50.0     |       | 0.0        | 3             |      |      |  |
| Actuated Green, G (s)                      | 8.0         | 70.9     | 58.9     |       | 9.6        | 9.6           |      |      |  |
| Effective Green, g (s)                     | 8.0         | 70.9     | 58.9     |       | 9.6        | 9.6           |      |      |  |
| Actuated g/C Ratio                         | 0.08        | 0.71     | 0.59     |       | 0.10       | 0.10          |      |      |  |
| Clearance Time (s)                         | 4.0         | 4.9      | 4.9      |       | 4.2        | 4.2           |      |      |  |
| Vehicle Extension (s)                      | 2.0         | 2.0      | 2.0      |       | 2.0        | 2.0           |      |      |  |
| Lane Grp Cap (vph)                         | 134         | 3437     | 1590     |       | 169        | 151           |      |      |  |
| v/s Ratio Prot                             | c0.04       | 0.04     | c0.61    |       | c0.02      |               |      |      |  |
| v/s Ratio Perm                             |             |          |          |       |            | 0.00          |      |      |  |
| v/c Ratio                                  | 0.50        | 0.06     | 1.03     |       | 0.18       | 0.04          |      |      |  |
| Uniform Delay, d1                          | 44.1        | 4.4      | 20.6     |       | 41.6       | 41.0          |      |      |  |
| Progression Factor                         | 1.00        | 1.00     | 0.79     |       | 1.00       | 1.00          |      |      |  |
| Incremental Delay, d2                      | 1.1         | 0.0      | 30.8     |       | 0.2        | 0.0           |      |      |  |
| Delay (s)                                  | 45.2        | 4.5      | 47.1     |       | 41.8       | 41.1          |      |      |  |
| Level of Service                           | D           | Α        | D        |       | D          | D             |      |      |  |
| Approach Delay (s)                         |             | 14.1     | 47.1     |       | 41.3       |               |      |      |  |
| Approach LOS                               |             | В        | D        |       | D          |               |      |      |  |
| Intersection Summary                       |             |          |          |       |            |               |      |      |  |
| HCM 2000 Control Delay                     |             |          | 42.2     | H     | CM 2000    | Level of Serv | vice | D    |  |
| HCM 2000 Volume to Capa                    | acity ratio |          | 0.80     |       |            |               |      |      |  |
| Actuated Cycle Length (s)                  |             |          | 100.0    |       | um of lost |               |      | 17.1 |  |
| Intersection Capacity Utilization          | ation       |          | 59.9%    | IC    | U Level o  | of Service    |      | В    |  |
| Analysis Period (min)                      |             |          | 15       |       |            |               |      |      |  |
| c Critical Lane Group                      |             |          |          |       |            |               |      |      |  |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway 图702080 Oyster Po

|                                   | <b></b> | ٠        | <b>→</b>  | •         | •         | <b>←</b>        | •       | ₽I    | 4     | †     | /        | <b>\</b> |
|-----------------------------------|---------|----------|-----------|-----------|-----------|-----------------|---------|-------|-------|-------|----------|----------|
| Movement                          | EBU     | EBL      | EBT       | EBR       | WBL2      | WBT             | WBR     | NBU   | NBL   | NBT   | NBR      | SBL      |
| Lane Configurations               |         | ሻ        | ተተኈ       |           | ሻ         | ተተ <sub>ጮ</sub> |         |       | 1,1   | ર્ન   | 7        |          |
| Traffic Volume (vph)              | 4       | 49       | 266       | 63        | 30        | 1255            | 19      | 2     | 766   | 32    | 49       | 8        |
| Future Volume (vph)               | 4       | 49       | 266       | 63        | 30        | 1255            | 19      | 2     | 766   | 32    | 49       | 8        |
| Ideal Flow (vphpl)                | 1900    | 1900     | 1900      | 1900      | 1900      | 1900            | 1900    | 1900  | 1900  | 1900  | 1900     | 1900     |
| Total Lost time (s)               |         | 4.0      | 4.6       |           | 4.0       | 4.6             |         |       | 4.0   | 4.0   | 4.0      |          |
| Lane Util. Factor                 |         | 1.00     | 0.91      |           | 1.00      | 0.91            |         |       | 0.91  | 0.91  | 1.00     |          |
| Frpb, ped/bikes                   |         | 1.00     | 1.00      |           | 1.00      | 1.00            |         |       | 1.00  | 1.00  | 0.94     |          |
| Flpb, ped/bikes                   |         | 1.00     | 1.00      |           | 1.00      | 1.00            |         |       | 1.00  | 1.00  | 1.00     |          |
| Frt                               |         | 1.00     | 0.97      |           | 1.00      | 1.00            |         |       | 1.00  | 1.00  | 0.85     |          |
| Flt Protected                     |         | 0.95     | 1.00      |           | 0.95      | 1.00            |         |       | 0.95  | 0.96  | 1.00     |          |
| Satd. Flow (prot)                 |         | 1597     | 4446      |           | 1770      | 5070            |         |       | 3189  | 1608  | 1480     |          |
| Flt Permitted                     |         | 0.28     | 1.00      |           | 0.95      | 1.00            |         |       | 0.95  | 0.96  | 1.00     |          |
| Satd. Flow (perm)                 |         | 467      | 4446      |           | 1770      | 5070            |         |       | 3189  | 1608  | 1480     |          |
| 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)                   | 4       | 51       | 277       | 66        | 31        | 1307            | 20      | 2     | 798   | 33    | 51       | 8        |
| RTOR Reduction (vph)              | 0       | 0        | 0         | 0         | 0         | 1               | 0       | 0     | 0     | 0     | 40       | 0        |
| Lane Group Flow (vph)             | 0       | 55       | 343       | 0         | 31        | 1326            | 0       | 0     | 553   | 280   | 11       | 0        |
| Confl. Peds. (#/hr)               |         |          |           |           |           |                 | 8       |       |       |       | 37       |          |
| Confl. Bikes (#/hr)               |         |          |           | 2         |           |                 | 5       |       |       |       | 4        |          |
| Heavy Vehicles (%)                | 13%     | 13%      | 13%       | 13%       | 2%        | 2%              | 2%      | 3%    | 3%    | 3%    | 3%       | 1%       |
|                                   | ustom   | Prot     | NA        |           | Prot      | NA              |         | Split | Split | NA    | Perm     | Split    |
| Protected Phases                  |         | 1        | 6         |           | 5         | 2               |         | 4     | 4     | 4     |          | 7        |
| Permitted Phases                  | 1       |          |           |           | -         | <del>-</del>    |         | •     | •     | •     | 4        |          |
| Actuated Green, G (s)             |         | 14.4     | 48.2      |           | 4.4       | 38.2            |         |       | 28.4  | 28.4  | 28.4     |          |
| Effective Green, g (s)            |         | 14.4     | 48.2      |           | 4.4       | 38.2            |         |       | 28.4  | 28.4  | 28.4     |          |
| Actuated g/C Ratio                |         | 0.11     | 0.37      |           | 0.03      | 0.30            |         |       | 0.22  | 0.22  | 0.22     |          |
| Clearance Time (s)                |         | 4.0      | 4.6       |           | 4.0       | 4.6             |         |       | 4.0   | 4.0   | 4.0      |          |
| Vehicle Extension (s)             |         | 2.0      | 3.0       |           | 2.0       | 3.0             |         |       | 2.0   | 2.0   | 2.0      |          |
| Lane Grp Cap (vph)                |         | 51       | 1656      |           | 60        | 1496            |         |       | 699   | 352   | 324      |          |
| v/s Ratio Prot                    |         | <u> </u> | 0.08      |           | 0.02      | c0.26           |         |       | 0.17  | c0.17 | <u> </u> |          |
| v/s Ratio Perm                    |         | c0.12    | 0.00      |           | 0.02      | 00.20           |         |       | •     | •     | 0.01     |          |
| v/c Ratio                         |         | 1.08     | 0.21      |           | 0.52      | 0.89            |         |       | 0.79  | 0.80  | 0.03     |          |
| Uniform Delay, d1                 |         | 57.5     | 27.6      |           | 61.5      | 43.5            |         |       | 47.7  | 47.8  | 39.7     |          |
| Progression Factor                |         | 1.00     | 1.00      |           | 1.00      | 1.00            |         |       | 1.00  | 1.00  | 1.00     |          |
| Incremental Delay, d2             |         | 149.7    | 0.1       |           | 3.1       | 6.7             |         |       | 5.7   | 11.0  | 0.0      |          |
| Delay (s)                         |         | 207.2    | 27.7      |           | 64.6      | 50.2            |         |       | 53.4  | 58.8  | 39.7     |          |
| Level of Service                  |         | F        | С         |           | E         | D               |         |       | D     | E     | D        |          |
| Approach Delay (s)                |         |          | 52.5      |           |           | 50.6            |         |       |       | 54.3  |          |          |
| Approach LOS                      |         |          | D         |           |           | D               |         |       |       | D     |          |          |
| Intersection Summary              |         |          |           |           |           |                 |         |       |       |       |          |          |
| HCM 2000 Control Delay            |         |          | 53.1      | Н         | CM 2000   | Level of S      | Service |       | D     |       |          |          |
| HCM 2000 Volume to Capacity       | ratio   |          | 0.76      |           |           |                 |         |       |       |       |          |          |
| Actuated Cycle Length (s)         |         |          | 129.4     | S         | um of los | t time (s)      |         |       | 21.1  |       |          |          |
| Intersection Capacity Utilization | 1       |          | 96.8%     |           |           | of Service      |         |       | F     |       |          |          |
| Analysis Period (min)             |         |          | 15        |           |           |                 |         |       |       |       |          |          |
| dr Defacto Right Lane. Reco       | de with | 1 though | lane as a | right lan | e.        |                 |         |       |       |       |          |          |
| c Critical Lane Group             |         |          |           |           |           |                 |         |       |       |       |          |          |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway 图标识题 Oyster Po

|                        | ļ      | 4    | /     | 4     |
|------------------------|--------|------|-------|-------|
| Movement               | SBT    | SBR2 | NER   | NER2  |
| Lane Configurations    | 4Th    |      | 77    | 7     |
| Traffic Volume (vph)   | 27     | 431  | 120   | 57    |
| Future Volume (vph)    | 27     | 431  | 120   | 57    |
| Ideal Flow (vphpl)     | 1900   | 1900 | 1990  | 1900  |
| Total Lost time (s)    | 4.0    | 1300 | 4.5   | 4.5   |
| Lane Util. Factor      | 0.95   |      | *0.95 | 1.00  |
|                        |        |      |       | 1.00  |
| Frpb, ped/bikes        | 0.97   |      | 1.00  |       |
| Flpb, ped/bikes        | 1.00   |      | 1.00  | 1.00  |
| Frt                    | 0.86   |      | 1.00  | 0.85  |
| Flt Protected          | 1.00   |      | 1.00  | 1.00  |
| Satd. Flow (prot)      | 2969   |      | 3376  | 1442  |
| Flt Permitted          | 1.00   |      | 1.00  | 1.00  |
| Satd. Flow (perm)      | 2969   |      | 3376  | 1442  |
| Peak-hour factor, PHF  | 0.96   | 0.96 | 0.96  | 0.96  |
| Adj. Flow (vph)        | 28     | 449  | 125   | 59    |
| RTOR Reduction (vph)   | 373    | 0    | 0     | 0     |
| Lane Group Flow (vph)  | 112    | 0    | 125   | 59    |
| Confl. Peds. (#/hr)    | 112    |      | 120   | 54    |
| Confl. Bikes (#/hr)    |        | 8    |       | 04    |
| , ,                    | 1%     | 1%   | 12%   | 12%   |
| Heavy Vehicles (%)     |        | 170  |       |       |
| Turn Type              | NA     |      | Prot  | Prot  |
| Protected Phases       | 7      |      | 3     | 3     |
| Permitted Phases       |        |      |       |       |
| Actuated Green, G (s)  | 9.1    |      | 18.2  | 18.2  |
| Effective Green, g (s) | 9.1    |      | 18.2  | 18.2  |
| Actuated g/C Ratio     | 0.07   |      | 0.14  | 0.14  |
| Clearance Time (s)     | 4.0    |      | 4.5   | 4.5   |
| Vehicle Extension (s)  | 2.0    |      | 2.0   | 2.0   |
| Lane Grp Cap (vph)     | 208    |      | 474   | 202   |
| v/s Ratio Prot         | c0.04  |      | 0.04  | c0.04 |
| v/s Ratio Perm         | 00.04  |      | 0.04  | 00.04 |
| v/c Ratio              | 0.93dr |      | 0.26  | 0.29  |
|                        | 58.1   |      | 49.6  | 49.8  |
| Uniform Delay, d1      |        |      |       |       |
| Progression Factor     | 1.00   |      | 1.00  | 1.00  |
| Incremental Delay, d2  | 1.3    |      | 0.1   | 0.3   |
| Delay (s)              | 59.5   |      | 49.7  | 50.1  |
| Level of Service       | Е      |      | D     | D     |
| Approach Delay (s)     | 59.5   |      |       |       |
| Approach LOS           | Е      |      |       |       |
| Intersection Summary   |        |      |       |       |
| intersection Summary   |        |      |       |       |

|                               | ۶          | <b>→</b>   | •     | €    | <b>←</b>   | •          | •       | <b>†</b> | <b>/</b> | <b>/</b> | <b>↓</b> | -√    |
|-------------------------------|------------|------------|-------|------|------------|------------|---------|----------|----------|----------|----------|-------|
| Movement                      | EBL        | EBT        | EBR   | WBL  | WBT        | WBR        | NBL     | NBT      | NBR      | SBL      | SBT      | SBR   |
| Lane Configurations           | 7          | <b>∱</b> ∱ |       | ሻ    | <b>∱</b> ∱ |            |         | 4        |          |          | <b>↑</b> | 7     |
| Traffic Volume (vph)          | 68         | 105        | 1     | 0    | 682        | 48         | 3       | 1        | 0        | 17       | 0        | 268   |
| Future Volume (vph)           | 68         | 105        | 1     | 0    | 682        | 48         | 3       | 1        | 0        | 17       | 0        | 268   |
| 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       | 0.95       |       |      | 0.95       |            |         | 1.00     |          |          | 1.00     | 1.00  |
| Frpb, ped/bikes               | 1.00       | 1.00       |       |      | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00  |
| Flpb, ped/bikes               | 1.00       | 1.00       |       |      | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00  |
| Frt                           | 1.00       | 1.00       |       |      | 0.99       |            |         | 1.00     |          |          | 1.00     | 0.85  |
| Flt Protected                 | 0.95       | 1.00       |       |      | 1.00       |            |         | 0.96     |          |          | 0.95     | 1.00  |
| Satd. Flow (prot)             | 1492       | 2979       |       |      | 3273       |            |         | 1831     |          |          | 1719     | 1538  |
| Flt Permitted                 | 0.95       | 1.00       |       |      | 1.00       |            |         | 0.66     |          |          | 0.76     | 1.00  |
| Satd. Flow (perm)             | 1492       | 2979       |       |      | 3273       |            |         | 1252     |          |          | 1366     | 1538  |
| 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)               | 73         | 113        | 1     | 0    | 733        | 52         | 3       | 1        | 0        | 18       | 0        | 288   |
| RTOR Reduction (vph)          | 0          | 1          | 0     | 0    | 0          | 0          | 0       | 0        | 0        | 0        | 0        | 258   |
| Lane Group Flow (vph)         | 73         | 113        | 0     | 0    | 785        | 0          | 0       | 4        | 0        | 0        | 18       | 30    |
| Confl. Peds. (#/hr)           |            |            | 1     |      |            | 2          |         |          |          |          |          |       |
| Confl. Bikes (#/hr)           |            |            |       |      |            | 3          |         |          |          |          |          |       |
| Heavy Vehicles (%)            | 21%        | 21%        | 21%   | 9%   | 9%         | 9%         | 0%      | 0%       | 0%       | 5%       | 5%       | 5%    |
| Turn Type                     | Prot       | NA         |       | Prot | NA         |            | Perm    | NA       |          | Perm     | NA       | Perm  |
| Protected Phases              | 5          | 2          |       | 1    | 6          |            |         | 3        |          |          | 4        |       |
| Permitted Phases              |            |            |       |      |            |            | 3       |          |          | 4        |          | 4     |
| Actuated Green, G (s)         | 7.2        | 35.7       |       |      | 24.5       |            |         | 19.9     |          |          | 7.8      | 7.8   |
| Effective Green, g (s)        | 7.2        | 35.7       |       |      | 24.5       |            |         | 19.9     |          |          | 7.8      | 7.8   |
| Actuated g/C Ratio            | 0.10       | 0.47       |       |      | 0.32       |            |         | 0.26     |          |          | 0.10     | 0.10  |
| Clearance Time (s)            | 4.0        | 4.0        |       |      | 4.0        |            |         | 4.0      |          |          | 4.0      | 4.0   |
| Vehicle Extension (s)         | 2.0        | 2.5        |       |      | 2.5        |            |         | 2.0      |          |          | 2.0      | 2.0   |
| Lane Grp Cap (vph)            | 142        | 1410       |       |      | 1063       |            |         | 330      |          |          | 141      | 159   |
| v/s Ratio Prot                | c0.05      | 0.04       |       |      | c0.24      |            |         |          |          |          |          |       |
| v/s Ratio Perm                |            |            |       |      |            |            |         | c0.00    |          |          | 0.01     | c0.02 |
| v/c Ratio                     | 0.51       | 0.08       |       |      | 0.74       |            |         | 0.01     |          |          | 0.13     | 0.19  |
| Uniform Delay, d1             | 32.4       | 10.9       |       |      | 22.6       |            |         | 20.5     |          |          | 30.7     | 30.9  |
| Progression Factor            | 1.00       | 1.00       |       |      | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00  |
| Incremental Delay, d2         | 1.3        | 0.0        |       |      | 2.6        |            |         | 0.1      |          |          | 0.1      | 0.2   |
| Delay (s)                     | 33.7       | 10.9       |       |      | 25.2       |            |         | 20.6     |          |          | 30.9     | 31.1  |
| Level of Service              | С          | В          |       |      | С          |            |         | С        |          |          | С        | С     |
| Approach Delay (s)            |            | 19.8       |       |      | 25.2       |            |         | 20.6     |          |          | 31.1     |       |
| Approach LOS                  |            | В          |       |      | С          |            |         | С        |          |          | С        |       |
| Intersection Summary          |            |            |       |      |            |            |         |          |          |          |          |       |
| HCM 2000 Control Delay        |            |            | 25.8  | Н    | CM 2000    | Level of   | Service |          | С        |          |          |       |
| HCM 2000 Volume to Capa       | city ratio |            | 0.40  |      |            |            |         |          |          |          |          |       |
| Actuated Cycle Length (s)     | ,          |            | 75.4  | Sı   | um of lost | t time (s) |         |          | 16.0     |          |          |       |
| Intersection Capacity Utiliza | ation      |            | 50.5% |      |            | of Service |         |          | А        |          |          |       |
| Analysis Period (min)         |            |            | 15    |      |            |            |         |          |          |          |          |       |
| c Critical Lane Group         |            |            |       |      |            |            |         |          |          |          |          |       |

| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations        |      | ર્ન  | 7    | , j  | ĵ.   |      |      | 4    | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 5    | 324  | 114  | 194  | 76   | 1    | 57   | 16   | 135  | 0    | 2    | 0    |
| Future Vol, veh/h          | 5    | 324  | 114  | 194  | 76   | 1    | 57   | 16   | 135  | 0    | 2    | 0    |
| Peak Hour Factor           | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles, %          | 4    | 4    | 4    | 10   | 10   | 10   | 16   | 16   | 16   | 50   | 50   | 50   |
| Mvmt Flow                  | 5    | 345  | 121  | 206  | 81   | 1    | 61   | 17   | 144  | 0    | 2    | 0    |
| Number of Lanes            | 0    | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      |      | SB   |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      |      | NB   |      |
| Opposing Lanes             | 2    |      |      | 2    |      |      | 1    |      |      |      | 2    |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      |      | WB   |      |
| Conflicting Lanes Left     | 1    |      |      | 2    |      |      | 2    |      |      |      | 2    |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      |      | EB   |      |
| Conflicting Lanes Right    | 2    |      |      | 1    |      |      | 2    |      |      |      | 2    |      |
| HCM Control Delay          | 13.5 |      |      | 12   |      |      | 10.8 |      |      |      | 10.9 |      |
| HCM LOS                    | В    |      |      | В    |      |      | В    |      |      |      | В    |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 |
|------------------------|-------|-------|-------|-------|-------|-------|-------|
| Vol Left, %            | 78%   | 0%    | 2%    | 0%    | 100%  | 0%    | 0%    |
| Vol Thru, %            | 22%   | 0%    | 98%   | 0%    | 0%    | 99%   | 100%  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 1%    | 0%    |
| Sign Control           | Stop  |
| Traffic Vol by Lane    | 73    | 135   | 329   | 114   | 194   | 77    | 2     |
| LT Vol                 | 57    | 0     | 5     | 0     | 194   | 0     | 0     |
| Through Vol            | 16    | 0     | 324   | 0     | 0     | 76    | 2     |
| RT Vol                 | 0     | 135   | 0     | 114   | 0     | 1     | 0     |
| Lane Flow Rate         | 78    | 144   | 350   | 121   | 206   | 82    | 2     |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6     |
| Degree of Util (X)     | 0.154 | 0.24  | 0.553 | 0.167 | 0.37  | 0.135 | 0.005 |
| Departure Headway (Hd) | 7.119 | 6.015 | 5.686 | 4.971 | 6.456 | 5.941 | 7.802 |
| Convergence, Y/N       | Yes   |
| Cap                    | 505   | 597   | 637   | 723   | 557   | 605   | 459   |
| Service Time           | 4.853 | 3.748 | 3.412 | 2.697 | 4.186 | 3.67  | 5.849 |
| HCM Lane V/C Ratio     | 0.154 | 0.241 | 0.549 | 0.167 | 0.37  | 0.136 | 0.004 |
| HCM Control Delay      | 11.2  | 10.6  | 15.2  | 8.7   | 12.9  | 9.6   | 10.9  |
| HCM Lane LOS           | В     | В     | С     | Α     | В     | Α     | В     |
| HCM 95th-tile Q        | 0.5   | 0.9   | 3.4   | 0.6   | 1.7   | 0.5   | 0     |

## HCM 6th Signalized Intersection Summary 1: Gateway & Gatewa Business Pkwy/Larkspur Landing Dwy

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b> | •    | 4    | <b>†</b>   | /    | <b>&gt;</b> | ļ          | 4    |
|------------------------------|------|----------|------|------|----------|------|------|------------|------|-------------|------------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT        | NBR  | SBL         | SBT        | SBR  |
| Lane Configurations          | 75   | 1>       |      | ሻ    | 1>       |      | ሻ    | <b>∱</b> } |      | 7           | <b>∱</b> } | •    |
| Traffic Volume (veh/h)       | 34   | 0        | 43   | 14   | 0        | 24   | 42   | 356        | 3    | 18          | 415        | 95   |
| Future Volume (veh/h)        | 34   | 0        | 43   | 14   | 0        | 24   | 42   | 356        | 3    | 18          | 415        | 95   |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 0          | 0    | 0           | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.96 |          | 0.95 | 0.96 |          | 0.95 | 1.00 |            | 0.96 | 1.00        |            | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No         |      |             | No         |      |
| Adj Sat Flow, veh/h/ln       | 1826 | 1826     | 1826 | 1781 | 1781     | 1781 | 1796 | 1796       | 1796 | 1767        | 1767       | 1767 |
| Adj Flow Rate, veh/h         | 35   | 0        | 5    | 14   | 0        | 2    | 43   | 367        | 3    | 19          | 428        | 83   |
| Peak Hour Factor             | 0.97 | 0.97     | 0.97 | 0.97 | 0.97     | 0.97 | 0.97 | 0.97       | 0.97 | 0.97        | 0.97       | 0.97 |
| Percent Heavy Veh, %         | 5    | 5        | 5    | 8    | 8        | 8    | 7    | 7          | 7    | 9           | 9          | 9    |
| Cap, veh/h                   | 261  | 0        | 186  | 254  | 0        | 182  | 108  | 2276       | 19   | 59          | 1750       | 336  |
| Arrive On Green              | 0.13 | 0.00     | 0.13 | 0.13 | 0.00     | 0.13 | 0.06 | 0.66       | 0.66 | 0.03        | 0.63       | 0.63 |
| Sat Flow, veh/h              | 1319 | 0        | 1477 | 1284 | 0        | 1441 | 1711 | 3468       | 28   | 1682        | 2786       | 535  |
| Grp Volume(v), veh/h         | 35   | 0        | 5    | 14   | 0        | 2    | 43   | 180        | 190  | 19          | 256        | 255  |
| Grp Sat Flow(s), veh/h/ln    | 1319 | 0        | 1477 | 1284 | 0        | 1441 | 1711 | 1706       | 1790 | 1682        | 1678       | 1642 |
| Q Serve(g_s), s              | 1.8  | 0.0      | 0.2  | 0.7  | 0.0      | 0.1  | 1.8  | 3.0        | 3.1  | 0.8         | 5.0        | 5.1  |
| Cycle Q Clear(g_c), s        | 1.9  | 0.0      | 0.2  | 0.9  | 0.0      | 0.1  | 1.8  | 3.0        | 3.1  | 0.8         | 5.0        | 5.1  |
| Prop In Lane                 | 1.00 | 0.0      | 1.00 | 1.00 | 0.0      | 1.00 | 1.00 | 0.0        | 0.02 | 1.00        | 0.0        | 0.33 |
| Lane Grp Cap(c), veh/h       | 261  | 0        | 186  | 254  | 0        | 182  | 108  | 1120       | 1175 | 59          | 1054       | 1031 |
| V/C Ratio(X)                 | 0.13 | 0.00     | 0.03 | 0.06 | 0.00     | 0.01 | 0.40 | 0.16       | 0.16 | 0.32        | 0.24       | 0.25 |
| Avail Cap(c_a), veh/h        | 620  | 0        | 589  | 604  | 0        | 575  | 237  | 1120       | 1175 | 233         | 1054       | 1031 |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 1.00 | 1.00 | 1.00       | 1.00 | 0.96        | 0.96       | 0.96 |
| Uniform Delay (d), s/veh     | 29.5 | 0.0      | 28.7 | 29.1 | 0.0      | 28.7 | 33.8 | 5.0        | 5.0  | 35.3        | 6.1        | 6.1  |
| Incr Delay (d2), s/veh       | 0.1  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.9  | 0.3        | 0.3  | 1.1         | 0.5        | 0.5  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 0.0        | 0.0  | 0.0         | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 0.6  | 0.0      | 0.1  | 0.2  | 0.0      | 0.0  | 0.8  | 1.0        | 1.0  | 0.3         | 1.6        | 1.6  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |      |      |            |      |             |            |      |
| LnGrp Delay(d),s/veh         | 29.6 | 0.0      | 28.8 | 29.2 | 0.0      | 28.7 | 34.6 | 5.3        | 5.2  | 36.5        | 6.6        | 6.7  |
| LnGrp LOS                    | С    | А        | С    | С    | Α        | С    | С    | Α          | A    | D           | Α          | Α    |
| Approach Vol, veh/h          |      | 40       |      |      | 16       |      |      | 413        |      |             | 530        |      |
| Approach Delay, s/veh        |      | 29.5     |      |      | 29.1     |      |      | 8.3        |      |             | 7.7        |      |
| Approach LOS                 |      | C        |      |      | C        |      |      | A          |      |             | Α.,        |      |
|                              |      |          |      |      |          |      |      |            |      |             | , ,        |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8          |      |             |            |      |
| Phs Duration (G+Y+Rc), s     | 6.6  | 54.3     |      | 14.1 | 8.7      | 52.2 |      | 14.1       |      |             |            |      |
| Change Period (Y+Rc), s      | 4.0  | 5.1      |      | 4.6  | 4.0      | 5.1  |      | 4.6        |      |             |            |      |
| Max Green Setting (Gmax), s  | 10.4 | 21.0     |      | 29.9 | 10.4     | 21.0 |      | 29.9       |      |             |            |      |
| Max Q Clear Time (g_c+l1), s | 2.8  | 5.1      |      | 3.9  | 3.8      | 7.1  |      | 2.9        |      |             |            |      |
| Green Ext Time (p_c), s      | 0.0  | 1.2      |      | 0.0  | 0.0      | 1.8  |      | 0.0        |      |             |            |      |
| Intersection Summary         |      |          |      |      |          |      |      |            |      |             |            |      |
| HCM 6th Ctrl Delay           |      |          | 9.2  |      |          |      |      |            |      |             |            |      |
| HCM 6th LOS                  |      |          | Α    |      |          |      |      |            |      |             |            |      |
| Notes                        |      |          |      |      |          |      |      |            |      |             |            |      |

User approved pedestrian interval to be less than phase max green.

|  | <b>→</b>  | $\rightarrow$ | •               | <b>←</b> | •         | ~    |      |
|--|-----------|---------------|-----------------|----------|-----------|------|------|
| Movement                                     | EBT       | EBR           | WBL             | WBT      | NBL       | NBR  |      |
| Lane Configurations                          | <b>4†</b> | LDIT          | ሻ               | <b>^</b> | ሻ         | 77   |      |
| Traffic Volume (veh/h)                       | 842       | 54            | 12              | 427      | 131       | 639  |      |
| Future Volume (veh/h)                        | 842       | 54            | 12              | 427      | 131       | 639  |      |
| Initial Q (Qb), veh                          | 45        | 0             | 0               | 0        | 10        | 51   |      |
| Ped-Bike Adj(A_pbT)                          | 10        | 0.96          | 1.00            |          | 1.00      | 1.00 |      |
| Parking Bus, Adj                             | 1.00      | 1.00          | 1.00            | 1.00     | 1.00      | 1.00 |      |
| Work Zone On Approach                        | No        | 1.00          | 1.00            | No       | No        | 1.00 |      |
| Adj Sat Flow, veh/h/ln                       | 1841      | 1841          | 1707            | 1707     | 1811      | 1811 |      |
| Adj Flow Rate, veh/h                         | 915       | 52            | 13              | 464      | 142       | 0    |      |
| Peak Hour Factor                             | 0.92      | 0.92          | 0.92            | 0.92     | 0.92      | 0.92 |      |
| Percent Heavy Veh, %                         | 4         | 4             | 13              | 13       | 6         | 6    |      |
| Cap, veh/h                                   | 3604      | 193           | 30              | 3719     | 214       |      |      |
| Arrive On Green                              | 0.51      | 0.51          | 0.02            | 0.82     | 0.10      | 0.00 |      |
| Sat Flow, veh/h                              | 5017      | 275           | 1626            | 4815     | 1725      | 2701 |      |
| Grp Volume(v), veh/h                         | 631       | 336           | 13              | 464      | 142       | 0    |      |
| Grp Sat Flow(s), veh/h/ln                    | 1675      | 1776          | 1626            | 1554     | 1725      | 1351 |      |
| Q Serve(g_s), s                              | 10.6      | 10.6          | 0.8             | 2.0      | 8.0       | 0.0  |      |
| Cycle Q Clear(g_c), s                        | 10.6      | 10.6          | 0.8             | 2.0      | 8.0       | 0.0  |      |
| Prop In Lane                                 | 10.0      | 0.15          | 1.00            | 2.0      | 1.00      | 1.00 |      |
| _ane Grp Cap(c), veh/h                       | 2479      | 1320          | 30              | 3719     | 214       | 1.00 |      |
| V/C Ratio(X)                                 | 0.25      | 0.25          | 0.44            | 0.12     | 0.66      |      |      |
| Avail Cap(c_a), veh/h                        | 2542      | 1348          | 130             | 3808     | 517       |      |      |
| HCM Platoon Ratio                            | 0.67      | 0.67          | 1.00            | 1.00     | 1.00      | 1.00 |      |
| Jpstream Filter(I)                           | 0.07      | 0.98          | 0.99            | 0.99     | 1.00      | 0.00 |      |
| Jniform Delay (d), s/veh                     | 10.7      | 10.5          | 48.6            | 2.5      | 42.9      | 0.00 |      |
| ncr Delay (d2), s/veh                        | 0.2       | 0.5           | 3.7             | 0.1      | 3.5       | 0.0  |      |
| nitial Q Delay(d3),s/veh                     | 1.4       | 1.2           | 0.0             | 0.0      | 46.7      | 0.0  |      |
| %ile BackOfQ(50%),veh/ln                     | 6.4       | 6.7           | 0.4             | 0.5      | 7.3       | 0.0  |      |
| Jnsig. Movement Delay, s/veh                 |           | 0.1           | U. <del>T</del> | 0.0      | 1.0       | 0.0  |      |
| .nGrp Delay(d),s/veh                         | 12.4      | 12.2          | 52.3            | 2.5      | 93.1      | 0.0  |      |
| inGrp LOS                                    | 12.4<br>B | 12.2<br>B     | 52.5<br>D       | 2.5<br>A | 93.1<br>F | 0.0  |      |
| Approach Vol, veh/h                          | 967       | ь             | U               | 477      | 142       | A    |      |
| Approach Voi, ven/n<br>Approach Delay, s/veh | 12.3      |               |                 | 3.9      | 93.1      | А    |      |
| •      | 12.3<br>B |               |                 | 3.9<br>A | 93.1<br>F |      |      |
| Approach LOS                                 | Б         |               |                 | A        | Г         |      |      |
| Timer - Assigned Phs                         | 1         | 2             |                 |          |           | 6    | 8    |
| Phs Duration (G+Y+Rc), s                     | 5.8       | 79.9          |                 |          |           | 85.7 | 14.3 |
| Change Period (Y+Rc), s                      | 4.0       | 4.0           |                 |          |           | 4.0  | 4.0  |
| Max Green Setting (Gmax), s                  | 8.0       | 50.0          |                 |          |           | 62.0 | 30.0 |
| Max Q Clear Time (g_c+l1), s                 | 2.8       | 12.6          |                 |          |           | 4.0  | 10.0 |
| Green Ext Time (p_c), s                      | 0.0       | 4.6           |                 |          |           | 2.2  | 0.5  |
| ntersection Summary                          |           |               |                 |          |           |      |      |
| HCM 6th Ctrl Delay                           |           |               | 17.0            |          |           |      |      |
| HCM 6th LOS                                  |           |               | В               |          |           |      |      |
| Notes  |           |               | _               |          |           |      |      |

| Movement   EBL   EBT   EBR   WBL   WBT   WBR   NBL   NBT   NBR   SBL   SBT   SBR   Lane Configurations   1   |   | ۶    | <b>→</b> | •    | •     | <b>+</b>    | •    | 1    | <b>†</b> | <b>/</b> | <b>/</b> | <b>+</b> | 4    |
|--|---|------|----------|------|-------|-------------|------|------|----------|----------|----------|----------|------|
| Traffic Volume (veh/h) 164 1247 70 113 295 104 42 162 304 192 131 102 1011 102 102   | Movement                                | EBL  | EBT      | EBR  | WBL   | WBT         | WBR  |      |          | NBR      | SBL      |          | SBR  |
| Future Volume (vehrh) 164 1247 70 113 295 104 42 162 304 192 131 102 initial Q (Qb), veh 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   |   |      |          |      |       | <b>↑</b> ↑₽ |      |      |          |          |          |          |      |
| Initial Q (Ob), weh   5  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Ped-Bike Adj(A_pbT)  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Parking Bus, Adj   |   |      | 0        |      |       | 0           |      |      | 0        |          |          | 0        |      |
| Work Zone On Ápproach  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Adj Star Flow, vehrhin 1841 969 1841 1633 1633 1633 1752 1752 1767 1767 1767 1767 Adj Flow Rate, vehrh 173 1313 771 119 311 76 44 171 0 202 138 0 Percent Heavy Veh, % 4 4 4 18 18 18 18 10 10 10 10 9 9 9 9 9 Cap, vehrh 211 1479 80 138 1961 457 131 273 225 461 Arrive On Green 0.11 0.58 0.58 0.09 0.55 0.55 0.08 0.08 0.00 0.13 0.14 0.00 Sat Flow, vehrh 1753 2564 133 1555 3597 838 1668 3416 0 1682 3445 0 Grp Volume(v), vehrh 1773 903 481 119 254 133 44 171 0 202 138 0 Grp Sat Flow(s), vehrhin 1753 882 939 1655 1486 1462 1668 1664 0 1682 1678 0 Q Serve(g.s.), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g.c.), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g.c.), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Lane Grp Cap(c), vehrh 211 1017 542 138 1621 797 131 273 225 461 V/C Ratio(X)   |   | 1.00 |          | 1.00 | 1.00  |             | 1.00 | 1.00 |          | 1.00     | 1.00     |          | 1.00 |
| Adj Flow Rate, veh/h Peak Hour Factor O.95 O.95 O.95 O.95 O.95 O.95 O.95 O.95  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Peak Hour Factor   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Percent Heavy Veh, %   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Cap, veh/h Arrive On Green 0.11 1479 80 138 1961 457 131 273 225 461 Arrive On Green 0.11 0.58 0.58 0.09 0.55 0.55 0.80 0.08 0.00 0.13 0.14 0.00 Sat Flow, veh/h 1753 2564 139 1555 3597 838 1668 3416 0 1682 3445 0 Grp Volume(v), veh/h 173 903 481 119 254 133 44 171 0 202 138 0 Grp Sat Flow(s), veh/h/ln 1753 882 939 1555 1486 1462 1668 1664 0 1682 1678 0 Q Serve(g_s), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_e), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Prop In Lane 1.00 0.15 1.00 0.57 1.00 0.00 1.07 5.5 0.0 Prop In Lane 1.00 0.15 1.00 0.57 1.00 0.00 1.00 0.00 Lane Grp Cap(c), veh/h 211 1017 542 138 1621 797 131 273 225 461 V/C Ratio(X) Avail Cap(c_a), veh/h 1270 1017 542 170 1647 810 157 710 331 1141 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Arrive On Green 0.11 0.58 0.58 0.09 0.55 0.55 0.08 0.08 0.00 0.13 0.14 0.00 Sat Flow, veh/h 1753 2564 139 1555 3597 838 1668 3416 0 1662 3445 0 Grp Volume(v), veh/h 173 903 481 119 254 133 44 171 0 202 138 0 Grp Sat Flow(s), veh/h 1753 882 939 1555 1486 1462 1668 1664 0 1682 1678 0 Q Serve(g_s), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Lane Grp Cap(c), veh/h 211 1017 542 138 1621 797 131 273 225 461 V/C Ratio(X) 0.82 0.89 0.89 0.89 0.86 0.16 0.17 0.34 0.63 0.90 0.30 Avail Cap(c_a), veh/h 270 1017 542 170 1647 810 157 710 371 1141 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0   |   |      |          |      |       |             |      |      |          | 10       |          |          | 9    |
| Sat Flow, veh/h         1753         2564         139         1555         3597         838         1668         3416         0         1682         3445         0           Grp Volume(v), veh/h         173         903         481         119         254         133         44         171         0         202         138         0           Grp Sat Flow(s), veh/h/ln         1753         882         939         1555         1486         1462         1668         1664         0         1682         1678         0           Q Serve(g.s), s         14.6         66.6         66.6         11.3         6.3         6.7         3.7         7.5         0.0         17.7         5.5         0.0           Cycle Q Clear(g.c), s         14.6         66.6         66.6         11.3         6.3         6.7         3.7         7.5         0.0         17.7         5.5         0.0           Prop In Lane         1.00         0.15         1.00         0.57         1.00         0.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Grp Volume(v), veh/h         173         903         481         119         254         133         44         171         0         202         138         0           Grp Sat Flow(s), veh/h/ln         1753         882         939         1555         1486         1462         1668         1664         0         1682         1678         0           Q Serve(g_s), s         14.6         66.6         66.6         66.6         11.3         6.3         6.7         3.7         7.5         0.0         17.7         5.5         0.0           Cycle Q Clear(g_c), s         14.6         66.6         66.6         11.3         6.3         6.7         3.7         7.5         0.0         17.7         5.5         0.0           Prop In Lane         1.00         0.15         1.00         0.57         1.00         0.00         1.00         1.00         0.00           Lane Grp Cap(c), veh/h         211         1017         542         138         1621         797         131         273         225         461           V/C Ratio(X)         0.82         0.89         0.89         0.86         0.16         0.17         0.34         0.63         0.99         0.30   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Grp Sat Flow(s), veh/h/ln 1753 882 939 1555 1486 1462 1668 1664 0 1682 1678 0 Q Serve(g_s), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 17.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 11.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 11.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 11.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 11.7 5.5 0.0 Cycle Q Clear(g_c), s 14.6 66.6 66.6 11.3 6.3 6.7 3.7 7.5 0.0 11.0 0.00 1.00 0.00 1.00 0.00 0.0  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Q Serve(g_s), s  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Cycle Q Clear(g_c), s         14.6         66.6         66.6         11.3         6.3         6.7         3.7         7.5         0.0         17.7         5.5         0.0           Prop In Lane         1.00         0.15         1.00         0.57         1.00         0.00         1.00         0.00           Lane GFD Cap(c), veh/h         211         1017         542         138         1621         797         131         273         225         461           V/C Ratio(X)         0.82         0.89         0.86         0.16         0.17         0.34         0.63         0.90         0.30           Avail Cap(c_a), veh/h         270         1017         542         170         1647         810         157         710         371         1141           HCM Platoon Ratio         1.00 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Prop In Lane 1.00 0.15 1.00 0.57 1.00 0.00 1.00 0.00 0.00 Lane Grp Cap(c), veh/h 211 1017 542 138 1621 797 131 273 225 461 V/C Ratio(X) 0.82 0.89 0.89 0.86 0.16 0.17 0.34 0.63 0.90 0.30 Avail Cap(c_a), veh/h 270 1017 542 170 1647 810 157 710 371 1141 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Lane Grp Cap(c), veh/h 211 1017 542 138 1621 797 131 273 225 461  V/C Ratio(X) 0.82 0.89 0.89 0.89 0.86 0.16 0.17 0.34 0.63 0.90 0.30  Avail Cap(c_a), veh/h 270 1017 542 170 1647 810 157 710 371 1141  HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0  |   |      | 66.6     |      |       | 6.3         |      |      | 7.5      |          |          | 5.5      |      |
| V/C Ratio(X)         0.82         0.89         0.89         0.86         0.16         0.17         0.34         0.63         0.90         0.30           Avail Cap(c_a), veh/h         270         1017         542         170         1647         810         157         710         371         1141           HCM Platoon Ratio         1.00  |   |      |          |      |       |             |      |      |          | 0.00     |          |          | 0.00 |
| Avail Cap(c_a), veh/h HCM Platoon Ratio HCM Plat |   |      |          |      |       |             |      |      |          |          |          |          |      |
| HCM Platoon Ratio  | . ,                                     |      |          |      |       |             |      |      |          |          |          |          |      |
| Upstream Filter(I)         0.85         0.85         0.85         0.96         0.96         0.96         1.00         1.00         0.00         1.00         1.00         0.00           Uniform Delay (d), s/veh         65.2         27.5         27.5         67.5         17.0         17.1         65.4         66.6         0.0         64.0         58.2         0.0           Incr Delay (d2), s/veh         9.9         9.9         16.8         25.2         0.2         0.4         0.6         0.9         0.0         9.4         0.1         0.0           Initial Q Delay(d3),s/veh         22.3         0.0  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Uniform Delay (d), s/veh 65.2 27.5 27.5 67.5 17.0 17.1 65.4 66.6 0.0 64.0 58.2 0.0 lncr Delay (d2), s/veh 9.9 9.9 16.8 25.2 0.2 0.4 0.6 0.9 0.0 9.4 0.1 0.0 lnitial Q Delay(d3),s/veh 22.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Incr Delay (d2), s/veh   9.9   9.9   16.8   25.2   0.2   0.4   0.6   0.9   0.0   9.4   0.1   0.0   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Initial Q Delay(d3),s/veh   22.3   0.0     | • |      |          |      |       |             |      |      |          |          |          |          |      |
| %ile BackOfQ(50%), veh/ln       9.2       15.0       17.1       5.5       2.3       2.4       1.6       3.2       0.0       8.2       2.4       0.0         Unsig. Movement Delay, s/veh       LnGrp Delay(d),s/veh       97.5       37.4       44.3       92.6       17.2       17.5       66.0       67.5       0.0       73.4       58.4       0.0         LnGrp LOS       F       D       D       F       B       B       E       E       E       E         Approach Vol, veh/h       1557       506       215       A       340       A         Approach Delay, s/veh       46.2       35.0       67.2       67.3         Approach LOS       D       D       E       E         Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       17.3       91.5       15.8       25.5       20.8       88.0       24.1       17.2         Change Period (Y+Rc), s       4.0       4.9       4.0       4.9       4.0       4.9         Max Q Clear Time (g_c+l1), s       13.3       68.6       5.7       7.5       16.6       8.7       19.7   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Unsig. Movement Delay, s/veh LnGrp Delay(d),s/veh 97.5 37.4 44.3 92.6 17.2 17.5 66.0 67.5 0.0 73.4 58.4 0.0 LnGrp LOS F D D F B B B E E E E Approach Vol, veh/h 1557 506 215 A 340 A Approach Delay, s/veh 46.2 35.0 67.2 67.3 Approach LOS D D E E  Timer - Assigned Phs 1 2 3 4 5 6 7 8 Phs Duration (G+Y+Rc), s 17.3 91.5 15.8 25.5 20.8 88.0 24.1 17.2 Change Period (Y+Rc), s 4.0 4.9 4.0 *4.9 4.0 4.9 4.0 4.9 Max Green Setting (Gmax), s 16.4 50.7 14.1 *51 23.1 44.0 33.1 32.0 Max Q Clear Time (g_c+I), s 13.3 68.6 5.7 7.5 16.6 8.7 19.7 9.5 Green Ext Time (p_c), s 0.1 0.0 0.0 0.5 0.2 1.7 0.3 0.6  Intersection Summary HCM 6th Ctrl Delay 48.5   |   |      |          |      |       |             |      |      |          |          |          |          |      |
| LnGrp Delay(d),s/veh       97.5       37.4       44.3       92.6       17.2       17.5       66.0       67.5       0.0       73.4       58.4       0.0         LnGrp LOS       F       D       D       F       B       B       E       E       E       E         Approach Vol, veh/h       1557       506       215       A       340       A         Approach Delay, s/veh       46.2       35.0       67.2       67.3         Approach LOS       D       D       E       E         Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       17.3       91.5       15.8       25.5       20.8       88.0       24.1       17.2         Change Period (Y+Rc), s       4.0       4.9       4.0       4.9       4.0       4.9         Max Green Setting (Gmax), s       16.4       50.7       14.1       *51       23.1       44.0       33.1       32.0         Max Q Clear Time (g_c+l1), s       13.3       68.6       5.7       7.5       16.6       8.7       19.7       9.5         Green Ext Time (p_c), s   |   |      | 15.0     | 17.1 | 5.5   | 2.3         | 2.4  | 1.6  | 3.2      | 0.0      | 8.2      | 2.4      | 0.0  |
| LnGrp LOS         F         D         D         F         B         B         E         E         E         E           Approach Vol, veh/h         1557         506         215         A         340         A           Approach Delay, s/veh         46.2         35.0         67.2         67.3           Approach LOS         D         D         E         E           Timer - Assigned Phs         1         2         3         4         5         6         7         8           Phs Duration (G+Y+Rc), s         17.3         91.5         15.8         25.5         20.8         88.0         24.1         17.2           Change Period (Y+Rc), s         4.0         4.9         4.0         4.9         4.0         4.9           Max Green Setting (Gmax), s         16.4         50.7         14.1         *51         23.1         44.0         33.1         32.0           Max Q Clear Time (g_c+l1), s         13.3         68.6         5.7         7.5         16.6         8.7         19.7         9.5           Green Ext Time (p_c), s         0.1         0.0         0.0         0.5         0.2         1.7         0.3         0.6           I  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Approach Vol, veh/h       1557       506       215       A       340       A         Approach Delay, s/veh       46.2       35.0       67.2       67.3         Approach LOS       D       D       E       E         Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       17.3       91.5       15.8       25.5       20.8       88.0       24.1       17.2         Change Period (Y+Rc), s       4.0       4.9       4.0       4.9       4.0       4.9         Max Green Setting (Gmax), s       16.4       50.7       14.1       *51       23.1       44.0       33.1       32.0         Max Q Clear Time (g_c+l1), s       13.3       68.6       5.7       7.5       16.6       8.7       19.7       9.5         Green Ext Time (p_c), s       0.1       0.0       0.0       0.5       0.2       1.7       0.3       0.6         Intersection Summary         HCM 6th Ctrl Delay       48.5   |   |      |          |      |       |             |      |      |          | 0.0      |          |          | 0.0  |
| Approach Delay, s/veh       46.2       35.0       67.2       67.3         Approach LOS       D       D       E       E         Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       17.3       91.5       15.8       25.5       20.8       88.0       24.1       17.2         Change Period (Y+Rc), s       4.0       4.9       4.0       4.9       4.0       4.9         Max Green Setting (Gmax), s       16.4       50.7       14.1       *51       23.1       44.0       33.1       32.0         Max Q Clear Time (g_c+l1), s       13.3       68.6       5.7       7.5       16.6       8.7       19.7       9.5         Green Ext Time (p_c), s       0.1       0.0       0.0       0.5       0.2       1.7       0.3       0.6         Intersection Summary         HCM 6th Ctrl Delay       48.5  |   | F    |          | D    | F     |             | В    | E    |          |          | <u>E</u> |          |      |
| Approach LOS D D E E  Timer - Assigned Phs 1 2 3 4 5 6 7 8  Phs Duration (G+Y+Rc), s 17.3 91.5 15.8 25.5 20.8 88.0 24.1 17.2  Change Period (Y+Rc), s 4.0 4.9 4.0 *4.9 4.0 4.9  Max Green Setting (Gmax), s 16.4 50.7 14.1 *51 23.1 44.0 33.1 32.0  Max Q Clear Time (g_c+l1), s 13.3 68.6 5.7 7.5 16.6 8.7 19.7 9.5  Green Ext Time (p_c), s 0.1 0.0 0.0 0.5 0.2 1.7 0.3 0.6  Intersection Summary  HCM 6th Ctrl Delay 48.5   |   |      |          |      |       |             |      |      |          | Α        |          |          | Α    |
| Timer - Assigned Phs       1       2       3       4       5       6       7       8         Phs Duration (G+Y+Rc), s       17.3       91.5       15.8       25.5       20.8       88.0       24.1       17.2         Change Period (Y+Rc), s       4.0       4.9       4.0       4.9       4.0       4.9         Max Green Setting (Gmax), s       16.4       50.7       14.1       * 51       23.1       44.0       33.1       32.0         Max Q Clear Time (g_c+I1), s       13.3       68.6       5.7       7.5       16.6       8.7       19.7       9.5         Green Ext Time (p_c), s       0.1       0.0       0.0       0.5       0.2       1.7       0.3       0.6         Intersection Summary         HCM 6th Ctrl Delay       48.5  |   |      |          |      |       |             |      |      |          |          |          |          |      |
| Phs Duration (G+Y+Rc), s 17.3 91.5 15.8 25.5 20.8 88.0 24.1 17.2 Change Period (Y+Rc), s 4.0 4.9 4.0 *4.9 4.0 4.9 4.0 4.9 Max Green Setting (Gmax), s 16.4 50.7 14.1 *51 23.1 44.0 33.1 32.0 Max Q Clear Time (g_c+I1), s 13.3 68.6 5.7 7.5 16.6 8.7 19.7 9.5 Green Ext Time (p_c), s 0.1 0.0 0.0 0.5 0.2 1.7 0.3 0.6  Intersection Summary HCM 6th Ctrl Delay 48.5  | Approach LOS                            |      | D        |      |       | D           |      |      | Е        |          |          | Е        |      |
| Change Period (Y+Rc), s 4.0 4.9 4.0 *4.9 4.0 4.9 4.0 4.9  Max Green Setting (Gmax), s 16.4 50.7 14.1 *51 23.1 44.0 33.1 32.0  Max Q Clear Time (g_c+I1), s 13.3 68.6 5.7 7.5 16.6 8.7 19.7 9.5  Green Ext Time (p_c), s 0.1 0.0 0.0 0.5 0.2 1.7 0.3 0.6  Intersection Summary  HCM 6th Ctrl Delay 48.5   | Timer - Assigned Phs                    | 1    | 2        | 3    | 4     | 5           | 6    | 7    | 8        |          |          |          |      |
| Max Green Setting (Gmax), s       16.4       50.7       14.1       * 51       23.1       44.0       33.1       32.0         Max Q Clear Time (g_c+I1), s       13.3       68.6       5.7       7.5       16.6       8.7       19.7       9.5         Green Ext Time (p_c), s       0.1       0.0       0.0       0.5       0.2       1.7       0.3       0.6         Intersection Summary         HCM 6th Ctrl Delay       48.5  | Phs Duration (G+Y+Rc), s                | 17.3 | 91.5     | 15.8 | 25.5  | 20.8        | 88.0 | 24.1 | 17.2     |          |          |          |      |
| Max Q Clear Time (g_c+l1), s       13.3       68.6       5.7       7.5       16.6       8.7       19.7       9.5         Green Ext Time (p_c), s       0.1       0.0       0.5       0.2       1.7       0.3       0.6         Intersection Summary         HCM 6th Ctrl Delay       48.5  | Change Period (Y+Rc), s                 | 4.0  | 4.9      | 4.0  | * 4.9 | 4.0         | 4.9  | 4.0  | 4.9      |          |          |          |      |
| Green Ext Time (p_c), s 0.1 0.0 0.0 0.5 0.2 1.7 0.3 0.6  Intersection Summary  HCM 6th Ctrl Delay 48.5   | Max Green Setting (Gmax), s             | 16.4 | 50.7     | 14.1 | * 51  | 23.1        | 44.0 | 33.1 | 32.0     |          |          |          |      |
| Intersection Summary HCM 6th Ctrl Delay 48.5   | Max Q Clear Time (g_c+l1), s            | 13.3 | 68.6     | 5.7  | 7.5   | 16.6        | 8.7  | 19.7 | 9.5      |          |          |          |      |
| HCM 6th Ctrl Delay 48.5  | Green Ext Time (p_c), s                 | 0.1  | 0.0      | 0.0  | 0.5   | 0.2         | 1.7  | 0.3  | 0.6      |          |          |          |      |
|  | Intersection Summary                    |      |          |      |       |             |      |      |          |          |          |          |      |
|  |   |      |          | 48.5 |       |             |      |      |          |          |          |          |      |
| HCM 6th LOS D  | HCM 6th LOS                             |      |          | D    |       |             |      |      |          |          |          |          |      |

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|   | •           | <b>→</b>    | •           | •            | <b>←</b>    | •            | 4          | <b>†</b>     | <b>/</b>   | <b>/</b>   | ļ          | 4         |
|---|-------------|-------------|-------------|--------------|-------------|--------------|------------|--------------|------------|------------|------------|-----------|
| Movement  | EBL         | EBT         | EBR         | WBL          | WBT         | WBR          | NBL        | NBT          | NBR        | SBL        | SBT        | SBR       |
| Lane Configurations                                     | 1,1         | <b>∱</b> ⊅  |             | ሻ            | <b>ተ</b> ኈ  |              | ሻ          | 4            | 7          | ሻ          | <b>₽</b>   | 7         |
| Traffic Volume (veh/h)                                  | 378         | 1225        | 140         | 34           | 337         | 17           | 79         | 114          | 173        | 104        | 84         | 96        |
| Future Volume (veh/h)                                   | 378         | 1225        | 140         | 34           | 337         | 17           | 79         | 114          | 173        | 104        | 84         | 96        |
| Initial Q (Qb), veh                                     | 0           | 0           | 0           | 0            | 0           | 0            | 0          | 0            | 0          | 0          | 0          | 0         |
| Ped-Bike Adj(A_pbT)                                     | 1.00        | 4.00        | 0.97        | 1.00         | 4.00        | 0.89         | 1.00       | 4.00         | 0.98       | 1.00       | 4.00       | 0.96      |
| Parking Bus, Adj<br>Work Zone On Approach               | 1.00        | 1.00        | 1.00        | 1.00         | 1.00<br>No  | 1.00         | 1.00       | 1.00<br>No   | 1.00       | 1.00       | 1.00<br>No | 1.00      |
| Adj Sat Flow, veh/h/ln                                  | 1811        | No<br>1811  | 1811        | 1618         | 1618        | 1618         | 1752       | 1752         | 1752       | 1663       | 1663       | 1663      |
| Adj Flow Rate, veh/h                                    | 394         | 1276        | 146         | 35           | 351         | 16           | 82         | 119          | 1732       | 1003       | 88         | 17        |
| Peak Hour Factor  | 0.96        | 0.96        | 0.96        | 0.96         | 0.96        | 0.96         | 0.96       | 0.96         | 0.96       | 0.96       | 0.96       | 0.96      |
| Percent Heavy Veh, %                                    | 6           | 6           | 6           | 19           | 19          | 19           | 10         | 10           | 10         | 16         | 16         | 16        |
| Cap, veh/h  | 1510        | 1867        | 213         | 110          | 643         | 29           | 148        | 156          | 129        | 182        | 192        | 156       |
| Arrive On Green   | 0.45        | 0.60        | 0.60        | 0.07         | 0.22        | 0.22         | 0.09       | 0.09         | 0.09       | 0.12       | 0.12       | 0.12      |
| Sat Flow, veh/h   | 3346        | 3104        | 353         | 1541         | 2977        | 135          | 1668       | 1752         | 1448       | 1584       | 1663       | 1350      |
| Grp Volume(v), veh/h                                    | 394         | 705         | 717         | 35           | 180         | 187          | 82         | 119          | 14         | 108        | 88         | 17        |
| Grp Sat Flow(s),veh/h/ln                                | 1673        | 1721        | 1737        | 1541         | 1537        | 1575         | 1668       | 1752         | 1448       | 1584       | 1663       | 1350      |
| Q Serve(g_s), s   | 11.0        | 41.4        | 42.1        | 3.2          | 15.6        | 15.8         | 7.1        | 10.0         | 1.3        | 9.7        | 7.4        | 1.7       |
| Cycle Q Clear(g_c), s                                   | 11.0        | 41.4        | 42.1        | 3.2          | 15.6        | 15.8         | 7.1        | 10.0         | 1.3        | 9.7        | 7.4        | 1.7       |
| Prop In Lane  | 1.00        |             | 0.20        | 1.00         |             | 0.09         | 1.00       |              | 1.00       | 1.00       |            | 1.00      |
| Lane Grp Cap(c), veh/h                                  | 1510        | 1035        | 1045        | 110          | 332         | 340          | 148        | 156          | 129        | 182        | 192        | 156       |
| V/C Ratio(X)  | 0.26        | 0.68        | 0.69        | 0.32         | 0.54        | 0.55         | 0.55       | 0.76         | 0.11       | 0.59       | 0.46       | 0.11      |
| Avail Cap(c_a), veh/h                                   | 1510        | 1035        | 1045        | 144          | 332         | 340          | 301        | 316          | 262        | 433        | 455        | 369       |
| HCM Platoon Ratio                                       | 1.00        | 1.00        | 1.00        | 1.00         | 1.00        | 1.00         | 1.00       | 1.00         | 1.00       | 1.00       | 1.00       | 1.00      |
| Upstream Filter(I)                                      | 0.09        | 0.09        | 0.09        | 1.00         | 1.00        | 1.00         | 1.00       | 1.00         | 1.00       | 1.00       | 1.00       | 1.00      |
| Uniform Delay (d), s/veh                                | 25.6        | 20.2        | 20.3        | 66.1         | 52.2        | 52.3         | 65.5       | 66.8         | 62.9       | 63.0       | 62.0       | 59.5      |
| Incr Delay (d2), s/veh                                  | 0.0         | 0.3         | 0.3         | 0.6          | 6.3<br>0.0  | 6.2          | 1.2<br>0.0 | 2.9          | 0.1        | 1.1        | 0.6        | 0.1       |
| Initial Q Delay(d3),s/veh %ile BackOfQ(50%),veh/ln      | 4.4         | 0.0<br>16.2 | 0.0<br>16.6 | 0.0<br>1.3   | 6.7         | 0.0<br>6.9   | 3.1        | 0.0<br>4.6   | 0.0<br>0.5 | 0.0<br>4.0 | 0.0<br>3.2 | 0.0       |
| Unsig. Movement Delay, s/veh                            |             | 10.2        | 10.0        | 1.3          | 0.7         | 0.9          | ٥.١        | 4.0          | 0.5        | 4.0        | 3.2        | 0.0       |
| LnGrp Delay(d),s/veh                                    | 25.6        | 20.5        | 20.6        | 66.7         | 58.5        | 58.5         | 66.7       | 69.7         | 63.0       | 64.2       | 62.6       | 59.6      |
| LnGrp LOS   | 23.0<br>C   | 20.5<br>C   | C           | E            | 50.5<br>E   | 50.5<br>E    | E          | 65.7<br>E    | E          | 04.Z       | 62.6<br>E  | 55.0<br>E |
| Approach Vol, veh/h                                     |             | 1816        |             |              | 402         |              |            | 215          |            |            | 213        |           |
| Approach Delay, s/veh                                   |             | 21.7        |             |              | 59.2        |              |            | 68.1         |            |            | 63.2       |           |
| Approach LOS  |             | C           |             |              | E           |              |            | E            |            |            | E          |           |
|   |             |             |             | _            |             | 0            |            |              |            |            |            |           |
| Timer - Assigned Phs                                    | 1 70.0      | 2           |             | 4            | 5           | 6            |            | 8            |            |            |            |           |
| Phs Duration (G+Y+Rc), s                                | 72.6        | 37.3        |             | 22.2         | 14.7        | 95.1         |            | 17.9         |            |            |            |           |
| Change Period (Y+Rc), s                                 | 4.9         | * 4.9       |             | 4.9          | 4.0         | 4.9          |            | 4.6          |            |            |            |           |
| Max Green Setting (Gmax), s                             | 31.1        | * 32        |             | 41.0<br>11.7 | 14.0<br>5.2 | 50.0<br>44.1 |            | 27.1<br>12.0 |            |            |            |           |
| Max Q Clear Time (g_c+l1), s<br>Green Ext Time (p_c), s | 13.0<br>1.7 | 17.8<br>1.2 |             | 0.6          | 0.0         | 44.1         |            | 0.5          |            |            |            |           |
|   | 1.7         | 1.2         |             | 0.0          | 0.0         | 4.1          |            | 0.5          |            |            |            |           |
| Intersection Summary                                    |             |             |             |              |             |              |            |              |            |            |            |           |
| HCM 6th Ctrl Delay                                      |             |             | 34.5        |              |             |              |            |              |            |            |            |           |
| HCM 6th LOS   |             |             | С           |              |             |              |            |              |            |            |            |           |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|  | ۶           | <b>→</b>    | •           | •          | <b>←</b>    | •          | 1           | <b>†</b>   | ~         | <b>/</b>   | <b>+</b>    |            |
|--|-------------|-------------|-------------|------------|-------------|------------|-------------|------------|-----------|------------|-------------|------------|
| Movement                                       | EBL         | EBT         | EBR         | WBL        | WBT         | WBR        | NBL         | NBT        | NBR       | SBL        | SBT         | SBR        |
| Lane Configurations                            |             | ₽           | 7           | 7          | ₽           |            | ሻሻ          | ተኈ         |           | ሻ          | <b>+</b>    | 7          |
| Traffic Volume (veh/h)                         | 96          | 314         | 368         | 29         | 159         | 18         | 330         | 467        | 349       | 22         | 116         | 200        |
| Future Volume (veh/h)                          | 96          | 314         | 368         | 29         | 159         | 18         | 330         | 467        | 349       | 22         | 116         | 200        |
| Initial Q (Qb), veh                            | 0           | 13          | 0           | 0          | 0           | 0          | 0           | 0          | 0         | 0          | 0           | 0          |
| Ped-Bike Adj(A_pbT)                            | 1.00        | 4.00        | 0.98        | 1.00       | 4.00        | 0.97       | 1.00        | 4.00       | 1.00      | 1.00       | 4.00        | 0.95       |
| Parking Bus, Adj                               | 1.00        | 1.00        | 1.00        | 1.00       | 1.00        | 1.00       | 1.00        | 1.00       | 1.00      | 1.00       | 1.00        | 1.00       |
| Work Zone On Approach                          | 1700        | No          | 1700        | 1571       | No          | 1571       | 1011        | No<br>1811 | 1011      | 1000       | No          | 1000       |
| Adj Sat Flow, veh/h/ln<br>Adj Flow Rate, veh/h | 1722<br>103 | 1722<br>338 | 1722<br>116 | 1574<br>31 | 1574<br>171 | 1574<br>15 | 1811<br>355 | 502        | 1811<br>0 | 1663<br>24 | 1663<br>125 | 1663<br>27 |
| Peak Hour Factor                               | 0.93        | 0.93        | 0.93        | 0.93       | 0.93        | 0.93       | 0.93        | 0.93       | 0.93      | 0.93       | 0.93        | 0.93       |
| Percent Heavy Veh, %                           | 12          | 12          | 12          | 22         | 22          | 22         | 6           | 6          | 6         | 16         | 16          | 16         |
| Cap, veh/h                                     | 226         | 408         | 339         | 85         | 213         | 19         | 1439        | 1480       | <u> </u>  | 165        | 173         | 139        |
| Arrive On Green                                | 0.04        | 0.07        | 0.07        | 0.06       | 0.15        | 0.15       | 0.45        | 0.45       | 0.00      | 0.10       | 0.10        | 0.10       |
| Sat Flow, veh/h                                | 1640        | 1722        | 1430        | 1499       | 1422        | 125        | 3346        | 3532       | 0         | 1584       | 1663        | 1338       |
| Grp Volume(v), veh/h                           | 103         | 338         | 116         | 31         | 0           | 186        | 355         | 502        | 0         | 24         | 125         | 27         |
| Grp Sat Flow(s), veh/h/ln                      | 1640        | 1722        | 1430        | 1499       | 0           | 1546       | 1673        | 1721       | 0         | 1584       | 1663        | 1338       |
| Q Serve(g_s), s                                | 6.5         | 20.4        | 8.1         | 2.1        | 0.0         | 12.2       | 6.9         | 9.9        | 0.0       | 1.4        | 7.6         | 1.9        |
| Cycle Q Clear(g_c), s                          | 6.5         | 20.4        | 8.1         | 2.1        | 0.0         | 12.2       | 6.9         | 9.9        | 0.0       | 1.4        | 7.6         | 1.9        |
| Prop In Lane                                   | 1.00        |             | 1.00        | 1.00       |             | 0.08       | 1.00        |            | 0.00      | 1.00       |             | 1.00       |
| Lane Grp Cap(c), veh/h                         | 226         | 408         | 339         | 85         | 0           | 232        | 1439        | 1480       |           | 165        | 173         | 139        |
| V/C Ratio(X)                                   | 0.46        | 0.83        | 0.34        | 0.36       | 0.00        | 0.80       | 0.25        | 0.34       |           | 0.15       | 0.72        | 0.19       |
| Avail Cap(c_a), veh/h                          | 201         | 426         | 354         | 144        | 0           | 364        | 1491        | 1533       |           | 353        | 371         | 298        |
| HCM Platoon Ratio                              | 0.33        | 0.33        | 0.33        | 1.00       | 1.00        | 1.00       | 1.00        | 1.00       | 1.00      | 1.00       | 1.00        | 1.00       |
| Upstream Filter(I)                             | 0.89        | 0.89        | 0.89        | 1.00       | 0.00        | 1.00       | 1.00        | 1.00       | 0.00      | 1.00       | 1.00        | 1.00       |
| Uniform Delay (d), s/veh                       | 46.3        | 47.9        | 40.7        | 47.7       | 0.0         | 43.1       | 19.1        | 20.0       | 0.0       | 42.8       | 45.6        | 43.0       |
| Incr Delay (d2), s/veh                         | 0.6         | 10.9        | 0.4         | 1.0        | 0.0         | 3.1        | 0.4         | 0.6        | 0.0       | 0.1        | 2.1         | 0.2        |
| Initial Q Delay(d3),s/veh                      | 0.0         | 42.8        | 0.0         | 0.0        | 0.0         | 0.0        | 0.0         | 0.0        | 0.0       | 0.0        | 0.0         | 0.0        |
| %ile BackOfQ(50%),veh/ln                       | 2.8         | 17.0        | 3.0         | 0.8        | 0.0         | 4.8        | 2.8         | 4.1        | 0.0       | 0.6        | 3.2         | 0.6        |
| Unsig. Movement Delay, s/veh                   | 46.9        | 101.5       | 41.1        | 48.7       | 0.0         | 46.2       | 19.5        | 20.6       | 0.0       | 42.9       | 47.7        | 43.2       |
| LnGrp Delay(d),s/veh<br>LnGrp LOS              | 46.9<br>D   | 101.5<br>F  | 41.1<br>D   | 40.7<br>D  | 0.0<br>A    | 40.2<br>D  | 19.5<br>B   | 20.6<br>C  | 0.0       | 42.9<br>D  | 47.7<br>D   | 43.2<br>D  |
|  | U           | 557         | ט           | U          | 217         | ט          | ь           | 857        | Α         | <u> </u>   | 176         |            |
| Approach Vol, veh/h Approach Delay, s/veh      |             | 78.8        |             |            | 46.6        |            |             | 20.1       | А         |            | 46.4        |            |
| Approach LOS                                   |             | 70.0<br>E   |             |            | 40.0<br>D   |            |             | 20.1<br>C  |           |            | 40.4<br>D   |            |
|  |             |             |             |            |             |            |             |            |           |            | U           |            |
| Timer - Assigned Phs                           | 1           | 2           |             | 4          | 5           | 6          |             | 8          |           |            |             |            |
| Phs Duration (G+Y+Rc), s                       | 10.0        | 27.8        |             | 51.4       | 17.4        | 20.3       |             | 15.8       |           |            |             |            |
| Change Period (Y+Rc), s                        | 4.0         | 4.6         |             | 4.6        | 4.6         | * 4.6      |             | 4.9        |           |            |             |            |
| Max Green Setting (Gmax), s                    | 10.1        | 26.0        |             | 27.4       | 11.4        | * 25       |             | 23.4       |           |            |             |            |
| Max Q Clear Time (g_c+l1), s                   | 4.1         | 22.4        |             | 11.9       | 8.5         | 14.2       |             | 9.6        |           |            |             |            |
| Green Ext Time (p_c), s                        | 0.0         | 0.7         |             | 2.8        | 0.0         | 0.4        |             | 0.4        |           |            |             |            |
| Intersection Summary                           |             |             |             |            |             |            |             |            |           |            |             |            |
| HCM 6th Ctrl Delay                             |             |             | 44.0        |            |             |            |             |            |           |            |             |            |
| HCM 6th LOS                                    |             |             | D           |            |             |            |             |            |           |            |             |            |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                                     | •           | <b>→</b> | •    | •           | <b>←</b> | •     | 4           | <b>†</b>   | ~    | <b>&gt;</b> | ţ            | 4    |
|-------------------------------------|-------------|----------|------|-------------|----------|-------|-------------|------------|------|-------------|--------------|------|
| Movement                            | EBL         | EBT      | EBR  | WBL         | WBT      | WBR   | NBL         | NBT        | NBR  | SBL         | SBT          | SBR  |
| Lane Configurations                 | 7           | 4₽       | 7    | ሻ           | 4₽       | 7     | 7           | <b>∱</b> ∱ |      | 7           | ^↑           | 7    |
| Traffic Volume (veh/h)              | 122         | 182      | 147  | 320         | 167      | 168   | 160         | 39         | 404  | 202         | 650          | 98   |
| Future Volume (veh/h)               | 122         | 182      | 147  | 320         | 167      | 168   | 160         | 39         | 404  | 202         | 650          | 98   |
| Initial Q (Qb), veh                 | 0           | 0        | 0    | 0           | 0        | 0     | 0           | 0          | 0    | 0           | 0            | 0    |
| Ped-Bike Adj(A_pbT)                 | 1.00        |          | 1.00 | 1.00        |          | 1.00  | 1.00        |            | 1.00 | 1.00        |              | 1.00 |
| Parking Bus, Adj                    | 1.00        | 1.00     | 1.00 | 1.00        | 1.00     | 1.00  | 1.00        | 1.00       | 1.00 | 1.00        | 1.00         | 1.00 |
| Work Zone On Approach               | 4444        | No       | 4444 | 1010        | No       | 1010  | 4700        | No         | 4700 | 1011        | No           | 1011 |
| Adj Sat Flow, veh/h/ln              | 1441        | 1441     | 1441 | 1618        | 1618     | 1618  | 1796        | 1796       | 1796 | 1811        | 1811         | 1811 |
| Adj Flow Rate, veh/h                | 107         | 222      | 0    | 337         | 176      | 0     | 168         | 41         | 0    | 213         | 684          | 0    |
| Peak Hour Factor                    | 0.95        | 0.95     | 0.95 | 0.95        | 0.95     | 0.95  | 0.95        | 0.95       | 0.95 | 0.95        | 0.95         | 0.95 |
| Percent Heavy Veh, %                | 31          | 31       | 31   | 19          | 19       | 19    | 7           | 7          | 7    | 6           | 6            | 6    |
| Cap, veh/h                          | 148         | 311      | 0.00 | 474         | 249      | 0.00  | 198         | 868        | 0.00 | 523         | 1548         | 0.00 |
| Arrive On Green                     | 0.11        | 0.11     | 0.00 | 0.05        | 0.05     | 0.00  | 0.12        | 0.25       | 0.00 | 0.30        | 0.45         | 0.00 |
| Sat Flow, veh/h                     | 1372        | 2881     | 1221 | 3083        | 1618     | 1372  | 1711        | 3503       | 0    | 1725        | 3441         | 1535 |
| Grp Volume(v), veh/h                | 107         | 222      | 0    | 337         | 176      | 0     | 168         | 41         | 0    | 213         | 684          | 0    |
| Grp Sat Flow(s),veh/h/ln            | 1372        | 1441     | 1221 | 1541        | 1618     | 1372  | 1711        | 1706       | 0    | 1725        | 1721         | 1535 |
| Q Serve(g_s), s                     | 7.9         | 7.8      | 0.0  | 11.3        | 11.2     | 0.0   | 10.1        | 1.0        | 0.0  | 10.3        | 14.3         | 0.0  |
| Cycle Q Clear(g_c), s               | 7.9         | 7.8      | 0.0  | 11.3        | 11.2     | 0.0   | 10.1        | 1.0        | 0.0  | 10.3        | 14.3         | 0.0  |
| Prop In Lane                        | 1.00<br>148 | 311      | 1.00 | 1.00        | 249      | 1.00  | 1.00        | 868        | 0.00 | 1.00<br>523 | 1510         | 1.00 |
| Lane Grp Cap(c), veh/h V/C Ratio(X) | 0.72        | 0.71     |      | 474<br>0.71 | 0.71     |       | 198<br>0.85 | 0.05       |      | 0.41        | 1548<br>0.44 |      |
| Avail Cap(c_a), veh/h               | 289         | 606      |      | 611         | 321      |       | 293         | 868        |      | 523         | 1548         |      |
| HCM Platoon Ratio                   | 1.00        | 1.00     | 1.00 | 0.33        | 0.33     | 0.33  | 1.00        | 1.00       | 1.00 | 1.00        | 1.00         | 1.00 |
| Upstream Filter(I)                  | 1.00        | 1.00     | 0.00 | 0.33        | 0.87     | 0.00  | 1.00        | 1.00       | 0.00 | 1.00        | 1.00         | 0.00 |
| Uniform Delay (d), s/veh            | 45.3        | 45.3     | 0.00 | 47.5        | 47.5     | 0.00  | 45.5        | 29.6       | 0.00 | 29.1        | 19.8         | 0.00 |
| Incr Delay (d2), s/veh              | 2.5         | 1.1      | 0.0  | 2.4         | 4.3      | 0.0   | 9.5         | 0.0        | 0.0  | 0.2         | 0.9          | 0.0  |
| Initial Q Delay(d3),s/veh           | 0.0         | 0.0      | 0.0  | 0.0         | 0.0      | 0.0   | 0.0         | 0.0        | 0.0  | 0.0         | 0.0          | 0.0  |
| %ile BackOfQ(50%),veh/ln            | 2.8         | 2.8      | 0.0  | 4.8         | 5.2      | 0.0   | 4.7         | 0.4        | 0.0  | 4.2         | 5.7          | 0.0  |
| Unsig. Movement Delay, s/veh        |             | 2.0      | 0.0  | 1.0         | 0.2      | 0.0   |             | 0.1        | 0.0  | 1.2         | 0.1          | 0.0  |
| LnGrp Delay(d),s/veh                | 47.8        | 46.4     | 0.0  | 49.9        | 51.8     | 0.0   | 55.0        | 29.6       | 0.0  | 29.3        | 20.7         | 0.0  |
| LnGrp LOS                           | D           | D        | 0.0  | D           | D        | 0.0   | D           | C          | 0.0  | C           | C            | 0.0  |
| Approach Vol, veh/h                 |             | 329      | А    |             | 513      | Α     |             | 209        | А    |             | 897          | Α    |
| Approach Delay, s/veh               |             | 46.8     | • •  |             | 50.6     |       |             | 50.0       |      |             | 22.8         |      |
| Approach LOS                        |             | D        |      |             | D        |       |             | D          |      |             | С            |      |
| Timer - Assigned Phs                | 1           | 2        |      | 4           | 5        | 6     |             | 8          |      |             |              |      |
| Phs Duration (G+Y+Rc), s            | 16.2        | 52.1     |      | 15.9        | 36.7     | 31.6  |             | 20.7       |      |             |              |      |
| Change Period (Y+Rc), s             | 4.0         | 4.9      |      | 4.6         | 4.9      | * 4.9 |             | 4.6        |      |             |              |      |
| Max Green Setting (Gmax), s         | 18.0        | 26.0     |      | 22.1        | 19.1     | * 25  |             | 20.8       |      |             |              |      |
| Max Q Clear Time (g_c+l1), s        | 12.1        | 16.3     |      | 9.9         | 12.3     | 3.0   |             | 13.3       |      |             |              |      |
| Green Ext Time (p_c), s             | 0.2         | 3.5      |      | 0.9         | 0.2      | 0.1   |             | 1.7        |      |             |              |      |
| . ,                                 | 0.2         | 0.0      |      | 0.0         | 0.2      | 0.1   |             | 1.7        |      |             |              |      |
| Intersection Summary                |             |          | 07.4 |             |          |       |             |            |      |             |              |      |
| HCM 6th Ctrl Delay                  |             |          | 37.1 |             |          |       |             |            |      |             |              |      |
| HCM 6th LOS                         |             |          | D    |             |          |       |             |            |      |             |              |      |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                                    | ۶            | <b>→</b> | •            | •           | •    | •    | 4            | <b>†</b>    | ~          | <b>/</b>                                | ļ          | 4          |
|------------------------------------|--------------|----------|--------------|-------------|------|------|--------------|-------------|------------|---|------------|------------|
| Movement                           | EBL          | EBT      | EBR          | WBL         | WBT  | WBR  | NBL          | NBT         | NBR        | SBL                                     | SBT        | SBR        |
| Lane Configurations                |              | 4        | 7            |             | ↔    |      | ሻ            | ħβ          |            | *                                       | <b>∱</b> ⊅ |            |
| Traffic Volume (veh/h)             | 61           | 0        | 34           | 3           | 0    | 12   | 41           | 329         | 5          | 18                                      | 500        | 155        |
| Future Volume (veh/h)              | 61           | 0        | 34           | 3           | 0    | 12   | 41           | 329         | 5          | 18                                      | 500        | 155        |
| Initial Q (Qb), veh                | 0            | 0        | 0            | 0           | 0    | 0    | 0            | 0           | 0          | 0                                       | 0          | 0          |
| Ped-Bike Adj(A_pbT)                | 0.96         | 4.00     | 0.96         | 0.96        | 4.00 | 1.00 | 1.00         | 4.00        | 0.96       | 1.00                                    | 4.00       | 0.96       |
| Parking Bus, Adj                   | 1.00         | 1.00     | 1.00         | 1.00        | 1.00 | 1.00 | 1.00         | 1.00        | 1.00       | 1.00                                    | 1.00       | 1.00       |
| Work Zone On Approach              | 4750         | No       | 4750         | 4500        | No   | 4500 | 4707         | No          | 4707       | 4700                                    | No         | 4700       |
| Adj Sat Flow, veh/h/ln             | 1752         | 1752     | 1752         | 1500        | 1500 | 1500 | 1707         | 1707        | 1707       | 1796                                    | 1796       | 1796       |
| Adj Flow Rate, veh/h               | 66           | 0        | 31           | 3           | 0    | 0    | 44           | 354         | 5          | 19                                      | 538        | 164        |
| Peak Hour Factor                   | 0.93         | 0.93     | 0.93         | 0.93        | 0.93 | 0.93 | 0.93         | 0.93        | 0.93       | 0.93                                    | 0.93       | 0.93       |
| Percent Heavy Veh, %               | 10           | 10       | 10           | 27          | 27   | 27   | 13           | 13          | 13         | 7                                       | 7          | 7          |
| Cap, veh/h                         | 298          | 0        | 213          | 215         | 0.00 | 0.00 | 53           | 2190        | 31         | 30<br>0.02                              | 1669       | 506        |
| Arrive On Green                    | 0.15<br>1362 | 0.00     | 0.15<br>1419 | 0.15<br>805 |      |      | 0.03<br>1626 | 0.67        | 0.67<br>46 | 1711                                    | 0.65       | 0.65       |
| Sat Flow, veh/h                    |              | 0        |              |             | 0    | 0    |              | 3273        |            |   | 2552       | 774        |
| Grp Volume(v), veh/h               | 66           | 0        | 31           | 3           | 0    | 0    | 44           | 175<br>1622 | 184        | 19                                      | 359        | 343        |
| Grp Sat Flow(s),veh/h/ln           | 1362         | 0        | 1419         | 805<br>0.2  | 0.0  | 0.0  | 1626         |             | 1697       | 1711<br>0.8                             | 1706       | 1620       |
| Q Serve(g_s), s                    | 0.0<br>2.8   | 0.0      | 1.5<br>1.5   | 3.0         | 0.0  | 0.0  | 2.1<br>2.1   | 3.1<br>3.1  | 3.1<br>3.1 | 0.8                                     | 7.0<br>7.0 | 7.1<br>7.1 |
| Cycle Q Clear(g_c), s Prop In Lane | 1.00         | 0.0      | 1.00         | 1.00        | 0.0  | 0.00 | 1.00         | ٥.١         | 0.03       | 1.00                                    | 7.0        | 0.48       |
| Lane Grp Cap(c), veh/h             | 298          | 0        | 213          | 215         | 0    | 0.00 | 53           | 1085        | 1136       | 30                                      | 1116       | 1060       |
| V/C Ratio(X)                       | 0.22         | 0.00     | 0.15         | 0.01        | 0.00 | 0.00 | 0.83         | 0.16        | 0.16       | 0.64                                    | 0.32       | 0.32       |
| Avail Cap(c_a), veh/h              | 508          | 0.00     | 446          | 390         | 0.00 | 0.00 | 511          | 1085        | 1136       | 537                                     | 1116       | 1060       |
| HCM Platoon Ratio                  | 1.00         | 1.00     | 1.00         | 1.00        | 1.00 | 1.00 | 1.00         | 1.00        | 1.00       | 1.00                                    | 1.00       | 1.00       |
| Upstream Filter(I)                 | 1.00         | 0.00     | 1.00         | 1.00        | 0.00 | 0.00 | 1.00         | 1.00        | 1.00       | 1.00                                    | 1.00       | 1.00       |
| Uniform Delay (d), s/veh           | 28.8         | 0.0      | 28.2         | 30.1        | 0.0  | 0.0  | 36.8         | 4.7         | 4.7        | 37.3                                    | 5.8        | 5.8        |
| Incr Delay (d2), s/veh             | 0.1          | 0.0      | 0.1          | 0.0         | 0.0  | 0.0  | 11.7         | 0.3         | 0.3        | 8.2                                     | 0.8        | 0.8        |
| Initial Q Delay(d3),s/veh          | 0.0          | 0.0      | 0.0          | 0.0         | 0.0  | 0.0  | 0.0          | 0.0         | 0.0        | 0.0                                     | 0.0        | 0.0        |
| %ile BackOfQ(50%),veh/ln           | 1.1          | 0.0      | 0.5          | 0.0         | 0.0  | 0.0  | 1.0          | 0.9         | 0.9        | 0.4                                     | 2.3        | 2.2        |
| Unsig. Movement Delay, s/veh       |              | 0.0      | 0.0          | 0.0         | 0.0  | 0.0  |              | 0.0         | 0.0        | • |            |            |
| LnGrp Delay(d),s/veh               | 28.9         | 0.0      | 28.4         | 30.1        | 0.0  | 0.0  | 48.5         | 5.0         | 5.0        | 45.5                                    | 6.6        | 6.6        |
| LnGrp LOS                          | С            | Α        | С            | С           | Α    | Α    | D            | Α           | Α          | D                                       | Α          | Α          |
| Approach Vol, veh/h                |              | 97       |              |             | 3    |      |              | 403         |            |   | 721        |            |
| Approach Delay, s/veh              |              | 28.8     |              |             | 30.1 |      |              | 9.8         |            |   | 7.6        |            |
| Approach LOS                       |              | С        |              |             | С    |      |              | А           |            |   | Α          |            |
| Timer - Assigned Phs               | 1            | 2        |              | 4           | 5    | 6    |              | 8           |            |   |            |            |
| Phs Duration (G+Y+Rc), s           | 5.3          | 55.7     |              | 15.5        | 6.5  | 54.5 |              | 15.5        |            |   |            |            |
| Change Period (Y+Rc), s            | 4.0          | 4.5      |              | 4.0         | 4.0  | 4.5  |              | 4.0         |            |   |            |            |
| Max Green Setting (Gmax), s        | 24.0         | 30.0     |              | 24.0        | 24.0 | 50.0 |              | 24.0        |            |   |            |            |
| Max Q Clear Time (g_c+l1), s       | 2.8          | 5.1      |              | 4.8         | 4.1  | 9.1  |              | 5.0         |            |   |            |            |
| Green Ext Time (p_c), s            | 0.0          | 1.4      |              | 0.2         | 0.0  | 3.2  |              | 0.0         |            |   |            |            |
| Intersection Summary               |              |          |              |             |      |      |              |             |            |   |            |            |
| HCM 6th Ctrl Delay                 |              |          | 10.0         |             |      |      |              |             |            |   |            |            |
| HCM 6th LOS                        |              |          | В            |             |      |      |              |             |            |   |            |            |

|                              | ၨ    | <b>→</b>                                | •    | •    | <b>←</b>                                | •    | •    | <b>†</b>  | /    | <b>&gt;</b> | ļ   | ∢   |
|------------------------------|------|---|------|------|---|------|------|-----------|------|-------------|-----|-----|
| Movement                     | EBL  | EBT                                     | EBR  | WBL  | WBT                                     | WBR  | NBL  | NBT       | NBR  | SBL         | SBT | SBR |
| Lane Configurations          | ሻሻ   | <b>∱</b> }                              | 7    | 1,1  | <b>†</b>                                | 77   | 44   | <b>†</b>  | 77   |             |     |     |
| Traffic Volume (veh/h)       | 501  | 1143                                    | 558  | 210  | 155                                     | 270  | 215  | 55        | 787  | 0           | 0   | 0   |
| Future Volume (veh/h)        | 501  | 1143                                    | 558  | 210  | 155                                     | 270  | 215  | 55        | 787  | 0           | 0   | 0   |
| Initial Q (Qb), veh          | 16   | 8                                       | 16   | 0    | 0                                       | 0    | 0    | 0         | 10   |             |     |     |
| Ped-Bike Adj(A_pbT)          | 1.00 |   | 0.97 | 1.00 |   | 1.00 | 1.00 |           | 1.00 |             |     |     |
| Parking Bus, Adj             | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00      | 1.00 |             |     |     |
| Work Zone On Approach        |      | No                                      |      |      | No                                      |      |      | No        |      |             |     |     |
| Adj Sat Flow, veh/h/ln       | 1870 | 1870                                    | 1870 | 1648 | 1648                                    | 1648 | 1856 | 1856      | 1856 |             |     |     |
| Adj Flow Rate, veh/h         | 516  | 1178                                    | 287  | 216  | 160                                     | 110  | 222  | 57        | 811  |             |     |     |
| Peak Hour Factor             | 0.97 | 0.97                                    | 0.97 | 0.97 | 0.97                                    | 0.97 | 0.97 | 0.97      | 0.97 |             |     |     |
| Percent Heavy Veh, %         | 2    | 2                                       | 2    | 17   | 17                                      | 17   | 3    | 3         | 3    |             |     |     |
| Cap, veh/h                   | 717  | 1652                                    | 681  | 306  | 557                                     | 831  | 1028 | 556       | 1108 |             |     |     |
| Arrive On Green              | 0.19 | 0.44                                    | 0.44 | 0.10 | 0.35                                    | 0.35 | 0.30 | 0.30      | 0.30 |             |     |     |
| Sat Flow, veh/h              | 3563 | 3741                                    | 1541 | 3045 | 1648                                    | 2458 | 3428 | 1856      | 2768 |             |     |     |
| Grp Volume(v), veh/h         | 516  | 1178                                    | 287  | 216  | 160                                     | 110  | 222  | 57        | 811  |             |     |     |
| Grp Sat Flow(s), veh/h/ln    | 1781 | 1870                                    | 1541 | 1522 | 1648                                    | 1229 | 1714 | 1856      | 1384 |             |     |     |
| Q Serve(g_s), s              | 10.8 | 20.1                                    | 10.0 | 5.4  | 5.4                                     | 2.4  | 3.8  | 1.7       | 19.5 |             |     |     |
| Cycle Q Clear(g_c), s        | 10.8 | 20.1                                    | 10.0 | 5.4  | 5.4                                     | 2.4  | 3.8  | 1.7       | 19.5 |             |     |     |
| Prop In Lane                 | 1.00 |   | 1.00 | 1.00 | • | 1.00 | 1.00 |           | 1.00 |             |     |     |
| Lane Grp Cap(c), veh/h       | 717  | 1652                                    | 681  | 306  | 557                                     | 831  | 1028 | 556       | 1108 |             |     |     |
| V/C Ratio(X)                 | 0.72 | 0.71                                    | 0.42 | 0.71 | 0.29                                    | 0.13 | 0.22 | 0.10      | 0.73 |             |     |     |
| Avail Cap(c_a), veh/h        | 1321 | 1817                                    | 749  | 1051 | 801                                     | 1194 | 1183 | 640       | 1234 |             |     |     |
| HCM Platoon Ratio            | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00      | 1.00 |             |     |     |
| Upstream Filter(I)           | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00                                    | 1.00 | 1.00 | 1.00      | 1.00 |             |     |     |
| Uniform Delay (d), s/veh     | 30.0 | 18.2                                    | 16.4 | 34.4 | 19.4                                    | 18.3 | 20.7 | 20.0      | 20.6 |             |     |     |
| Incr Delay (d2), s/veh       | 1.0  | 1.4                                     | 0.6  | 1.1  | 0.4                                     | 0.1  | 0.0  | 0.0       | 1.6  |             |     |     |
| Initial Q Delay(d3),s/veh    | 12.8 | 0.6                                     | 6.9  | 0.0  | 0.0                                     | 0.0  | 0.0  | 0.0       | 2.2  |             |     |     |
| %ile BackOfQ(50%),veh/ln     | 6.6  | 9.1                                     | 6.3  | 2.0  | 2.2                                     | 0.7  | 1.5  | 0.8       | 0.6  |             |     |     |
| Unsig. Movement Delay, s/veh |      | • | 0.0  |      |   | •    |      | 0.0       | 0.0  |             |     |     |
| LnGrp Delay(d),s/veh         | 43.9 | 20.2                                    | 23.9 | 35.6 | 19.8                                    | 18.4 | 20.8 | 20.0      | 24.5 |             |     |     |
| LnGrp LOS                    | D    | C                                       | C    | D    | В                                       | В    | C    | C         | C    |             |     |     |
| Approach Vol, veh/h          |      | 1981                                    |      |      | 486                                     |      |      | 1090      |      |             |     |     |
| Approach Delay, s/veh        |      | 26.9                                    |      |      | 26.5                                    |      |      | 23.5      |      |             |     |     |
| Approach LOS                 |      | C C                                     |      |      | C C                                     |      |      | 20.0<br>C |      |             |     |     |
|                              |      |   |      |      |   | •    |      |           |      |             |     |     |
| Timer - Assigned Phs         | 1    | 2                                       |      | 4    | 5                                       | 6    |      |           |      |             |     |     |
| Phs Duration (G+Y+Rc), s     | 11.4 | 39.5                                    |      | 27.3 | 18.1                                    | 32.8 |      |           |      |             |     |     |
| Change Period (Y+Rc), s      | 3.5  | 5.0                                     |      | 4.0  | 3.5                                     | 5.0  |      |           |      |             |     |     |
| Max Green Setting (Gmax), s  | 27.0 | 38.0                                    |      | 27.0 | 29.0                                    | 38.0 |      |           |      |             |     |     |
| Max Q Clear Time (g_c+I1), s | 7.4  | 22.1                                    |      | 21.5 | 12.8                                    | 7.4  |      |           |      |             |     |     |
| Green Ext Time (p_c), s      | 0.6  | 12.5                                    |      | 1.8  | 1.9                                     | 2.8  |      |           |      |             |     |     |
| Intersection Summary         |      |   |      |      |   |      |      |           |      |             |     |     |
| HCM 6th Ctrl Delay           |      |   | 25.8 |      |   |      |      |           |      |             |     |     |
| HCM 6th LOS                  |      |   | С    |      |   |      |      |           |      |             |     |     |
| Notes                        |      |   |      |      |   |      |      |           |      |             |     |     |

|                                    | ٠            | <b>→</b>     | •            | •    | •          | •           | 4          | <b>†</b>    | ~    | <b>/</b>    | ţ    | 4    |
|------------------------------------|--------------|--------------|--------------|------|------------|-------------|------------|-------------|------|-------------|------|------|
| Movement                           | EBL          | EBT          | EBR          | WBL  | WBT        | WBR         | NBL        | NBT         | NBR  | SBL         | SBT  | SBR  |
| Lane Configurations                | ሻሻ           | <b>∱</b> ⊅   |              |      | <b>∱</b> ⊅ |             | ሻ          | ₽           |      |             | 4    | 11   |
| Traffic Volume (veh/h)             | 386          | 1615         | 94           | 4    | 317        | 25          | 59         | 4           | 6    | 36          | 2    | 92   |
| Future Volume (veh/h)              | 386          | 1615         | 94           | 4    | 317        | 25          | 59         | 4           | 6    | 36          | 2    | 92   |
| Initial Q (Qb), veh                | 0            | 32           | 0            | 0    | 26         | 0           | 0          | 0           | 0    | 0           | 0    | 0    |
| Ped-Bike Adj(A_pbT)                | 1.00         | 4.00         | 0.96         | 1.00 | 4.00       | 0.99        | 1.00       | 4.00        | 1.00 | 1.00        | 4.00 | 1.00 |
| Parking Bus, Adj                   | 1.00         | 1.00         | 1.00         | 1.00 | 1.00       | 1.00        | 1.00       | 1.00        | 1.00 | 1.00        | 1.00 | 1.00 |
| Work Zone On Approach              | 4050         | No           | 4050         | 4574 | No         | 4574        | 4000       | No          | 4000 | 4070        | No   | 4070 |
| Adj Sat Flow, veh/h/ln             | 1856         | 1856         | 1856         | 1574 | 1574       | 1574        | 1366       | 1366        | 1366 | 1678        | 1678 | 1678 |
| Adj Flow Rate, veh/h               | 420          | 1755         | 100          | 4    | 345        | 24          | 64         | 4           | 0    | 39          | 2    | 0    |
| Peak Hour Factor                   | 0.92         | 0.92         | 0.92         | 0.92 | 0.92       | 0.92        | 0.92       | 0.92        | 0.92 | 0.92        | 0.92 | 0.92 |
| Percent Heavy Veh, %               | 3            | 3            | 3            | 22   | 22         | 22          | 36         | 36          | 36   | 15          | 15   | 15   |
| Cap, veh/h                         | 494          | 2333         | 117          | 9    | 1558       | 100         | 156        | 163<br>0.12 | 0    | 59<br>0.04  | 3    | 97   |
| Arrive On Green                    | 0.14         | 0.68<br>3384 | 0.68<br>191  | 0.01 | 0.55       | 0.55<br>196 | 0.12       | 1366        | 0.00 | 1523        | 0.04 | 0.00 |
| Sat Flow, veh/h                    | 3428         |              |              | 1499 | 2835       |             | 1301       |             |      |             | 78   | 2502 |
| Grp Volume(v), veh/h               | 420          | 906          | 949          | 4    | 181        | 188         | 64         | 4           | 0    | 41          | 0    | 1051 |
| Grp Sat Flow(s), veh/h/ln          | 1714         | 1763         | 1812<br>38.2 | 1499 | 1495       | 1535        | 1301       | 1366        | 0    | 1602<br>2.8 | 0    | 1251 |
| Q Serve(g_s), s                    | 13.1<br>13.1 | 36.7<br>36.7 | 38.2         | 0.3  | 6.9<br>6.9 | 7.0<br>7.0  | 5.0<br>5.0 | 0.3         | 0.0  | 2.8         | 0.0  | 0.0  |
| Cycle Q Clear(g_c), s Prop In Lane | 1.00         | 30.7         | 0.11         | 1.00 | 0.9        | 0.13        | 1.00       | 0.3         | 0.00 | 0.95        | 0.0  | 1.00 |
| Lane Grp Cap(c), veh/h             | 494          | 1206         | 1243         | 9    | 817        | 840         | 1.00       | 163         | 0.00 | 62          | 0    | 97   |
| V/C Ratio(X)                       | 0.85         | 0.75         | 0.76         | 0.43 | 0.22       | 0.22        | 0.41       | 0.02        | 0.00 | 0.66        | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h              | 686          | 1206         | 1240         | 123  | 817        | 839         | 367        | 385         | 0.00 | 160         | 0.00 | 250  |
| HCM Platoon Ratio                  | 1.00         | 1.00         | 1.00         | 1.00 | 1.00       | 1.00        | 1.00       | 1.00        | 1.00 | 1.00        | 1.00 | 1.00 |
| Upstream Filter(I)                 | 0.09         | 0.09         | 0.09         | 1.00 | 1.00       | 1.00        | 1.00       | 1.00        | 0.00 | 1.00        | 0.00 | 0.00 |
| Uniform Delay (d), s/veh           | 45.9         | 12.6         | 12.7         | 54.5 | 13.9       | 13.8        | 44.8       | 42.8        | 0.0  | 52.1        | 0.0  | 0.0  |
| Incr Delay (d2), s/veh             | 0.5          | 0.4          | 0.4          | 10.9 | 0.6        | 0.6         | 0.6        | 0.0         | 0.0  | 4.3         | 0.0  | 0.0  |
| Initial Q Delay(d3),s/veh          | 0.0          | 5.1          | 5.0          | 0.0  | 2.3        | 2.2         | 0.0        | 0.0         | 0.0  | 0.0         | 0.0  | 0.0  |
| %ile BackOfQ(50%),veh/ln           | 5.5          | 16.8         | 17.7         | 0.1  | 4.3        | 4.4         | 1.7        | 0.1         | 0.0  | 1.2         | 0.0  | 0.0  |
| Unsig. Movement Delay, s/veh       |              |              |              | •    |            |             |            | •           | 0.0  |             | 0.0  | 0.0  |
| LnGrp Delay(d),s/veh               | 46.4         | 18.1         | 18.2         | 65.4 | 16.8       | 16.7        | 45.5       | 42.8        | 0.0  | 56.4        | 0.0  | 0.0  |
| LnGrp LOS                          | D            | В            | В            | Е    | В          | В           | D          | D           | Α    | Е           | A    | Α    |
| Approach Vol, veh/h                |              | 2275         |              |      | 373        |             |            | 68          |      |             | 41   |      |
| Approach Delay, s/veh              |              | 23.4         |              |      | 17.3       |             |            | 45.3        |      |             | 56.4 |      |
| Approach LOS                       |              | С            |              |      | В          |             |            | D           |      |             | Е    |      |
| Timer - Assigned Phs               | 1            | 2            |              | 4    | 5          | 6           |            | 8           |      |             |      |      |
| Phs Duration (G+Y+Rc), s           | 19.9         | 64.7         |              | 17.2 | 4.7        | 79.9        |            | 8.3         |      |             |      |      |
| Change Period (Y+Rc), s            | 4.0          | 4.6          |              | 4.0  | 4.0        | 4.6         |            | 4.0         |      |             |      |      |
| Max Green Setting (Gmax), s        | 22.0         | 29.4         |              | 31.0 | 9.0        | 42.4        |            | 11.0        |      |             |      |      |
| Max Q Clear Time (g_c+l1), s       | 15.1         | 9.0          |              | 7.0  | 2.3        | 40.2        |            | 4.8         |      |             |      |      |
| Green Ext Time (p_c), s            | 0.7          | 1.9          |              | 0.1  | 0.0        | 1.7         |            | 0.0         |      |             |      |      |
| Intersection Summary               |              |              |              |      |            |             |            |             |      |             |      |      |
| HCM 6th Ctrl Delay                 |              |              | 23.6         |      |            |             |            |             |      |             |      |      |
| HCM 6th LOS                        |              |              | С            |      |            |             |            |             |      |             |      |      |

|                              | •    | <b>→</b>    | $\rightarrow$ | •    | <b>←</b>   | •    | •    | <b>†</b> | /    | <b>&gt;</b> | ļ        | 4    |
|------------------------------|------|-------------|---------------|------|------------|------|------|----------|------|-------------|----------|------|
| Movement                     | EBL  | EBT         | EBR           | WBL  | WBT        | WBR  | NBL  | NBT      | NBR  | SBL         | SBT      | SBR  |
| Lane Configurations          | Ť    | <b>↑</b> ↑₽ |               | 44   | <b>∱</b> ∱ |      | Ţ    | <b>^</b> | 77   | ሻሻ          | <b>^</b> | 7    |
| Traffic Volume (veh/h)       | 142  | 1432        | 35            | 74   | 157        | 139  | 23   | 188      | 378  | 392         | 328      | 211  |
| Future Volume (veh/h)        | 142  | 1432        | 35            | 74   | 157        | 139  | 23   | 188      | 378  | 392         | 328      | 211  |
| Initial Q (Qb), veh          | 0    | 50          | 0             | 0    | 0          | 0    | 0    | 0        | 12   | 24          | 24       | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |             | 0.98          | 1.00 |            | 1.00 | 1.00 |          | 1.00 | 1.00        |          | 0.97 |
| Parking Bus, Adj             | 1.00 | 1.00        | 1.00          | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00     | 1.00 |
| Work Zone On Approach        |      | No          |               |      | No         |      |      | No       |      |             | No       |      |
| Adj Sat Flow, veh/h/ln       | 1885 | 1885        | 1885          | 1826 | 1826       | 1826 | 1870 | 1870     | 1870 | 1826        | 1826     | 1826 |
| Adj Flow Rate, veh/h         | 149  | 1507        | 34            | 78   | 165        | 47   | 24   | 198      | 398  | 413         | 345      | 47   |
| Peak Hour Factor             | 0.95 | 0.95        | 0.95          | 0.95 | 0.95       | 0.95 | 0.95 | 0.95     | 0.95 | 0.95        | 0.95     | 0.95 |
| Percent Heavy Veh, %         | 1    | 1           | 1             | 5    | 5          | 5    | 2    | 2        | 2    | 5           | 5        | 5    |
| Cap, veh/h                   | 186  | 1896        | 28            | 324  | 986        | 273  | 83   | 272      | 687  | 549         | 848      | 387  |
| Arrive On Green              | 0.10 | 0.36        | 0.36          | 0.12 | 0.39       | 0.39 | 0.05 | 0.14     | 0.14 | 0.15        | 0.24     | 0.24 |
| Sat Flow, veh/h              | 1795 | 5175        | 117           | 3374 | 2684       | 743  | 1781 | 1870     | 2790 | 3374        | 3469     | 1501 |
| Grp Volume(v), veh/h         | 149  | 999         | 542           | 78   | 105        | 107  | 24   | 198      | 398  | 413         | 345      | 47   |
| Grp Sat Flow(s),veh/h/ln     | 1795 | 1716        | 1861          | 1687 | 1735       | 1692 | 1781 | 1870     | 1395 | 1687        | 1735     | 1501 |
| Q Serve(g_s), s              | 6.5  | 21.0        | 21.0          | 1.7  | 3.2        | 3.3  | 1.0  | 8.2      | 2.6  | 9.5         | 6.7      | 2.0  |
| Cycle Q Clear(g_c), s        | 6.5  | 21.0        | 21.0          | 1.7  | 3.2        | 3.3  | 1.0  | 8.2      | 2.6  | 9.5         | 6.7      | 2.0  |
| Prop In Lane                 | 1.00 |             | 0.06          | 1.00 |            | 0.44 | 1.00 |          | 1.00 | 1.00        |          | 1.00 |
| Lane Grp Cap(c), veh/h       | 186  | 1244        | 678           | 324  | 637        | 622  | 83   | 272      | 687  | 549         | 848      | 387  |
| V/C Ratio(X)                 | 0.80 | 0.80        | 0.80          | 0.24 | 0.16       | 0.17 | 0.29 | 0.73     | 0.58 | 0.75        | 0.41     | 0.12 |
| Avail Cap(c_a), veh/h        | 292  | 1244        | 675           | 394  | 673        | 657  | 200  | 304      | 779  | 590         | 821      | 355  |
| HCM Platoon Ratio            | 1.00 | 1.00        | 1.00          | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00     | 1.00 |
| Upstream Filter(I)           | 1.00 | 1.00        | 1.00          | 0.98 | 0.98       | 0.98 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00     | 1.00 |
| Uniform Delay (d), s/veh     | 35.0 | 24.3        | 24.2          | 33.5 | 17.1       | 17.1 | 36.9 | 32.7     | 11.6 | 33.0        | 26.2     | 22.8 |
| Incr Delay (d2), s/veh       | 3.7  | 5.6         | 9.6           | 0.1  | 0.5        | 0.6  | 0.7  | 6.0      | 0.4  | 4.3         | 0.1      | 0.1  |
| Initial Q Delay(d3),s/veh    | 0.0  | 26.3        | 21.8          | 0.0  | 0.0        | 0.0  | 0.0  | 0.0      | 5.2  | 55.8        | 9.7      | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 3.0  | 15.3        | 16.4          | 0.7  | 1.3        | 1.3  | 0.5  | 3.9      | 2.4  | 9.2         | 4.7      | 0.7  |
| Unsig. Movement Delay, s/veh |      |             |               |      |            |      |      |          |      |             |          |      |
| LnGrp Delay(d),s/veh         | 38.8 | 56.2        | 55.5          | 33.6 | 17.6       | 17.7 | 37.6 | 38.7     | 17.2 | 93.1        | 36.1     | 22.8 |
| LnGrp LOS                    | D    | <u>E</u>    | E             | С    | В          | В    | D    | D        | В    | F           | D        | С    |
| Approach Vol, veh/h          |      | 1690        |               |      | 290        |      |      | 620      |      |             | 805      |      |
| Approach Delay, s/veh        |      | 54.4        |               |      | 22.0       |      |      | 24.8     |      |             | 64.6     |      |
| Approach LOS                 |      | D           |               |      | С          |      |      | С        |      |             | Е        |      |
| Timer - Assigned Phs         | 1    | 2           | 3             | 4    | 5          | 6    | 7    | 8        |      |             |          |      |
| Phs Duration (G+Y+Rc), s     | 7.7  | 23.9        | 12.3          | 36.1 | 15.8       | 15.8 | 14.3 | 34.0     |      |             |          |      |
| Change Period (Y+Rc), s      | 4.0  | 5.0         | 4.0           | 5.0  | 4.0        | 5.0  | 5.0  | * 5      |      |             |          |      |
| Max Green Setting (Gmax), s  | 9.0  | 18.0        | 13.0          | 22.0 | 14.0       | 13.0 | 6.0  | * 29     |      |             |          |      |
| Max Q Clear Time (g_c+l1), s | 3.0  | 8.7         | 8.5           | 5.3  | 11.5       | 10.2 | 3.7  | 23.0     |      |             |          |      |
| Green Ext Time (p_c), s      | 0.0  | 1.0         | 0.1           | 0.6  | 0.3        | 0.6  | 0.0  | 3.7      |      |             |          |      |
| Intersection Summary         |      |             |               |      |            |      |      |          |      |             |          |      |
| HCM 6th Ctrl Delay           |      |             | 48.7          |      |            |      |      |          |      |             |          |      |
| HCM 6th LOS                  |      |             | D             |      |            |      |      |          |      |             |          |      |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier. User approved changes to right turn type.

|                              | ۶    | <b>→</b> | •         | •         | <b>←</b> | •        | •         | <b>†</b> | ~    | <b>&gt;</b> | ļ       | 4        |
|------------------------------|------|----------|-----------|-----------|----------|----------|-----------|----------|------|-------------|---------|----------|
| Movement                     | EBL  | EBT      | EBR       | WBL       | WBT      | WBR      | NBL       | NBT      | NBR  | SBL         | SBT     | SBR      |
| Lane Configurations          | Į.   | 4        | 7         |           | 4        |          | Ť         | f)       |      |             | <b></b> | 77       |
| Traffic Volume (veh/h)       | 938  | 2        | 74        | 1         | 0        | 5        | 40        | 114      | 1    | 2           | 150     | 616      |
| Future Volume (veh/h)        | 938  | 2        | 74        | 1         | 0        | 5        | 40        | 114      | 1    | 2           | 150     | 616      |
| Initial Q (Qb), veh          | 24   | 0        | 0         | 0         | 0        | 0        | 0         | 0        | 0    | 0           | 0       | 0        |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 1.00      | 1.00      |          | 1.00     | 1.00      |          | 1.00 | 0.99        |         | 1.00     |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00      | 1.00      | 1.00     | 1.00     | 1.00      | 1.00     | 1.00 | 1.00        | 1.00    | 1.00     |
| Work Zone On Approach        |      | No       |           |           | No       |          |           | No       |      |             | No      |          |
| Adj Sat Flow, veh/h/ln       | 1856 | 1856     | 1856      | 1411      | 1411     | 1411     | 1781      | 1781     | 1781 | 1767        | 1767    | 1767     |
| Adj Flow Rate, veh/h         | 1021 | 0        | 40        | 1         | 0        | 0        | 43        | 124      | 0    | 2           | 163     | 480      |
| Peak Hour Factor             | 0.92 | 0.92     | 0.92      | 0.92      | 0.92     | 0.92     | 0.92      | 0.92     | 0.92 | 0.92        | 0.92    | 0.92     |
| Percent Heavy Veh, %         | 3    | 3        | 3         | 33        | 33       | 33       | 8         | 8        | 8    | 9           | 9       | 9        |
| Cap, veh/h                   | 1424 | 0        | 633       | 3         | 0        | 0        | 64        | 642      | 0    | 92          | 436     | 1715     |
| Arrive On Green              | 0.39 | 0.00     | 0.39      | 0.00      | 0.00     | 0.00     | 0.04      | 0.37     | 0.00 | 0.26        | 0.26    | 0.26     |
| Sat Flow, veh/h              | 3534 | 0        | 1572      | 1344      | 0        | 0        | 1697      | 1781     | 0    | 5           | 1759    | 2635     |
| Grp Volume(v), veh/h         | 1021 | 0        | 40        | 1         | 0        | 0        | 43        | 124      | 0    | 165         | 0       | 480      |
| Grp Sat Flow(s), veh/h/ln    | 1767 | 0        | 1572      | 1344      | 0        | 0        | 1697      | 1781     | 0    | 1764        | 0       | 1317     |
| Q Serve(g_s), s              | 9.8  | 0.0      | 0.6       | 0.0       | 0.0      | 0.0      | 1.0       | 1.8      | 0.0  | 0.0         | 0.0     | 3.1      |
| Cycle Q Clear(g_c), s        | 9.8  | 0.0      | 0.6       | 0.0       | 0.0      | 0.0      | 1.0       | 1.8      | 0.0  | 3.0         | 0.0     | 3.1      |
| Prop In Lane                 | 1.00 | 0.0      | 1.00      | 1.00      | 0.0      | 0.00     | 1.00      | 1.0      | 0.00 | 0.01        | 0.0     | 1.00     |
| Lane Grp Cap(c), veh/h       | 1424 | 0        | 633       | 3         | 0        | 0.00     | 64        | 642      | 0.00 | 528         | 0       | 1715     |
| V/C Ratio(X)                 | 0.72 | 0.00     | 0.06      | 0.30      | 0.00     | 0.00     | 0.67      | 0.19     | 0.00 | 0.31        | 0.00    | 0.28     |
| Avail Cap(c_a), veh/h        | 2710 | 0.00     | 1206      | 687       | 0.00     | 0.00     | 867       | 2641     | 0.00 | 1666        | 0.00    | 3373     |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00      | 1.00      | 1.00     | 1.00     | 1.00      | 1.00     | 1.00 | 1.00        | 1.00    | 1.00     |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00      | 1.00      | 0.00     | 0.00     | 1.00      | 1.00     | 0.00 | 1.00        | 0.00    | 1.00     |
| Uniform Delay (d), s/veh     | 10.6 | 0.00     | 7.4       | 20.3      | 0.00     | 0.0      | 19.3      | 9.1      | 0.00 | 12.8        | 0.00    | 3.0      |
| Incr Delay (d2), s/veh       | 0.3  | 0.0      | 0.0       | 43.9      | 0.0      | 0.0      | 11.4      | 0.1      | 0.0  | 0.3         | 0.0     | 0.1      |
| Initial Q Delay(d3),s/veh    | 7.2  | 0.0      | 0.0       | 0.0       | 0.0      | 0.0      | 0.0       | 0.0      | 0.0  | 0.0         | 0.0     | 0.0      |
| %ile BackOfQ(50%),veh/ln     | 4.8  | 0.0      | 0.0       | 0.0       | 0.0      | 0.0      | 0.6       | 0.6      | 0.0  | 1.1         | 0.0     | 1.7      |
| Unsig. Movement Delay, s/veh |      | 0.0      | 0.2       | 0.0       | 0.0      | 0.0      | 0.0       | 0.0      | 0.0  | 1.1         | 0.0     | 1.7      |
| LnGrp Delay(d),s/veh         | 18.1 | 0.0      | 7.4       | 64.2      | 0.0      | 0.0      | 30.7      | 9.2      | 0.0  | 13.1        | 0.0     | 3.1      |
| LnGrp LOS                    | В    | Α        | 7.4<br>A  | 04.Z<br>E | Α        | 0.0<br>A | 30.7<br>C | 9.2<br>A | Α    | 13.1<br>B   | Α       | 3.1<br>A |
| <u> </u>                     | ь    |          | ^         |           | 1        | ^        |           | 167      |      | Ь           |         |          |
| Approach Vol, veh/h          |      | 1061     |           |           |          |          |           |          |      |             | 645     |          |
| Approach Delay, s/veh        |      | 17.7     |           |           | 64.2     |          |           | 14.7     |      |             | 5.7     |          |
| Approach LOS                 |      | В        |           |           | E        |          |           | В        |      |             | Α       |          |
| Timer - Assigned Phs         | 1    | 2        |           | 4         |          | 6        |           | 8        |      |             |         |          |
| Phs Duration (G+Y+Rc), s     | 4.5  | 13.5     |           | 3.0       |          | 18.0     |           | 18.1     |      |             |         |          |
| Change Period (Y+Rc), s      | 3.0  | 3.5      |           | 3.0       |          | 3.5      |           | 3.0      |      |             |         |          |
| Max Green Setting (Gmax), s  | 20.0 | 35.0     |           | 20.0      |          | 58.0     |           | 30.0     |      |             |         |          |
| Max Q Clear Time (g_c+l1), s | 3.0  | 5.1      |           | 2.0       |          | 3.8      |           | 11.8     |      |             |         |          |
| Green Ext Time (p_c), s      | 0.1  | 2.8      |           | 0.0       |          | 0.4      |           | 3.3      |      |             |         |          |
| Intersection Summary         |      |          |           |           |          |          |           |          |      |             |         |          |
| HCM 6th Ctrl Delay           |      |          | 13.3      |           |          |          |           |          |      |             |         |          |
| HCM 6th LOS                  |      |          | 13.3<br>B |           |          |          |           |          |      |             |         |          |
|                              |      |          | D         |           |          |          |           |          |      |             |         |          |
| Notes                        |      |          |           |           |          |          |           |          |      |             |         |          |

|                                   | ၨ        | <b>→</b> | $\rightarrow$ | •     | <b>←</b>  | •          | •       | <b>†</b> | _      | <b>&gt;</b> | ļ     | 1    |
|-----------------------------------|----------|----------|---------------|-------|-----------|------------|---------|----------|--------|-------------|-------|------|
| Movement                          | EBL      | EBT      | EBR           | WBL   | WBT       | WBR        | NBL     | NBT      | NBR    | SBL         | SBT   | SBR  |
| Lane Configurations               |          | €Î}      |               | 77    | <b>†</b>  | 7          | ሻ       | <b>^</b> | 7      | ሻ           | 414   | 7    |
| Traffic Volume (vph)              | 186      | 214      | 82            | 198   | 114       | 63         | 33      | 333      | 282    | 388         | 391   | 124  |
| Future Volume (vph)               | 186      | 214      | 82            | 198   | 114       | 63         | 33      | 333      | 282    | 388         | 391   | 124  |
| Ideal Flow (vphpl)                | 1900     | 1900     | 1900          | 1900  | 1900      | 1900       | 1900    | 1900     | 1900   | 1900        | 1900  | 1900 |
| Total Lost time (s)               |          | 4.0      |               | 4.9   | 4.9       | 4.9        | 4.9     | 4.9      | 4.9    | 4.9         | 4.9   | 4.9  |
| Lane Util. Factor                 |          | 0.95     |               | 0.97  | 1.00      | 1.00       | 1.00    | 0.95     | 1.00   | 0.91        | 0.91  | 1.00 |
| Frpb, ped/bikes                   |          | 0.98     |               | 1.00  | 1.00      | 1.00       | 1.00    | 1.00     | 1.00   | 1.00        | 1.00  | 0.92 |
| Flpb, ped/bikes                   |          | 1.00     |               | 1.00  | 1.00      | 1.00       | 1.00    | 1.00     | 1.00   | 1.00        | 1.00  | 1.00 |
| Frt                               |          | 0.97     |               | 1.00  | 1.00      | 0.85       | 1.00    | 1.00     | 0.85   | 1.00        | 1.00  | 0.85 |
| Flt Protected                     |          | 0.98     |               | 0.95  | 1.00      | 1.00       | 0.95    | 1.00     | 1.00   | 0.95        | 0.99  | 1.00 |
| Satd. Flow (prot)                 |          | 2999     |               | 2814  | 1527      | 1298       | 1464    | 2927     | 1309   | 1421        | 2954  | 1281 |
| Flt Permitted                     |          | 0.98     |               | 0.95  | 1.00      | 1.00       | 0.95    | 1.00     | 1.00   | 0.95        | 0.99  | 1.00 |
| Satd. Flow (perm)                 |          | 2999     |               | 2814  | 1527      | 1298       | 1464    | 2927     | 1309   | 1421        | 2954  | 1281 |
| 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)                   | 196      | 225      | 86            | 208   | 120       | 66         | 35      | 351      | 297    | 408         | 412   | 131  |
| RTOR Reduction (vph)              | 0        | 17       | 0             | 0     | 0         | 59         | 0       | 0        | 0      | 0           | 0     | 86   |
| Lane Group Flow (vph)             | 0        | 490      | 0             | 208   | 120       | 7          | 35      | 351      | 297    | 265         | 555   | 45   |
| Confl. Peds. (#/hr)               |          |          | 58            |       |           |            |         |          |        |             |       | 20   |
| Confl. Bikes (#/hr)               |          |          | 9             |       |           |            |         |          | 3      |             |       | 3    |
| Heavy Vehicles (%)                | 2%       | 2%       | 2%            | 12%   | 12%       | 12%        | 11%     | 11%      | 11%    | 4%          | 4%    | 4%   |
| Turn Type                         | Split    | NA       |               | Split | NA        | Perm       | Split   | NA       | custom | Split       | NA    | Perm |
| Protected Phases                  | 4        | 4        |               | . 7   | 7         |            | 6       | 6        | 267!   | 2!          | 2     |      |
| Permitted Phases                  |          |          |               |       |           | 7          |         |          |        |             |       | 2    |
| Actuated Green, G (s)             |          | 22.7     |               | 11.0  | 11.0      | 11.0       | 16.2    | 16.2     | 73.4   | 36.4        | 36.4  | 36.4 |
| Effective Green, g (s)            |          | 22.7     |               | 11.0  | 11.0      | 11.0       | 16.2    | 16.2     | 73.4   | 36.4        | 36.4  | 36.4 |
| Actuated g/C Ratio                |          | 0.22     |               | 0.10  | 0.10      | 0.10       | 0.15    | 0.15     | 0.70   | 0.35        | 0.35  | 0.35 |
| Clearance Time (s)                |          | 4.0      |               | 4.9   | 4.9       | 4.9        | 4.9     | 4.9      |        | 4.9         | 4.9   | 4.9  |
| Vehicle Extension (s)             |          | 2.0      |               | 3.0   | 3.0       | 3.0        | 2.5     | 2.5      |        | 2.0         | 2.0   | 2.0  |
| Lane Grp Cap (vph)                |          | 648      |               | 294   | 159       | 135        | 225     | 451      | 915    | 492         | 1024  | 444  |
| v/s Ratio Prot                    |          | c0.16    |               | 0.07  | c0.08     |            | 0.02    | c0.12    | 0.23   | 0.19        | c0.19 |      |
| v/s Ratio Perm                    |          |          |               |       |           | 0.01       |         |          |        |             |       | 0.04 |
| v/c Ratio                         |          | 0.76     |               | 0.71  | 0.75      | 0.05       | 0.16    | 0.78     | 0.32   | 0.54        | 0.54  | 0.10 |
| Uniform Delay, d1                 |          | 38.6     |               | 45.4  | 45.7      | 42.3       | 38.5    | 42.7     | 6.2    | 27.6        | 27.6  | 23.2 |
| 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             |          | 4.5      |               | 7.6   | 18.2      | 0.2        | 0.2     | 7.9      | 0.2    | 4.2         | 2.1   | 0.5  |
| Delay (s)                         |          | 43.0     |               | 53.0  | 63.9      | 42.5       | 38.7    | 50.6     | 6.3    | 31.7        | 29.7  | 23.7 |
| Level of Service                  |          | D        |               | D     | Е         | D          | D       | D        | Α      | С           | С     | С    |
| Approach Delay (s)                |          | 43.0     |               |       | 54.6      |            |         | 30.7     |        |             | 29.4  |      |
| Approach LOS                      |          | D        |               |       | D         |            |         | С        |        |             | С     |      |
| Intersection Summary              |          |          |               |       |           |            |         |          |        |             |       |      |
| HCM 2000 Control Delay            |          |          | 36.4          | Н     | CM 2000   | Level of S | Service |          | D      |             |       |      |
| HCM 2000 Volume to Capacit        | y ratio  |          | 0.67          |       |           |            |         |          |        |             |       |      |
| Actuated Cycle Length (s)         |          |          | 105.0         |       | um of los |            |         |          | 18.7   |             |       |      |
| Intersection Capacity Utilization | n        |          | 72.2%         | IC    | CU Level  | of Service |         |          | С      |             |       |      |
| Analysis Period (min)             |          |          | 15            |       |           |            |         |          |        |             |       |      |
| ! Phase conflict between lan      | e groups | 3.       |               |       |           |            |         |          |        |             |       |      |
| c Critical Lane Group             |          |          |               |       |           |            |         |          |        |             |       |      |

|                                | ٠          | <b>→</b> | •               | •    | <b>&gt;</b> | 4              |    |      |
|--------------------------------|------------|----------|-----------------|------|-------------|----------------|----|------|
| Movement                       | EBL        | EBT      | WBT             | WBR  | SBL         | SBR            |    |      |
| Lane Configurations            | ሻ          | <b>^</b> | <del>ተ</del> ተኈ |      | ሻ           | 7              |    |      |
| Traffic Volume (vph)           | 42         | 842      | 518             | 40   | 54          | 19             |    |      |
| Future Volume (vph)            | 42         | 842      | 518             | 40   | 54          | 19             |    |      |
| Ideal Flow (vphpl)             | 1900       | 1900     | 1900            | 1900 | 1900        | 1900           |    |      |
| Total Lost time (s)            | 4.0        | 4.9      | 4.9             |      | 4.2         | 4.2            |    |      |
| Lane Util. Factor              | 1.00       | 0.91     | 0.91            |      | 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)              | 1736       | 4988     | 4541            |      | 1703        | 1524           |    |      |
| Flt Permitted                  | 0.95       | 1.00     | 1.00            |      | 0.95        | 1.00           |    |      |
| Satd. Flow (perm)              | 1736       | 4988     | 4541            |      | 1703        | 1524           |    |      |
| Peak-hour factor, PHF          | 0.93       | 0.93     | 0.93            | 0.93 | 0.93        | 0.93           |    |      |
| Adj. Flow (vph)                | 45         | 905      | 557             | 43   | 58          | 20             |    |      |
| RTOR Reduction (vph)           | 0          | 0        | 3               | 0    | 0           | 18             |    |      |
| Lane Group Flow (vph)          | 45         | 905      | 597             | 0    | 58          | 2              |    |      |
| Heavy Vehicles (%)             | 4%         | 4%       | 13%             | 13%  | 6%          | 6%             |    |      |
| Turn Type                      | Prot       | NA       | NA              |      | Prot        | Perm           |    |      |
| Protected Phases               | 5          | 2        | 6               |      | 3           |                |    |      |
| Permitted Phases               |            |          |                 |      |             | 3              |    |      |
| Actuated Green, G (s)          | 5.6        | 81.3     | 71.7            |      | 9.6         | 9.6            |    |      |
| Effective Green, g (s)         | 5.6        | 81.3     | 71.7            |      | 9.6         | 9.6            |    |      |
| Actuated g/C Ratio             | 0.06       | 0.81     | 0.72            |      | 0.10        | 0.10           |    |      |
| Clearance Time (s)             | 4.0        | 4.9      | 4.9             |      | 4.2         | 4.2            |    |      |
| Vehicle Extension (s)          | 2.0        | 2.0      | 2.0             |      | 2.0         | 2.0            |    |      |
| Lane Grp Cap (vph)             | 97         | 4055     | 3255            |      | 163         | 146            |    |      |
| v/s Ratio Prot                 | c0.03      | c0.18    | 0.13            |      | c0.03       |                |    |      |
| v/s Ratio Perm                 |            |          |                 |      |             | 0.00           |    |      |
| v/c Ratio                      | 0.46       | 0.22     | 0.18            |      | 0.36        | 0.01           |    |      |
| Uniform Delay, d1              | 45.7       | 2.1      | 4.6             |      | 42.3        | 40.9           |    |      |
| Progression Factor             | 1.00       | 1.00     | 0.96            |      | 1.00        | 1.00           |    |      |
| Incremental Delay, d2          | 1.3        | 0.1      | 0.1             |      | 0.5         | 0.0            |    |      |
| Delay (s)                      | 47.0       | 2.3      | 4.5             |      | 42.8        | 40.9           |    |      |
| Level of Service               | D          | Α        | Α               |      | D           | D              |    |      |
| Approach Delay (s)             |            | 4.4      | 4.5             |      | 42.3        |                |    |      |
| Approach LOS                   |            | Α        | Α               |      | D           |                |    |      |
| Intersection Summary           |            |          |                 |      |             |                |    |      |
| HCM 2000 Control Delay         |            |          | 6.3             | H    | CM 2000     | Level of Servi | ce | Α    |
| HCM 2000 Volume to Capac       | city ratio |          | 0.27            |      |             |                |    |      |
| Actuated Cycle Length (s)      |            |          | 100.0           | Sı   | um of lost  | t time (s)     |    | 17.1 |
| Intersection Capacity Utilizat | tion       |          | 40.9%           |      |             | of Service     |    | Α    |
| Analysis Period (min)          |            |          | 15              |      |             |                |    |      |
| c Critical Lane Group          |            |          |                 |      |             |                |    |      |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴlvd2௸ Oyster Po

|                                | <b></b>    | ۶     | <b>→</b> | •    | •            | +           | •        | •     | <b>†</b> | <i>&gt;</i> | <b>/</b> | <del> </del> |
|--------------------------------|------------|-------|----------|------|--------------|-------------|----------|-------|----------|-------------|----------|--------------|
| Movement                       | EBU        | EBL   | EBT      | EBR  | WBL2         | WBT         | WBR      | NBL   | NBT      | NBR         | SBL      | SBT          |
| Lane Configurations            |            | ă     | ተተኈ      |      | ٦            | ተተኈ         |          | 1,4   | ર્ન      | 7           |          | 4Th          |
| Traffic Volume (vph)           | 1          | 318   | 1257     | 354  | 46           | 402         | 20       | 208   | 92       | 127         | 7        | 16           |
| Future Volume (vph)            | 1          | 318   | 1257     | 354  | 46           | 402         | 20       | 208   | 92       | 127         | 7        | 16           |
| Ideal Flow (vphpl)             | 1900       | 1900  | 1900     | 1900 | 1900         | 1900        | 1900     | 1900  | 1900     | 1900        | 1900     | 1900         |
| Total Lost time (s)            |            | 4.0   | 4.6      |      | 4.0          | 4.6         |          | 4.0   | 4.0      | 4.0         |          | 4.0          |
| Lane Util. Factor              |            | 1.00  | 0.91     |      | 1.00         | 0.91        |          | 0.91  | 0.91     | 1.00        |          | 0.95         |
| Frpb, ped/bikes                |            | 1.00  | 1.00     |      | 1.00         | 1.00        |          | 1.00  | 1.00     | 0.93        |          | 0.99         |
| Flpb, ped/bikes                |            | 1.00  | 1.00     |      | 1.00         | 1.00        |          | 1.00  | 1.00     | 1.00        |          | 1.00         |
| Frt                            |            | 1.00  | 0.97     |      | 1.00         | 0.99        |          | 1.00  | 1.00     | 0.85        |          | 0.92         |
| Flt Protected                  |            | 0.95  | 1.00     |      | 0.95         | 1.00        |          | 0.95  | 0.99     | 1.00        |          | 0.99         |
| Satd. Flow (prot)              |            | 1752  | 4850     |      | 1480         | 4213        |          | 3042  | 1586     | 1395        |          | 2789         |
| Flt Permitted                  |            | 0.95  | 1.00     |      | 0.95         | 1.00        |          | 0.95  | 0.99     | 1.00        |          | 0.99         |
| Satd. Flow (perm)              |            | 1752  | 4850     |      | 1480         | 4213        |          | 3042  | 1586     | 1395        |          | 2789         |
| Peak-hour factor, PHF          | 0.92       | 0.88  | 0.88     | 0.88 | 0.88         | 0.88        | 0.88     | 0.88  | 0.88     | 0.88        | 0.88     | 0.88         |
| Adj. Flow (vph)                | 1          | 361   | 1428     | 402  | 52           | 457         | 23       | 236   | 105      | 144         | 8        | 18           |
| RTOR Reduction (vph)           | 0          | 0     | 0        | 0    | 0            | 4           | 0        | 0     | 0        | 116         | 0        | 51           |
| Lane Group Flow (vph)          | 0          | 362   | 1830     | 0    | 52           | 476         | 0        | 212   | 129      | 28          | 0        | 2            |
| Confl. Peds. (#/hr)            |            |       |          |      |              |             | 9        |       |          | 51          |          |              |
| Confl. Bikes (#/hr)            |            |       |          | 9    |              |             | 1        |       |          | 4           |          |              |
| Heavy Vehicles (%)             | 2%         | 3%    | 3%       | 3%   | 22%          | 22%         | 22%      | 8%    | 8%       | 8%          | 17%      | 17%          |
| Turn Type                      | Prot       | Prot  | NA       |      | Prot         | NA          |          | Split | NA       | Perm        | Split    | NA           |
| Protected Phases               | 1          | 1     | 6        |      | 5            | 2           |          | 4     | 4        |             | . 7      | 7            |
| Permitted Phases               |            |       |          |      |              |             |          |       |          | 4           |          |              |
| Actuated Green, G (s)          |            | 14.6  | 36.4     |      | 7.3          | 29.1        |          | 23.0  | 23.0     | 23.0        |          | 3.4          |
| Effective Green, g (s)         |            | 14.6  | 36.4     |      | 7.3          | 29.1        |          | 23.0  | 23.0     | 23.0        |          | 3.4          |
| Actuated g/C Ratio             |            | 0.12  | 0.31     |      | 0.06         | 0.24        |          | 0.19  | 0.19     | 0.19        |          | 0.03         |
| Clearance Time (s)             |            | 4.0   | 4.6      |      | 4.0          | 4.6         |          | 4.0   | 4.0      | 4.0         |          | 4.0          |
| Vehicle Extension (s)          |            | 2.0   | 3.0      |      | 2.0          | 3.0         |          | 2.0   | 2.0      | 2.0         |          | 2.0          |
| Lane Grp Cap (vph)             |            | 214   | 1482     |      | 90           | 1029        |          | 587   | 306      | 269         |          | 79           |
| v/s Ratio Prot                 |            | c0.21 | c0.38    |      | 0.04         | 0.11        |          | 0.07  | c0.08    |             |          | c0.00        |
| v/s Ratio Perm                 |            |       |          |      |              |             |          |       |          | 0.02        |          |              |
| v/c Ratio                      |            | 1.69  | 1.23     |      | 0.58         | 0.46        |          | 0.36  | 0.42     | 0.10        |          | 0.02         |
| Uniform Delay, d1              |            | 52.2  | 41.4     |      | 54.4         | 38.3        |          | 41.7  | 42.2     | 39.6        |          | 56.2         |
| Progression Factor             |            | 1.00  | 1.00     |      | 1.00         | 1.00        |          | 1.00  | 1.00     | 1.00        |          | 1.00         |
| Incremental Delay, d2          |            | 330.6 | 111.7    |      | 5.5          | 0.3         |          | 0.1   | 0.3      | 0.1         |          | 0.0          |
| Delay (s)                      |            | 382.8 | 153.1    |      | 59.9         | 38.7        |          | 41.8  | 42.5     | 39.6        |          | 56.3         |
| Level of Service               |            | F     | F        |      | Е            | D           |          | D     | D        | D           |          | Е            |
| Approach Delay (s)             |            |       | 191.0    |      |              | 40.7        |          |       | 41.4     |             |          | 56.3         |
| Approach LOS                   |            |       | F        |      |              | D           |          |       | D        |             |          | Е            |
| Intersection Summary           |            |       |          |      |              |             |          |       |          |             |          |              |
| HCM 2000 Control Delay         |            |       | 124.9    | H    | ICM 2000     | Level of    | Service  |       | F        |             |          |              |
| HCM 2000 Volume to Capac       | city ratio |       | 1.06     | •    | - C-III 2000 | 2010.01     | 0011100  |       |          |             |          |              |
| Actuated Cycle Length (s)      | ,          |       | 119.1    | S    | um of los    | t time (s)  |          |       | 21.1     |             |          |              |
| Intersection Capacity Utilizat | tion       |       | 99.3%    |      | CU Level     |             | <u> </u> |       | F        |             |          |              |
| Analysis Period (min)          |            |       | 15       |      | 2 20101      | 2. 20. 1100 |          |       | •        |             |          |              |
| c Critical Lane Group          |            |       |          |      |              |             |          |       |          |             |          |              |
|                                |            |       |          |      |              |             |          |       |          |             |          |              |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴlvd2௸ Oyster Po

|                        | 1    | /     | 4     |
|------------------------|------|-------|-------|
| Movement               | SBR2 | NER   | NER2  |
| Lane Configurations    |      | 77    | 7     |
| Traffic Volume (vph)   | 24   | 704   | 366   |
| Future Volume (vph)    | 24   | 704   | 366   |
| Ideal Flow (vphpl)     | 1900 | 1990  | 1900  |
| Total Lost time (s)    |      | 4.5   | 4.5   |
| Lane Util. Factor      |      | *0.95 | 1.00  |
| Frpb, ped/bikes        |      | 1.00  | 1.00  |
| Flpb, ped/bikes        |      | 1.00  | 1.00  |
| Frt                    |      | 1.00  | 0.85  |
| Flt Protected          |      | 1.00  | 1.00  |
| Satd. Flow (prot)      |      | 3781  | 1615  |
| Flt Permitted          |      | 1.00  | 1.00  |
| Satd. Flow (perm)      |      | 3781  | 1615  |
| Peak-hour factor, PHF  | 0.88 | 0.88  | 0.88  |
| Adj. Flow (vph)        | 27   | 800   | 416   |
| RTOR Reduction (vph)   | 0    | 0     | 0     |
| Lane Group Flow (vph)  | 0    | 800   | 416   |
| Confl. Peds. (#/hr)    |      |       | 63    |
| Confl. Bikes (#/hr)    | 2    |       |       |
| Heavy Vehicles (%)     | 17%  | 0%    | 0%    |
| Turn Type              |      | Prot  | Prot  |
| Protected Phases       |      | 3     | 3     |
| Permitted Phases       |      |       |       |
| Actuated Green, G (s)  |      | 27.9  | 27.9  |
| Effective Green, g (s) |      | 27.9  | 27.9  |
| Actuated g/C Ratio     |      | 0.23  | 0.23  |
| Clearance Time (s)     |      | 4.5   | 4.5   |
| Vehicle Extension (s)  |      | 2.0   | 2.0   |
| Lane Grp Cap (vph)     |      | 885   | 378   |
| v/s Ratio Prot         |      | 0.21  | c0.26 |
| v/s Ratio Perm         |      | V     | 00.20 |
| v/c Ratio              |      | 0.90  | 1.10  |
| Uniform Delay, d1      |      | 44.3  | 45.6  |
| Progression Factor     |      | 1.00  | 1.00  |
| Incremental Delay, d2  |      | 12.2  | 76.2  |
| Delay (s)              |      | 56.5  | 121.8 |
| Level of Service       |      | E     | F     |
| Approach Delay (s)     |      |       | ·     |
| Approach LOS           |      |       |       |
| • •                    |      |       |       |
| Intersection Summary   |      |       |       |
|                        |      |       |       |

|                               | ۶          | <b>→</b>   | •     | •    | <b>←</b>   | •          | 4       | <b>†</b> | <b>/</b> | <b>/</b> | <b>↓</b> | -√   |
|-------------------------------|------------|------------|-------|------|------------|------------|---------|----------|----------|----------|----------|------|
| Movement                      | EBL        | EBT        | EBR   | WBL  | WBT        | WBR        | NBL     | NBT      | NBR      | SBL      | SBT      | SBR  |
| Lane Configurations           | 7          | <b>∱</b> } |       | ň    | <b>∱</b> ∱ |            |         | 4        |          |          | <b>↑</b> | 7    |
| Traffic Volume (vph)          | 135        | 477        | 3     | 1    | 116        | 24         | 2       | 2        | 0        | 51       | 2        | 70   |
| Future Volume (vph)           | 135        | 477        | 3     | 1    | 116        | 24         | 2       | 2        | 0        | 51       | 2        | 70   |
| Ideal Flow (vphpl)            | 1900       | 1900       | 1900  | 1900 | 1900       | 1900       | 1900    | 1900     | 1900     | 1900     | 1900     | 1900 |
| Total Lost time (s)           | 4.0        | 4.0        |       | 4.0  | 4.0        |            |         | 4.0      |          |          | 4.0      | 4.0  |
| Lane Util. Factor             | 1.00       | 0.95       |       | 1.00 | 0.95       |            |         | 1.00     |          |          | 1.00     | 1.00 |
| Frpb, ped/bikes               | 1.00       | 1.00       |       | 1.00 | 0.99       |            |         | 1.00     |          |          | 1.00     | 1.00 |
| Flpb, ped/bikes               | 1.00       | 1.00       |       | 1.00 | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00 |
| Frt                           | 1.00       | 1.00       |       | 1.00 | 0.97       |            |         | 1.00     |          |          | 1.00     | 0.85 |
| Flt Protected                 | 0.95       | 1.00       |       | 0.95 | 1.00       |            |         | 0.98     |          |          | 0.95     | 1.00 |
| Satd. Flow (prot)             | 1752       | 3502       |       | 1378 | 2670       |            |         | 1854     |          |          | 1523     | 1357 |
| Flt Permitted                 | 0.95       | 1.00       |       | 0.95 | 1.00       |            |         | 1.00     |          |          | 0.73     | 1.00 |
| Satd. Flow (perm)             | 1752       | 3502       |       | 1378 | 2670       |            |         | 1900     |          |          | 1167     | 1357 |
| 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)               | 157        | 555        | 3     | 1    | 135        | 28         | 2       | 2        | 0        | 59       | 2        | 81   |
| RTOR Reduction (vph)          | 0          | 0          | 0     | 0    | 0          | 0          | 0       | 0        | 0        | 0        | 0        | 71   |
| Lane Group Flow (vph)         | 157        | 558        | 0     | 1    | 163        | 0          | 0       | 4        | 0        | 0        | 61       | 10   |
| Confl. Peds. (#/hr)           |            |            |       |      |            | 11         |         |          |          |          |          |      |
| Confl. Bikes (#/hr)           |            |            | 1     |      |            | 1          |         |          |          |          |          |      |
| Heavy Vehicles (%)            | 3%         | 3%         | 3%    | 31%  | 31%        | 31%        | 0%      | 0%       | 0%       | 19%      | 19%      | 19%  |
| Turn Type                     | Prot       | NA         |       | Prot | NA         |            | Perm    | NA       |          | Perm     | NA       | Perm |
| Protected Phases              | 5          | 2          |       | 1    | 6          |            |         | 3        |          |          | 4        |      |
| Permitted Phases              |            |            |       |      |            |            | 3       |          |          | 4        |          | 4    |
| Actuated Green, G (s)         | 9.1        | 27.5       |       | 0.6  | 19.0       |            |         | 0.6      |          |          | 6.2      | 6.2  |
| Effective Green, g (s)        | 9.1        | 27.5       |       | 0.6  | 19.0       |            |         | 0.6      |          |          | 6.2      | 6.2  |
| Actuated g/C Ratio            | 0.18       | 0.54       |       | 0.01 | 0.37       |            |         | 0.01     |          |          | 0.12     | 0.12 |
| Clearance Time (s)            | 4.0        | 4.0        |       | 4.0  | 4.0        |            |         | 4.0      |          |          | 4.0      | 4.0  |
| Vehicle Extension (s)         | 2.0        | 2.5        |       | 2.0  | 2.5        |            |         | 2.0      |          |          | 2.0      | 2.0  |
| Lane Grp Cap (vph)            | 313        | 1892       |       | 16   | 996        |            |         | 22       |          |          | 142      | 165  |
| v/s Ratio Prot                | c0.09      | c0.16      |       | 0.00 | 0.06       |            |         |          |          |          |          |      |
| v/s Ratio Perm                |            |            |       |      |            |            |         | c0.00    |          |          | c0.05    | 0.01 |
| v/c Ratio                     | 0.50       | 0.29       |       | 0.06 | 0.16       |            |         | 0.18     |          |          | 0.43     | 0.06 |
| Uniform Delay, d1             | 18.9       | 6.4        |       | 24.9 | 10.6       |            |         | 24.9     |          |          | 20.7     | 19.8 |
| Progression Factor            | 1.00       | 1.00       |       | 1.00 | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00 |
| Incremental Delay, d2         | 0.5        | 0.1        |       | 0.6  | 0.1        |            |         | 1.4      |          |          | 0.8      | 0.1  |
| Delay (s)                     | 19.3       | 6.5        |       | 25.5 | 10.7       |            |         | 26.4     |          |          | 21.5     | 19.8 |
| Level of Service              | В          | Α          |       | С    | В          |            |         | С        |          |          | С        | В    |
| Approach Delay (s)            |            | 9.3        |       |      | 10.8       |            |         | 26.4     |          |          | 20.5     |      |
| Approach LOS                  |            | Α          |       |      | В          |            |         | С        |          |          | С        |      |
| Intersection Summary          |            |            |       |      |            |            |         |          |          |          |          |      |
| HCM 2000 Control Delay        |            |            | 11.2  | H    | CM 2000    | Level of   | Service |          | В        |          |          | ,    |
| HCM 2000 Volume to Capa       | city ratio |            | 0.39  |      |            |            |         |          |          |          |          |      |
| Actuated Cycle Length (s)     | ,          |            | 50.9  | Sı   | um of lost | t time (s) |         |          | 16.0     |          |          |      |
| Intersection Capacity Utiliza | ition      |            | 35.2% |      |            | of Service | !       |          | А        |          |          |      |
| Analysis Period (min)         |            |            | 15    |      |            |            |         |          |          |          |          |      |
| c Critical Lane Group         |            |            |       |      |            |            |         |          |          |          |          |      |

| Intersection              |      |
|---------------------------|------|
| Intersection Delay, s/veh | 21.1 |
| Intersection LOS          | С    |

| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations        |      | ર્ન  | 7    | ň    | î,   |      |      | ર્ન  | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 3    | 79   | 24   | 104  | 419  | 2    | 318  | 0    | 73   | 0    | 1    | 0    |
| Future Vol, veh/h          | 3    | 79   | 24   | 104  | 419  | 2    | 318  | 0    | 73   | 0    | 1    | 0    |
| Peak Hour Factor           | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles, %          | 22   | 22   | 22   | 10   | 10   | 10   | 7    | 7    | 7    | 100  | 100  | 100  |
| Mvmt Flow                  | 3    | 83   | 25   | 109  | 441  | 2    | 335  | 0    | 77   | 0    | 1    | 0    |
| Number of Lanes            | 0    | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      |      | SB   |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      |      | NB   |      |
| Opposing Lanes             | 2    |      |      | 2    |      |      | 1    |      |      |      | 2    |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      |      | WB   |      |
| Conflicting Lanes Left     | 1    |      |      | 2    |      |      | 2    |      |      |      | 2    |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      |      | EB   |      |
| Conflicting Lanes Right    | 2    |      |      | 1    |      |      | 2    |      |      |      | 2    |      |
| HCM Control Delay          | 11   |      |      | 24.1 |      |      | 19.9 |      |      |      | 12.2 |      |
| HCM LOS                    | В    |      |      | С    |      |      | С    |      |      |      | В    |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 |  |
|------------------------|-------|-------|-------|-------|-------|-------|-------|--|
| Vol Left, %            | 100%  | 0%    | 4%    | 0%    | 100%  | 0%    | 0%    |  |
| Vol Thru, %            | 0%    | 0%    | 96%   | 0%    | 0%    | 100%  | 100%  |  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 0%    | 0%    |  |
| Sign Control           | Stop  |  |
| Traffic Vol by Lane    | 318   | 73    | 82    | 24    | 104   | 421   | 1     |  |
| LT Vol                 | 318   | 0     | 3     | 0     | 104   | 0     | 0     |  |
| Through Vol            | 0     | 0     | 79    | 0     | 0     | 419   | 1     |  |
| RT Vol                 | 0     | 73    | 0     | 24    | 0     | 2     | 0     |  |
| Lane Flow Rate         | 335   | 77    | 86    | 25    | 109   | 443   | 1     |  |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6     |  |
| Degree of Util (X)     | 0.656 | 0.125 | 0.173 | 0.045 | 0.207 | 0.773 | 0.003 |  |
| Departure Headway (Hd) | 7.059 | 5.846 | 7.199 | 6.464 | 6.791 | 6.28  | 9.069 |  |
| Convergence, Y/N       | Yes   |  |
| Сар                    | 512   | 612   | 497   | 552   | 529   | 576   | 393   |  |
| Service Time           | 4.808 | 3.595 | 4.966 | 4.23  | 4.535 | 4.025 | 7.152 |  |
| HCM Lane V/C Ratio     | 0.654 | 0.126 | 0.173 | 0.045 | 0.206 | 0.769 | 0.003 |  |
| HCM Control Delay      | 22.3  | 9.4   | 11.5  | 9.5   | 11.3  | 27.3  | 12.2  |  |
| HCM Lane LOS           | С     | Α     | В     | Α     | В     | D     | В     |  |
| HCM 95th-tile Q        | 4.7   | 0.4   | 0.6   | 0.1   | 0.8   | 7.1   | 0     |  |

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b> | •    | 4    | <b>†</b> | ~    | <b>/</b> | <b>+</b>   | ✓    |
|------------------------------|------|----------|------|------|----------|------|------|----------|------|----------|------------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT      | NBR  | SBL      | SBT        | SBR  |
| Lane Configurations          | 7    | î,       |      | 7    | f)       |      | 7    | ħβ       |      | ň        | <b>∱</b> ∱ |      |
| Traffic Volume (veh/h)       | 130  | 4        | 61   | 8    | 4        | 12   | 27   | 579      | 5    | 8        | 253        | 12   |
| Future Volume (veh/h)        | 130  | 4        | 61   | 8    | 4        | 12   | 27   | 579      | 5    | 8        | 253        | 12   |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 22       | 0    | 0        | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.96 |          | 0.96 | 0.96 |          | 0.95 | 1.00 |          | 0.97 | 1.00     |            | 0.97 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00     | 1.00       | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No       |      |          | No         |      |
| Adj Sat Flow, veh/h/ln       | 1885 | 1885     | 1885 | 1648 | 1648     | 1648 | 1796 | 1796     | 1796 | 1811     | 1811       | 1811 |
| Adj Flow Rate, veh/h         | 141  | 4        | 6    | 9    | 4        | 1    | 29   | 629      | 5    | 9        | 275        | 10   |
| Peak Hour Factor             | 0.92 | 0.92     | 0.92 | 0.92 | 0.92     | 0.92 | 0.92 | 0.92     | 0.92 | 0.92     | 0.92       | 0.92 |
| Percent Heavy Veh, %         | 1    | 1        | 1    | 17   | 17       | 17   | 7    | 7        | 7    | 6        | 6          | 6    |
| Cap, veh/h                   | 334  | 117      | 176  | 301  | 222      | 56   | 83   | 2160     | 16   | 31       | 2003       | 73   |
| Arrive On Green              | 0.18 | 0.18     | 0.18 | 0.18 | 0.18     | 0.18 | 0.05 | 0.62     | 0.62 | 0.02     | 0.59       | 0.59 |
| Sat Flow, veh/h              | 1370 | 664      | 996  | 1193 | 1257     | 314  | 1711 | 3469     | 28   | 1725     | 3382       | 123  |
| Grp Volume(v), veh/h         | 141  | 0        | 10   | 9    | 0        | 5    | 29   | 309      | 325  | 9        | 139        | 146  |
| Grp Sat Flow(s),veh/h/ln     | 1370 | 0        | 1660 | 1193 | 0        | 1572 | 1711 | 1706     | 1790 | 1725     | 1721       | 1784 |
| Q Serve(g_s), s              | 7.1  | 0.0      | 0.4  | 0.5  | 0.0      | 0.2  | 1.2  | 6.3      | 6.3  | 0.4      | 2.7        | 2.7  |
| Cycle Q Clear(g_c), s        | 7.3  | 0.0      | 0.4  | 0.8  | 0.0      | 0.2  | 1.2  | 6.3      | 6.3  | 0.4      | 2.7        | 2.7  |
| Prop In Lane                 | 1.00 |          | 0.60 | 1.00 |          | 0.20 | 1.00 |          | 0.02 | 1.00     |            | 0.07 |
| Lane Grp Cap(c), veh/h       | 334  | 0        | 293  | 301  | 0        | 278  | 83   | 1062     | 1114 | 31       | 1019       | 1057 |
| V/C Ratio(X)                 | 0.42 | 0.00     | 0.03 | 0.03 | 0.00     | 0.02 | 0.35 | 0.29     | 0.29 | 0.29     | 0.14       | 0.14 |
| Avail Cap(c_a), veh/h        | 657  | 0        | 684  | 582  | 0        | 647  | 237  | 1062     | 1114 | 239      | 1019       | 1057 |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00     | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00     | 1.00       | 1.00 |
| Uniform Delay (d), s/veh     | 28.5 | 0.0      | 25.6 | 25.9 | 0.0      | 25.5 | 34.5 | 7.0      | 7.0  | 36.3     | 6.8        | 6.8  |
| Incr Delay (d2), s/veh       | 0.3  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.9  | 0.7      | 0.7  | 1.8      | 0.3        | 0.3  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 1.1      | 1.0  | 0.0      | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 2.3  | 0.0      | 0.1  | 0.1  | 0.0      | 0.1  | 0.5  | 3.1      | 3.2  | 0.2      | 0.9        | 1.0  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |      |      |          |      |          |            |      |
| LnGrp Delay(d),s/veh         | 28.8 | 0.0      | 25.6 | 25.9 | 0.0      | 25.5 | 35.5 | 8.8      | 8.6  | 38.2     | 7.1        | 7.1  |
| LnGrp LOS                    | С    | A        | С    | С    | Α        | С    | D    | A        | A    | D        | A          | A    |
| Approach Vol, veh/h          |      | 151      |      |      | 14       |      |      | 663      |      |          | 294        |      |
| Approach Delay, s/veh        |      | 28.6     |      |      | 25.8     |      |      | 9.9      |      |          | 8.0        |      |
| Approach LOS                 |      | С        |      |      | С        |      |      | Α        |      |          | Α          |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8        |      |          |            |      |
| Phs Duration (G+Y+Rc), s     | 5.4  | 51.8     |      | 17.9 | 7.6      | 49.5 |      | 17.9     |      |          |            |      |
| Change Period (Y+Rc), s      | 4.0  | 5.1      |      | 4.6  | 4.0      | 5.1  |      | 4.6      |      |          |            |      |
| Max Green Setting (Gmax), s  | 10.4 | 20.0     |      | 30.9 | 10.4     | 20.0 |      | 30.9     |      |          |            |      |
| Max Q Clear Time (g_c+l1), s | 2.4  | 8.3      |      | 9.3  | 3.2      | 4.7  |      | 2.8      |      |          |            |      |
| Green Ext Time (p_c), s      | 0.0  | 2.1      |      | 0.2  | 0.0      | 0.9  |      | 0.0      |      |          |            |      |
| Intersection Summary         |      |          |      |      |          |      |      |          |      |          |            |      |
| HCM 6th Ctrl Delay           |      |          | 12.1 |      |          |      |      |          |      |          |            |      |
| HCM 6th LOS                  |      |          | В    |      |          |      |      |          |      |          |            |      |

| Movement EBT EBR WBL WBT NBL NBR                        |
|---|
|   |
| Lane Configurations                                     |
| Traffic Volume (veh/h) 217 28 11 1409 233 229           |
| Future Volume (veh/h) 217 28 11 1409 233 229            |
| Initial Q (Qb), veh 0 0 0 30 5 0                        |
| Ped-Bike Adj(A_pbT) 0.96 1.00 1.00 1.00                 |
| Parking Bus, Adj 1.00 1.00 1.00 1.00 1.00               |
| Work Zone On Approach No No No                          |
| Adj Sat Flow, veh/h/ln 1781 1781 1856 1856 1781 1781    |
| Adj Flow Rate, veh/h 219 19 11 1423 235 0               |
| Peak Hour Factor 0.99 0.99 0.99 0.99 0.99               |
| Percent Heavy Veh, % 8 8 3 3 8 8                        |
| Cap, veh/h 3106 263 28 3703 296                         |
| Arrive On Green 1.00 1.00 0.02 0.76 0.16 0.00           |
| Sat Flow, veh/h 4712 385 1767 5233 1697 2657            |
| Grp Volume(v), veh/h 154 84 11 1423 235 0               |
| Grp Sat Flow(s), veh/h/ln 1621 1694 1767 1689 1697 1329 |
| Q Serve(g_s), s 0.0 0.0 0.6 9.5 13.4 0.0                |
| Cycle Q Clear(g_c), s 0.0 0.0 0.6 9.5 13.4 0.0          |
| Prop In Lane 0.23 1.00 1.00 1.00                        |
| Lane Grp Cap(c), veh/h 2213 1156 28 3703 296            |
| V/C Ratio(X) 0.07 0.07 0.39 0.38 0.79                   |
| Avail Cap(c_a), veh/h 2272 1187 141 3832 696            |
| HCM Platoon Ratio 2.00 2.00 1.00 1.00 1.00 1.00         |
| Upstream Filter(I) 1.00 1.00 0.83 0.83 1.00 0.00        |
| Uniform Delay (d), s/veh 0.2 0.2 48.7 6.2 40.1 0.0      |
| Incr Delay (d2), s/veh 0.1 0.1 2.8 0.3 4.8 0.0          |
| Initial Q Delay(d3),s/veh 0.0 0.0 0.8 10.0 0.0          |
| %ile BackOfQ(50%),veh/ln 0.0 0.1 0.3 4.6 7.2 0.0        |
| Unsig. Movement Delay, s/veh                            |
| LnGrp Delay(d),s/veh 0.2 0.3 51.5 7.3 55.0 0.0          |
| LnGrp LOS A A D A E                                     |
| Approach Vol, veh/h 238 1434 235 A                      |
| Approach Delay, s/veh 0.3 7.6 55.0                      |
| Approach LOS A A E                                      |
|   |
| Timer - Assigned Phs 1 2 6                              |
| Phs Duration (G+Y+Rc), s 5.6 74.1 79.6                  |
| Change Period (Y+Rc), s 4.0 4.0 4.0                     |
| Max Green Setting (Gmax), s 8.0 39.0 51.0               |
| Max Q Clear Time (g_c+l1), s 2.6 2.0 11.5               |
| Green Ext Time (p_c), s 0.0 1.0 8.7                     |
| Intersection Summary                                    |
| HCM 6th Ctrl Delay 12.5                                 |
| HCM 6th LOS B   |
| Notes   |

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

|   | ۶           | <b>→</b>     | •           | •           | <b>←</b>     | •           | 1           | <b>†</b>    | ~    | <b>/</b>    | <b>↓</b>    | -√   |
|---|-------------|--------------|-------------|-------------|--------------|-------------|-------------|-------------|------|-------------|-------------|------|
| Movement                                | EBL         | EBT          | EBR         | WBL         | WBT          | WBR         | NBL         | NBT         | NBR  | SBL         | SBT         | SBR  |
| Lane Configurations                     |             | <b>↑</b> ↑₽  |             |             | <b>↑</b> ↑₽  |             | ሻ           | <b>∱</b> ⊅  |      | ሻ           | <b>∱</b> ∱  |      |
| Traffic Volume (veh/h)                  | 103         | 267          | 76          | 351         | 1134         | 177         | 75          | 125         | 70   | 59          | 314         | 211  |
| Future Volume (veh/h)                   | 103         | 267          | 76          | 351         | 1134         | 177         | 75          | 125         | 70   | 59          | 314         | 211  |
| Initial Q (Qb), veh                     | 0           | 0            | 0           | 0           | 34           | 0           | 0           | 0           | 0    | 0           | 32          | 0    |
| Ped-Bike Adj(A_pbT)                     | 1.00        | 4.00         | 0.99        | 1.00        | 4.00         | 0.95        | 1.00        | 4.00        | 1.00 | 1.00        | 4.00        | 1.00 |
| Parking Bus, Adj                        | 1.00        | 1.00         | 1.00        | 1.00        | 1.00         | 1.00        | 1.00        | 1.00        | 1.00 | 1.00        | 1.00        | 1.00 |
| Work Zone On Approach                   | 4700        | No           | 4700        | 4070        | No           | 4070        | 4707        | No          | 4707 | 4050        | No          | 4050 |
| Adj Sat Flow, veh/h/ln                  | 1722        | 1722         | 1722        | 1870        | 1870         | 1870        | 1767        | 1767        | 1767 | 1856        | 1856        | 1856 |
| Adj Flow Rate, veh/h                    | 106         | 275          | 51          | 362         | 1169         | 171         | 77          | 129         | 0    | 61          | 324         | 0 07 |
| Peak Hour Factor                        | 0.97        | 0.97         | 0.97        | 0.97        | 0.97         | 0.97        | 0.97        | 0.97        | 0.97 | 0.97        | 0.97        | 0.97 |
| Percent Heavy Veh, %                    | 12          | 12           | 12          | 2           | 2            | 2           | 9           | 9           | 9    | 3           | 3           | 3    |
| Cap, veh/h                              | 405         | 1703         | 304         | 381         | 1776         | 219         | 151         | 523         | 0.00 | 152         | 530         | 0.00 |
| Arrive On Green                         | 0.27        | 0.45         | 0.45        | 0.43        | 0.77         | 0.77        | 0.09        | 0.13        | 0.00 | 0.09        | 0.12        | 0.00 |
| Sat Flow, veh/h                         | 1640        | 4003         | 714         | 1781        | 4461         | 652         | 1682        | 3445        | 0    | 1767        | 3618        | 0    |
| Grp Volume(v), veh/h                    | 106         | 213          | 113         | 362         | 892          | 448         | 77          | 129         | 0    | 61          | 324         | 0    |
| Grp Sat Flow(s), veh/h/ln               | 1640        | 1567         | 1583        | 1781        | 1702         | 1710        | 1682        | 1678        | 0    | 1767        | 1763        | 0    |
| Q Serve(g_s), s                         | 7.5         | 6.0          | 6.3         | 29.4        | 18.7         | 18.7        | 6.5         | 5.2         | 0.0  | 4.9         | 13.4        | 0.0  |
| Cycle Q Clear(g_c), s                   | 7.5         | 6.0          | 6.3         | 29.4        | 18.7         | 18.7        | 6.5         | 5.2         | 0.0  | 4.9         | 13.4        | 0.0  |
| Prop In Lane                            | 1.00        | 4222         | 0.45        | 1.00        | 1216         | 0.38        | 1.00        | E02         | 0.00 | 1.00        | E20         | 0.00 |
| Lane Grp Cap(c), veh/h                  | 405<br>0.26 | 1333         | 673<br>0.17 | 381         | 1316         | 669<br>0.67 | 151         | 523<br>0.25 |      | 152<br>0.40 | 530<br>0.61 |      |
| V/C Ratio(X)                            | 451         | 0.16<br>1422 | 718         | 0.95<br>539 | 0.68<br>1316 | 661         | 0.51<br>214 | 866         |      | 225         | 917         |      |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 1.00        | 1.00         | 1.00        | 2.00        | 2.00         | 2.00        | 1.00        | 1.00        | 1.00 | 1.00        | 1.00        | 1.00 |
| Upstream Filter(I)                      | 0.99        | 0.99         | 0.99        | 0.67        | 0.67         | 0.67        | 1.00        | 1.00        | 0.00 | 1.00        | 1.00        | 0.00 |
| Uniform Delay (d), s/veh                | 45.7        | 26.8         | 26.9        | 42.1        | 13.5         | 13.3        | 65.1        | 55.8        | 0.00 | 64.9        | 62.1        | 0.00 |
| Incr Delay (d2), s/veh                  | 0.1         | 0.3          | 0.5         | 14.4        | 1.9          | 3.6         | 1.0         | 0.1         | 0.0  | 0.6         | 0.4         | 0.0  |
| Initial Q Delay(d3),s/veh               | 0.0         | 0.0          | 0.0         | 0.0         | 6.6          | 6.3         | 0.0         | 0.0         | 0.0  | 0.0         | 67.5        | 0.0  |
| %ile BackOfQ(50%),veh/ln                | 3.2         | 2.5          | 2.7         | 12.5        | 7.1          | 7.3         | 2.9         | 2.2         | 0.0  | 2.2         | 13.4        | 0.0  |
| Unsig. Movement Delay, s/veh            |             | 2.0          | 2.1         | 12.0        | 7.1          | 1.0         | 2.5         | 2.2         | 0.0  | ۷.۷         | 10.4        | 0.0  |
| LnGrp Delay(d),s/veh                    | 45.9        | 27.1         | 27.5        | 56.5        | 22.0         | 23.1        | 66.1        | 55.9        | 0.0  | 65.5        | 130.1       | 0.0  |
| LnGrp LOS                               | D           | C            | C           | E           | C            | C           | E           | E           | 0.0  | E           | F           | 0.0  |
| Approach Vol, veh/h                     |             | 432          |             |             | 1702         |             |             | 206         | А    |             | 385         | A    |
| Approach Delay, s/veh                   |             | 31.8         |             |             | 29.6         |             |             | 59.7        | Λ    |             | 119.8       |      |
| Approach LOS                            |             | C            |             |             | 23.0<br>C    |             |             | 55.7<br>E   |      |             | F           |      |
|   |             |              |             |             |              |             |             |             |      |             | '           |      |
| Timer - Assigned Phs                    | 1           | 2            | 3           | 4           | 5            | 6           | 7           | 8           |      |             |             |      |
| Phs Duration (G+Y+Rc), s                | 36.1        | 72.9         | 18.3        | 22.6        | 46.1         | 62.9        | 16.9        | 24.1        |      |             |             |      |
| Change Period (Y+Rc), s                 | 4.0         | 4.9          | 4.9         | * 4.6       | 4.9          | * 4.9       | 4.0         | 4.9         |      |             |             |      |
| Max Green Setting (Gmax), s             | 45.4        | 29.0         | 19.1        | * 39        | 16.4         | * 58        | 19.1        | 38.7        |      |             |             |      |
| Max Q Clear Time (g_c+l1), s            | 31.4        | 8.3          | 8.5         | 15.4        | 9.5          | 20.7        | 6.9         | 7.2         |      |             |             |      |
| Green Ext Time (p_c), s                 | 0.7         | 1.3          | 0.1         | 1.2         | 0.1          | 7.3         | 0.1         | 0.5         |      |             |             |      |
| Intersection Summary                    |             |              |             |             |              |             |             |             |      |             |             |      |
| HCM 6th Ctrl Delay                      |             |              | 45.0        |             |              |             |             |             |      |             |             |      |
| HCM 6th LOS                             |             |              | D           |             |              |             |             |             |      |             |             |      |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|                              | ၨ    | <b>→</b>   | •         | •    | <b>←</b>   | •    | 4    | <b>†</b> | ~    | <b>&gt;</b> | ļ    | 4    |
|------------------------------|------|------------|-----------|------|------------|------|------|----------|------|-------------|------|------|
| Movement                     | EBL  | EBT        | EBR       | WBL  | WBT        | WBR  | NBL  | NBT      | NBR  | SBL         | SBT  | SBR  |
| Lane Configurations          | 1,1  | <b>∱</b> β |           | *    | <b>∱</b> } |      | Ţ    | ર્ન      | 7    | ¥           | ĵ»   | 7    |
| Traffic Volume (veh/h)       | 109  | 216        | 71        | 86   | 1100       | 14   | 188  | 34       | 29   | 36          | 186  | 374  |
| Future Volume (veh/h)        | 109  | 216        | 71        | 86   | 1100       | 14   | 188  | 34       | 29   | 36          | 186  | 374  |
| Initial Q (Qb), veh          | 0    | 0          | 0         | 0    | 0          | 0    | 0    | 0        | 0    | 0           | 0    | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |            | 0.98      | 1.00 |            | 0.88 | 1.00 |          | 0.97 | 1.00        |      | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00       | 1.00      | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00 | 1.00 |
| Work Zone On Approach        |      | No         |           |      | No         |      |      | No       |      |             | No   |      |
| Adj Sat Flow, veh/h/ln       | 1663 | 1663       | 1663      | 1856 | 1856       | 1856 | 1767 | 1767     | 1767 | 1826        | 1826 | 1826 |
| Adj Flow Rate, veh/h         | 115  | 227        | 75        | 91   | 1158       | 14   | 224  | 0        | 2    | 38          | 196  | 166  |
| Peak Hour Factor             | 0.95 | 0.95       | 0.95      | 0.95 | 0.95       | 0.95 | 0.95 | 0.95     | 0.95 | 0.95        | 0.95 | 0.95 |
| Percent Heavy Veh, %         | 16   | 16         | 16        | 3    | 3          | 3    | 9    | 9        | 9    | 5           | 5    | 5    |
| Cap, veh/h                   | 916  | 1266       | 406       | 161  | 1189       | 14   | 302  | 0        | 130  | 278         | 291  | 238  |
| Arrive On Green              | 0.20 | 0.36       | 0.36      | 0.09 | 0.33       | 0.33 | 0.09 | 0.00     | 0.09 | 0.16        | 0.16 | 0.16 |
| Sat Flow, veh/h              | 3072 | 2341       | 751       | 1767 | 3561       | 43   | 3365 | 0        | 1452 | 1739        | 1826 | 1493 |
| Grp Volume(v), veh/h         | 115  | 151        | 151       | 91   | 573        | 599  | 224  | 0        | 2    | 38          | 196  | 166  |
| Grp Sat Flow(s), veh/h/ln    | 1536 | 1580       | 1512      | 1767 | 1763       | 1841 | 1682 | 0        | 1452 | 1739        | 1826 | 1493 |
| Q Serve(g_s), s              | 4.6  | 9.8        | 10.2      | 7.4  | 48.1       | 48.2 | 9.7  | 0.0      | 0.2  | 2.8         | 15.2 | 15.8 |
| Cycle Q Clear(g_c), s        | 4.6  | 9.8        | 10.2      | 7.4  | 48.1       | 48.2 | 9.7  | 0.0      | 0.2  | 2.8         | 15.2 | 15.8 |
| Prop In Lane                 | 1.00 | 5.0        | 0.50      | 1.00 | 70.1       | 0.02 | 1.00 | 0.0      | 1.00 | 1.00        | 10.2 | 1.00 |
| Lane Grp Cap(c), veh/h       | 916  | 854        | 818       | 161  | 589        | 615  | 302  | 0        | 130  | 278         | 291  | 238  |
| V/C Ratio(X)                 | 0.13 | 0.18       | 0.18      | 0.56 | 0.97       | 0.97 | 0.74 | 0.00     | 0.02 | 0.14        | 0.67 | 0.70 |
| Avail Cap(c_a), veh/h        | 916  | 854        | 818       | 284  | 589        | 615  | 628  | 0.00     | 271  | 475         | 499  | 408  |
| HCM Platoon Ratio            | 0.67 | 0.67       | 0.67      | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00 | 1.00 |
| Upstream Filter(I)           | 0.07 | 0.07       | 0.07      | 1.00 | 1.00       | 1.00 | 1.00 | 0.00     | 1.00 | 1.00        | 1.00 | 1.00 |
| Uniform Delay (d), s/veh     | 44.0 | 25.1       | 25.2      | 65.3 | 49.3       | 49.3 | 66.6 | 0.00     | 62.2 | 54.2        | 59.3 | 59.6 |
| Incr Delay (d2), s/veh       | 0.1  | 0.4        | 0.5       | 1.2  | 31.1       | 30.4 | 1.4  | 0.0      | 0.0  | 0.1         | 1.0  | 1.4  |
|                              | 0.0  | 0.4        | 0.0       | 0.0  | 0.0        | 0.0  | 0.0  | 0.0      | 0.0  | 0.1         | 0.0  | 0.0  |
| Initial Q Delay(d3),s/veh    | 1.8  | 4.0        | 4.0       | 3.4  | 26.2       | 27.3 | 4.2  | 0.0      | 0.0  | 1.3         | 7.1  | 6.0  |
| %ile BackOfQ(50%),veh/ln     |      | 4.0        | 4.0       | 3.4  | 20.2       | 21.3 | 4.2  | 0.0      | 0.1  | 1.3         | 1.1  | 0.0  |
| Unsig. Movement Delay, s/veh |      | OF F       | 25.7      | ee e | 00.4       | 70.7 | 67.0 | 0.0      | 60.0 | 54.2        | 60.2 | 64.0 |
| LnGrp Delay(d),s/veh         | 44.0 | 25.5       |           | 66.5 | 80.4       | 79.7 | 67.9 | 0.0      | 62.3 |             | 60.3 | 61.0 |
| LnGrp LOS                    | D    | C          | С         | E    | F          | E    | E    | A        | E    | D           | E    | E    |
| Approach Vol, veh/h          |      | 417        |           |      | 1263       |      |      | 226      |      |             | 400  |      |
| Approach Delay, s/veh        |      | 30.7       |           |      | 79.1       |      |      | 67.9     |      |             | 60.0 |      |
| Approach LOS                 |      | С          |           |      | Е          |      |      | Е        |      |             | Е    |      |
| Timer - Assigned Phs         | 1    | 2          |           | 4    | 5          | 6    |      | 8        |      |             |      |      |
| Phs Duration (G+Y+Rc), s     | 48.7 | 55.0       |           | 27.9 | 18.6       | 85.1 |      | 18.3     |      |             |      |      |
| Change Period (Y+Rc), s      | 4.0  | 4.9        |           | 4.0  | 4.9        | 4.0  |      | 4.9      |      |             |      |      |
| Max Green Setting (Gmax), s  | 13.1 | 50.1       |           | 41.0 | 24.1       | 39.1 |      | 28.0     |      |             |      |      |
| Max Q Clear Time (g c+l1), s | 6.6  | 50.2       |           | 17.8 | 9.4        | 12.2 |      | 11.7     |      |             |      |      |
| Green Ext Time (p_c), s      | 0.2  | 0.0        |           | 1.2  | 0.1        | 1.7  |      | 0.5      |      |             |      |      |
| Intersection Summary         |      |            |           |      |            |      |      |          |      |             |      |      |
| HCM 6th Ctrl Delay           |      |            | 65.9      |      |            |      |      |          |      |             |      |      |
| HCM 6th LOS                  |      |            | 05.5<br>E |      |            |      |      |          |      |             |      |      |
| Notes                        |      |            | _         |      |            |      |      |          |      |             |      |      |

|   | •           | <b>→</b>    | •           | •           | <b>—</b> | •           | 4           | <b>†</b>    | ~    | <b>&gt;</b> | ļ           | 4           |
|---|-------------|-------------|-------------|-------------|----------|-------------|-------------|-------------|------|-------------|-------------|-------------|
| Movement                                | EBL         | EBT         | EBR         | WBL         | WBT      | WBR         | NBL         | NBT         | NBR  | SBL         | SBT         | SBR         |
| Lane Configurations                     | ሻ           | ₽           | 7           | ሻ           | f)       |             | ሻሻ          | <b>ተ</b> ኈ  |      | ሻ           |             | 7           |
| Traffic Volume (veh/h)                  | 50          | 100         | 391         | 58          | 355      | 14          | 486         | 195         | 61   | 5           | 189         | 546         |
| Future Volume (veh/h)                   | 50          | 100         | 391         | 58          | 355      | 14          | 486         | 195         | 61   | 5           | 189         | 546         |
| Initial Q (Qb), veh                     | 0           | 0           | 0           | 0           | 25       | 0           | 0           | 0           | 0    | 0           | 72          | 0           |
| Ped-Bike Adj(A_pbT)                     | 1.00        |             | 0.98        | 1.00        |          | 0.97        | 1.00        |             | 1.00 | 1.00        |             | 0.95        |
| Parking Bus, Adj                        | 1.00        | 1.00        | 1.00        | 1.00        | 1.00     | 1.00        | 1.00        | 1.00        | 1.00 | 1.00        | 1.00        | 1.00        |
| Work Zone On Approach                   |             | No          |             |             | No       |             |             | No          |      |             | No          |             |
| Adj Sat Flow, veh/h/ln                  | 1781        | 1781        | 1781        | 1811        | 1811     | 1811        | 1767        | 1767        | 1767 | 1841        | 1841        | 1841        |
| Adj Flow Rate, veh/h                    | 53          | 143         | 131         | 62          | 378      | 13          | 517         | 207         | 0    | 5           | 201         | 346         |
| Peak Hour Factor                        | 0.94        | 0.94        | 0.94        | 0.94        | 0.94     | 0.94        | 0.94        | 0.94        | 0.94 | 0.94        | 0.94        | 0.94        |
| Percent Heavy Veh, %                    | 8           | 8           | 8           | 6           | 6        | 6           | 9           | 9           | 9    | 4           | 4           | 4           |
| Cap, veh/h                              | 127         | 482         | 402         | 137         | 494      | 4           | 831         | 855         | 0.00 | 391         | 410         | 332         |
| Arrive On Green                         | 0.07        | 0.23        | 0.23        | 0.08        | 0.24     | 0.24        | 0.29        | 0.29        | 0.00 | 0.22        | 0.22        | 0.22        |
| Sat Flow, veh/h                         | 1697        | 1781        | 1484        | 1725        | 1739     | 60          | 3264        | 3445        | 0    | 1753        | 1841        | 1489        |
| Grp Volume(v), veh/h                    | 53          | 143         | 131         | 62          | 0        | 391         | 517         | 207         | 0    | 5           | 201         | 346         |
| Grp Sat Flow(s),veh/h/ln                | 1697        | 1781        | 1484        | 1725        | 0        | 1798        | 1632        | 1678        | 0    | 1753        | 1841        | 1489        |
| Q Serve(g_s), s                         | 3.1         | 7.0         | 7.8         | 3.6         | 0.0      | 22.2        | 14.0        | 4.9         | 0.0  | 0.2         | 10.0        | 23.4        |
| Cycle Q Clear(g_c), s                   | 3.1         | 7.0         | 7.8         | 3.6         | 0.0      | 22.2        | 14.0        | 4.9         | 0.0  | 0.2         | 10.0        | 23.4        |
| Prop In Lane                            | 1.00        | 400         | 1.00        | 1.00        | ^        | 0.03        | 1.00        | ٥٦٦         | 0.00 | 1.00        | 440         | 1.00        |
| Lane Grp Cap(c), veh/h                  | 127         | 482         | 402         | 137         | 0        | 494         | 831         | 855         |      | 391         | 410         | 332         |
| V/C Ratio(X)                            | 0.42<br>179 | 0.30<br>492 | 0.33<br>410 | 0.45<br>182 | 0.00     | 0.79<br>497 | 0.62<br>955 | 0.24<br>982 |      | 0.01<br>391 | 0.49<br>410 | 1.04        |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 1.00        | 1.00        | 1.00        | 1.00        | 1.00     | 1.00        | 1.00        | 1.00        | 1.00 | 1.00        | 1.00        | 332<br>1.00 |
| Upstream Filter(I)                      | 0.73        | 0.73        | 0.73        | 1.00        | 0.00     | 1.00        | 1.00        | 1.00        | 0.00 | 1.00        | 1.00        | 1.00        |
| Uniform Delay (d), s/veh                | 46.4        | 30.4        | 30.6        | 46.1        | 0.00     | 38.1        | 34.7        | 31.1        | 0.00 | 31.8        | 40.8        | 40.8        |
| Incr Delay (d2), s/veh                  | 0.6         | 0.2         | 0.3         | 0.9         | 0.0      | 7.8         | 3.5         | 0.7         | 0.0  | 0.0         | 0.3         | 60.9        |
| Initial Q Delay(d3),s/veh               | 0.0         | 0.2         | 0.0         | 0.9         | 0.0      | 88.7        | 0.0         | 0.0         | 0.0  | 0.0         | 402.4       | 0.0         |
| %ile BackOfQ(50%),veh/ln                | 1.3         | 2.9         | 2.7         | 1.6         | 0.0      | 25.6        | 6.1         | 2.1         | 0.0  | 0.0         | 56.3        | 14.1        |
| Unsig. Movement Delay, s/veh            |             | 2.3         | ۷.۱         | 1.0         | 0.0      | 25.0        | 0.1         | ۷.۱         | 0.0  | 0.1         | 30.5        | 17.1        |
| LnGrp Delay(d),s/veh                    | 47.0        | 30.6        | 30.9        | 47.0        | 0.0      | 134.5       | 38.2        | 31.8        | 0.0  | 31.8        | 443.5       | 101.7       |
| LnGrp LOS                               | D           | C           | C           | T7.0        | A        | F           | D           | C           | 0.0  | C           | F           | F           |
| Approach Vol, veh/h                     |             | 327         |             |             | 453      | <u> </u>    |             | 724         | Α    |             | 552         | •           |
| Approach Delay, s/veh                   |             | 33.4        |             |             | 122.5    |             |             | 36.3        | А    |             | 225.5       |             |
| Approach LOS                            |             | C           |             |             | 122.5    |             |             | D           |      |             | ZZ0.0       |             |
|   |             |             |             |             | •        |             |             |             |      |             | <u> </u>    |             |
| Timer - Assigned Phs                    | 1           | 2           |             | 4           | 5        | 6           |             | 8           |      |             |             |             |
| Phs Duration (G+Y+Rc), s                | 12.4        | 29.0        |             | 35.3        | 11.9     | 29.5        |             | 28.3        |      |             |             |             |
| Change Period (Y+Rc), s                 | 4.0         | 4.6         |             | 4.6         | 4.0      | 4.6         |             | 4.9         |      |             |             |             |
| Max Green Setting (Gmax), s             | 11.1        | 29.0        |             | 23.4        | 11.1     | 29.0        |             | 23.4        |      |             |             |             |
| Max Q Clear Time (g_c+l1), s            | 5.6         | 9.8         |             | 16.0        | 5.1      | 24.2        |             | 25.4        |      |             |             |             |
| Green Ext Time (p_c), s                 | 0.0         | 1.0         |             | 1.6         | 0.0      | 0.7         |             | 0.0         |      |             |             |             |
| Intersection Summary                    |             |             |             |             |          |             |             |             |      |             |             |             |
| HCM 6th Ctrl Delay                      |             |             | 105.6       |             |          |             |             |             |      |             |             |             |
| HCM 6th LOS                             |             |             | F           |             |          |             |             |             |      |             |             |             |

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

|   | ۶           | <b>→</b>    | •    | •            | <b>←</b>     | •     | 1            | <b>†</b>     | <b>/</b> | <b>/</b>     | <b>↓</b>    | 4    |
|---|-------------|-------------|------|--------------|--------------|-------|--------------|--------------|----------|--------------|-------------|------|
| Movement  | EBL         | EBT         | EBR  | WBL          | WBT          | WBR   | NBL          | NBT          | NBR      | SBL          | SBT         | SBR  |
| Lane Configurations                                 | ሻ           | 4₽          | 7    | ሻ            | 414          | 7     | ሻ            | <b>∱</b> ∱   |          | ሻ            | <b>^</b>    | 7    |
| Traffic Volume (veh/h)                              | 169         | 169         | 200  | 785          | 224          | 378   | 101          | 15           | 269      | 158          | 839         | 130  |
| Future Volume (veh/h)                               | 169         | 169         | 200  | 785          | 224          | 378   | 101          | 15           | 269      | 158          | 839         | 130  |
| Initial Q (Qb), veh                                 | 0           | 0           | 0    | 0            | 0            | 0     | 0            | 0            | 0        | 0            | 0           | 0    |
| Ped-Bike Adj(A_pbT)                                 | 1.00        |             | 1.00 | 1.00         |              | 1.00  | 1.00         |              | 1.00     | 1.00         |             | 1.00 |
| Parking Bus, Adj                                    | 1.00        | 1.00        | 1.00 | 1.00         | 1.00         | 1.00  | 1.00         | 1.00         | 1.00     | 1.00         | 1.00        | 1.00 |
| Work Zone On Approach                               | 1011        | No          | 1011 | 1011         | No           | 1011  | 40=0         | No           | 40=0     | 10-0         | No          | 10=0 |
| Adj Sat Flow, veh/h/ln                              | 1811        | 1811        | 1811 | 1811         | 1811         | 1811  | 1678         | 1678         | 1678     | 1856         | 1856        | 1856 |
| Adj Flow Rate, veh/h                                | 199         | 148         | 0    | 826          | 236          | 0     | 106          | 16           | 0        | 166          | 883         | 0    |
| Peak Hour Factor                                    | 0.95        | 0.95        | 0.95 | 0.95         | 0.95         | 0.95  | 0.95         | 0.95         | 0.95     | 0.95         | 0.95        | 0.95 |
| Percent Heavy Veh, %                                | 6           | 6           | 6    | 6            | 6            | 6     | 15           | 15           | 15       | 3            | 3           | 3    |
| Cap, veh/h  | 381         | 200         | 0.00 | 893          | 469          | 0.00  | 142          | 821          | 0.00     | 380          | 1378        | 0.00 |
| Arrive On Green                                     | 0.11        | 0.11        | 0.00 | 0.26         | 0.26         | 0.00  | 0.09         | 0.26         | 0.00     | 0.21         | 0.39        | 0.00 |
| Sat Flow, veh/h                                     | 3450        | 1811        | 1535 | 3450         | 1811         | 1535  | 1598         | 3272         | 0        | 1767         | 3526        | 1572 |
| Grp Volume(v), veh/h                                | 199         | 148         | 0    | 826          | 236          | 0     | 106          | 16           | 0        | 166          | 883         | 0    |
| Grp Sat Flow(s),veh/h/ln                            | 1725        | 1811        | 1535 | 1725         | 1811         | 1535  | 1598         | 1594         | 0        | 1767         | 1763        | 1572 |
| Q Serve(g_s), s                                     | 6.5         | 9.5         | 0.0  | 28.0         | 13.3         | 0.0   | 7.8          | 0.4          | 0.0      | 9.8          | 24.4        | 0.0  |
| Cycle Q Clear(g_c), s                               | 6.5         | 9.5         | 0.0  | 28.0         | 13.3         | 0.0   | 7.8          | 0.4          | 0.0      | 9.8          | 24.4        | 0.0  |
| Prop In Lane  | 1.00        | 000         | 1.00 | 1.00         | 400          | 1.00  | 1.00         | 004          | 0.00     | 1.00         | 4070        | 1.00 |
| Lane Grp Cap(c), veh/h                              | 381         | 200         |      | 893          | 469          |       | 142          | 821          |          | 380          | 1378        |      |
| V/C Ratio(X)  | 0.52        | 0.74        |      | 0.93         | 0.50         |       | 0.75         | 0.02         |          | 0.44         | 0.64        |      |
| Avail Cap(c_a), veh/h                               | 635         | 334         | 4.00 | 914          | 480          | 4.00  | 160          | 821          | 4.00     | 380          | 1378        | 4.00 |
| HCM Platoon Ratio                                   | 1.00        | 1.00        | 1.00 | 1.00         | 1.00         | 1.00  | 1.00         | 1.00         | 1.00     | 1.00         | 1.00        | 1.00 |
| Upstream Filter(I)                                  | 1.00        | 1.00        | 0.00 | 0.44<br>43.3 | 0.44<br>37.9 | 0.00  | 1.00<br>53.3 | 1.00<br>33.2 | 0.00     | 1.00<br>40.8 | 1.00        | 0.00 |
| Uniform Delay (d), s/veh                            | 50.4<br>0.4 | 51.7<br>2.0 | 0.0  | 7.6          | 0.4          | 0.0   | 12.7         | 0.0          | 0.0      | 0.3          | 29.7<br>2.3 | 0.0  |
| Incr Delay (d2), s/veh<br>Initial Q Delay(d3),s/veh | 0.4         | 0.0         | 0.0  | 0.0          | 0.4          | 0.0   | 0.0          | 0.0          | 0.0      | 0.0          | 0.0         | 0.0  |
| %ile BackOfQ(50%),veh/ln                            | 2.8         | 4.4         | 0.0  | 12.9         | 6.0          | 0.0   | 3.6          | 0.0          | 0.0      | 4.3          | 10.6        | 0.0  |
| Unsig. Movement Delay, s/veh                        |             | 4.4         | 0.0  | 12.9         | 0.0          | 0.0   | 3.0          | 0.2          | 0.0      | 4.5          | 10.0        | 0.0  |
| LnGrp Delay(d),s/veh                                | 50.8        | 53.7        | 0.0  | 50.9         | 38.3         | 0.0   | 66.0         | 33.3         | 0.0      | 41.1         | 32.0        | 0.0  |
| LnGrp LOS   | 50.0<br>D   | 55.7<br>D   | 0.0  | 50.9<br>D    | 30.3<br>D    | 0.0   | 00.0<br>E    | 00.0<br>C    | 0.0      | T 1.1        | 32.0<br>C   | 0.0  |
| Approach Vol, veh/h                                 |             | 347         | А    | <u> </u>     | 1062         | А     | <u> </u>     | 122          | А        |              | 1049        | A    |
| Approach Delay, s/veh                               |             | 52.1        | A    |              | 48.1         | A     |              | 61.7         | A        |              | 33.4        | A    |
| Approach LOS  |             | 52.1<br>D   |      |              | 40.1<br>D    |       |              | 61.7<br>E    |          |              | 33.4<br>C   |      |
| Approach 203  |             |             |      |              |              |       |              |              |          |              | C           |      |
| Timer - Assigned Phs                                | 1           | 2           |      | 4            | 5            | 6     |              | 8            |          |              |             |      |
| Phs Duration (G+Y+Rc), s                            | 14.7        | 51.8        |      | 17.8         | 30.7         | 35.8  |              | 35.7         |          |              |             |      |
| Change Period (Y+Rc), s                             | 4.0         | 4.9         |      | 4.6          | 4.9          | * 4.9 |              | 4.6          |          |              |             |      |
| Max Green Setting (Gmax), s                         | 12.0        | 36.0        |      | 22.1         | 17.1         | * 31  |              | 31.8         |          |              |             |      |
| Max Q Clear Time (g_c+l1), s                        | 9.8         | 26.4        |      | 11.5         | 11.8         | 2.4   |              | 30.0         |          |              |             |      |
| Green Ext Time (p_c), s                             | 0.0         | 4.5         |      | 0.8          | 0.1          | 0.0   |              | 1.1          |          |              |             |      |
| Intersection Summary                                |             |             |      |              |              |       |              |              |          |              |             |      |
| HCM 6th Ctrl Delay                                  |             |             | 43.3 |              |              |       |              |              |          |              |             |      |
| HCM 6th LOS   |             |             | D    |              |              |       |              |              |          |              |             |      |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|                              | ۶    | <b>→</b>  | $\rightarrow$ | •    | <b>←</b>  | •    | 4    | <b>†</b>   | /    | <b>&gt;</b> | <b>↓</b>    | 4    |
|------------------------------|------|-----------|---------------|------|-----------|------|------|------------|------|-------------|-------------|------|
| Movement                     | EBL  | EBT       | EBR           | WBL  | WBT       | WBR  | NBL  | NBT        | NBR  | SBL         | SBT         | SBR  |
| Lane Configurations          |      | 4         | 7             |      | 4         |      | ሻ    | <b>∱</b> } |      | ሻ           | <b>∱</b> 1≽ |      |
| Traffic Volume (veh/h)       | 274  | Ō         | 76            | 4    | 0         | 27   | 10   | 887        | 3    | 31          | 151         | 44   |
| Future Volume (veh/h)        | 274  | 0         | 76            | 4    | 0         | 27   | 10   | 887        | 3    | 31          | 151         | 44   |
| Initial Q (Qb), veh          | 0    | 0         | 0             | 0    | 0         | 0    | 0    | 44         | 0    | 0           | 0           | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |           | 0.99          | 1.00 |           | 0.99 | 1.00 |            | 0.98 | 1.00        |             | 0.99 |
| Parking Bus, Adj             | 1.00 | 1.00      | 1.00          | 1.00 | 1.00      | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00        | 1.00 |
| Work Zone On Approach        |      | No        |               |      | No        |      |      | No         |      |             | No          |      |
| Adj Sat Flow, veh/h/ln       | 1900 | 1900      | 1900          | 1900 | 1900      | 1900 | 1841 | 1841       | 1841 | 1796        | 1796        | 1796 |
| Adj Flow Rate, veh/h         | 311  | 0         | 66            | 5    | 0         | 4    | 11   | 1008       | 3    | 35          | 172         | 45   |
| Peak Hour Factor             | 0.88 | 0.88      | 0.88          | 0.88 | 0.88      | 0.88 | 0.88 | 0.88       | 0.88 | 0.88        | 0.88        | 0.88 |
| Percent Heavy Veh, %         | 0    | 0         | 0             | 0    | 0         | 0    | 4    | 4          | 4    | 7           | 7           | 7    |
| Cap, veh/h                   | 372  | 0         | 438           | 64   | 18        | 14   | 19   | 1991       | 5    | 45          | 1536        | 390  |
| Arrive On Green              | 0.27 | 0.00      | 0.27          | 0.27 | 0.00      | 0.27 | 0.01 | 0.56       | 0.56 | 0.03        | 0.57        | 0.57 |
| Sat Flow, veh/h              | 1056 | 0         | 1596          | 0    | 65        | 52   | 1753 | 3577       | 11   | 1711        | 2685        | 682  |
| Grp Volume(v), veh/h         | 311  | 0         | 66            | 9    | 0         | 0    | 11   | 493        | 518  | 35          | 107         | 110  |
| Grp Sat Flow(s), veh/h/ln    | 1056 | 0         | 1596          | 117  | 0         | 0    | 1753 | 1749       | 1839 | 1711        | 1706        | 1661 |
| Q Serve(g_s), s              | 0.0  | 0.0       | 2.7           | 0.0  | 0.0       | 0.0  | 0.5  | 15.2       | 15.2 | 1.8         | 2.5         | 2.6  |
| Cycle Q Clear(g_c), s        | 24.0 | 0.0       | 2.7           | 24.0 | 0.0       | 0.0  | 0.5  | 15.2       | 15.2 | 1.8         | 2.5         | 2.6  |
| Prop In Lane                 | 1.00 | 0.0       | 1.00          | 0.56 | 0.0       | 0.44 | 1.00 | 10.2       | 0.01 | 1.00        | 2.0         | 0.41 |
| Lane Grp Cap(c), veh/h       | 372  | 0         | 438           | 96   | 0         | 0.11 | 19   | 973        | 1023 | 45          | 976         | 950  |
| V/C Ratio(X)                 | 0.84 | 0.00      | 0.15          | 0.09 | 0.00      | 0.00 | 0.59 | 0.51       | 0.51 | 0.78        | 0.11        | 0.12 |
| Avail Cap(c_a), veh/h        | 372  | 0.00      | 438           | 96   | 0.00      | 0.00 | 481  | 973        | 1023 | 470         | 976         | 950  |
| HCM Platoon Ratio            | 1.00 | 1.00      | 1.00          | 1.00 | 1.00      | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00        | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00      | 1.00          | 1.00 | 0.00      | 0.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00        | 1.00 |
| Uniform Delay (d), s/veh     | 32.5 | 0.0       | 24.0          | 26.0 | 0.0       | 0.0  | 43.1 | 13.3       | 13.3 | 42.3        | 8.6         | 8.6  |
| Incr Delay (d2), s/veh       | 14.4 | 0.0       | 0.1           | 0.2  | 0.0       | 0.0  | 10.3 | 1.9        | 1.8  | 10.4        | 0.2         | 0.2  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0       | 0.0           | 0.0  | 0.0       | 0.0  | 0.0  | 7.5        | 6.7  | 0.0         | 0.0         | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 8.0  | 0.0       | 1.0           | 0.1  | 0.0       | 0.0  | 0.3  | 10.1       | 10.3 | 0.9         | 0.9         | 0.9  |
| Unsig. Movement Delay, s/veh |      | 0.0       | 1.0           | 0.1  | 0.0       | 0.0  | 0.0  | 10.1       | 10.0 | 0.0         | 0.0         | 0.0  |
| LnGrp Delay(d),s/veh         | 46.9 | 0.0       | 24.1          | 26.2 | 0.0       | 0.0  | 53.3 | 22.7       | 21.8 | 52.7        | 8.8         | 8.8  |
| LnGrp LOS                    | D    | Α         | C             | C    | Α         | A    | D    | C          | C C  | D           | Α           | A    |
| Approach Vol, veh/h          |      | 377       |               |      | 9         |      |      | 1022       |      |             | 252         |      |
| Approach Delay, s/veh        |      | 42.9      |               |      | 26.2      |      |      | 22.6       |      |             | 14.9        |      |
| Approach LOS                 |      | 42.3<br>D |               |      | 20.2<br>C |      |      | 22.0<br>C  |      |             | 14.3<br>B   |      |
|                              |      | U         |               |      | U         |      |      |            |      |             | ט           |      |
| Timer - Assigned Phs         | 1    | 2         |               | 4    | 5         | 6    |      | 8          |      |             |             |      |
| Phs Duration (G+Y+Rc), s     | 6.3  | 53.1      |               | 28.0 | 4.9       | 54.5 |      | 28.0       |      |             |             |      |
| Change Period (Y+Rc), s      | 4.0  | 4.5       |               | 4.0  | 4.0       | 4.5  |      | 4.0        |      |             |             |      |
| Max Green Setting (Gmax), s  | 24.0 | 30.0      |               | 24.0 | 24.0      | 50.0 |      | 24.0       |      |             |             |      |
| Max Q Clear Time (g_c+I1), s | 3.8  | 17.2      |               | 26.0 | 2.5       | 4.6  |      | 26.0       |      |             |             |      |
| Green Ext Time (p_c), s      | 0.0  | 3.7       |               | 0.0  | 0.0       | 0.9  |      | 0.0        |      |             |             |      |
| Intersection Summary         |      |           |               |      |           |      |      |            |      |             |             |      |
| HCM 6th Ctrl Delay           |      |           | 26.0          |      |           |      |      |            |      |             |             |      |
| HCM 6th LOS                  |      |           | С             |      |           |      |      |            |      |             |             |      |
| Notes                        |      |           |               |      |           |      |      |            |      |             |             |      |

User approved pedestrian interval to be less than phase max green.

|                              | ۶    | <b>→</b>   | •    | •    | <b>←</b> | •    | 4    | <b>†</b> | ~    | <b>\</b> | ļ   | 1   |
|------------------------------|------|------------|------|------|----------|------|------|----------|------|----------|-----|-----|
| Movement                     | EBL  | EBT        | EBR  | WBL  | WBT      | WBR  | NBL  | NBT      | NBR  | SBL      | SBT | SBR |
| Lane Configurations          | ሻሻ   | <b>↑</b> ↑ | 7    | ሻሻ   | <b>^</b> | 77   | 77   | <b>^</b> | 77   |          |     |     |
| Traffic Volume (veh/h)       | 245  | 212        | 295  | 833  | 666      | 1028 | 490  | 153      | 190  | 0        | 0   | 0   |
| Future Volume (veh/h)        | 245  | 212        | 295  | 833  | 666      | 1028 | 490  | 153      | 190  | 0        | 0   | 0   |
| Initial Q (Qb), veh          | 0    | 0          | 0    | 32   | 16       | 0    | 10   | 0        | 5    |          |     |     |
| Ped-Bike Adj(A_pbT)          | 1.00 |            | 0.97 | 1.00 |          | 1.00 | 1.00 |          | 1.00 |          |     |     |
| Parking Bus, Adj             | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 |          |     |     |
| Work Zone On Approach        |      | No         |      |      | No       |      |      | No       |      |          |     |     |
| Adj Sat Flow, veh/h/ln       | 1841 | 1841       | 1841 | 1870 | 1870     | 1870 | 1826 | 1826     | 1826 |          |     |     |
| Adj Flow Rate, veh/h         | 258  | 223        | 80   | 877  | 701      | 686  | 516  | 161      | 200  |          |     |     |
| Peak Hour Factor             | 0.95 | 0.95       | 0.95 | 0.95 | 0.95     | 0.95 | 0.95 | 0.95     | 0.95 |          |     |     |
| Percent Heavy Veh, %         | 4    | 4          | 4    | 2    | 2        | 2    | 5    | 5        | 5    |          |     |     |
| Cap, veh/h                   | 386  | 1042       | 426  | 1061 | 868      | 1328 | 741  | 445      | 1395 |          |     |     |
| Arrive On Green              | 0.11 | 0.31       | 0.31 | 0.30 | 0.49     | 0.49 | 0.21 | 0.21     | 0.21 |          |     |     |
| Sat Flow, veh/h              | 3506 | 3681       | 1507 | 3456 | 1870     | 2790 | 3374 | 1826     | 2723 |          |     |     |
| Grp Volume(v), veh/h         | 258  | 223        | 80   | 877  | 701      | 686  | 516  | 161      | 200  |          |     |     |
| Grp Sat Flow(s), veh/h/ln    | 1753 | 1841       | 1507 | 1728 | 1870     | 1395 | 1687 | 1826     | 1362 |          |     |     |
| Q Serve(g_s), s              | 4.8  | 3.1        | 2.7  | 16.3 | 20.8     | 11.3 | 9.7  | 5.2      | 2.7  |          |     |     |
| Cycle Q Clear(g_c), s        | 4.8  | 3.1        | 2.7  | 16.3 | 20.8     | 11.3 | 9.7  | 5.2      | 2.7  |          |     |     |
| Prop In Lane                 | 1.00 | J. I       | 1.00 | 1.00 | 20.0     | 1.00 | 1.00 | J.Z      | 1.00 |          |     |     |
| Lane Grp Cap(c), veh/h       | 386  | 1042       | 426  | 1061 | 868      | 1328 | 741  | 445      | 1395 |          |     |     |
| V/C Ratio(X)                 | 0.67 | 0.21       | 0.19 | 0.83 | 0.81     | 0.52 | 0.70 | 0.36     | 0.14 |          |     |     |
| Avail Cap(c_a), veh/h        | 1485 | 2043       | 837  | 1363 | 1038     | 1548 | 1330 | 720      | 1887 |          |     |     |
| HCM Platoon Ratio            | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 |          |     |     |
| Upstream Filter(I)           | 1.00 | 1.00       | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 |          |     |     |
| Uniform Delay (d), s/veh     | 31.7 | 20.6       | 20.4 | 27.2 | 19.5     | 13.7 | 25.4 | 23.0     | 8.9  |          |     |     |
|                              | 1.5  | 0.1        | 0.3  | 2.7  | 4.5      | 0.4  | 0.4  | 0.2      | 0.0  |          |     |     |
| Incr Delay (d2), s/veh       | 0.0  | 0.0        | 0.0  | 37.7 | 12.7     | 0.4  | 4.3  | 0.2      | 0.0  |          |     |     |
| Initial Q Delay(d3),s/veh    | 2.3  |            | 1.1  |      | 16.3     |      | 4.8  |          | 2.8  |          |     |     |
| %ile BackOfQ(50%),veh/ln     |      | 1.5        | 1.1  | 15.2 | 10.3     | 3.8  | 4.0  | 2.3      | 2.0  |          |     |     |
| Unsig. Movement Delay, s/veh |      | 20.7       | 20.7 | 67 F | 26.0     | 111  | 20.0 | 02.0     | 9.1  |          |     |     |
| LnGrp Delay(d),s/veh         | 33.2 | 20.7       | 20.7 | 67.5 | 36.8     | 14.1 | 30.2 | 23.2     |      |          |     |     |
| LnGrp LOS                    | С    | C          | С    | E    | D        | В    | С    | C        | A    |          |     |     |
| Approach Vol, veh/h          |      | 561        |      |      | 2264     |      |      | 877      |      |          |     |     |
| Approach Delay, s/veh        |      | 26.5       |      |      | 41.8     |      |      | 24.1     |      |          |     |     |
| Approach LOS                 |      | С          |      |      | D        |      |      | С        |      |          |     |     |
| Timer - Assigned Phs         | 1    | 2          |      | 4    | 5        | 6    |      |          |      |          |     |     |
| Phs Duration (G+Y+Rc), s     | 23.9 | 26.0       |      | 18.5 | 11.2     | 38.7 |      |          |      |          |     |     |
| Change Period (Y+Rc), s      | 3.5  | 5.0        |      | 4.0  | 3.5      | 5.0  |      |          |      |          |     |     |
| Max Green Setting (Gmax), s  | 27.0 | 38.0       |      | 27.0 | 29.0     | 38.0 |      |          |      |          |     |     |
| Max Q Clear Time (g_c+l1), s | 18.3 | 5.1        |      | 11.7 | 6.8      | 22.8 |      |          |      |          |     |     |
| Green Ext Time (p_c), s      | 2.1  | 3.5        |      | 2.8  | 0.9      | 10.9 |      |          |      |          |     |     |
| Intersection Summary         |      |            |      |      |          |      |      |          |      |          |     |     |
| HCM 6th Ctrl Delay           |      |            | 35.3 |      |          |      |      |          |      |          |     |     |
| HCM 6th LOS                  |      |            | D    |      |          |      |      |          |      |          |     |     |
| Notes                        |      |            |      |      |          |      |      |          |      |          |     |     |

|   | ۶         | <b>→</b>    | •         | •       | -           | •           | 1           | <b>†</b>  | ~    | <b>/</b>   | Ţ    | 4         |
|---|-----------|-------------|-----------|---------|-------------|-------------|-------------|-----------|------|------------|------|-----------|
| Movement                                      | EBL       | EBT         | EBR       | WBL     | WBT         | WBR         | NBL         | NBT       | NBR  | SBL        | SBT  | SBR       |
| Lane Configurations                           | ሻሻ        | Φ₽          |           | 7       | <b>∱</b> ∱  |             |             | ₽         |      |            | र्स  | 77        |
| Traffic Volume (veh/h)                        | 121       | 292         | 30        | 5       | 931         | 41          | 99          | 1         | 18   | 27         | 0    | 274       |
| Future Volume (veh/h)                         | 121       | 292         | 30        | 5       | 931         | 41          | 99          | 1         | 18   | 27         | 0    | 274       |
| Initial Q (Qb), veh                           | 0         | 32          | 0         | 0       | 140         | 0           | 0           | 0         | 0    | 0          | 0    | 0         |
| Ped-Bike Adj(A_pbT)                           | 1.00      | 4.00        | 0.96      | 1.00    | 4.00        | 0.99        | 1.00        | 4.00      | 1.00 | 1.00       | 1.00 | 1.00      |
| Parking Bus, Adj                              | 1.00      | 1.00        | 1.00      | 1.00    | 1.00        | 1.00        | 1.00        | 1.00      | 1.00 | 1.00       | 1.00 | 1.00      |
| Work Zone On Approach                         | 4070      | No          | 4070      | 4070    | No          | 4070        | 4044        | No        | 4044 | 4070       | No   | 4070      |
| Adj Sat Flow, veh/h/ln                        | 1678      | 1678        | 1678      | 1870    | 1870        | 1870        | 1841        | 1841      | 1841 | 1870       | 1870 | 1870      |
| Adj Flow Rate, veh/h                          | 133       | 321         | 30        | 5       | 1023        | 43          | 109         | 1         | 0 01 | 30         | 0 01 | 0.01      |
| Peak Hour Factor                              | 0.91      | 0.91        | 0.91      | 0.91    | 0.91        | 0.91        | 0.91        | 0.91      | 0.91 | 0.91       | 0.91 | 0.91      |
| Percent Heavy Veh, %                          | 15<br>176 | 15<br>2172  | 15<br>189 | 2<br>11 | 2<br>2410   | 2<br>73     | 4<br>195    | 4<br>204  | 4    | 2<br>53    | 2    | 82        |
| Cap, veh/h<br>Arrive On Green                 | 0.06      | 0.73        | 0.73      | 0.01    | 0.68        | 0.68        | 0.11        | 0.11      | 0.00 | 0.03       | 0.00 | 0.00      |
| Sat Flow, veh/h                               | 3100      | 2937        | 272       | 1781    | 3473        | 146         | 1753        | 1841      | 0.00 | 1781       | 0.00 | 2790      |
|   | 133       |             | 178       | 5       |             |             |             |           | 0    |            | 0    |           |
| Grp Volume(v), veh/h Grp Sat Flow(s),veh/h/ln | 1550      | 173<br>1594 | 1615      | 1781    | 523<br>1777 | 543<br>1842 | 109<br>1753 | 1<br>1841 | 0    | 30<br>1781 | 0    | 0<br>1395 |
|   | 5.9       | 4.5         | 4.6       | 0.4     | 18.5        | 18.5        | 8.3         | 0.1       | 0.0  | 2.3        | 0.0  | 0.0       |
| Q Serve(g_s), s<br>Cycle Q Clear(g_c), s      | 5.9       | 4.5         | 4.6       | 0.4     | 18.5        | 18.5        | 8.3         | 0.1       | 0.0  | 2.3        | 0.0  | 0.0       |
| Prop In Lane                                  | 1.00      | 4.5         | 0.17      | 1.00    | 10.5        | 0.08        | 1.00        | 0.1       | 0.00 | 1.00       | 0.0  | 1.00      |
| Lane Grp Cap(c), veh/h                        | 176       | 1171        | 1189      | 1.00    | 1216        | 1265        | 195         | 204       | 0.00 | 53         | 0    | 82        |
| V/C Ratio(X)                                  | 0.76      | 0.15        | 0.15      | 0.44    | 0.43        | 0.43        | 0.56        | 0.00      | 0.00 | 0.57       | 0.00 | 0.00      |
| Avail Cap(c_a), veh/h                         | 221       | 1171        | 1187      | 102     | 1216        | 1260        | 388         | 408       | 0.00 | 140        | 0.00 | 219       |
| HCM Platoon Ratio                             | 1.00      | 1.00        | 1.00      | 1.00    | 1.00        | 1.00        | 1.00        | 1.00      | 1.00 | 1.00       | 1.00 | 1.00      |
| Upstream Filter(I)                            | 0.98      | 0.98        | 0.98      | 1.00    | 1.00        | 1.00        | 1.00        | 1.00      | 0.00 | 1.00       | 0.00 | 0.00      |
| Uniform Delay (d), s/veh                      | 65.1      | 6.4         | 6.3       | 69.3    | 14.8        | 14.6        | 59.0        | 55.3      | 0.0  | 67.1       | 0.0  | 0.0       |
| Incr Delay (d2), s/veh                        | 7.8       | 0.3         | 0.3       | 9.9     | 1.1         | 1.1         | 0.9         | 0.0       | 0.0  | 3.6        | 0.0  | 0.0       |
| Initial Q Delay(d3),s/veh                     | 0.0       | 1.6         | 1.5       | 0.0     | 41.9        | 38.6        | 0.0         | 0.0       | 0.0  | 0.0        | 0.0  | 0.0       |
| %ile BackOfQ(50%),veh/ln                      | 2.5       | 3.9         | 4.0       | 0.2     | 32.9        | 32.5        | 3.8         | 0.0       | 0.0  | 1.1        | 0.0  | 0.0       |
| Unsig. Movement Delay, s/veh                  |           |             |           |         |             |             |             |           |      |            |      |           |
| LnGrp Delay(d),s/veh                          | 72.9      | 8.2         | 8.1       | 79.2    | 57.9        | 54.2        | 59.9        | 55.3      | 0.0  | 70.6       | 0.0  | 0.0       |
| LnGrp LOS                                     | Е         | Α           | Α         | Е       | Е           | D           | Е           | Е         | Α    | Е          | Α    | Α         |
| Approach Vol, veh/h                           |           | 484         |           |         | 1071        |             |             | 110       |      |            | 30   |           |
| Approach Delay, s/veh                         |           | 25.9        |           |         | 56.1        |             |             | 59.9      |      |            | 70.6 |           |
| Approach LOS                                  |           | С           |           |         | Е           |             |             | E         |      |            | E    |           |
| Timer - Assigned Phs                          | 1         | 2           |           | 4       | 5           | 6           |             | 8         |      |            |      |           |
| Phs Duration (G+Y+Rc), s                      | 11.9      | 100.4       |           | 19.6    | 4.9         | 107.4       |             | 8.1       |      |            |      |           |
| Change Period (Y+Rc), s                       | 4.0       | 4.6         |           | 4.0     | 4.0         | 4.6         |             | 4.0       |      |            |      |           |
| Max Green Setting (Gmax), s                   | 10.0      | 71.4        |           | 31.0    | 8.0         | 73.4        |             | 11.0      |      |            |      |           |
| Max Q Clear Time (g_c+l1), s                  | 7.9       | 20.5        |           | 10.3    | 2.4         | 6.6         |             | 4.3       |      |            |      |           |
| Green Ext Time (p_c), s                       | 0.1       | 8.2         |           | 0.2     | 0.0         | 2.1         |             | 0.0       |      |            |      |           |
| Intersection Summary                          |           |             |           |         |             |             |             |           |      |            |      |           |
| HCM 6th Ctrl Delay                            |           |             | 48.0      |         |             |             |             |           |      |            |      |           |
| HCM 6th LOS                                   |           |             | ¬о.о      |         |             |             |             |           |      |            |      |           |
|   |           |             |           |         |             |             |             |           |      |            |      |           |

|                                       | •         | <b>→</b>  | •         | •         | <b>←</b>   | •         | •           | <b>†</b>  | ~         | <b>&gt;</b> | ļ         | 4        |
|---------------------------------------|-----------|-----------|-----------|-----------|------------|-----------|-------------|-----------|-----------|-------------|-----------|----------|
| Movement                              | EBL       | EBT       | EBR       | WBL       | WBT        | WBR       | NBL         | NBT       | NBR       | SBL         | SBT       | SBR      |
| Lane Configurations                   | ň         | ተተኈ       |           | 14.54     | <b>∱</b> ∱ |           | Ţ           | <b></b>   | 77        | 14.54       | <b>^</b>  | 7        |
| Traffic Volume (veh/h)                | 118       | 360       | 28        | 196       | 883        | 77        | 68          | 285       | 212       | 180         | 468       | 521      |
| Future Volume (veh/h)                 | 118       | 360       | 28        | 196       | 883        | 77        | 68          | 285       | 212       | 180         | 468       | 521      |
| Initial Q (Qb), veh                   | 0         | 0         | 0         | 0         | 10         | 0         | 0           | 0         | 32        | 0           | 36        | 18       |
| Ped-Bike Adj(A_pbT)                   | 1.00      |           | 0.98      | 1.00      |            | 0.98      | 1.00        |           | 1.00      | 1.00        |           | 0.96     |
| Parking Bus, Adj                      | 1.00      | 1.00      | 1.00      | 1.00      | 1.00       | 1.00      | 1.00        | 1.00      | 1.00      | 1.00        | 1.00      | 1.00     |
| Work Zone On Approach                 |           | No        |           |           | No         |           |             | No        |           |             | No        |          |
| Adj Sat Flow, veh/h/ln                | 1870      | 1870      | 1870      | 1885      | 1885       | 1885      | 1870        | 1870      | 1870      | 1870        | 1870      | 1870     |
| Adj Flow Rate, veh/h                  | 120       | 367       | 23        | 200       | 901        | 75        | 69          | 291       | 216       | 184         | 478       | 224      |
| Peak Hour Factor                      | 0.98      | 0.98      | 0.98      | 0.98      | 0.98       | 0.98      | 0.98        | 0.98      | 0.98      | 0.98        | 0.98      | 0.98     |
| Percent Heavy Veh, %                  | 2         | 2         | 2         | 1         | 1          | 1         | 2           | 2         | 2         | 2           | 2         | 2        |
| Cap, veh/h                            | 150       | 1740      | 108       | 389       | 1285       | 99        | 114         | 365       | 851       | 574         | 1088      | 468      |
| Arrive On Green                       | 0.08      | 0.35      | 0.35      | 0.11      | 0.38       | 0.38      | 0.06        | 0.18      | 0.18      | 0.18        | 0.31      | 0.31     |
| Sat Flow, veh/h                       | 1781      | 4908      | 304       | 3483      | 3341       | 278       | 1781        | 1870      | 2790      | 3456        | 3554      | 1529     |
| Grp Volume(v), veh/h                  | 120       | 253       | 137       | 200       | 483        | 493       | 69          | 291       | 216       | 184         | 478       | 224      |
| Grp Sat Flow(s), veh/h/ln             | 1781      | 1702      | 1808      | 1742      | 1791       | 1828      | 1781        | 1870      | 1395      | 1728        | 1777      | 1529     |
| Q Serve(g_s), s                       | 7.3       | 5.7       | 5.8       | 6.0       | 25.1       | 25.1      | 4.1         | 16.6      | 0.0       | 5.1         | 11.9      | 10.0     |
| Cycle Q Clear(g_c), s                 | 7.3       | 5.7       | 5.8       | 6.0       | 25.1       | 25.1      | 4.1         | 16.6      | 0.0       | 5.1         | 11.9      | 10.0     |
| Prop In Lane                          | 1.00      | 0.1       | 0.17      | 1.00      | 20.1       | 0.15      | 1.00        | 10.0      | 1.00      | 1.00        | 11.5      | 1.00     |
| Lane Grp Cap(c), veh/h                | 150       | 1207      | 641       | 389       | 684        | 699       | 114         | 365       | 851       | 574         | 1088      | 468      |
| V/C Ratio(X)                          | 0.80      | 0.21      | 0.21      | 0.51      | 0.71       | 0.70      | 0.61        | 0.80      | 0.25      | 0.32        | 0.44      | 0.48     |
| Avail Cap(c_a), veh/h                 | 162       | 1207      | 641       | 412       | 684        | 698       | 130         | 493       | 1047      | 624         | 1088      | 468      |
| HCM Platoon Ratio                     | 1.00      | 1.00      | 1.00      | 1.00      | 1.00       | 1.00      | 1.00        | 1.00      | 1.00      | 1.00        | 1.00      | 1.00     |
| Upstream Filter(I)                    | 1.00      | 1.00      | 1.00      | 0.60      | 0.60       | 0.60      | 1.00        | 1.00      | 1.00      | 1.00        | 1.00      | 1.00     |
| Uniform Delay (d), s/veh              | 49.4      | 24.8      | 24.8      | 46.0      | 29.3       | 29.3      | 50.1        | 42.3      | 30.6      | 40.5        | 32.4      | 19.1     |
| Incr Delay (d2), s/veh                | 20.2      | 0.4       | 0.8       | 0.2       | 3.7        | 3.6       | 3.4         | 16.5      | 0.7       | 0.1         | 1.3       | 3.5      |
| Initial Q Delay(d3),s/veh             | 0.0       | 0.0       | 0.0       | 0.2       | 1.3        | 1.2       | 0.0         | 0.0       | 13.6      | 0.0         | 14.1      | 20.4     |
| %ile BackOfQ(50%),veh/ln              | 4.1       | 2.4       | 2.7       | 2.5       | 11.9       | 12.1      | 1.9         | 9.0       | 5.0       | 2.2         | 9.5       | 8.3      |
| Unsig. Movement Delay, s/veh          |           | 2.4       | 2.1       | 2.0       | 11.9       | 12.1      | 1.9         | 9.0       | 5.0       | ۷.۷         | 9.5       | 0.5      |
| · · · · · · · · · · · · · · · · · · · | 69.6      | 25.1      | 25.6      | 46.3      | 34.3       | 34.1      | 53.5        | 58.8      | 44.9      | 40.6        | 47.7      | 43.0     |
| LnGrp Delay(d),s/veh                  | 09.0<br>E | 23.1<br>C | 25.0<br>C | 40.3<br>D | 34.3<br>C  | 34.1<br>C | 55.5<br>D   | 30.0<br>E | 44.9<br>D |             | 47.7<br>D |          |
| LnGrp LOS                             |           |           |           | <u> </u>  |            |           | <u> </u>    |           | <u>U</u>  | D           |           | <u>D</u> |
| Approach Vol, veh/h                   |           | 510       |           |           | 1176       |           |             | 576       |           |             | 886       |          |
| Approach Delay, s/veh                 |           | 35.7      |           |           | 36.3       |           |             | 52.9      |           |             | 45.1      |          |
| Approach LOS                          |           | D         |           |           | D          |           |             | D         |           |             | D         |          |
| Timer - Assigned Phs                  | 1         | 2         | 3         | 4         | 5          | 6         | 7           | 8         |           |             |           |          |
| Phs Duration (G+Y+Rc), s              | 11.0      | 38.7      | 13.3      | 47.0      | 24.9       | 24.9      | 16.3        | 44.0      |           |             |           |          |
| Change Period (Y+Rc), s               | 4.0       | 5.0       | 4.0       | 5.0       | 5.0        | * 5       | 4.0         | 5.0       |           |             |           |          |
| Max Green Setting (Gmax), s           | 8.0       | 32.0      | 10.0      | 42.0      | 11.0       | * 29      | 13.0        | 39.0      |           |             |           |          |
| Max Q Clear Time (g_c+l1), s          | 6.1       | 13.9      | 9.3       | 27.1      | 7.1        | 18.6      | 8.0         | 7.8       |           |             |           |          |
| Green Ext Time (p_c), s               | 0.0       | 2.5       | 0.0       | 3.2       | 0.2        | 1.2       | 0.2         | 1.7       |           |             |           |          |
| Intersection Summary                  | 0.0       |           |           | V.=       |            |           | V. <u> </u> |           |           |             |           |          |
|                                       |           |           | 11.7      |           |            |           |             |           |           |             |           |          |
| HCM 6th Ctrl Delay                    |           |           | 41.7      |           |            |           |             |           |           |             |           |          |
| HCM 6th LOS                           |           |           | D         |           |            |           |             |           |           |             |           |          |
| Notes                                 |           |           |           |           |            |           |             |           |           |             |           |          |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                              | ۶    | <b>→</b> | •         | •            | <b>←</b> | •    | •          | <b>†</b> | <i>&gt;</i> | <b>&gt;</b> | ļ       | 4    |
|------------------------------|------|----------|-----------|--------------|----------|------|------------|----------|-------------|-------------|---------|------|
| Movement                     | EBL  | EBT      | EBR       | WBL          | WBT      | WBR  | NBL        | NBT      | NBR         | SBL         | SBT     | SBR  |
| Lane Configurations          | ř    | 4        | 7         |              | 4        |      | Ť          | f)       |             |             | <b></b> | 77   |
| Traffic Volume (veh/h)       | 578  | 2        | 50        | 2            | 0        | 2    | 63         | 252      | 3           | 0           | 122     | 1006 |
| Future Volume (veh/h)        | 578  | 2        | 50        | 2            | 0        | 2    | 63         | 252      | 3           | 0           | 122     | 1006 |
| Initial Q (Qb), veh          | 0    | 0        | 0         | 0            | 0        | 0    | 12         | 12       | 0           | 0           | 0       | 24   |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 1.00      | 1.00         |          | 1.00 | 1.00       |          | 0.95        | 1.00        |         | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00      | 1.00         | 1.00     | 1.00 | 1.00       | 1.00     | 1.00        | 1.00        | 1.00    | 1.00 |
| Work Zone On Approach        |      | No       |           |              | No       |      |            | No       |             |             | No      |      |
| Adj Sat Flow, veh/h/ln       | 1841 | 1841     | 1841      | 1900         | 1900     | 1900 | 1841       | 1841     | 1841        | 0           | 1856    | 1856 |
| Adj Flow Rate, veh/h         | 609  | 0        | 19        | 2            | 0        | 0    | 66         | 265      | 2           | 0           | 128     | 700  |
| Peak Hour Factor             | 0.95 | 0.95     | 0.95      | 0.95         | 0.95     | 0.95 | 0.95       | 0.95     | 0.95        | 0.95        | 0.95    | 0.95 |
| Percent Heavy Veh, %         | 4    | 4        | 4         | 0            | 0        | 0    | 4          | 4        | 4           | 0           | 3       | 3    |
| Cap, veh/h                   | 914  | 0        | 407       | 5            | 0        | 0    | 139        | 867      | 6           | 0           | 594     | 1608 |
| Arrive On Green              | 0.27 | 0.00     | 0.27      | 0.00         | 0.00     | 0.00 | 0.05       | 0.45     | 0.45        | 0.00        | 0.31    | 0.31 |
| Sat Flow, veh/h              | 3506 | 0        | 1560      | 1809         | 0        | 0    | 1753       | 1824     | 14          | 0           | 1856    | 2768 |
| Grp Volume(v), veh/h         | 609  | 0        | 19        | 2            | 0        | 0    | 66         | 0        | 267         | 0           | 128     | 700  |
| Grp Sat Flow(s), veh/h/ln    | 1753 | 0        | 1560      | 1810         | 0        | 0    | 1753       | 0        | 1837        | 0           | 1856    | 1384 |
| Q Serve(g_s), s              | 5.3  | 0.0      | 0.3       | 0.0          | 0.0      | 0.0  | 1.3        | 0.0      | 3.2         | 0.0         | 1.7     | 4.9  |
| Cycle Q Clear(g_c), s        | 5.3  | 0.0      | 0.3       | 0.0          | 0.0      | 0.0  | 1.3        | 0.0      | 3.2         | 0.0         | 1.7     | 4.9  |
| Prop In Lane                 | 1.00 | 0.0      | 1.00      | 1.00         | 0.0      | 0.00 | 1.00       | 0.0      | 0.01        | 0.00        | 1.7     | 1.00 |
| Lane Grp Cap(c), veh/h       | 914  | 0        | 407       | 5            | 0        | 0.00 | 139        | 0        | 853         | 0.00        | 594     | 1608 |
| V/C Ratio(X)                 | 0.67 | 0.00     | 0.05      | 0.39         | 0.00     | 0.00 | 0.47       | 0.00     | 0.31        | 0.00        | 0.22    | 0.44 |
| Avail Cap(c_a), veh/h        | 3080 | 0.00     | 1370      | 1060         | 0.00     | 0.00 | 1027       | 0.00     | 3121        | 0.00        | 1902    | 3573 |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00      | 1.00         | 1.00     | 1.00 | 1.00       | 1.00     | 1.00        | 1.00        | 1.00    | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00      | 1.00         | 0.00     | 0.00 | 1.00       | 0.00     | 1.00        | 0.00        | 1.00    | 1.00 |
| Uniform Delay (d), s/veh     | 13.1 | 0.00     | 11.0      | 19.4         | 0.00     | 0.00 | 18.2       | 0.00     | 6.3         | 0.00        | 9.4     | 4.9  |
| Incr Delay (d2), s/veh       | 0.3  | 0.0      | 0.0       | 41.3         | 0.0      | 0.0  | 2.5        | 0.0      | 0.2         | 0.0         | 0.2     | 0.2  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0       | 0.0          | 0.0      | 0.0  | 101.3      | 0.0      | 2.1         | 0.0         | 0.2     | 2.8  |
| %ile BackOfQ(50%),veh/ln     | 1.9  | 0.0      | 0.0       | 0.0          | 0.0      | 0.0  | 5.5        | 0.0      | 2.1         | 0.0         | 0.6     | 3.9  |
| Unsig. Movement Delay, s/veh |      | 0.0      | 0.1       | 0.1          | 0.0      | 0.0  | 5.5        | 0.0      | ۷.۱         | 0.0         | 0.0     | 5.9  |
|                              | 13.5 | 0.0      | 11.0      | 60.7         | 0.0      | 0.0  | 122.0      | 0.0      | 8.6         | 0.0         | 9.6     | 8.0  |
| LnGrp Delay(d),s/veh         |      | 0.0<br>A | 11.0<br>B | 60. <i>1</i> |          |      | 122.0<br>F |          | 0.0<br>A    | 0.0<br>A    |         |      |
| LnGrp LOS                    | В    |          |           |              | A        | A    |            | A        | A           | A           | A       | A    |
| Approach Vol, veh/h          |      | 628      |           |              | 2        |      |            | 333      |             |             | 828     |      |
| Approach Delay, s/veh        |      | 13.4     |           |              | 60.7     |      |            | 31.1     |             |             | 8.2     |      |
| Approach LOS                 |      | В        |           |              | Е        |      |            | С        |             |             | А       |      |
| Timer - Assigned Phs         | 1    | 2        |           | 4            |          | 6    |            | 8        |             |             |         |      |
| Phs Duration (G+Y+Rc), s     | 4.9  | 14.1     |           | 3.1          |          | 19.0 |            | 12.1     |             |             |         |      |
| Change Period (Y+Rc), s      | 3.0  | 3.5      |           | 3.0          |          | 3.5  |            | 3.0      |             |             |         |      |
| Max Green Setting (Gmax), s  | 20.0 | 35.0     |           | 20.0         |          | 58.0 |            | 30.0     |             |             |         |      |
| Max Q Clear Time (g_c+l1), s | 3.3  | 6.9      |           | 2.0          |          | 5.2  |            | 7.3      |             |             |         |      |
| Green Ext Time (p_c), s      | 0.1  | 3.7      |           | 0.0          |          | 0.8  |            | 1.8      |             |             |         |      |
| Intersection Summary         |      |          |           |              |          |      |            |          |             |             |         |      |
| HCM 6th Ctrl Delay           |      |          | 14.3      |              |          |      |            |          |             |             |         |      |
| HCM 6th LOS                  |      |          | 14.3<br>B |              |          |      |            |          |             |             |         |      |
|                              |      |          | D         |              |          |      |            |          |             |             |         |      |
| Notes                        |      |          |           |              |          |      |            |          |             |             |         |      |

|                                   | ۶         | <b>→</b> | $\rightarrow$ | •     | <b>←</b>   | •          | •       | <b>†</b> | <i>&gt;</i> | <b>&gt;</b> | ļ     | 1    |
|-----------------------------------|-----------|----------|---------------|-------|------------|------------|---------|----------|-------------|-------------|-------|------|
| Movement                          | EBL       | EBT      | EBR           | WBL   | WBT        | WBR        | NBL     | NBT      | NBR         | SBL         | SBT   | SBR  |
| Lane Configurations               |           | €Î}      |               | 1/1   | <b>†</b>   | 7          | ሻ       | <b>^</b> | 7           | ሻ           | 414   | 7    |
| Traffic Volume (vph)              | 152       | 53       | 85            | 650   | 241        | 240        | 59      | 455      | 120         | 109         | 447   | 102  |
| Future Volume (vph)               | 152       | 53       | 85            | 650   | 241        | 240        | 59      | 455      | 120         | 109         | 447   | 102  |
| Ideal Flow (vphpl)                | 1900      | 1900     | 1900          | 1900  | 1900       | 1900       | 1900    | 1900     | 1900        | 1900        | 1900  | 1900 |
| Total Lost time (s)               |           | 4.0      |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      | 4.9         | 4.9         | 4.9   | 4.9  |
| Lane Util. Factor                 |           | 0.95     |               | 0.97  | 1.00       | 1.00       | 1.00    | 0.95     | 1.00        | 0.91        | 0.91  | 1.00 |
| Frpb, ped/bikes                   |           | 0.97     |               | 1.00  | 1.00       | 0.98       | 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     | 1.00        | 1.00        | 1.00  | 1.00 |
| Frt                               |           | 0.96     |               | 1.00  | 1.00       | 0.85       | 1.00    | 1.00     | 0.85        | 1.00        | 1.00  | 0.85 |
| Flt Protected                     |           | 0.97     |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00        | 0.95        | 1.00  | 1.00 |
| Satd. Flow (prot)                 |           | 2896     |               | 3060  | 1660       | 1387       | 1547    | 3094     | 1384        | 1408        | 2961  | 1333 |
| Flt Permitted                     |           | 0.97     |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00        | 0.95        | 1.00  | 1.00 |
| Satd. Flow (perm)                 |           | 2896     |               | 3060  | 1660       | 1387       | 1547    | 3094     | 1384        | 1408        | 2961  | 1333 |
| 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)                   | 157       | 55       | 88            | 670   | 248        | 247        | 61      | 469      | 124         | 112         | 461   | 105  |
| RTOR Reduction (vph)              | 0         | 40       | 0             | 0     | 0          | 180        | 0       | 0        | 0           | 0           | 0     | 81   |
| Lane Group Flow (vph)             | 0         | 260      | 0             | 670   | 248        | 67         | 61      | 469      | 124         | 101         | 472   | 24   |
| Confl. Peds. (#/hr)               |           |          | 74            |       |            |            |         |          |             |             |       | 5    |
| Confl. Bikes (#/hr)               |           |          | 2             |       |            | 6          |         |          | 4           |             |       |      |
| Heavy Vehicles (%)                | 1%        | 1%       | 1%            | 3%    | 3%         | 3%         | 5%      | 5%       | 5%          | 5%          | 5%    | 5%   |
| Turn Type                         | Split     | NA       |               | Split | NA         | Perm       | Split   | NA       | custom      | Split       | NA    | Perm |
| Protected Phases                  | 4         | 4        |               | . 7   | 7          |            | 6       | 6        | 2 6 7!      | 2!          | 2     |      |
| Permitted Phases                  |           |          |               |       |            | 7          |         |          |             |             |       | 2    |
| Actuated Green, G (s)             |           | 20.5     |               | 32.4  | 32.4       | 32.4       | 21.0    | 21.0     | 90.6        | 27.4        | 27.4  | 27.4 |
| Effective Green, g (s)            |           | 20.5     |               | 32.4  | 32.4       | 32.4       | 21.0    | 21.0     | 90.6        | 27.4        | 27.4  | 27.4 |
| Actuated g/C Ratio                |           | 0.17     |               | 0.27  | 0.27       | 0.27       | 0.18    | 0.18     | 0.75        | 0.23        | 0.23  | 0.23 |
| Clearance Time (s)                |           | 4.0      |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      |             | 4.9         | 4.9   | 4.9  |
| Vehicle Extension (s)             |           | 3.0      |               | 3.0   | 3.0        | 3.0        | 2.5     | 2.5      |             | 2.0         | 2.0   | 2.0  |
| Lane Grp Cap (vph)                |           | 494      |               | 826   | 448        | 374        | 270     | 541      | 1044        | 321         | 676   | 304  |
| v/s Ratio Prot                    |           | c0.09    |               | c0.22 | 0.15       |            | 0.04    | c0.15    | 0.09        | 0.07        | c0.16 |      |
| v/s Ratio Perm                    |           |          |               |       |            | 0.05       |         |          |             |             |       | 0.02 |
| v/c Ratio                         |           | 0.53     |               | 0.81  | 0.55       | 0.18       | 0.23    | 0.87     | 0.12        | 0.31        | 0.70  | 0.08 |
| Uniform Delay, d1                 |           | 45.3     |               | 40.9  | 37.6       | 33.6       | 42.5    | 48.1     | 4.0         | 38.5        | 42.5  | 36.4 |
| 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             |           | 1.0      |               | 6.1   | 1.5        | 0.2        | 0.3     | 13.6     | 0.0         | 2.6         | 5.9   | 0.5  |
| Delay (s)                         |           | 46.3     |               | 47.0  | 39.1       | 33.8       | 42.8    | 61.7     | 4.0         | 41.0        | 48.4  | 36.9 |
| Level of Service                  |           | D        |               | D     | D          | С          | D       | Е        | Α           | D           | D     | D    |
| Approach Delay (s)                |           | 46.3     |               |       | 42.5       |            |         | 49.0     |             |             | 45.5  |      |
| Approach LOS                      |           | D        |               |       | D          |            |         | D        |             |             | D     |      |
| Intersection Summary              |           |          |               |       |            |            |         |          |             |             |       |      |
| HCM 2000 Control Delay            |           |          | 45.2          | H     | CM 2000    | Level of S | Service |          | D           |             |       |      |
| HCM 2000 Volume to Capacit        | ty ratio  |          | 0.73          |       |            |            |         |          |             |             |       |      |
| Actuated Cycle Length (s)         |           |          | 120.0         |       | um of lost |            |         |          | 18.7        |             |       |      |
| Intersection Capacity Utilization | on        |          | 85.1%         | IC    | U Level    | of Service |         |          | Е           |             |       |      |
| Analysis Period (min)             |           |          | 15            |       |            |            |         |          |             |             |       |      |
| ! Phase conflict between lar      | ne groups | S        |               |       |            |            |         |          |             |             |       |      |
| c Critical Lane Group             |           |          |               |       |            |            |         |          |             |             |       |      |

|                                   | ٠           | <b>→</b>     | <b>←</b>   | •    | <b>&gt;</b> | ✓             |     |      |  |
|-----------------------------------|-------------|--------------|------------|------|-------------|---------------|-----|------|--|
| Movement                          | EBL         | EBT          | WBT        | WBR  | SBL         | SBR           |     |      |  |
| Lane Configurations               | ሻ           | ተተተ          | ተተኈ        |      | ች           | 7             |     |      |  |
| Traffic Volume (vph)              | 67          | 215          | 1526       | 116  | 30          | 60            |     |      |  |
| Future Volume (vph)               | 67          | 215          | 1526       | 116  | 30          | 60            |     |      |  |
| Ideal Flow (vphpl)                | 1900        | 1900         | 1900       | 1900 | 1900        | 1900          |     |      |  |
| Total Lost time (s)               | 4.0         | 4.9          | 4.9        | 1000 | 4.2         | 4.2           |     |      |  |
| Lane Util. Factor                 | 1.00        | 0.91         | 0.91       |      | 1.00        | 1.00          |     |      |  |
| Frpb, ped/bikes                   | 1.00        | 1.00         | 1.00       |      | 1.00        | 1.00          |     |      |  |
| Flpb, ped/bikes                   | 1.00        | 1.00         | 1.00       |      | 1.00        | 1.00          |     |      |  |
| Frt                               | 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)                 | 1687        | 4848         | 2700       |      | 1770        | 1583          |     |      |  |
| Flt Permitted                     | 0.95        | 1.00         | 1.00       |      | 0.95        | 1.00          |     |      |  |
| Satd. Flow (perm)                 | 1687        | 4848         | 5023       |      | 1770        | 1583          |     |      |  |
| Peak-hour factor, PHF             | 0.98        | 0.98         | 0.98       | 0.98 | 0.98        | 0.98          |     |      |  |
| Adj. Flow (vph)                   | 0.96        | 219          | 1557       | 118  | 31          | 61            |     |      |  |
| RTOR Reduction (vph)              | 0           | 0            | 5          | 0    | 0           | 55            |     |      |  |
| Lane Group Flow (vph)             | 68          | 219          | 1670       | 0    | 31          | 6             |     |      |  |
| Confl. Peds. (#/hr)               | 00          | 219          | 1070       | 1    | JI          | U             |     |      |  |
| Confl. Bikes (#/hr)               |             |              |            | 6    |             |               |     |      |  |
| Heavy Vehicles (%)                | 7%          | 7%           | 2%         | 2%   | 2%          | 2%            |     |      |  |
|                                   |             |              |            | Z 70 |             |               |     |      |  |
| Turn Type                         | Prot        | NA           | NA         |      | Prot<br>3   | Perm          |     |      |  |
| Protected Phases Permitted Phases | 5           | 2            | 6          |      | 3           | 2             |     |      |  |
|                                   | 0.0         | 70.0         | 58.9       |      | 0.6         | 3<br>9.6      |     |      |  |
| Actuated Green, G (s)             | 8.0         | 70.9         | 58.9       |      | 9.6         | 9.6           |     |      |  |
| Effective Green, g (s)            | 8.0<br>80.0 | 70.9<br>0.71 | 0.59       |      | 9.6<br>0.10 | 0.10          |     |      |  |
| Actuated g/C Ratio                |             |              |            |      | 4.2         | 4.2           |     |      |  |
| Clearance Time (s)                | 4.0         | 4.9          | 4.9<br>2.0 |      |             |               |     |      |  |
| Vehicle Extension (s)             | 2.0         | 2.0          |            |      | 2.0         | 2.0           |     |      |  |
| Lane Grp Cap (vph)                | 134         | 3437         | 1590       |      | 169         | 151           |     |      |  |
| v/s Ratio Prot                    | c0.04       | 0.05         | c0.62      |      | c0.02       | 0.00          |     |      |  |
| v/s Ratio Perm                    | 0.54        | 0.00         | 4.05       |      | 0.40        | 0.00          |     |      |  |
| v/c Ratio                         | 0.51        | 0.06         | 1.05       |      | 0.18        | 0.04          |     |      |  |
| Uniform Delay, d1                 | 44.1        | 4.4          | 20.6       |      | 41.6        | 41.0          |     |      |  |
| Progression Factor                | 1.00        | 1.00         | 0.79       |      | 1.00        | 1.00          |     |      |  |
| Incremental Delay, d2             | 1.1         | 0.0          | 36.5       |      | 0.2         | 0.0           |     |      |  |
| Delay (s)                         | 45.2        | 4.5          | 52.8       |      | 41.8        | 41.1          |     |      |  |
| Level of Service                  | D           | A            | D          |      | D           | D             |     |      |  |
| Approach Delay (s)                |             | 14.1         | 52.8       |      | 41.3        |               |     |      |  |
| Approach LOS                      |             | В            | D          |      | D           |               |     |      |  |
| Intersection Summary              |             |              |            |      |             |               |     |      |  |
| HCM 2000 Control Delay            |             |              | 46.8       | H(   | CM 2000     | Level of Serv | ice | D    |  |
| HCM 2000 Volume to Capac          | city ratio  |              | 0.82       |      |             |               |     |      |  |
| Actuated Cycle Length (s)         |             |              | 100.0      |      | um of lost  |               |     | 17.1 |  |
| Intersection Capacity Utilizati   | ion         |              | 60.5%      | IC   | U Level     | of Service    |     | В    |  |
| Analysis Period (min)             |             |              | 15         |      |             |               |     |      |  |
| c Critical Lane Group             |             |              |            |      |             |               |     |      |  |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩20& Oyster Po

|                                   | <b></b> | ۶        | <b>→</b> | •         | •         | <b>←</b>   | 4       | ₹I    | 1     | <b>†</b> | ~       | <b>\</b> |
|-----------------------------------|---------|----------|----------|-----------|-----------|------------|---------|-------|-------|----------|---------|----------|
| Movement                          | EBU     | EBL      | EBT      | EBR       | WBL2      | WBT        | WBR     | NBU   | NBL   | NBT      | NBR     | SBL      |
| Lane Configurations               |         | ሻ        | ተተኈ      |           | ሻ         | ተተኈ        |         |       | 1,1   | 4        | 7       |          |
| Traffic Volume (vph)              | 4       | 49       | 266      | 83        | 30        | 1255       | 19      | 2     | 837   | 32       | 49      | 8        |
| Future Volume (vph)               | 4       | 49       | 266      | 83        | 30        | 1255       | 19      | 2     | 837   | 32       | 49      | 8        |
| Ideal Flow (vphpl)                | 1900    | 1900     | 1900     | 1900      | 1900      | 1900       | 1900    | 1900  | 1900  | 1900     | 1900    | 1900     |
| Total Lost time (s)               |         | 4.0      | 4.6      |           | 4.0       | 4.6        |         |       | 4.0   | 4.0      | 4.0     |          |
| Lane Util. Factor                 |         | 1.00     | 0.91     |           | 1.00      | 0.91       |         |       | 0.91  | 0.91     | 1.00    |          |
| Frpb, ped/bikes                   |         | 1.00     | 1.00     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00     | 0.94    |          |
| Flpb, ped/bikes                   |         | 1.00     | 1.00     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00     | 1.00    |          |
| Frt                               |         | 1.00     | 0.96     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00     | 0.85    |          |
| Flt Protected                     |         | 0.95     | 1.00     |           | 0.95      | 1.00       |         |       | 0.95  | 0.96     | 1.00    |          |
| Satd. Flow (prot)                 |         | 1597     | 4413     |           | 1770      | 5070       |         |       | 3189  | 1607     | 1480    |          |
| Flt Permitted                     |         | 0.28     | 1.00     |           | 0.95      | 1.00       |         |       | 0.95  | 0.96     | 1.00    |          |
| Satd. Flow (perm)                 |         | 467      | 4413     |           | 1770      | 5070       |         |       | 3189  | 1607     | 1480    |          |
| 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)                   | 4       | 51       | 277      | 86        | 31        | 1307       | 20      | 2     | 872   | 33       | 51      | 8        |
| RTOR Reduction (vph)              | 0       | 0        | 0        | 0         | 0         | 1          | 0       | 0     | 0     | 0        | 39      | 0        |
| Lane Group Flow (vph)             | 0       | 55       | 363      | 0         | 31        | 1326       | 0       | 0     | 604   | 303      | 12      | 0        |
| Confl. Peds. (#/hr)               |         |          |          |           |           |            | 8       |       |       |          | 37      |          |
| Confl. Bikes (#/hr)               |         |          |          | 2         |           |            | 5       |       |       |          | 4       |          |
| Heavy Vehicles (%)                | 13%     | 13%      | 13%      | 13%       | 2%        | 2%         | 2%      | 3%    | 3%    | 3%       | 3%      | 1%       |
|                                   | stom    | Prot     | NA       | 7070      | Prot      | NA         |         | Split | Split | NA       | Perm    | Split    |
| Protected Phases                  | Otom    | 1        | 6        |           | 5         | 2          |         | 4     | 4     | 4        | 1 01111 | 7        |
| Permitted Phases                  | 1       | •        | · ·      |           | Ū         | =          |         | •     | •     | •        | 4       | •        |
| Actuated Green, G (s)             |         | 14.4     | 47.9     |           | 4.4       | 37.9       |         |       | 29.5  | 29.5     | 29.5    |          |
| Effective Green, g (s)            |         | 14.4     | 47.9     |           | 4.4       | 37.9       |         |       | 29.5  | 29.5     | 29.5    |          |
| Actuated g/C Ratio                |         | 0.11     | 0.37     |           | 0.03      | 0.29       |         |       | 0.23  | 0.23     | 0.23    |          |
| Clearance Time (s)                |         | 4.0      | 4.6      |           | 4.0       | 4.6        |         |       | 4.0   | 4.0      | 4.0     |          |
| Vehicle Extension (s)             |         | 2.0      | 3.0      |           | 2.0       | 3.0        |         |       | 2.0   | 2.0      | 2.0     |          |
| Lane Grp Cap (vph)                |         | 51       | 1619     |           | 59        | 1472       |         |       | 720   | 363      | 334     |          |
| v/s Ratio Prot                    |         | 01       | 0.08     |           | 0.02      | c0.26      |         |       | c0.19 | 0.19     | 004     |          |
| v/s Ratio Perm                    |         | c0.12    | 0.00     |           | 0.02      | 00.20      |         |       | 00.10 | 0.15     | 0.01    |          |
| v/c Ratio                         |         | 1.08     | 0.22     |           | 0.53      | 0.90       |         |       | 0.84  | 0.83     | 0.03    |          |
| Uniform Delay, d1                 |         | 58.0     | 28.5     |           | 62.0      | 44.5       |         |       | 48.2  | 48.2     | 39.4    |          |
| Progression Factor                |         | 1.00     | 1.00     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00     | 1.00    |          |
| Incremental Delay, d2             |         | 149.7    | 0.1      |           | 3.8       | 7.9        |         |       | 8.1   | 14.5     | 0.0     |          |
| Delay (s)                         |         | 207.8    | 28.6     |           | 65.9      | 52.4       |         |       | 56.4  | 62.7     | 39.4    |          |
| Level of Service                  |         | 207.0    | C        |           | E         | D          |         |       | E     | E        | D       |          |
| Approach Delay (s)                |         | •        | 52.1     |           |           | 52.7       |         |       |       | 57.5     |         |          |
| Approach LOS                      |         |          | D        |           |           | D          |         |       |       | E        |         |          |
| Intersection Summary              |         |          |          |           |           |            |         |       |       |          |         |          |
| HCM 2000 Control Delay            |         |          | 54.9     | Н         | CM 2000   | Level of   | Service |       | D     |          |         |          |
| HCM 2000 Volume to Capacity       | ratio   |          | 0.79     |           |           |            |         |       |       |          |         |          |
| Actuated Cycle Length (s)         |         |          | 130.5    | S         | um of los | t time (s) |         |       | 21.1  |          |         |          |
| Intersection Capacity Utilization |         |          | 97.2%    |           | CU Level  |            | !       |       | F     |          |         |          |
| Analysis Period (min)             |         |          | 15       |           |           |            |         |       | •     |          |         |          |
| dr Defacto Right Lane. Recog      | le with | 1 though |          | right lan | e.        |            |         |       |       |          |         |          |
| c Critical Lane Group             | ,       |          |          |           | -         |            |         |       |       |          |         |          |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩₩20&₽ Oyster Po

| <b>↓</b> | 4  | <i>&gt;</i>  | 4  |
|----------|--|--|--|
| SBT      | SBR2   | NER  | NER2   |
|          |  |  | 7  |
|          | 431  |  | 72   |
|          |  |  | 72   |
|          |  |  | 1900   |
|          | 1000   |  | 4.5  |
|          |  |  | 1.00   |
|          |  |  | 1.00   |
|          |  |  | 1.00   |
|          |  |  | 0.85   |
|          |  |  | 1.00   |
|          |  |  | 1442   |
|          |  |  |  |
|          |  |  | 1.00   |
|          |  |  | 1442   |
|          |  |  | 0.96   |
|          |  |  | 75   |
|          | 0  |  | 0  |
| 113      | 0  | 125  | 75   |
|          |  |  | 54   |
|          | 8  |  |  |
| 1%       | 1%   | 12%  | 12%  |
| NA       |  | Prot   | Prot   |
| 7        |  | 3  | 3  |
|          |  |  |  |
| 9.1      |  | 18.5   | 18.5   |
|          |  |  | 18.5   |
|          |  |  | 0.14   |
|          |  |  | 4.5  |
|          |  |  | 2.0  |
|          |  |  |  |
|          |  |  | 204  |
| cu.u4    |  | 0.04   | c0.05  |
|          |  |  | 2.25   |
|          |  |  | 0.37   |
|          |  |  | 50.7   |
|          |  |  | 1.00   |
|          |  |  | 0.4  |
|          |  | 50.0   | 51.1   |
| Е        |  | D  | D  |
| 60.3     |  |  |  |
| Е        |  |  |  |
|          |  |  |  |
|          |  |  |  |
|          | 27<br>27<br>1900<br>4.0<br>0.95<br>0.97<br>1.00<br>0.86<br>1.00<br>2969<br>1.00<br>2969<br>0.96<br>28<br>372<br>113<br>1%<br>NA<br>7<br>9.1<br>9.1<br>0.07<br>4.0<br>2.0<br>207<br>c0.04 | 27 431 27 431 1900 1900 4.0 0.95 0.97 1.00 0.86 1.00 2969 1.00 2969 0.96 28 449 372 0 113 0  8 1% NA 7  9.1 9.1 0.07 4.0 2.0 207 c0.04  0.93dr 58.7 1.00 1.6 60.3 E 60.3 | 27 431 120 27 431 120 1900 1900 1990 4.0 4.5 0.95 *0.95 0.97 1.00 1.00 1.00 0.86 1.00 1.00 1.00 2969 3376 1.00 1.00 2969 3376 0.96 0.96 0.96 28 449 125 372 0 0 113 0 125  8 1% 1% 12% NA Prot 7 3  9.1 18.5 9.1 18.5 9.1 18.5 0.07 0.14 4.0 4.5 2.0 2.0 207 478 c0.04 0.04  0.93dr 0.26 58.7 49.9 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 |

|                               | ۶          | <b>→</b>   | •     | •    | <b>←</b>    | •          | 1       | <b>†</b> | /    | <b>/</b> | Ţ        | 4     |
|-------------------------------|------------|------------|-------|------|-------------|------------|---------|----------|------|----------|----------|-------|
| Movement                      | EBL        | EBT        | EBR   | WBL  | WBT         | WBR        | NBL     | NBT      | NBR  | SBL      | SBT      | SBR   |
| Lane Configurations           | *          | <b>∱</b> } |       | ሻ    | <b>∱</b> 1≽ |            |         | 4        |      |          | <b>†</b> | 7     |
| Traffic Volume (vph)          | 68         | 105        | 1     | 0    | 682         | 48         | 3       | 1        | 0    | 17       | Ö        | 268   |
| Future Volume (vph)           | 68         | 105        | 1     | 0    | 682         | 48         | 3       | 1        | 0    | 17       | 0        | 268   |
| 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       | 0.95       |       |      | 0.95        |            |         | 1.00     |      |          | 1.00     | 1.00  |
| Frpb, ped/bikes               | 1.00       | 1.00       |       |      | 1.00        |            |         | 1.00     |      |          | 1.00     | 1.00  |
| Flpb, ped/bikes               | 1.00       | 1.00       |       |      | 1.00        |            |         | 1.00     |      |          | 1.00     | 1.00  |
| Frt                           | 1.00       | 1.00       |       |      | 0.99        |            |         | 1.00     |      |          | 1.00     | 0.85  |
| Flt Protected                 | 0.95       | 1.00       |       |      | 1.00        |            |         | 0.96     |      |          | 0.95     | 1.00  |
| Satd. Flow (prot)             | 1492       | 2979       |       |      | 3273        |            |         | 1831     |      |          | 1719     | 1538  |
| Flt Permitted                 | 0.95       | 1.00       |       |      | 1.00        |            |         | 0.66     |      |          | 0.76     | 1.00  |
| Satd. Flow (perm)             | 1492       | 2979       |       |      | 3273        |            |         | 1252     |      |          | 1366     | 1538  |
| 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)               | 73         | 113        | 1     | 0    | 733         | 52         | 3       | 1        | 0    | 18       | 0        | 288   |
| RTOR Reduction (vph)          | 0          | 1          | 0     | 0    | 0           | 0          | 0       | 0        | 0    | 0        | 0        | 258   |
| Lane Group Flow (vph)         | 73         | 113        | 0     | 0    | 785         | 0          | 0       | 4        | 0    | 0        | 18       | 30    |
| Confl. Peds. (#/hr)           |            |            | 1     |      |             | 2          |         |          |      |          |          |       |
| Confl. Bikes (#/hr)           |            |            |       |      |             | 3          |         |          |      |          |          |       |
| Heavy Vehicles (%)            | 21%        | 21%        | 21%   | 9%   | 9%          | 9%         | 0%      | 0%       | 0%   | 5%       | 5%       | 5%    |
| Turn Type                     | Prot       | NA         |       | Prot | NA          |            | Perm    | NA       |      | Perm     | NA       | Perm  |
| Protected Phases              | 5          | 2          |       | 1    | 6           |            |         | 3        |      |          | 4        |       |
| Permitted Phases              |            |            |       |      |             |            | 3       |          |      | 4        |          | 4     |
| Actuated Green, G (s)         | 7.2        | 35.7       |       |      | 24.5        |            |         | 19.9     |      |          | 7.8      | 7.8   |
| Effective Green, g (s)        | 7.2        | 35.7       |       |      | 24.5        |            |         | 19.9     |      |          | 7.8      | 7.8   |
| Actuated g/C Ratio            | 0.10       | 0.47       |       |      | 0.32        |            |         | 0.26     |      |          | 0.10     | 0.10  |
| Clearance Time (s)            | 4.0        | 4.0        |       |      | 4.0         |            |         | 4.0      |      |          | 4.0      | 4.0   |
| Vehicle Extension (s)         | 2.0        | 2.5        |       |      | 2.5         |            |         | 2.0      |      |          | 2.0      | 2.0   |
| Lane Grp Cap (vph)            | 142        | 1410       |       |      | 1063        |            |         | 330      |      |          | 141      | 159   |
| v/s Ratio Prot                | c0.05      | 0.04       |       |      | c0.24       |            |         |          |      |          |          |       |
| v/s Ratio Perm                | 00.00      | 0.0.       |       |      |             |            |         | c0.00    |      |          | 0.01     | c0.02 |
| v/c Ratio                     | 0.51       | 0.08       |       |      | 0.74        |            |         | 0.01     |      |          | 0.13     | 0.19  |
| Uniform Delay, d1             | 32.4       | 10.9       |       |      | 22.6        |            |         | 20.5     |      |          | 30.7     | 30.9  |
| Progression Factor            | 1.00       | 1.00       |       |      | 1.00        |            |         | 1.00     |      |          | 1.00     | 1.00  |
| Incremental Delay, d2         | 1.3        | 0.0        |       |      | 2.6         |            |         | 0.1      |      |          | 0.1      | 0.2   |
| Delay (s)                     | 33.7       | 10.9       |       |      | 25.2        |            |         | 20.6     |      |          | 30.9     | 31.1  |
| Level of Service              | С          | В          |       |      | С           |            |         | С        |      |          | С        | С     |
| Approach Delay (s)            |            | 19.8       |       |      | 25.2        |            |         | 20.6     |      |          | 31.1     |       |
| Approach LOS                  |            | В          |       |      | С           |            |         | С        |      |          | С        |       |
| Intersection Summary          |            |            |       |      |             |            |         |          |      |          |          |       |
| HCM 2000 Control Delay        |            |            | 25.8  | H    | CM 2000     | Level of S | Service |          | С    |          |          |       |
| HCM 2000 Volume to Capa       | city ratio |            | 0.40  |      |             |            |         |          |      |          |          |       |
| Actuated Cycle Length (s)     |            |            | 75.4  | S    | um of lost  | time (s)   |         |          | 16.0 |          |          |       |
| Intersection Capacity Utiliza | ation      |            | 50.5% | IC   | U Level     | of Service | 1       |          | Α    |          |          |       |
| Analysis Period (min)         |            |            | 15    |      |             |            |         |          |      |          |          |       |
| c Critical Lane Group         |            |            |       |      |             |            |         |          |      |          |          |       |

| Movement                   | EBL   | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations        |       | ર્ન  | 7    | ň    | ĵ.   |      |      | ર્ન  | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 21    | 910  | 144  | 211  | 249  | 10   | 57   | 16   | 135  | 9    | 7    | 25   |
| Future Vol, veh/h          | 21    | 910  | 144  | 211  | 249  | 10   | 57   | 16   | 135  | 9    | 7    | 25   |
| Peak Hour Factor           | 0.94  | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles, %          | 4     | 4    | 4    | 10   | 10   | 10   | 16   | 16   | 16   | 50   | 50   | 50   |
| Mvmt Flow                  | 22    | 968  | 153  | 224  | 265  | 11   | 61   | 17   | 144  | 10   | 7    | 27   |
| Number of Lanes            | 0     | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB    |      |      | WB   |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |      |      | EB   |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 2     |      |      | 2    |      |      | 1    |      |      | 2    |      |      |
| Conflicting Approach Left  | SB    |      |      | NB   |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |      |      | 2    |      |      | 2    |      |      | 2    |      |      |
| Conflicting Approach Right | NB    |      |      | SB   |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 2     |      |      | 1    |      |      | 2    |      |      | 2    |      |      |
| HCM Control Delay          | 318.3 |      |      | 17.2 |      |      | 14.2 |      |      | 14.2 |      |      |
| HCM LOS                    | F     |      |      | С    |      |      | В    |      |      | В    |      |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1  |  |
|------------------------|-------|-------|-------|-------|-------|-------|--------|--|
| Vol Left, %            | 78%   | 0%    | 2%    | 0%    | 100%  | 0%    | 22%    |  |
| Vol Thru, %            | 22%   | 0%    | 98%   | 0%    | 0%    | 96%   | 17%    |  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 4%    | 61%    |  |
| Sign Control           | Stop   |  |
| Traffic Vol by Lane    | 73    | 135   | 931   | 144   | 211   | 259   | 41     |  |
| LT Vol                 | 57    | 0     | 21    | 0     | 211   | 0     | 9      |  |
| Through Vol            | 16    | 0     | 910   | 0     | 0     | 249   | 7      |  |
| RT Vol                 | 0     | 135   | 0     | 144   | 0     | 10    | 25     |  |
| Lane Flow Rate         | 78    | 144   | 990   | 153   | 224   | 276   | 44     |  |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6      |  |
| Degree of Util (X)     | 0.178 | 0.286 | 1.761 | 0.242 | 0.447 | 0.508 | 0.105  |  |
| Departure Headway (Hd) | 9.37  | 8.238 | 6.402 | 5.678 | 7.957 | 7.416 | 10.009 |  |
| Convergence, Y/N       | Yes    |  |
| Cap                    | 385   | 439   | 574   | 633   | 456   | 490   | 360    |  |
| Service Time           | 7.07  | 5.938 | 4.132 | 3.409 | 5.657 | 5.116 | 8.009  |  |
| HCM Lane V/C Ratio     | 0.203 | 0.328 | 1.725 | 0.242 | 0.491 | 0.563 | 0.122  |  |
| HCM Control Delay      | 14.1  | 14.2  | 365.9 | 10.2  | 16.9  | 17.5  | 14.2   |  |
| HCM Lane LOS           | В     | В     | F     | В     | С     | С     | В      |  |
| HCM 95th-tile Q        | 0.6   | 1.2   | 59.5  | 0.9   | 2.3   | 2.8   | 0.3    |  |

# HCM 6th Signalized Intersection Summary 1: Gateway & Gatewa Business Pkwy/Larkspur Landing Dwy

|                              | ၨ    | <b>→</b> | •    | •    | <b>←</b> | •    | 4    | <b>†</b>    | /    | <b>&gt;</b> | ļ          | 4    |
|------------------------------|------|----------|------|------|----------|------|------|-------------|------|-------------|------------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT         | NBR  | SBL         | SBT        | SBR  |
| Lane Configurations          |      | 1>       |      | ሻ    | f)       |      | *    | <b>†</b> \$ |      | ሻ           | <b>∱</b> } |      |
| Traffic Volume (veh/h)       | 60   | 0        | 43   | 14   | 0        | 44   | 42   | 571         | 3    | 52          | 1077       | 271  |
| Future Volume (veh/h)        | 60   | 0        | 43   | 14   | 0        | 44   | 42   | 571         | 3    | 52          | 1077       | 271  |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 0           | 0    | 0           | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.96 |          | 0.96 | 0.96 |          | 0.96 | 1.00 |             | 0.96 | 1.00        |            | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00        | 1.00 | 1.00        | 1.00       | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No          |      |             | No         |      |
| Adj Sat Flow, veh/h/ln       | 1826 | 1826     | 1826 | 1781 | 1781     | 1781 | 1796 | 1796        | 1796 | 1767        | 1767       | 1767 |
| Adj Flow Rate, veh/h         | 61   | 0        | 6    | 14   | 0        | 6    | 42   | 577         | 3    | 53          | 1088       | 258  |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99 | 0.99        | 0.99 | 0.99        | 0.99       | 0.99 |
| Percent Heavy Veh, %         | 5    | 5        | 5    | 8    | 8        | 8    | 7    | 7           | 7    | 9           | 9          | 9    |
| Cap, veh/h                   | 282  | 0        | 215  | 278  | 0        | 209  | 106  | 2094        | 11   | 120         | 1630       | 384  |
| Arrive On Green              | 0.14 | 0.00     | 0.14 | 0.14 | 0.00     | 0.14 | 0.06 | 0.60        | 0.60 | 0.07        | 0.61       | 0.61 |
| Sat Flow, veh/h              | 1323 | 0        | 1486 | 1291 | 0        | 1450 | 1711 | 3480        | 18   | 1682        | 2670       | 628  |
| Grp Volume(v), veh/h         | 61   | 0        | 6    | 14   | 0        | 6    | 42   | 283         | 297  | 53          | 681        | 665  |
| Grp Sat Flow(s),veh/h/ln     | 1323 | 0        | 1486 | 1291 | 0        | 1450 | 1711 | 1706        | 1792 | 1682        | 1678       | 1620 |
| Q Serve(g_s), s              | 3.1  | 0.0      | 0.3  | 0.7  | 0.0      | 0.3  | 1.8  | 5.9         | 5.9  | 2.3         | 19.9       | 20.3 |
| Cycle Q Clear(g_c), s        | 3.4  | 0.0      | 0.3  | 1.0  | 0.0      | 0.3  | 1.8  | 5.9         | 5.9  | 2.3         | 19.9       | 20.3 |
| Prop In Lane                 | 1.00 |          | 1.00 | 1.00 |          | 1.00 | 1.00 |             | 0.01 | 1.00        |            | 0.39 |
| Lane Grp Cap(c), veh/h       | 282  | 0        | 215  | 278  | 0        | 209  | 106  | 1027        | 1078 | 120         | 1025       | 989  |
| V/C Ratio(X)                 | 0.22 | 0.00     | 0.03 | 0.05 | 0.00     | 0.03 | 0.39 | 0.28        | 0.28 | 0.44        | 0.66       | 0.67 |
| Avail Cap(c_a), veh/h        | 619  | 0        | 593  | 606  | 0        | 578  | 237  | 1027        | 1078 | 233         | 1025       | 989  |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00        | 1.00 | 1.00        | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 1.00 | 1.00 | 1.00        | 1.00 | 0.83        | 0.83       | 0.83 |
| Uniform Delay (d), s/veh     | 29.0 | 0.0      | 27.6 | 28.0 | 0.0      | 27.6 | 33.8 | 7.1         | 7.1  | 33.4        | 9.6        | 9.6  |
| Incr Delay (d2), s/veh       | 0.1  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.9  | 0.7         | 0.6  | 0.8         | 2.8        | 3.0  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 0.0         | 0.0  | 0.0         | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 1.0  | 0.0      | 0.1  | 0.2  | 0.0      | 0.1  | 0.7  | 2.0         | 2.1  | 0.9         | 6.8        | 6.7  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |      |      |             |      |             |            |      |
| LnGrp Delay(d),s/veh         | 29.2 | 0.0      | 27.6 | 28.0 | 0.0      | 27.6 | 34.7 | 7.8         | 7.8  | 34.2        | 12.4       | 12.7 |
| LnGrp LOS                    | С    | Α        | С    | С    | Α        | С    | С    | Α           | Α    | С           | В          | В    |
| Approach Vol, veh/h          |      | 67       |      |      | 20       |      |      | 622         |      |             | 1399       |      |
| Approach Delay, s/veh        |      | 29.0     |      |      | 27.9     |      |      | 9.6         |      |             | 13.4       |      |
| Approach LOS                 |      | С        |      |      | С        |      |      | Α           |      |             | В          |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8           |      |             |            |      |
| Phs Duration (G+Y+Rc), s     | 9.3  | 50.2     |      | 15.4 | 8.7      | 50.9 |      | 15.4        |      |             |            |      |
| Change Period (Y+Rc), s      | 4.0  | 5.1      |      | 4.6  | 4.0      | 5.1  |      | 4.6         |      |             |            |      |
| Max Green Setting (Gmax), s  | 10.4 | 21.0     |      | 29.9 | 10.4     | 21.0 |      | 29.9        |      |             |            |      |
| Max Q Clear Time (g_c+l1), s | 4.3  | 7.9      |      | 5.4  | 3.8      | 22.3 |      | 3.0         |      |             |            |      |
| Green Ext Time (p_c), s      | 0.0  | 2.0      |      | 0.1  | 0.0      | 0.0  |      | 0.0         |      |             |            |      |
| Intersection Summary         |      |          |      |      |          |      |      |             |      |             |            |      |
| HCM 6th Ctrl Delay           |      |          | 12.9 |      |          |      |      |             |      |             |            |      |
| HCM 6th LOS                  |      |          | В    |      |          |      |      |             |      |             |            |      |
| Notes                        |      |          |      |      |          |      |      |             |      |             |            |      |

User approved pedestrian interval to be less than phase max green.

|                              | -          | •         | •    | <b>←</b> | 4         | /    |      |
|------------------------------|------------|-----------|------|----------|-----------|------|------|
| Movement                     | EBT        | EBR       | WBL  | WBT      | NBL       | NBR  |      |
| Lane Configurations          | <b>↑</b> ↑ |           | 7    | ተተተ      | ች         | 77   |      |
| Traffic Volume (veh/h)       | 2081       | 133       | 16   | 822      | 240       | 694  |      |
| Future Volume (veh/h)        | 2081       | 133       | 16   | 822      | 240       | 694  |      |
| Initial Q (Qb), veh          | 45         | 0         | 0    | 0        | 10        | 51   |      |
| Ped-Bike Adj(A_pbT)          |            | 0.95      | 1.00 |          | 1.00      | 1.00 |      |
| Parking Bus, Adj             | 1.00       | 1.00      | 1.00 | 1.00     | 1.00      | 1.00 |      |
| Work Zone On Approach        | No         |           |      | No       | No        |      |      |
| Adj Sat Flow, veh/h/ln       | 1841       | 1841      | 1707 | 1707     | 1811      | 1811 |      |
| Adj Flow Rate, veh/h         | 2102       | 128       | 16   | 830      | 242       | 0    |      |
| Peak Hour Factor             | 0.99       | 0.99      | 0.99 | 0.99     | 0.99      | 0.99 |      |
| Percent Heavy Veh, %         | 4          | 4         | 13   | 13       | 6         | 6    |      |
| Cap, veh/h                   | 3199       | 168       | 35   | 3378     | 317       |      |      |
| Arrive On Green              | 0.23       | 0.23      | 0.02 | 0.76     | 0.16      | 0.00 |      |
| Sat Flow, veh/h              | 4995       | 292       | 1626 | 4815     | 1725      | 2701 |      |
| Grp Volume(v), veh/h         | 1453       | 777       | 16   | 830      | 242       | 0    |      |
| Grp Sat Flow(s), veh/h/ln    | 1675       | 1771      | 1626 | 1554     | 1725      | 1351 |      |
| Q Serve(g_s), s              | 39.0       | 39.5      | 1.0  | 5.3      | 13.6      | 0.0  |      |
| Cycle Q Clear(g_c), s        | 39.0       | 39.5      | 1.0  | 5.3      | 13.6      | 0.0  |      |
| Prop In Lane                 | 00.0       | 0.16      | 1.00 | 0.0      | 1.00      | 1.00 |      |
| ane Grp Cap(c), veh/h        | 2195       | 1174      | 35   | 3378     | 317       | 1.00 |      |
| //C Ratio(X)                 | 0.66       | 0.66      | 0.46 | 0.25     | 0.76      |      |      |
| Avail Cap(c_a), veh/h        | 2326       | 1230      | 130  | 3523     | 517       |      |      |
| HCM Platoon Ratio            | 0.33       | 0.33      | 1.00 | 1.00     | 1.00      | 1.00 |      |
| Jpstream Filter(I)           | 0.84       | 0.84      | 0.95 | 0.95     | 1.00      | 0.00 |      |
| Jniform Delay (d), s/veh     | 30.8       | 30.5      | 48.3 | 4.8      | 39.8      | 0.0  |      |
| ncr Delay (d2), s/veh        | 1.3        | 2.5       | 3.3  | 0.2      | 3.8       | 0.0  |      |
| nitial Q Delay(d3),s/veh     | 4.0        | 3.5       | 0.0  | 0.0      | 30.2      | 0.0  |      |
| %ile BackOfQ(50%),veh/ln     | 21.2       | 22.7      | 0.4  | 1.7      | 9.7       | 0.0  |      |
| Jnsig. Movement Delay, s/veh |            | 22.1      | 0.4  | 1.7      | 5.1       | 0.0  |      |
| _nGrp Delay(d),s/veh         | 36.2       | 36.5      | 51.6 | 5.0      | 73.9      | 0.0  |      |
| _nGrp LOS                    | 30.2<br>D  | 30.3<br>D | D D  | 3.0<br>A | 7 J. J    | 0.0  |      |
|                              | 2230       | U         | ט    | 846      | 242       | Α    |      |
| Approach Vol, veh/h          |            |           |      |          | 73.9      | А    |      |
| Approach Delay, s/veh        | 36.3       |           |      | 5.9      | 73.9<br>E |      |      |
| Approach LOS                 | D          |           |      | А        | E         |      |      |
| Fimer - Assigned Phs         | 1          | 2         |      |          |           | 6    | 8    |
| Phs Duration (G+Y+Rc), s     | 6.2        | 73.4      |      |          |           | 79.6 | 20.4 |
| Change Period (Y+Rc), s      | 4.0        | 4.0       |      |          |           | 4.0  | 4.0  |
| Max Green Setting (Gmax), s  | 8.0        | 50.0      |      |          |           | 62.0 | 30.0 |
| Max Q Clear Time (g_c+l1), s | 3.0        | 41.5      |      |          |           | 7.3  | 15.6 |
| Green Ext Time (p_c), s      | 0.0        | 6.3       |      |          |           | 4.3  | 0.8  |
| ntersection Summary          |            |           |      |          |           |      |      |
| HCM 6th Ctrl Delay           |            |           | 31.3 |          |           |      |      |
| HCM 6th LOS                  |            |           | С    |          |           |      |      |
| Notes                        |            |           |      |          |           |      |      |

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

|  | •           | <b>→</b>    | •           | •             | <b>←</b>    | •           | 4          | †           | /    | <b>&gt;</b>   | ţ           | 4    |
|--|-------------|-------------|-------------|---------------|-------------|-------------|------------|-------------|------|---------------|-------------|------|
| Movement   | EBL         | EBT         | EBR         | WBL           | WBT         | WBR         | NBL        | NBT         | NBR  | SBL           | SBT         | SBR  |
| Lane Configurations                                | 7           | ተተተ         | 7           | ሻሻ            | ተተኈ         |             | ሻ          | <b>↑</b>    | 7    | ሻ             | ^↑          | 7    |
| Traffic Volume (veh/h)                             | 163         | 2325        | 287         | 531           | 546         | 104         | 115        | 156         | 738  | 265           | 168         | 110  |
| Future Volume (veh/h)                              | 163         | 2325        | 287         | 531           | 546         | 104         | 115        | 156         | 738  | 265           | 168         | 110  |
| Initial Q (Qb), veh                                | 5           | 0           | 0           | 0             | 0           | 0           | 0          | 0           | 0    | 0             | 0           | 0    |
| Ped-Bike Adj(A_pbT)                                | 1.00        |             | 0.97        | 1.00          |             | 0.98        | 1.00       |             | 1.00 | 1.00          |             | 1.00 |
| Parking Bus, Adj                                   | 1.00        | 1.00        | 1.00        | 1.00          | 1.00        | 1.00        | 1.00       | 1.00        | 1.00 | 1.00          | 1.00        | 1.00 |
| Work Zone On Approach                              |             | No          |             |               | No          |             |            | No          |      |               | No          |      |
| Adj Sat Flow, veh/h/ln                             | 1841        | 1841        | 1841        | 1633          | 1633        | 1633        | 1752       | 1752        | 1752 | 1767          | 1767        | 1767 |
| Adj Flow Rate, veh/h                               | 165         | 2348        | 204         | 536           | 552         | 90          | 116        | 158         | 0    | 268           | 170         | 0    |
| Peak Hour Factor                                   | 0.99        | 0.99        | 0.99        | 0.99          | 0.99        | 0.99        | 0.99       | 0.99        | 0.99 | 0.99          | 0.99        | 0.99 |
| Percent Heavy Veh, %                               | 4           | 4           | 4           | 18            | 18          | 18          | 10         | 10          | 10   | 9             | 9           | 9    |
| Cap, veh/h   | 204         | 2832        | 853         | 302           | 2000        | 320         | 154        | 195         | 0.00 | 179           | 420         | 0.00 |
| Arrive On Green                                    | 0.11        | 0.56        | 0.56        | 0.10          | 0.56        | 0.56        | 0.09       | 0.11        | 0.00 | 0.11          | 0.13        | 0.00 |
| Sat Flow, veh/h                                    | 1753        | 5025        | 1514        | 3018          | 3862        | 618         | 1668       | 1752        | 1485 | 1682          | 3357        | 1497 |
| Grp Volume(v), veh/h                               | 165         | 2348        | 204         | 536           | 422         | 220         | 116        | 158         | 0    | 268           | 170         | 0    |
| Grp Sat Flow(s),veh/h/ln                           | 1753        | 1675        | 1514        | 1509          | 1486        | 1507        | 1668       | 1752        | 1485 | 1682          | 1678        | 1497 |
| Q Serve(g_s), s                                    | 13.9        | 57.4        | 10.2        | 15.0          | 11.0        | 11.3        | 10.2       | 13.2        | 0.0  | 16.0          | 7.0         | 0.0  |
| Cycle Q Clear(g_c), s                              | 13.9        | 57.4        | 10.2        | 15.0          | 11.0        | 11.3        | 10.2       | 13.2        | 0.0  | 16.0          | 7.0         | 0.0  |
| Prop In Lane                                       | 1.00        | 0000        | 1.00        | 1.00          | 4540        | 0.41        | 1.00       | 405         | 1.00 | 1.00          | 400         | 1.00 |
| Lane Grp Cap(c), veh/h                             | 204         | 2832        | 853         | 302           | 1540        | 780         | 154        | 195         |      | 179           | 420         |      |
| V/C Ratio(X)                                       | 0.81        | 0.83        | 0.24        | 1.78          | 0.27        | 0.28        | 0.75       | 0.81        |      | 1.49          | 0.40        |      |
| Avail Cap(c_a), veh/h                              | 280         | 2832        | 853         | 302           | 1653        | 838         | 200        | 445         | 4.00 | 179           | 815         | 4.00 |
| HCM Platoon Ratio                                  | 1.00        | 1.00        | 1.00        | 1.00          | 1.00        | 1.00        | 1.00       | 1.00        | 1.00 | 1.00          | 1.00        | 1.00 |
| Upstream Filter(I)                                 | 0.59        | 0.59        | 0.59        | 1.00          | 1.00        | 1.00        | 1.00       | 1.00        | 0.00 | 1.00          | 1.00        | 0.00 |
| Uniform Delay (d), s/veh                           | 65.5<br>5.0 | 26.8<br>1.8 | 16.5<br>0.4 | 67.5<br>362.5 | 20.4<br>0.4 | 20.4<br>0.9 | 66.4       | 65.1<br>3.1 | 0.0  | 67.0<br>249.1 | 60.5<br>0.2 | 0.0  |
| Incr Delay (d2), s/veh                             | 22.5        | 0.0         | 0.4         | 0.0           | 0.4         | 0.9         | 7.5<br>0.0 | 0.0         | 0.0  | 0.0           | 0.2         | 0.0  |
| Initial Q Delay(d3),s/veh %ile BackOfQ(50%),veh/ln | 8.6         | 22.9        | 3.6         | 21.0          | 4.3         | 4.6         | 4.6        | 6.1         | 0.0  | 19.3          | 3.0         | 0.0  |
| Unsig. Movement Delay, s/veh                       |             | 22.9        | 3.0         | 21.0          | 4.3         | 4.0         | 4.0        | 0.1         | 0.0  | 19.5          | 3.0         | 0.0  |
| LnGrp Delay(d),s/veh                               | 93.0        | 28.6        | 16.9        | 430.0         | 20.8        | 21.3        | 73.8       | 68.2        | 0.0  | 316.1         | 60.7        | 0.0  |
| LnGrp LOS  | 93.0<br>F   | 20.0<br>C   | 10.9<br>B   | 430.0<br>F    | Z0.0        | 21.3<br>C   | 73.0<br>E  | 00.2<br>E   | 0.0  | 510.1<br>F    | 60.7<br>E   | 0.0  |
| Approach Vol, veh/h                                | <u> </u>    | 2717        | D           | ı             | 1178        |             | <u> </u>   | 274         | A    | ı             | 438         | Α    |
| Approach Delay, s/veh                              |             | 31.6        |             |               | 207.1       |             |            | 70.6        | А    |               | 216.9       | А    |
| Approach LOS                                       |             | 31.0<br>C   |             |               | 207.1       |             |            | 70.0<br>E   |      |               | 210.9<br>F  |      |
|  |             |             |             |               | Г           |             |            |             |      |               | Г           |      |
| Timer - Assigned Phs                               | 1           | 2           | 3           | 4             | 5           | 6           | 7          | 8           |      |               |             |      |
| Phs Duration (G+Y+Rc), s                           | 19.0        | 89.4        | 17.9        | 23.7          | 20.1        | 88.3        | 20.0       | 21.6        |      |               |             |      |
| Change Period (Y+Rc), s                            | 4.0         | 4.9         | 4.0         | * 4.9         | 4.0         | 4.9         | 4.0        | 4.9         |      |               |             |      |
| Max Green Setting (Gmax), s                        | 15.0        | 63.1        | 18.0        | * 36          | 24.0        | 54.1        | 16.0       | 38.1        |      |               |             |      |
| Max Q Clear Time (g_c+l1), s                       | 17.0        | 59.4        | 12.2        | 9.0           | 15.9        | 13.3        | 18.0       | 15.2        |      |               |             |      |
| Green Ext Time (p_c), s                            | 0.0         | 3.2         | 0.1         | 0.6           | 0.2         | 2.9         | 0.0        | 0.5         |      |               |             |      |
| Intersection Summary                               |             |             |             |               |             |             |            |             |      |               |             |      |
| HCM 6th Ctrl Delay                                 |             |             | 96.4        |               |             |             |            |             |      |               |             |      |
| HCM 6th LOS  |             |             | F           |               |             |             |            |             |      |               |             |      |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|                              | ၨ    | <b>→</b> | •    | •    | <b>←</b> | •     | •    | <b>†</b>   | /    | <b>&gt;</b> | ļ    | 4    |
|------------------------------|------|----------|------|------|----------|-------|------|------------|------|-------------|------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR   | NBL  | NBT        | NBR  | SBL         | SBT  | SBR  |
| Lane Configurations          | 14   | <b>†</b> | 77   | ሻ    | ተተተ      | 7     | ሻሻ   | <b>∱</b> ∱ |      | ሻ           |      | 77   |
| Traffic Volume (veh/h)       | 156  | 366      | 456  | 37   | 417      | 30    | 466  | 1030       | 1265 | 22          | 116  | 653  |
| Future Volume (veh/h)        | 156  | 366      | 456  | 37   | 417      | 30    | 466  | 1030       | 1265 | 22          | 116  | 653  |
| Initial Q (Qb), veh          | 0    | 13       | 0    | 0    | 0        | 0     | 0    | 0          | 0    | 0           | 0    | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 0.97 | 1.00 |          | 0.97  | 1.00 |            | 1.00 | 1.00        |      | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00  | 1.00 | 1.00       | 1.00 | 1.00        | 1.00 | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |       |      | No         |      |             | No   |      |
| Adj Sat Flow, veh/h/ln       | 1722 | 1722     | 1722 | 1574 | 1574     | 1574  | 1811 | 1811       | 1811 | 1663        | 1663 | 1663 |
| Adj Flow Rate, veh/h         | 158  | 370      | 90   | 37   | 421      | 3     | 471  | 1040       | 0    | 22          | 117  | 266  |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99  | 0.99 | 0.99       | 0.99 | 0.99        | 0.99 | 0.99 |
| Percent Heavy Veh, %         | 12   | 12       | 12   | 22   | 22       | 22    | 6    | 6          | 6    | 16          | 16   | 16   |
| Cap, veh/h                   | 493  | 410      | 592  | 94   | 603      | 181   | 1285 | 1321       |      | 226         | 237  | 339  |
| Arrive On Green              | 0.05 | 0.08     | 0.08 | 0.06 | 0.14     | 0.14  | 0.39 | 0.39       | 0.00 | 0.14        | 0.14 | 0.14 |
| Sat Flow, veh/h              | 3182 | 1722     | 2485 | 1499 | 4297     | 1288  | 3346 | 3532       | 0    | 1584        | 1663 | 2375 |
| Grp Volume(v), veh/h         | 158  | 370      | 90   | 37   | 421      | 3     | 471  | 1040       | 0    | 22          | 117  | 266  |
| Grp Sat Flow(s),veh/h/ln     | 1591 | 1722     | 1242 | 1499 | 1432     | 1288  | 1673 | 1721       | 0    | 1584        | 1663 | 1188 |
| Q Serve(g_s), s              | 5.0  | 22.4     | 3.6  | 2.5  | 9.8      | 0.2   | 10.5 | 27.8       | 0.0  | 1.3         | 6.8  | 11.4 |
| Cycle Q Clear(g_c), s        | 5.0  | 22.4     | 3.6  | 2.5  | 9.8      | 0.2   | 10.5 | 27.8       | 0.0  | 1.3         | 6.8  | 11.4 |
| Prop In Lane                 | 1.00 |          | 1.00 | 1.00 |          | 1.00  | 1.00 |            | 0.00 | 1.00        |      | 1.00 |
| Lane Grp Cap(c), veh/h       | 493  | 410      | 592  | 94   | 603      | 181   | 1285 | 1321       |      | 226         | 237  | 339  |
| V/C Ratio(X)                 | 0.32 | 0.90     | 0.15 | 0.39 | 0.70     | 0.02  | 0.37 | 0.79       |      | 0.10        | 0.49 | 0.78 |
| Avail Cap(c_a), veh/h        | 480  | 410      | 592  | 143  | 1023     | 307   | 1298 | 1335       |      | 347         | 364  | 520  |
| HCM Platoon Ratio            | 0.33 | 0.33     | 0.33 | 1.00 | 1.00     | 1.00  | 1.00 | 1.00       | 1.00 | 1.00        | 1.00 | 1.00 |
| Upstream Filter(I)           | 0.63 | 0.63     | 0.63 | 1.00 | 1.00     | 1.00  | 1.00 | 1.00       | 0.00 | 1.00        | 1.00 | 1.00 |
| Uniform Delay (d), s/veh     | 44.5 | 48.4     | 38.5 | 47.3 | 43.0     | 38.9  | 23.2 | 28.6       | 0.0  | 39.1        | 41.5 | 43.5 |
| Incr Delay (d2), s/veh       | 0.1  | 15.7     | 0.1  | 1.0  | 0.6      | 0.0   | 8.0  | 4.8        | 0.0  | 0.1         | 0.6  | 1.9  |
| Initial Q Delay(d3),s/veh    | 0.0  | 70.2     | 0.0  | 0.0  | 0.0      | 0.0   | 0.0  | 0.0        | 0.0  | 0.0         | 0.0  | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 2.1  | 21.3     | 1.1  | 1.0  | 3.5      | 0.1   | 4.2  | 11.9       | 0.0  | 0.5         | 2.8  | 3.4  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |       |      |            |      |             |      |      |
| LnGrp Delay(d),s/veh         | 44.6 | 134.3    | 38.5 | 48.3 | 43.6     | 38.9  | 24.0 | 33.4       | 0.0  | 39.2        | 42.1 | 45.4 |
| LnGrp LOS                    | D    | F        | D    | D    | D        | D     | С    | С          |      | D           | D    | D    |
| Approach Vol, veh/h          |      | 618      |      |      | 461      |       |      | 1511       | Α    |             | 405  |      |
| Approach Delay, s/veh        |      | 97.4     |      |      | 43.9     |       |      | 30.4       |      |             | 44.1 |      |
| Approach LOS                 |      | F        |      |      | D        |       |      | С          |      |             | D    |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6     |      | 8          |      |             |      |      |
| Phs Duration (G+Y+Rc), s     | 10.6 | 29.2     |      | 45.3 | 20.5     | 19.3  |      | 19.9       |      |             |      |      |
| Change Period (Y+Rc), s      | 4.0  | 4.6      |      | 4.6  | 4.6      | * 4.6 |      | 4.9        |      |             |      |      |
| Max Green Setting (Gmax), s  | 10.0 | 25.0     |      | 28.9 | 10.0     | * 25  |      | 23.0       |      |             |      |      |
| Max Q Clear Time (g_c+I1), s | 4.5  | 24.4     |      | 29.8 | 7.0      | 11.8  |      | 13.4       |      |             |      |      |
| Green Ext Time (p_c), s      | 0.0  | 0.2      |      | 0.0  | 0.1      | 1.6   |      | 1.0        |      |             |      |      |
| Intersection Summary         |      |          |      |      |          |       |      |            |      |             |      |      |
| HCM 6th Ctrl Delay           |      |          | 48.2 |      |          |       |      |            |      |             |      |      |
| HCM 6th LOS                  |      |          | D    |      |          |       |      |            |      |             |      |      |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier. Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

|                                       | ۶           | <b>→</b>    | •         | •            | <b>←</b>    | 4     | 1           | <b>†</b>   | <b>/</b> | <b>/</b>    | <b>+</b>    | 4    |
|---------------------------------------|-------------|-------------|-----------|--------------|-------------|-------|-------------|------------|----------|-------------|-------------|------|
| Movement                              | EBL         | EBT         | EBR       | WBL          | WBT         | WBR   | NBL         | NBT        | NBR      | SBL         | SBT         | SBR  |
| Lane Configurations                   | ሻ           | 4₽          | 7         | ያቸሻ          | <b>†</b>    | 7     | ሻ           | <b>^</b>   | 7        | ሻ           | <b>^</b>    | 7    |
| Traffic Volume (veh/h)                | 122         | 289         | 149       | 1020         | 261         | 282   | 192         | 46         | 520      | 202         | 782         | 99   |
| Future Volume (veh/h)                 | 122         | 289         | 149       | 1020         | 261         | 282   | 192         | 46         | 520      | 202         | 782         | 99   |
| Initial Q (Qb), veh                   | 0           | 0           | 0         | 0            | 0           | 0     | 0           | 0          | 0        | 0           | 0           | 0    |
| Ped-Bike Adj(A_pbT)                   | 1.00        | 4.00        | 1.00      | 1.00         | 4.00        | 1.00  | 1.00        | 4.00       | 1.00     | 1.00        | 1.00        | 1.00 |
| Parking Bus, Adj                      | 1.00        | 1.00        | 1.00      | 1.00         | 1.00        | 1.00  | 1.00        | 1.00       | 1.00     | 1.00        | 1.00        | 1.00 |
| Work Zone On Approach                 | 1111        | No          | 1111      | 1610         | No          | 1610  | 1706        | No         | 1706     | 1011        | No          | 1011 |
| Adj Sat Flow, veh/h/ln                | 1441        | 1441        | 1441<br>0 | 1618<br>1030 | 1618<br>264 | 1618  | 1796<br>194 | 1796<br>46 | 1796     | 1811        | 1811<br>790 | 1811 |
| Adj Flow Rate, veh/h Peak Hour Factor | 123<br>0.99 | 292<br>0.99 | 0.99      | 0.99         | 0.99        | 0.99  | 0.99        | 0.99       | 0.99     | 204<br>0.99 | 0.99        | 0.99 |
| Percent Heavy Veh, %                  | 31          | 31          | 31        | 19           | 19          | 19    | 7           | 7          | 7        | 0.99        | 0.99        | 0.99 |
| Cap, veh/h                            | 180         | 378         | JI        | 1093         | 407         | 19    | 196         | 453        | <i>'</i> | 524         | 1138        | U    |
| Arrive On Green                       | 0.13        | 0.13        | 0.00      | 0.08         | 0.08        | 0.00  | 0.11        | 0.13       | 0.00     | 0.30        | 0.33        | 0.00 |
| Sat Flow, veh/h                       | 1372        | 2881        | 1221      | 4347         | 1618        | 1372  | 1711        | 3413       | 1522     | 1725        | 3441        | 1535 |
| Grp Volume(v), veh/h                  | 123         | 292         | 0         | 1030         | 264         | 0     | 194         | 46         | 0        | 204         | 790         | 0    |
| Grp Sat Flow(s), veh/h/ln             | 1372        | 1441        | 1221      | 1449         | 1618        | 1372  | 1711        | 1706       | 1522     | 1725        | 1721        | 1535 |
| Q Serve(g_s), s                       | 9.0         | 10.3        | 0.0       | 24.8         | 16.6        | 0.0   | 11.9        | 1.2        | 0.0      | 9.8         | 20.9        | 0.0  |
| Cycle Q Clear(g_c), s                 | 9.0         | 10.3        | 0.0       | 24.8         | 16.6        | 0.0   | 11.9        | 1.2        | 0.0      | 9.8         | 20.9        | 0.0  |
| Prop In Lane                          | 1.00        |             | 1.00      | 1.00         |             | 1.00  | 1.00        |            | 1.00     | 1.00        |             | 1.00 |
| Lane Grp Cap(c), veh/h                | 180         | 378         |           | 1093         | 407         |       | 196         | 453        |          | 524         | 1138        |      |
| V/C Ratio(X)                          | 0.68        | 0.77        |           | 0.94         | 0.65        |       | 0.99        | 0.10       |          | 0.39        | 0.69        |      |
| Avail Cap(c_a), veh/h                 | 287         | 604         |           | 1093         | 407         |       | 196         | 686        |          | 524         | 1138        |      |
| HCM Platoon Ratio                     | 1.00        | 1.00        | 1.00      | 0.33         | 0.33        | 0.33  | 1.00        | 1.00       | 1.00     | 1.00        | 1.00        | 1.00 |
| Upstream Filter(I)                    | 1.00        | 1.00        | 0.00      | 0.70         | 0.70        | 0.00  | 1.00        | 1.00       | 0.00     | 1.00        | 1.00        | 0.00 |
| Uniform Delay (d), s/veh              | 43.5        | 44.1        | 0.0       | 47.4         | 43.7        | 0.0   | 46.5        | 40.0       | 0.0      | 28.9        | 30.5        | 0.0  |
| Incr Delay (d2), s/veh                | 1.7         | 1.3         | 0.0       | 11.8         | 2.5         | 0.0   | 61.9        | 0.0        | 0.0      | 0.2         | 3.5         | 0.0  |
| Initial Q Delay(d3),s/veh             | 0.0         | 0.0         | 0.0       | 0.0          | 0.0         | 0.0   | 0.0         | 0.0        | 0.0      | 0.0         | 0.0         | 0.0  |
| %ile BackOfQ(50%),veh/ln              | 3.1         | 3.7         | 0.0       | 10.8         | 7.5         | 0.0   | 8.3         | 0.5        | 0.0      | 4.0         | 9.0         | 0.0  |
| Unsig. Movement Delay, s/veh          |             |             |           |              |             |       |             |            |          |             |             |      |
| LnGrp Delay(d),s/veh                  | 45.2        | 45.4        | 0.0       | 59.2         | 46.2        | 0.0   | 108.4       | 40.1       | 0.0      | 29.1        | 34.0        | 0.0  |
| LnGrp LOS                             | D           | D           |           | <u>E</u>     | D           |       | F           | D          |          | С           | С           |      |
| Approach Vol, veh/h                   |             | 415         | Α         |              | 1294        | Α     |             | 240        | Α        |             | 994         | Α    |
| Approach Delay, s/veh                 |             | 45.3        |           |              | 56.5        |       |             | 95.3       |          |             | 33.0        |      |
| Approach LOS                          |             | D           |           |              | Е           |       |             | F          |          |             | С           |      |
| Timer - Assigned Phs                  | 1           | 2           |           | 4            | 5           | 6     |             | 8          |          |             |             |      |
| Phs Duration (G+Y+Rc), s              | 16.0        | 39.6        |           | 18.4         | 36.8        | 18.8  |             | 31.0       |          |             |             |      |
| Change Period (Y+Rc), s               | 4.0         | 4.9         |           | 4.6          | 4.9         | * 4.9 |             | 4.6        |          |             |             |      |
| Max Green Setting (Gmax), s           | 12.0        | 26.5        |           | 22.0         | 17.4        | * 21  |             | 26.4       |          |             |             |      |
| Max Q Clear Time (g_c+l1), s          | 13.9        | 22.9        |           | 12.3         | 11.8        | 3.2   |             | 26.8       |          |             |             |      |
| Green Ext Time (p_c), s               | 0.0         | 1.8         |           | 1.1          | 0.2         | 0.1   |             | 0.0        |          |             |             |      |
| Intersection Summary                  |             |             |           |              |             |       |             |            |          |             |             |      |
| HCM 6th Ctrl Delay                    |             |             | 50.2      |              |             |       |             |            |          |             |             |      |
| HCM 6th LOS                           |             |             | D         |              |             |       |             |            |          |             |             |      |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|   | ۶           | <b>→</b>  | •           | •           | <b>←</b> | •    | 1           | <b>†</b>     | <b>/</b>     | <b>/</b>    | <b>+</b>     |              |
|---|-------------|-----------|-------------|-------------|----------|------|-------------|--------------|--------------|-------------|--------------|--------------|
| Movement                                | EBL         | EBT       | EBR         | WBL         | WBT      | WBR  | NBL         | NBT          | NBR          | SBL         | SBT          | SBR          |
| Lane Configurations                     |             | 4         | 7           |             | - ↔      |      | ሻ           | ተኈ           |              | *           | <b>∱</b> ∱   |              |
| Traffic Volume (veh/h)                  | 25          | 0         | 6           | 3           | 0        | 25   | 18          | 675          | 5            | 52          | 1419         | 45           |
| Future Volume (veh/h)                   | 25          | 0         | 6           | 3           | 0        | 25   | 18          | 675          | 5            | 52          | 1419         | 45           |
| Initial Q (Qb), veh                     | 0           | 0         | 0           | 0           | 0        | 0    | 0           | 0            | 0            | 0           | 0            | 0            |
| Ped-Bike Adj(A_pbT)                     | 0.95        |           | 1.00        | 0.95        |          | 1.00 | 1.00        |              | 0.96         | 1.00        |              | 0.96         |
| Parking Bus, Adj                        | 1.00        | 1.00      | 1.00        | 1.00        | 1.00     | 1.00 | 1.00        | 1.00         | 1.00         | 1.00        | 1.00         | 1.00         |
| Work Zone On Approach                   | 4750        | No        | 4750        | 4500        | No       | 4500 | 4707        | No           | 4707         | 4700        | No           | 4700         |
| Adj Sat Flow, veh/h/ln                  | 1752        | 1752      | 1752        | 1500        | 1500     | 1500 | 1707        | 1707         | 1707         | 1796        | 1796         | 1796         |
| Adj Flow Rate, veh/h                    | 25          | 0         | 0           | 3           | 0        | 0    | 18          | 682          | 5            | 53          | 1433         | 44           |
| Peak Hour Factor                        | 0.99        | 0.99      | 0.99        | 0.99        | 0.99     | 0.99 | 0.99        | 0.99         | 0.99         | 0.99        | 0.99         | 0.99         |
| Percent Heavy Veh, %                    | 10          | 10        | 10          | 27          | 27       | 27   | 13          | 13           | 13           | 7           | 7            | 7            |
| Cap, veh/h                              | 263         | 0         | 193         | 244         | 0        | 0    | 27          | 2180         | 16           | 66          | 2304         | 71           |
| Arrive On Green                         | 0.13        | 0.00      | 0.00        | 0.13        | 0.00     | 0.00 | 0.02        | 0.66         | 0.66         | 0.04        | 0.68         | 0.68         |
| Sat Flow, veh/h                         | 1266        | 0         | 1485        | 1119        | 0        | 0    | 1626        | 3300         | 24           | 1711        | 3376         | 103          |
| Grp Volume(v), veh/h                    | 25          | 0         | 0           | 3           | 0        | 0    | 18          | 335          | 352          | 53          | 723          | 754          |
| Grp Sat Flow(s),veh/h/ln                | 1266        | 0         | 1485        | 1119        | 0        | 0    | 1626        | 1622         | 1702         | 1711        | 1706         | 1773         |
| Q Serve(g_s), s                         | 1.1         | 0.0       | 0.0         | 0.0         | 0.0      | 0.0  | 0.8         | 6.5          | 6.5          | 2.3         | 17.1         | 17.2         |
| Cycle Q Clear(g_c), s                   | 1.3         | 0.0       | 0.0         | 0.1         | 0.0      | 0.0  | 0.8         | 6.5          | 6.5          | 2.3         | 17.1         | 17.2         |
| Prop In Lane                            | 1.00        | ٥         | 1.00        | 1.00        | ٥        | 0.00 | 1.00        | 1071         | 0.01         | 1.00        | 1105         | 0.06         |
| Lane Grp Cap(c), veh/h                  | 263         | 0         | 193         | 244         | 0.00     | 0    | 27          | 1071         | 1124         | 66          | 1165         | 1210         |
| V/C Ratio(X)                            | 0.10<br>512 | 0.00      | 0.00<br>486 | 0.01<br>458 | 0.00     | 0.00 | 0.66<br>533 | 0.31<br>1071 | 0.31<br>1124 | 0.80<br>560 | 0.62<br>1165 | 0.62         |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 1.00        | 1.00      | 1.00        | 1.00        | 1.00     | 1.00 | 1.00        | 1.00         | 1.00         | 1.00        | 1.00         | 1210<br>1.00 |
| Upstream Filter(I)                      | 1.00        | 0.00      | 0.00        | 1.00        | 0.00     | 0.00 | 1.00        | 1.00         | 1.00         | 1.00        | 1.00         | 1.00         |
| Uniform Delay (d), s/veh                | 28.2        | 0.00      | 0.00        | 27.8        | 0.00     | 0.00 | 35.8        | 5.3          | 5.3          | 34.9        | 6.4          | 6.4          |
| Incr Delay (d2), s/veh                  | 0.1         | 0.0       | 0.0         | 0.0         | 0.0      | 0.0  | 9.7         | 0.8          | 0.7          | 8.0         | 2.5          | 2.4          |
| Initial Q Delay(d3),s/veh               | 0.0         | 0.0       | 0.0         | 0.0         | 0.0      | 0.0  | 0.0         | 0.0          | 0.0          | 0.0         | 0.0          | 0.0          |
| %ile BackOfQ(50%),veh/ln                | 0.4         | 0.0       | 0.0         | 0.0         | 0.0      | 0.0  | 0.4         | 1.9          | 2.0          | 1.1         | 5.3          | 5.5          |
| Unsig. Movement Delay, s/veh            |             | 0.0       | 0.0         | 0.0         | 0.0      | 0.0  | 0.4         | 1.0          | 2.0          | 1.1         | 0.0          | 5.5          |
| LnGrp Delay(d),s/veh                    | 28.3        | 0.0       | 0.0         | 27.8        | 0.0      | 0.0  | 45.5        | 6.1          | 6.0          | 42.9        | 8.9          | 8.8          |
| LnGrp LOS                               | 20.5<br>C   | Α         | Α           | C C         | Α        | Α    | 75.5<br>D   | Α            | Α            | 72.3<br>D   | Α            | Α            |
| Approach Vol, veh/h                     |             | 25        |             |             | 3        |      |             | 705          |              |             | 1530         |              |
| Approach Delay, s/veh                   |             | 28.3      |             |             | 27.8     |      |             | 7.1          |              |             | 10.1         |              |
| Approach LOS                            |             | 20.5<br>C |             |             | C C      |      |             | A            |              |             | В            |              |
|   |             |           |             |             |          |      |             |              |              |             |              |              |
| Timer - Assigned Phs                    | 1           | 2         |             | 4           | 5        | 6    |             | 8            |              |             |              |              |
| Phs Duration (G+Y+Rc), s                | 6.8         | 52.9      |             | 13.5        | 5.2      | 54.5 |             | 13.5         |              |             |              |              |
| Change Period (Y+Rc), s                 | 4.0         | 4.5       |             | 4.0         | 4.0      | 4.5  |             | 4.0          |              |             |              |              |
| Max Green Setting (Gmax), s             | 24.0        | 30.0      |             | 24.0        | 24.0     | 50.0 |             | 24.0         |              |             |              |              |
| Max Q Clear Time (g_c+l1), s            | 4.3         | 8.5       |             | 3.3         | 2.8      | 19.2 |             | 2.1          |              |             |              |              |
| Green Ext Time (p_c), s                 | 0.0         | 2.8       |             | 0.0         | 0.0      | 8.6  |             | 0.0          |              |             |              |              |
| Intersection Summary                    |             |           |             |             |          |      |             |              |              |             |              |              |
| HCM 6th Ctrl Delay                      |             |           | 9.4         |             |          |      |             |              |              |             |              |              |
| HCM 6th LOS                             |             |           | Α           |             |          |      |             |              |              |             |              |              |

|   | ၨ        | <b>→</b>     | •         | •     | <b>←</b> | •    | •    | <b>†</b>     | /     | <b>&gt;</b> | ļ   | 4   |
|---|----------|--------------|-----------|-------|----------|------|------|--------------|-------|-------------|-----|-----|
| Movement                                | EBL      | EBT          | EBR       | WBL   | WBT      | WBR  | NBL  | NBT          | NBR   | SBL         | SBT | SBR |
| Lane Configurations                     | ሻሻ       | <b>∱</b> }   | 7         | 1/1   | <b>†</b> | 77   | 1,4  | <b>^</b>     | 77    |             |     |     |
| Traffic Volume (veh/h)                  | 501      | 1975         | 642       | 452   | 220      | 748  | 226  | 64           | 1139  | 0           | 0   | 0   |
| Future Volume (veh/h)                   | 501      | 1975         | 642       | 452   | 220      | 748  | 226  | 64           | 1139  | 0           | 0   | 0   |
| Initial Q (Qb), veh                     | 16       | 8            | 16        | 0     | 0        | 0    | 0    | 0            | 10    |             |     |     |
| Ped-Bike Adj(A_pbT)                     | 1.00     |              | 0.97      | 1.00  |          | 1.00 | 1.00 |              | 1.00  |             |     |     |
| Parking Bus, Adj                        | 1.00     | 1.00         | 1.00      | 1.00  | 1.00     | 1.00 | 1.00 | 1.00         | 1.00  |             |     |     |
| Work Zone On Approach                   |          | No           |           |       | No       |      |      | No           |       |             |     |     |
| Adj Sat Flow, veh/h/ln                  | 1870     | 1870         | 1870      | 1648  | 1648     | 1648 | 1856 | 1856         | 1856  |             |     |     |
| Adj Flow Rate, veh/h                    | 506      | 1995         | 446       | 457   | 222      | 285  | 228  | 65           | 1151  |             |     |     |
| Peak Hour Factor                        | 0.99     | 0.99         | 0.99      | 0.99  | 0.99     | 0.99 | 0.99 | 0.99         | 0.99  |             |     |     |
| Percent Heavy Veh, %                    | 2        | 2            | 2         | 17    | 17       | 17   | 3    | 3            | 3     |             |     |     |
| Cap, veh/h                              | 642      | 1949         | 805       | 386   | 731      | 1090 | 805  | 828          | 1000  |             |     |     |
| Arrive On Green                         | 0.17     | 0.52         | 0.52      | 0.13  | 0.48     | 0.48 | 0.23 | 0.23         | 0.23  |             |     |     |
| Sat Flow, veh/h                         | 3563     | 3741         | 1545      | 3045  | 1648     | 2458 | 3428 | 3526         | 2768  |             |     |     |
| Grp Volume(v), veh/h                    | 506      | 1995         | 446       | 457   | 222      | 285  | 228  | 65           | 1151  |             |     |     |
| Grp Sat Flow(s), veh/h/ln               | 1781     | 1870         | 1545      | 1522  | 1648     | 1229 | 1714 | 1763         | 1384  |             |     |     |
| Q Serve(g_s), s                         | 14.7     | 55.5         | 20.7      | 13.5  | 8.6      | 7.3  | 5.8  | 1.5          | 25.0  |             |     |     |
| Cycle Q Clear(g_c), s                   | 14.7     | 55.5         | 20.7      | 13.5  | 8.6      | 7.3  | 5.8  | 1.5          | 25.0  |             |     |     |
| Prop In Lane                            | 1.00     | 55.5         | 1.00      | 1.00  | 0.0      | 1.00 | 1.00 | 1.5          | 1.00  |             |     |     |
| Lane Grp Cap(c), veh/h                  | 642      | 1949         | 805       | 386   | 731      | 1090 | 805  | 828          | 1000  |             |     |     |
| V/C Ratio(X)                            | 0.79     | 1.02         | 0.55      | 1.18  | 0.30     | 0.26 | 0.28 | 0.08         | 1.15  |             |     |     |
|   | 789      | 1949         | 805       | 386   | 791      | 1180 | 805  | 828          | 1000  |             |     |     |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 1.00     | 1.00         | 1.00      | 1.00  | 1.00     | 1.00 | 1.00 | 1.00         | 1.00  |             |     |     |
|   |          |              | 1.00      |       | 1.00     | 1.00 | 1.00 |              | 1.00  |             |     |     |
| Upstream Filter(I)                      | 1.00     | 1.00<br>25.5 | 18.7      | 1.00  | 19.1     | 18.7 |      | 1.00<br>31.8 | 34.0  |             |     |     |
| Uniform Delay (d), s/veh                | 42.6     |              |           | 46.5  |          |      | 33.4 |              |       |             |     |     |
| Incr Delay (d2), s/veh                  | 4.0      | 26.5         | 1.1       | 106.2 | 0.3      | 0.2  | 0.1  | 0.0          | 79.4  |             |     |     |
| Initial Q Delay(d3),s/veh               | 21.2     | 14.8         | 6.4       | 0.0   | 0.0      | 0.0  | 0.0  | 0.0          | 36.0  |             |     |     |
| %ile BackOfQ(50%),veh/ln                | 9.6      | 34.6         | 11.0      | 10.8  | 3.6      | 2.3  | 2.4  | 0.7          | 40.3  |             |     |     |
| Unsig. Movement Delay, s/veh            |          | 00.0         | 00.4      | 450.7 | 40.4     | 40.0 | 22.5 | 24.0         | 440.4 |             |     |     |
| LnGrp Delay(d),s/veh                    | 67.8     | 66.8         | 26.1      | 152.7 | 19.4     | 18.9 | 33.5 | 31.8         | 149.4 |             |     |     |
| LnGrp LOS                               | <u>E</u> | F            | С         | F     | В        | В    | С    | С            | F     |             |     |     |
| Approach Vol, veh/h                     |          | 2947         |           |       | 964      |      |      | 1444         |       |             |     |     |
| Approach Delay, s/veh                   |          | 60.8         |           |       | 82.4     |      |      | 125.8        |       |             |     |     |
| Approach LOS                            |          | Е            |           |       | F        |      |      | F            |       |             |     |     |
| Timer - Assigned Phs                    | 1        | 2            |           | 4     | 5        | 6    |      |              |       |             |     |     |
| Phs Duration (G+Y+Rc), s                | 17.0     | 60.5         |           | 29.0  | 21.4     | 56.1 |      |              |       |             |     |     |
| Change Period (Y+Rc), s                 | 3.5      | 5.0          |           | 4.0   | 3.5      | 5.0  |      |              |       |             |     |     |
| Max Green Setting (Gmax), s             | 13.5     | 55.5         |           | 25.0  | 23.6     | 45.4 |      |              |       |             |     |     |
| Max Q Clear Time (g_c+l1), s            | 15.5     | 57.5         |           | 27.0  | 16.7     | 10.6 |      |              |       |             |     |     |
| Green Ext Time (p_c), s                 | 0.0      | 0.0          |           | 0.0   | 1.2      | 5.4  |      |              |       |             |     |     |
| Intersection Summary                    |          |              |           |       |          |      |      |              |       |             |     |     |
| HCM 6th Ctrl Delay                      |          |              | 82.2      |       |          |      |      |              |       |             |     |     |
| HCM 6th LOS                             |          |              | 02.Z<br>F |       |          |      |      |              |       |             |     |     |
| Notes                                   |          |              | •         |       |          |      |      |              |       |             |     |     |

|                                     | •           | <b>→</b>     | •           | •           | <b>←</b>   | •           | 4    | <b>†</b>    | /           | <b>&gt;</b> | ţ           | 4           |
|-------------------------------------|-------------|--------------|-------------|-------------|------------|-------------|------|-------------|-------------|-------------|-------------|-------------|
| Movement                            | EBL         | EBT          | EBR         | WBL         | WBT        | WBR         | NBL  | NBT         | NBR         | SBL         | SBT         | SBR         |
| Lane Configurations                 | ሻ           | <b>↑</b> ↑₽  |             | ሻሻ          | <b>∱</b> ∱ |             | ሻ    | <b>↑</b>    | 77          | ሻሻሻ         | <b>•</b>    | 7           |
| Traffic Volume (veh/h)              | 142         | 1716         | 38          | 105         | 179        | 162         | 23   | 205         | 585         | 817         | 328         | 211         |
| Future Volume (veh/h)               | 142         | 1716         | 38          | 105         | 179        | 162         | 23   | 205         | 585         | 817         | 328         | 211         |
| Initial Q (Qb), veh                 | 0           | 50           | 0           | 0           | 0          | 0           | 0    | 0           | 12          | 24          | 24          | 0           |
| Ped-Bike Adj(A_pbT)                 | 1.00        |              | 0.98        | 1.00        |            | 1.00        | 1.00 |             | 1.00        | 1.00        |             | 0.97        |
| Parking Bus, Adj                    | 1.00        | 1.00         | 1.00        | 1.00        | 1.00       | 1.00        | 1.00 | 1.00        | 1.00        | 1.00        | 1.00        | 1.00        |
| Work Zone On Approach               | 4005        | No           | 4005        | 4000        | No         | 4000        | 4070 | No          | 4070        | 4000        | No          | 4000        |
| Adj Sat Flow, veh/h/ln              | 1885        | 1885         | 1885        | 1826        | 1826       | 1826        | 1870 | 1870        | 1870        | 1826        | 1826        | 1826        |
| Adj Flow Rate, veh/h                | 143         | 1733         | 35          | 106         | 181        | 39          | 23   | 207         | 591         | 825         | 331         | 61          |
| Peak Hour Factor                    | 0.99        | 0.99         | 0.99        | 0.99        | 0.99       | 0.99        | 0.99 | 0.99        | 0.99        | 0.99        | 0.99        | 0.99        |
| Percent Heavy Veh, %                | 1           | 1            | 1           | 5           | 5          | 5           | 2    | 2           | 2           | 5           | 5           | 5           |
| Cap, veh/h                          | 180         | 1912         | 12          | 661         | 1343       | 283         | 80   | 274         | 641         | 919         | 523         | 435         |
| Arrive On Green                     | 0.10        | 0.36         | 0.36        | 0.07        | 0.35       | 0.35        | 0.05 | 0.14        | 0.14        | 0.19        | 0.28        | 0.28        |
| Sat Flow, veh/h                     | 1795        | 5190         | 105         | 3374        | 2851       | 601         | 1781 | 1870        | 2790        | 4904        | 1826        | 1505        |
| Grp Volume(v), veh/h                | 143         | 1146         | 622         | 106         | 109        | 111         | 23   | 207         | 591         | 825         | 331         | 61          |
| Grp Sat Flow(s),veh/h/ln            | 1795        | 1716         | 1863        | 1687        | 1735       | 1718        | 1781 | 1870        | 1395        | 1635        | 1826        | 1505        |
| Q Serve(g_s), s                     | 6.2         | 25.6         | 25.6        | 2.4         | 3.5        | 3.6         | 1.0  | 8.6         | 8.3         | 13.1        | 12.7        | 2.4         |
| Cycle Q Clear(g_c), s               | 6.2         | 25.6         | 25.6        | 2.4         | 3.5        | 3.6         | 1.0  | 8.6         | 8.3         | 13.1        | 12.7        | 2.4         |
| Prop In Lane                        | 1.00        | 1011         | 0.06<br>681 | 1.00<br>661 | 817        | 0.35<br>809 | 1.00 | 274         | 1.00<br>641 | 1.00        | E00         | 1.00        |
| Lane Grp Cap(c), veh/h V/C Ratio(X) | 180<br>0.80 | 1244<br>0.92 | 0.91        | 0.16        | 0.13       | 0.14        | 0.29 | 274<br>0.75 | 0.92        | 919<br>0.90 | 523<br>0.63 | 435<br>0.14 |
| Avail Cap(c_a), veh/h               | 292         | 1244         | 675         | 253         | 606        | 600         | 200  | 281         | 625         | 919         | 513         | 423         |
| HCM Platoon Ratio                   | 1.00        | 1.00         | 1.00        | 1.00        | 1.00       | 1.00        | 1.00 | 1.00        | 1.00        | 1.00        | 1.00        | 1.00        |
| Upstream Filter(I)                  | 1.00        | 1.00         | 1.00        | 0.97        | 0.97       | 0.97        | 1.00 | 1.00        | 1.00        | 1.00        | 1.00        | 1.00        |
| Uniform Delay (d), s/veh            | 35.2        | 25.5         | 25.5        | 26.9        | 12.2       | 12.2        | 37.0 | 32.8        | 16.3        | 32.5        | 26.7        | 21.1        |
| Incr Delay (d2), s/veh              | 3.1         | 12.5         | 18.9        | 0.0         | 0.3        | 0.3         | 0.7  | 9.6         | 19.3        | 11.2        | 2.0         | 0.1         |
| Initial Q Delay(d3),s/veh           | 0.0         | 60.9         | 49.6        | 0.0         | 0.0        | 0.0         | 0.0  | 0.0         | 32.6        | 47.7        | 41.4        | 0.0         |
| %ile BackOfQ(50%),veh/ln            | 2.8         | 23.9         | 25.2        | 0.8         | 1.0        | 1.1         | 0.4  | 4.4         | 7.1         | 10.7        | 13.6        | 0.8         |
| Unsig. Movement Delay, s/veh        |             | 20.0         | 20.2        | 0.0         | 1.0        |             | 0.4  | 7.7         | 7.1         | 10.7        | 10.0        | 0.0         |
| LnGrp Delay(d),s/veh                | 38.3        | 98.9         | 94.0        | 27.0        | 12.5       | 12.6        | 37.7 | 42.4        | 68.3        | 91.4        | 70.1        | 21.1        |
| LnGrp LOS                           | D           | F            | F           | C           | В          | В           | D    | D           | E           | F           | E           | C           |
| Approach Vol, veh/h                 |             | 1911         | ·           |             | 326        |             |      | 821         |             | •           | 1217        |             |
| Approach Delay, s/veh               |             | 92.8         |             |             | 17.2       |             |      | 60.9        |             |             | 82.1        |             |
| Approach LOS                        |             | F            |             |             | В          |             |      | E           |             |             | F           |             |
|                                     | 1           |              | 3           | 1           |            | 6           | 7    |             |             |             |             |             |
| Timer - Assigned Phs                | 7.0         | 2            |             | 4           | 5          | 6           | 7    | 8           |             |             |             |             |
| Phs Duration (G+Y+Rc), s            | 7.6         | 27.5         | 12.0        | 32.9        | 19.0       | 16.1        | 10.9 | 34.0        |             |             |             |             |
| Change Period (Y+Rc), s             | 4.0         | 5.0          | 4.0         | 5.0         | 4.0        | 5.0         | 5.0  | * 5<br>* 00 |             |             |             |             |
| Max Green Setting (Gmax), s         | 9.0         | 18.0         | 13.0        | 22.0        | 15.0       | 12.0        | 6.0  | * 29        |             |             |             |             |
| Max Q Clear Time (g_c+l1), s        | 3.0         | 14.7         | 8.2         | 5.6         | 15.1       | 10.6        | 4.4  | 27.6        |             |             |             |             |
| Green Ext Time (p_c), s             | 0.0         | 0.5          | 0.1         | 0.6         | 0.0        | 0.5         | 0.0  | 1.1         |             |             |             |             |
| Intersection Summary                |             |              |             |             |            |             |      |             |             |             |             |             |
| HCM 6th Ctrl Delay                  |             |              | 77.9        |             |            |             |      |             |             |             |             |             |
| HCM 6th LOS                         |             |              | Е           |             |            |             |      |             |             |             |             |             |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier. User approved changes to right turn type.

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b> | 4    | 1    | <b>†</b>       | ~    | <b>/</b> | <b>†</b> | ✓    |
|------------------------------|------|----------|------|------|----------|------|------|----------------|------|----------|----------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT            | NBR  | SBL      | SBT      | SBR  |
| Lane Configurations          | ሻሻ   | ₽        |      |      | 4        |      | ሻ    | <del>(</del> î |      |          | र्स      | 77   |
| Traffic Volume (veh/h)       | 1315 | 2        | 74   | 1    | 0        | 5    | 40   | 109            | 3    | 2        | 150      | 942  |
| Future Volume (veh/h)        | 1315 | 2        | 74   | 1    | 0        | 5    | 40   | 109            | 3    | 2        | 150      | 942  |
| Initial Q (Qb), veh          | 24   | 0        | 0    | 0    | 0        | 0    | 0    | 0              | 0    | 0        | 0        | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 1.00 | 1.00 |          | 1.00 | 1.00 |                | 0.96 | 0.99     |          | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00           | 1.00 | 1.00     | 1.00     | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No             |      |          | No       |      |
| Adj Sat Flow, veh/h/ln       | 1856 | 1856     | 1856 | 1411 | 1411     | 1411 | 1781 | 1781           | 1781 | 1767     | 1767     | 1767 |
| Adj Flow Rate, veh/h         | 1328 | 2        | 34   | 1    | 0        | 0    | 40   | 110            | 2    | 2        | 152      | 666  |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99 | 0.99           | 0.99 | 0.99     | 0.99     | 0.99 |
| Percent Heavy Veh, %         | 3    | 3        | 3    | 33   | 33       | 33   | 8    | 8              | 8    | 9        | 9        | 9    |
| Cap, veh/h                   | 1720 | 44       | 751  | 3    | 0        | 0    | 58   | 531            | 10   | 75       | 369      | 1876 |
| Arrive On Green              | 0.48 | 0.48     | 0.48 | 0.00 | 0.00     | 0.00 | 0.03 | 0.32           | 0.32 | 0.22     | 0.22     | 0.22 |
| Sat Flow, veh/h              | 3428 | 88       | 1498 | 1344 | 0        | 0    | 1697 | 1743           | 32   | 6        | 1758     | 2635 |
| Grp Volume(v), veh/h         | 1328 | 0        | 36   | 1    | 0        | 0    | 40   | 0              | 112  | 154      | 0        | 666  |
| Grp Sat Flow(s),veh/h/ln     | 1714 | 0        | 1586 | 1344 | 0        | 0    | 1697 | 0              | 1774 | 1764     | 0        | 1317 |
| Q Serve(g_s), s              | 15.5 | 0.0      | 0.6  | 0.0  | 0.0      | 0.0  | 1.1  | 0.0            | 2.2  | 0.0      | 0.0      | 4.8  |
| Cycle Q Clear(g_c), s        | 15.5 | 0.0      | 0.6  | 0.0  | 0.0      | 0.0  | 1.1  | 0.0            | 2.2  | 3.5      | 0.0      | 4.8  |
| Prop In Lane                 | 1.00 |          | 0.94 | 1.00 | _        | 0.00 | 1.00 |                | 0.02 | 0.01     |          | 1.00 |
| Lane Grp Cap(c), veh/h       | 1720 | 0        | 796  | 3    | 0        | 0    | 58   | 0              | 541  | 444      | 0        | 1876 |
| V/C Ratio(X)                 | 0.77 | 0.00     | 0.05 | 0.37 | 0.00     | 0.00 | 0.69 | 0.00           | 0.21 | 0.35     | 0.00     | 0.36 |
| Avail Cap(c_a), veh/h        | 4794 | 0        | 2218 | 199  | 0        | 0    | 216  | 0              | 1316 | 1046     | 0        | 2722 |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00           | 1.00 | 1.00     | 1.00     | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 0.00 | 1.00 | 0.00           | 1.00 | 1.00     | 0.00     | 1.00 |
| Uniform Delay (d), s/veh     | 10.7 | 0.0      | 6.3  | 25.7 | 0.0      | 0.0  | 24.6 | 0.0            | 13.6 | 17.9     | 0.0      | 2.7  |
| Incr Delay (d2), s/veh       | 0.3  | 0.0      | 0.0  | 67.0 | 0.0      | 0.0  | 13.7 | 0.0            | 0.1  | 0.5      | 0.0      | 0.1  |
| Initial Q Delay(d3),s/veh    | 6.2  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 0.0            | 0.0  | 0.0      | 0.0      | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 7.2  | 0.0      | 0.1  | 0.1  | 0.0      | 0.0  | 0.7  | 0.0            | 0.9  | 1.5      | 0.0      | 3.7  |
| Unsig. Movement Delay, s/veh |      | 0.0      | 0.0  | 00.7 | 0.0      | 0.0  | 20.2 | 0.0            | 40.0 | 40.0     | 0.0      | 0.0  |
| LnGrp Delay(d),s/veh         | 17.1 | 0.0      | 6.3  | 92.7 | 0.0      | 0.0  | 38.3 | 0.0            | 13.8 | 18.3     | 0.0      | 2.9  |
| LnGrp LOS                    | В    | A        | Α    | F    | A        | A    | D    | A              | В    | В        | A        | A    |
| Approach Vol, veh/h          |      | 1364     |      |      | 1        |      |      | 152            |      |          | 820      |      |
| Approach Delay, s/veh        |      | 16.8     |      |      | 92.7     |      |      | 20.2           |      |          | 5.8      |      |
| Approach LOS                 |      | В        |      |      | F        |      |      | С              |      |          | Α        |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    |          | 6    |      | 8              |      |          |          |      |
| Phs Duration (G+Y+Rc), s     | 4.6  | 13.8     |      | 3.1  |          | 18.4 |      | 25.8           |      |          |          |      |
| Change Period (Y+Rc), s      | 3.0  | 3.5      |      | 3.0  |          | 3.5  |      | 3.0            |      |          |          |      |
| Max Green Setting (Gmax), s  | 6.0  | 26.0     |      | 7.0  |          | 35.0 |      | 66.0           |      |          |          |      |
| Max Q Clear Time (g_c+l1), s | 3.1  | 6.8      |      | 2.0  |          | 4.2  |      | 17.5           |      |          |          |      |
| Green Ext Time (p_c), s      | 0.0  | 3.5      |      | 0.0  |          | 0.3  |      | 5.3            |      |          |          |      |
| Intersection Summary         |      |          |      |      |          |      |      |                |      |          |          |      |
| HCM 6th Ctrl Delay           |      |          | 13.2 |      |          |      |      |                |      |          |          |      |
| HCM 6th LOS                  |      |          | В    |      |          |      |      |                |      |          |          |      |

|   | •            | -     | •      | •     | ←         | •          | <b>1</b> | <b>†</b> | ~         | -     | ţ        | 1    |
|---|--------------|-------|--------|-------|-----------|------------|----------|----------|-----------|-------|----------|------|
| Movement  | EBL          | EBT   | EBR    | WBL   | WBT       | WBR        | NBL      | NBT      | NBR       | SBL   | SBT      | SBR  |
| Lane Configurations                                     | ሻ            | f)    |        | 77    | <b>†</b>  | 7          | ሻ        | <b>^</b> | 7         | 44    | <b>^</b> | 7    |
| Traffic Volume (vph)                                    | 186          | 292   | 119    | 430   | 191       | 146        | 35       | 434      | 469       | 1478  | 556      | 124  |
| Future Volume (vph)                                     | 186          | 292   | 119    | 430   | 191       | 146        | 35       | 434      | 469       | 1478  | 556      | 124  |
| Ideal Flow (vphpl)                                      | 1900         | 1900  | 1900   | 1900  | 1900      | 1900       | 1900     | 1900     | 1900      | 1900  | 1900     | 1900 |
| Total Lost time (s)                                     | 4.0          | 4.0   |        | 4.9   | 4.9       | 4.9        | 4.9      | 4.9      | 4.9       | 4.9   | 4.9      | 4.9  |
| Lane Util. Factor                                       | 1.00         | 1.00  |        | 0.97  | 1.00      | 1.00       | 1.00     | 0.95     | 1.00      | 0.97  | 0.95     | 1.00 |
| Frpb, ped/bikes   | 1.00         | 0.97  |        | 1.00  | 1.00      | 1.00       | 1.00     | 1.00     | 1.00      | 1.00  | 1.00     | 0.92 |
| 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         | 0.96  |        | 1.00  | 1.00      | 0.85       | 1.00     | 1.00     | 0.85      | 1.00  | 1.00     | 0.85 |
| Flt Protected   | 0.95         | 1.00  |        | 0.95  | 1.00      | 1.00       | 0.95     | 1.00     | 1.00      | 0.95  | 1.00     | 1.00 |
| Satd. Flow (prot)                                       | 1593         | 1563  |        | 2814  | 1527      | 1298       | 1464     | 2927     | 1309      | 3030  | 3124     | 1281 |
| Flt Permitted   | 0.95         | 1.00  |        | 0.95  | 1.00      | 1.00       | 0.95     | 1.00     | 1.00      | 0.95  | 1.00     | 1.00 |
| Satd. Flow (perm)                                       | 1593         | 1563  |        | 2814  | 1527      | 1298       | 1464     | 2927     | 1309      | 3030  | 3124     | 1281 |
| 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)   | 188          | 295   | 120    | 434   | 193       | 147        | 35       | 438      | 474       | 1493  | 562      | 125  |
| RTOR Reduction (vph)                                    | 0            | 14    | 0      | 0     | 0         | 129        | 0        | 0        | 0         | 0     | 0        | 83   |
| Lane Group Flow (vph)                                   | 188          | 401   | 0      | 434   | 193       | 18         | 35       | 438      | 474       | 1493  | 562      | 42   |
| Confl. Peds. (#/hr)                                     |              |       | 58     |       |           |            |          |          |           |       |          | 20   |
| Confl. Bikes (#/hr)                                     |              |       | 9      |       |           |            |          |          | 3         |       |          | 3    |
| Heavy Vehicles (%)                                      | 2%           | 2%    | 2%     | 12%   | 12%       | 12%        | 11%      | 11%      | 11%       | 4%    | 4%       | 4%   |
| Turn Type   | Split        | NA    |        | Split | NA        | Perm       | Split    | NA       | custom    | Split | NA       | Perm |
| Protected Phases  | 4            | 4     |        | 7     | 7         |            | 6        | 6        | 2 6 7!    | 2!    | 2        |      |
| Permitted Phases  |              |       |        |       |           | 7          |          |          |           |       |          | 2    |
| Actuated Green, G (s)                                   | 26.0         | 26.0  |        | 13.1  | 13.1      | 13.1       | 12.1     | 12.1     | 70.1      | 35.1  | 35.1     | 35.1 |
| Effective Green, g (s)                                  | 26.0         | 26.0  |        | 13.1  | 13.1      | 13.1       | 12.1     | 12.1     | 70.1      | 35.1  | 35.1     | 35.1 |
| Actuated g/C Ratio                                      | 0.25         | 0.25  |        | 0.12  | 0.12      | 0.12       | 0.12     | 0.12     | 0.67      | 0.33  | 0.33     | 0.33 |
| Clearance Time (s)                                      | 4.0          | 4.0   |        | 4.9   | 4.9       | 4.9        | 4.9      | 4.9      |           | 4.9   | 4.9      | 4.9  |
| Vehicle Extension (s)                                   | 2.0          | 2.0   |        | 3.0   | 3.0       | 3.0        | 2.5      | 2.5      |           | 2.0   | 2.0      | 2.0  |
| Lane Grp Cap (vph)                                      | 394          | 387   |        | 351   | 190       | 161        | 168      | 337      | 873       | 1012  | 1044     | 428  |
| v/s Ratio Prot  | 0.12         | c0.26 |        | c0.15 | 0.13      |            | 0.02     | c0.15    | 0.36      | c0.49 | 0.18     |      |
| v/s Ratio Perm  |              |       |        |       |           | 0.01       |          |          |           |       |          | 0.03 |
| v/c Ratio   | 0.48         | 1.04  |        | 1.24  | 1.02      | 0.11       | 0.21     | 1.30     | 0.54      | 1.48  | 0.54     | 0.10 |
| Uniform Delay, d1                                       | 33.7         | 39.5  |        | 46.0  | 46.0      | 40.8       | 42.1     | 46.5     | 9.1       | 35.0  | 28.4     | 24.1 |
| 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                                   | 0.3          | 55.2  |        | 128.6 | 69.5      | 0.3        | 0.5      | 155.0    | 0.5       | 219.3 | 2.0      | 0.5  |
| Delay (s)   | 34.0         | 94.7  |        | 174.5 | 115.4     | 41.1       | 42.6     | 201.5    | 9.6       | 254.2 | 30.4     | 24.5 |
| Level of Service  | С            | F     |        | F     | F         | D          | D        | F        | A         | F     | C        | С    |
| Approach Delay (s)                                      |              | 75.8  |        |       | 134.5     |            |          | 99.6     |           |       | 183.3    |      |
| Approach LOS  |              | Е     |        |       | F         |            |          | F        |           |       | F        |      |
| Intersection Summary                                    |              |       |        |       |           |            |          |          |           |       |          |      |
| HCM 2000 Control Delay                                  | aite e matia |       | 142.9  | Н     | CM 2000   | Level of S | Service  |          | F         |       |          |      |
| HCM 2000 Volume to Capac                                | city ratio   |       | 1.28   |       |           | time (a)   |          |          | 10.7      |       |          |      |
| Actuated Cycle Length (s) Intersection Capacity Utiliza | tion         |       | 105.0  |       | um of los | of Service |          |          | 18.7<br>H |       |          |      |
|   | uon          |       | 117.0% | IC    | Level (   | or Service |          |          | П         |       |          |      |
| Analysis Period (min) ! Phase conflict between la       | ano groupe   |       | 15     |       |           |            |          |          |           |       |          |      |
| 0.111 0   | ane groups   |       |        |       |           |            |          |          |           |       |          |      |
| c Critical Lane Group                                   |              |       |        |       |           |            |          |          |           |       |          |      |

|                               | •          | <b>→</b> | <b>+</b>        | •    | <b>/</b>    | 4              |    |      |
|-------------------------------|------------|----------|-----------------|------|-------------|----------------|----|------|
| Movement                      | EBL        | EBT      | WBT             | WBR  | SBL         | SBR            |    |      |
| Lane Configurations           | ሻ          | <b>^</b> | <del>ተ</del> ተጉ |      | *           | 7              |    |      |
| Traffic Volume (vph)          | 108        | 2159     | 1020            | 42   | 55          | 43             |    |      |
| Future Volume (vph)           | 108        | 2159     | 1020            | 42   | 55          | 43             |    |      |
| Ideal Flow (vphpl)            | 1900       | 1900     | 1900            | 1900 | 1900        | 1900           |    |      |
| Total Lost time (s)           | 4.0        | 4.9      | 4.9             |      | 4.2         | 4.2            |    |      |
| Lane Util. Factor             | 1.00       | 0.91     | 0.91            |      | 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)             | 1736       | 4988     | 4563            |      | 1703        | 1524           |    |      |
| Flt Permitted                 | 0.95       | 1.00     | 1.00            |      | 0.95        | 1.00           |    |      |
| Satd. Flow (perm)             | 1736       | 4988     | 4563            |      | 1703        | 1524           |    |      |
| Peak-hour factor, PHF         | 0.99       | 0.99     | 0.99            | 0.99 | 0.99        | 0.99           |    |      |
| Adj. Flow (vph)               | 109        | 2181     | 1030            | 42   | 56          | 43             |    |      |
| RTOR Reduction (vph)          | 0          | 0        | 2               | 0    | 0           | 39             |    |      |
| Lane Group Flow (vph)         | 109        | 2181     | 1070            | 0    | 56          | 4              |    |      |
| Heavy Vehicles (%)            | 4%         | 4%       | 13%             | 13%  | 6%          | 6%             |    |      |
| Turn Type                     | Prot       | NA       | NA              |      | Prot        | Perm           |    |      |
| Protected Phases              | 5          | 2        | 6               |      | 3           |                |    |      |
| Permitted Phases              |            |          |                 |      |             | 3              |    |      |
| Actuated Green, G (s)         | 10.1       | 81.3     | 67.2            |      | 9.6         | 9.6            |    |      |
| Effective Green, g (s)        | 10.1       | 81.3     | 67.2            |      | 9.6         | 9.6            |    |      |
| Actuated g/C Ratio            | 0.10       | 0.81     | 0.67            |      | 0.10        | 0.10           |    |      |
| Clearance Time (s)            | 4.0        | 4.9      | 4.9             |      | 4.2         | 4.2            |    |      |
| Vehicle Extension (s)         | 2.0        | 2.0      | 2.0             |      | 2.0         | 2.0            |    |      |
| Lane Grp Cap (vph)            | 175        | 4055     | 3066            |      | 163         | 146            |    |      |
| v/s Ratio Prot                | c0.06      | c0.44    | 0.23            |      | c0.03       |                |    |      |
| v/s Ratio Perm                |            |          |                 |      |             | 0.00           |    |      |
| v/c Ratio                     | 0.62       | 0.54     | 0.35            |      | 0.34        | 0.03           |    |      |
| Uniform Delay, d1             | 43.1       | 3.1      | 7.0             |      | 42.3        | 41.0           |    |      |
| Progression Factor            | 1.00       | 1.00     | 1.15            |      | 1.00        | 1.00           |    |      |
| Incremental Delay, d2         | 4.9        | 0.5      | 0.3             |      | 0.5         | 0.0            |    |      |
| Delay (s)                     | 48.0       | 3.6      | 8.4             |      | 42.7        | 41.0           |    |      |
| Level of Service              | D          | Α        | Α               |      | D           | D              |    |      |
| Approach Delay (s)            |            | 5.7      | 8.4             |      | 42.0        |                |    |      |
| Approach LOS                  |            | Α        | Α               |      | D           |                |    |      |
| Intersection Summary          |            |          |                 |      |             |                |    |      |
| HCM 2000 Control Delay        |            |          | 7.6             | H    | CM 2000     | Level of Servi | ce | Α    |
| HCM 2000 Volume to Capac      | city ratio |          | 0.57            |      |             |                |    |      |
| Actuated Cycle Length (s)     |            |          | 100.0           | Sı   | um of lost  | time (s)       |    | 17.1 |
| Intersection Capacity Utiliza | tion       |          | 59.3%           | IC   | CU Level of | of Service     |    | В    |
| Analysis Period (min)         |            |          | 15              |      |             |                |    |      |
| c Critical Lane Group         |            |          |                 |      |             |                |    |      |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩020& Oyster Po

|                                | <b></b>    | ۶     | <b>→</b> | •    | •         | +          | •       | •     | <b>†</b> | <i>&gt;</i> | <b>/</b> | <del> </del> |
|--------------------------------|------------|-------|----------|------|-----------|------------|---------|-------|----------|-------------|----------|--------------|
| Movement                       | EBU        | EBL   | EBT      | EBR  | WBL2      | WBT        | WBR     | NBL   | NBT      | NBR         | SBL      | SBT          |
| Lane Configurations            |            | ă     | ተተኈ      |      | ሻ         | ተተኈ        |         | 1,4   | ર્ન      | 7           |          | 4Th          |
| Traffic Volume (vph)           | 1          | 321   | 2016     | 776  | 48        | 887        | 21      | 496   | 92       | 127         | 10       | 16           |
| Future Volume (vph)            | 1          | 321   | 2016     | 776  | 48        | 887        | 21      | 496   | 92       | 127         | 10       | 16           |
| Ideal Flow (vphpl)             | 1900       | 1900  | 1900     | 1900 | 1900      | 1900       | 1900    | 1900  | 1900     | 1900        | 1900     | 1900         |
| Total Lost time (s)            |            | 4.0   | 4.6      |      | 4.0       | 4.6        |         | 4.0   | 4.0      | 4.0         |          | 4.0          |
| Lane Util. Factor              |            | 1.00  | 0.91     |      | 1.00      | 0.91       |         | 0.91  | 0.91     | 1.00        |          | 0.95         |
| Frpb, ped/bikes                |            | 1.00  | 0.99     |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 0.93        |          | 0.98         |
| Flpb, ped/bikes                |            | 1.00  | 1.00     |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 1.00        |          | 1.00         |
| Frt                            |            | 1.00  | 0.96     |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 0.85        |          | 0.91         |
| Flt Protected                  |            | 0.95  | 1.00     |      | 0.95      | 1.00       |         | 0.95  | 0.97     | 1.00        |          | 0.99         |
| Satd. Flow (prot)              |            | 1752  | 4802     |      | 1480      | 4233       |         | 3042  | 1559     | 1391        |          | 2748         |
| Flt Permitted                  |            | 0.95  | 1.00     |      | 0.95      | 1.00       |         | 0.95  | 0.97     | 1.00        |          | 0.99         |
| Satd. Flow (perm)              |            | 1752  | 4802     |      | 1480      | 4233       |         | 3042  | 1559     | 1391        |          | 2748         |
| 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)                | 1          | 324   | 2036     | 784  | 48        | 896        | 21      | 501   | 93       | 128         | 10       | 16           |
| RTOR Reduction (vph)           | 0          | 0     | 0        | 0    | 0         | 1          | 0       | 0     | 0        | 101         | 0        | 60           |
| Lane Group Flow (vph)          | 0          | 325   | 2820     | 0    | 48        | 916        | 0       | 391   | 203      | 27          | 0        | 2            |
| Confl. Peds. (#/hr)            |            |       |          |      |           |            | 9       |       |          | 51          |          |              |
| Confl. Bikes (#/hr)            |            |       |          | 9    |           |            | 1       |       |          | 4           |          |              |
| Heavy Vehicles (%)             | 2%         | 3%    | 3%       | 3%   | 22%       | 22%        | 22%     | 8%    | 8%       | 8%          | 17%      | 17%          |
| Turn Type                      | Prot       | Prot  | NA       |      | Prot      | NA         |         | Split | NA       | Perm        | Split    | NA           |
| Protected Phases               | 1          | 1     | 6        |      | 5         | 2          |         | 4     | 4        |             | . 7      | 7            |
| Permitted Phases               |            |       |          |      |           |            |         |       |          | 4           |          |              |
| Actuated Green, G (s)          |            | 14.3  | 40.9     |      | 7.3       | 33.9       |         | 26.4  | 26.4     | 26.4        |          | 3.4          |
| Effective Green, g (s)         |            | 14.3  | 40.9     |      | 7.3       | 33.9       |         | 26.4  | 26.4     | 26.4        |          | 3.4          |
| Actuated g/C Ratio             |            | 0.11  | 0.32     |      | 0.06      | 0.27       |         | 0.21  | 0.21     | 0.21        |          | 0.03         |
| Clearance Time (s)             |            | 4.0   | 4.6      |      | 4.0       | 4.6        |         | 4.0   | 4.0      | 4.0         |          | 4.0          |
| Vehicle Extension (s)          |            | 2.0   | 3.0      |      | 2.0       | 3.0        |         | 2.0   | 2.0      | 2.0         |          | 2.0          |
| Lane Grp Cap (vph)             |            | 197   | 1551     |      | 85        | 1133       |         | 634   | 325      | 290         |          | 73           |
| v/s Ratio Prot                 |            | c0.19 | c0.59    |      | 0.03      | 0.22       |         | 0.13  | c0.13    |             |          | c0.00        |
| v/s Ratio Perm                 |            |       |          |      |           |            |         |       |          | 0.02        |          |              |
| v/c Ratio                      |            | 1.65  | 1.82     |      | 0.56      | 0.81       |         | 0.62  | 0.62     | 0.09        |          | 0.02         |
| Uniform Delay, d1              |            | 56.1  | 42.8     |      | 58.1      | 43.3       |         | 45.5  | 45.6     | 40.4        |          | 60.0         |
| Progression Factor             |            | 1.00  | 1.00     |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 1.00        |          | 1.00         |
| Incremental Delay, d2          |            | 314.0 | 370.7    |      | 5.0       | 4.3        |         | 1.3   | 2.7      | 0.1         |          | 0.0          |
| Delay (s)                      |            | 370.1 | 413.6    |      | 63.1      | 47.6       |         | 46.8  | 48.3     | 40.5        |          | 60.0         |
| Level of Service               |            | F     | F        |      | Е         | D          |         | D     | D        | D           |          | Е            |
| Approach Delay (s)             |            |       | 409.1    |      |           | 48.4       |         |       | 46.1     |             |          | 60.0         |
| Approach LOS                   |            |       | F        |      |           | D          |         |       | D        |             |          | Е            |
| Intersection Summary           |            |       |          |      |           |            |         |       |          |             |          |              |
| HCM 2000 Control Delay         |            |       | 377.2    | H    | ICM 2000  | Level of   | Service |       | F        |             |          |              |
| HCM 2000 Volume to Capac       | city ratio |       | 1.59     | •    |           | 2010.0.    | 0011100 |       |          |             |          |              |
| Actuated Cycle Length (s)      | ,          |       | 126.6    | .9   | um of los | t time (s) |         |       | 21.1     |             |          |              |
| Intersection Capacity Utilizat | tion       |       | 161.5%   |      | CU Level  |            | )       |       | H        |             |          |              |
| Analysis Period (min)          |            |       | 15       |      |           | 501 VIOC   |         |       |          |             |          |              |
| c Critical Lane Group          |            |       |          |      |           |            |         |       |          |             |          |              |
|                                |            |       |          |      |           |            |         |       |          |             |          |              |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩020& Oyster Po

|                                  | 4    | /     | 4             |
|----------------------------------|------|-------|---------------|
| Movement                         | SBR2 | NER   | NER2          |
| LageConfigurations               |      | 11    | 7             |
| Traffic Volume (vph)             | 36   | 1813  | 654           |
| Future Volume (vph)              | 36   | 1813  | 654           |
| Ideal Flow (vphpl)               | 1900 | 1990  | 1900          |
| Total Lost time (s)              |      | 4.5   | 4.5           |
| Lane Util. Factor                |      | *0.95 | 1.00          |
| Frpb, ped/bikes                  |      | 1.00  | 1.00          |
| Flpb, ped/bikes                  |      | 1.00  | 1.00          |
| Frt                              |      | 1.00  | 0.85          |
| Flt Protected                    |      | 1.00  | 1.00          |
| Satd. Flow (prot)                |      | 3781  | 1615          |
| FIt Permitted                    |      | 1.00  | 1.00          |
| Satd. Flow (perm)                |      | 3781  | 1615          |
| Peak-hour factor, PHF            | 0.99 | 0.99  | 0.99          |
| Adj. Flow (vph)                  | 36   | 1831  | 661           |
| RTOR Reduction (vph)             | 0    | 0     | 0             |
| Lane Group Flow (vph)            | 0    | 1831  | 661           |
| Confl. Peds. (#/hr)              | •    |       | 63            |
| Confl. Bikes (#/hr)              | 2    |       |               |
| Heavy Vehicles (%)               | 17%  | 0%    | 0%            |
| Turn Type                        | ,    | Prot  | Prot          |
| Protected Phases                 |      | 3     | 3             |
| Permitted Phases                 |      |       | •             |
| Actuated Green, G (s)            |      | 27.5  | 27.5          |
| Effective Green, g (s)           |      | 27.5  | 27.5          |
| Actuated g/C Ratio               |      | 0.22  | 0.22          |
| Clearance Time (s)               |      | 4.5   | 4.5           |
| Vehicle Extension (s)            |      | 2.0   | 2.0           |
| Lane Grp Cap (vph)               |      | 821   | 350           |
| v/s Ratio Prot                   |      | c0.48 | 0.41          |
| v/s Ratio Prot<br>v/s Ratio Perm |      | CU.40 | 0.41          |
| v/c Ratio                        |      | 2.23  | 1.89          |
| Uniform Delay, d1                |      | 49.5  | 49.5          |
|                                  |      |       |               |
| Progression Factor               |      | 1.00  | 1.00<br>410.5 |
| Incremental Delay, d2            |      | 557.5 |               |
| Delay (s)                        |      | 607.1 | 460.1         |
| Level of Service                 |      | F     | F             |
| Approach LOS                     |      |       |               |
| Approach LOS                     |      |       |               |
| Intersection Summary             |      |       |               |
|                                  |      |       |               |

|                                | ۶          | <b>→</b>     | •     | •    | <b>←</b>   | •          | •       | <b>†</b> | <b>/</b> | <b>/</b> | <b>↓</b> | -√      |
|--------------------------------|------------|--------------|-------|------|------------|------------|---------|----------|----------|----------|----------|---------|
| Movement                       | EBL        | EBT          | EBR   | WBL  | WBT        | WBR        | NBL     | NBT      | NBR      | SBL      | SBT      | SBR     |
| Lane Configurations            | , j        | <b>∱</b> }   |       | ¥    | <b>∱</b> ∱ |            |         | 4        |          |          | 4        | 7       |
| Traffic Volume (vph)           | 187        | 660          | 3     | 1    | 175        | 36         | 2       | 2        | 1        | 59       | 2        | 120     |
| Future Volume (vph)            | 187        | 660          | 3     | 1    | 175        | 36         | 2       | 2        | 1        | 59       | 2        | 120     |
| Ideal Flow (vphpl)             | 1900       | 1900         | 1900  | 1900 | 1900       | 1900       | 1900    | 1900     | 1900     | 1900     | 1900     | 1900    |
| Total Lost time (s)            | 4.0        | 4.0          |       | 4.0  | 4.0        |            |         | 4.0      |          |          | 4.0      | 4.0     |
| Lane Util. Factor              | 1.00       | 0.95         |       | 1.00 | 0.95       |            |         | 1.00     |          |          | 0.95     | 0.95    |
| Frpb, ped/bikes                | 1.00       | 1.00         |       | 1.00 | 0.99       |            |         | 1.00     |          |          | 1.00     | 1.00    |
| Flpb, ped/bikes                | 1.00       | 1.00         |       | 1.00 | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00    |
| Frt                            | 1.00       | 1.00         |       | 1.00 | 0.97       |            |         | 0.97     |          |          | 0.95     | 0.85    |
| Flt Protected                  | 0.95       | 1.00         |       | 0.95 | 1.00       |            |         | 0.98     |          |          | 0.97     | 1.00    |
| Satd. Flow (prot)              | 1752       | 3502         |       | 1378 | 2672       |            |         | 1812     |          |          | 1394     | 1289    |
| Flt Permitted                  | 0.95       | 1.00         |       | 0.95 | 1.00       |            |         | 1.00     |          |          | 0.81     | 1.00    |
| Satd. Flow (perm)              | 1752       | 3502         |       | 1378 | 2672       |            |         | 1849     |          |          | 1158     | 1289    |
| 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)                | 189        | 667          | 3     | 1    | 177        | 36         | 2       | 2        | 1        | 60       | 2        | 121     |
| RTOR Reduction (vph)           | 0          | 0            | 0     | 0    | 0          | 0          | 0       | 1        | 0        | 0        | 16       | 76      |
| Lane Group Flow (vph)          | 189        | 670          | 0     | 1    | 213        | 0          | 0       | 4        | 0        | 0        | 79       | 12      |
| Confl. Peds. (#/hr)            |            |              |       |      |            | 11         |         |          |          |          |          |         |
| Confl. Bikes (#/hr)            |            |              | 1     |      |            | 1          |         |          |          |          |          |         |
| Heavy Vehicles (%)             | 3%         | 3%           | 3%    | 31%  | 31%        | 31%        | 0%      | 0%       | 0%       | 19%      | 19%      | 19%     |
| Turn Type                      | Prot       | NA           |       | Prot | NA         |            | Perm    | NA       |          | Perm     | NA       | Perm    |
| Protected Phases               | 5          | 2            |       | 1    | 6          |            |         | 3        |          |          | 4        |         |
| Permitted Phases               |            | <del>-</del> |       | •    |            |            | 3       | -        |          | 4        | •        | 4       |
| Actuated Green, G (s)          | 10.7       | 28.0         |       | 0.5  | 17.8       |            |         | 0.6      |          |          | 6.9      | 6.9     |
| Effective Green, g (s)         | 10.7       | 28.0         |       | 0.5  | 17.8       |            |         | 0.6      |          |          | 6.9      | 6.9     |
| Actuated g/C Ratio             | 0.21       | 0.54         |       | 0.01 | 0.34       |            |         | 0.01     |          |          | 0.13     | 0.13    |
| Clearance Time (s)             | 4.0        | 4.0          |       | 4.0  | 4.0        |            |         | 4.0      |          |          | 4.0      | 4.0     |
| Vehicle Extension (s)          | 2.0        | 2.5          |       | 2.0  | 2.5        |            |         | 2.0      |          |          | 2.0      | 2.0     |
| Lane Grp Cap (vph)             | 360        | 1885         |       | 13   | 914        |            |         | 21       |          |          | 153      | 171     |
| v/s Ratio Prot                 | c0.11      | c0.19        |       | 0.00 | 0.08       |            |         |          |          |          | 100      | .,,     |
| v/s Ratio Perm                 | 00.11      | 00.10        |       | 0.00 | 0.00       |            |         | c0.00    |          |          | c0.07    | 0.01    |
| v/c Ratio                      | 0.53       | 0.36         |       | 0.08 | 0.23       |            |         | 0.19     |          |          | 0.52     | 0.07    |
| Uniform Delay, d1              | 18.4       | 6.8          |       | 25.5 | 12.2       |            |         | 25.5     |          |          | 21.0     | 19.7    |
| Progression Factor             | 1.00       | 1.00         |       | 1.00 | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00    |
| Incremental Delay, d2          | 0.6        | 0.1          |       | 0.9  | 0.1        |            |         | 1.6      |          |          | 1.2      | 0.1     |
| Delay (s)                      | 19.0       | 6.9          |       | 26.4 | 12.3       |            |         | 27.1     |          |          | 22.2     | 19.8    |
| Level of Service               | В          | Α            |       | C    | 12.0<br>B  |            |         | C        |          |          | C        | В       |
| Approach Delay (s)             | U U        | 9.6          |       |      | 12.4       |            |         | 27.1     |          |          | 21.1     | <u></u> |
| Approach LOS                   |            | Α            |       |      | В          |            |         | C        |          |          | C        |         |
| Intersection Summary           |            |              |       |      |            |            |         |          |          |          |          |         |
| HCM 2000 Control Delay         |            |              | 11.8  | Н    | CM 2000    | Level of   | Service |          | В        |          |          |         |
| HCM 2000 Volume to Capac       | city ratio |              | 0.46  |      |            |            |         |          |          |          |          |         |
| Actuated Cycle Length (s)      |            |              | 52.0  | S    | um of lost | time (s)   |         |          | 16.0     |          |          |         |
| Intersection Capacity Utilizat | tion       |              | 42.0% |      |            | of Service |         |          | Α        |          |          |         |
| Analysis Period (min)          |            |              | 15    |      |            |            |         |          |          |          |          |         |
| c Critical Lane Group          |            |              |       |      |            |            |         |          |          |          |          |         |

| Intersection              |       |
|---------------------------|-------|
| Intersection Delay, s/veh | 258.5 |
| Intersection LOS          | F     |

| Movement                   | EBL  | EBT  | EBR  | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|------|------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations        |      | ર્ન  | 7    | ሻ     | ĵ.   |      |      | ર્ન  | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 8    | 253  | 37   | 104   | 925  | 13   | 318  | 0    | 112  | 4    | 12   | 39   |
| Future Vol, veh/h          | 8    | 253  | 37   | 104   | 925  | 13   | 318  | 0    | 112  | 4    | 12   | 39   |
| Peak Hour Factor           | 0.95 | 0.95 | 0.95 | 0.95  | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles, %          | 22   | 22   | 22   | 10    | 10   | 10   | 7    | 7    | 7    | 100  | 100  | 100  |
| Mvmt Flow                  | 8    | 266  | 39   | 109   | 974  | 14   | 335  | 0    | 118  | 4    | 13   | 41   |
| Number of Lanes            | 0    | 1    | 1    | 1     | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB   |      |      | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 2    |      |      | 2     |      |      | 1    |      |      | 2    |      |      |
| Conflicting Approach Left  | SB   |      |      | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1    |      |      | 2     |      |      | 2    |      |      | 2    |      |      |
| Conflicting Approach Right | NB   |      |      | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 2    |      |      | 1     |      |      | 2    |      |      | 2    |      |      |
| HCM Control Delay          | 23.5 |      |      | 432.4 |      |      | 30.8 |      |      | 17.6 |      |      |
| HCM LOS                    | С    |      |      | F     |      |      | D    |      |      | С    |      |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1  |  |
|------------------------|-------|-------|-------|-------|-------|-------|--------|--|
| Vol Left, %            | 100%  | 0%    | 3%    | 0%    | 100%  | 0%    | 7%     |  |
| Vol Thru, %            | 0%    | 0%    | 97%   | 0%    | 0%    | 99%   | 22%    |  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 1%    | 71%    |  |
| Sign Control           | Stop   |  |
| Traffic Vol by Lane    | 318   | 112   | 261   | 37    | 104   | 938   | 55     |  |
| LT Vol                 | 318   | 0     | 8     | 0     | 104   | 0     | 4      |  |
| Through Vol            | 0     | 0     | 253   | 0     | 0     | 925   | 12     |  |
| RT Vol                 | 0     | 112   | 0     | 37    | 0     | 13    | 39     |  |
| Lane Flow Rate         | 335   | 118   | 275   | 39    | 109   | 987   | 58     |  |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6      |  |
| Degree of Util (X)     | 0.756 | 0.227 | 0.607 | 0.078 | 0.239 | 2.01  | 0.162  |  |
| Departure Headway (Hd) | 9.669 | 8.421 | 9.206 | 8.457 | 7.852 | 7.329 | 12.249 |  |
| Convergence, Y/N       | Yes    |  |
| Cap                    | 378   | 429   | 396   | 426   | 457   | 504   | 295    |  |
| Service Time           | 7.369 | 6.121 | 6.906 | 6.157 | 5.616 | 5.093 | 10.249 |  |
| HCM Lane V/C Ratio     | 0.886 | 0.275 | 0.694 | 0.092 | 0.239 | 1.958 | 0.197  |  |
| HCM Control Delay      | 36.9  | 13.6  | 25.1  | 11.9  | 13.1  | 478.9 | 17.6   |  |
| HCM Lane LOS           | Е     | В     | D     | В     | В     | F     | С      |  |
| HCM 95th-tile Q        | 6.1   | 0.9   | 3.9   | 0.3   | 0.9   | 67    | 0.6    |  |

|                              | ၨ    | <b>→</b> | •    | <b>√</b> | <b>←</b> | •     | •    | †          | <i>&gt;</i> | <b>/</b> | <b>+</b>   | 4        |
|------------------------------|------|----------|------|----------|----------|-------|------|------------|-------------|----------|------------|----------|
| Movement                     | EBL  | EBT      | EBR  | WBL      | WBT      | WBR   | NBL  | NBT        | NBR         | SBL      | SBT        | SBR      |
| Lane Configurations          | ሻ    | ₽        |      | 7        | ₽        |       | ሻ    | <b>∱</b> ∱ |             | ሻ        | <b>∱</b> ∱ |          |
| Traffic Volume (veh/h)       | 265  | 4        | 61   | 8        | 4        | 27    | 27   | 1162       | 5           | 20       | 420        | 29       |
| Future Volume (veh/h)        | 265  | 4        | 61   | 8        | 4        | 27    | 27   | 1162       | 5           | 20       | 420        | 29       |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0        | 0        | 0     | 0    | 22         | 0           | 0        | 0          | 0        |
| Ped-Bike Adj(A_pbT)          | 0.97 |          | 0.97 | 0.97     |          | 0.96  | 1.00 |            | 0.97        | 1.00     |            | 0.96     |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00     | 1.00     | 1.00  | 1.00 | 1.00       | 1.00        | 1.00     | 1.00       | 1.00     |
| Work Zone On Approach        |      | No       |      |          | No       |       |      | No         |             |          | No         |          |
| Adj Sat Flow, veh/h/ln       | 1885 | 1885     | 1885 | 1648     | 1648     | 1648  | 1796 | 1796       | 1796        | 1811     | 1811       | 1811     |
| Adj Flow Rate, veh/h         | 268  | 4        | 14   | 8        | 4        | 6     | 27   | 1174       | 5           | 20       | 424        | 25       |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99     | 0.99     | 0.99  | 0.99 | 0.99       | 0.99        | 0.99     | 0.99       | 0.99     |
| Percent Heavy Veh, %         | 1    | 1        | 1    | 17       | 17       | 17    | 7    | 7          | 7           | 6        | 6          | 6        |
| Cap, veh/h                   | 438  | 91       | 319  | 389      | 147      | 220   | 79   | 1840       | 7           | 63       | 1708       | 100      |
| Arrive On Green              | 0.25 | 0.25     | 0.25 | 0.25     | 0.25     | 0.25  | 0.05 | 0.53       | 0.53        | 0.04     | 0.52       | 0.52     |
| Sat Flow, veh/h              | 1380 | 360      | 1259 | 1198     | 580      | 870   | 1711 | 3485       | 15          | 1725     | 3295       | 194      |
| Grp Volume(v), veh/h         | 268  | 0        | 18   | 8        | 0        | 10    | 27   | 575        | 604         | 20       | 221        | 228      |
| Grp Sat Flow(s),veh/h/ln     | 1380 | 0        | 1619 | 1198     | 0        | 1450  | 1711 | 1706       | 1793        | 1725     | 1721       | 1768     |
| Q Serve(g_s), s              | 13.6 | 0.0      | 0.6  | 0.4      | 0.0      | 0.4   | 1.1  | 18.0       | 18.0        | 8.0      | 5.3        | 5.4      |
| Cycle Q Clear(g_c), s        | 14.0 | 0.0      | 0.6  | 1.0      | 0.0      | 0.4   | 1.1  | 18.0       | 18.0        | 0.8      | 5.3        | 5.4      |
| Prop In Lane                 | 1.00 |          | 0.78 | 1.00     |          | 0.60  | 1.00 |            | 0.01        | 1.00     |            | 0.11     |
| Lane Grp Cap(c), veh/h       | 438  | 0        | 410  | 389      | 0        | 367   | 79   | 901        | 947         | 63       | 892        | 916      |
| V/C Ratio(X)                 | 0.61 | 0.00     | 0.04 | 0.02     | 0.00     | 0.03  | 0.34 | 0.64       | 0.64        | 0.32     | 0.25       | 0.25     |
| Avail Cap(c_a), veh/h        | 657  | 0        | 667  | 580      | 0        | 597   | 237  | 901        | 947         | 239      | 892        | 916      |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00     | 1.00     | 1.00  | 1.00 | 1.00       | 1.00        | 1.00     | 1.00       | 1.00     |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00     | 0.00     | 1.00  | 1.00 | 1.00       | 1.00        | 0.98     | 0.98       | 0.98     |
| Uniform Delay (d), s/veh     | 26.3 | 0.0      | 21.2 | 21.5     | 0.0      | 21.1  | 34.7 | 13.3       | 13.3        | 35.2     | 10.0       | 10.0     |
| Incr Delay (d2), s/veh       | 0.5  | 0.0      | 0.0  | 0.0      | 0.0      | 0.0   | 1.0  | 3.5        | 3.3         | 1.1      | 0.6        | 0.6      |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0      | 0.0      | 0.0   | 0.0  | 3.0        | 2.7         | 0.0      | 0.0        | 0.0      |
| %ile BackOfQ(50%),veh/ln     | 4.3  | 0.0      | 0.2  | 0.1      | 0.0      | 0.1   | 0.5  | 8.6        | 8.9         | 0.4      | 2.0        | 2.0      |
| Unsig. Movement Delay, s/veh |      |          | 010  | 0.4 =    |          | 0.1.1 |      | 40 =       | 40.0        |          | 10.0       | 40.0     |
| LnGrp Delay(d),s/veh         | 26.8 | 0.0      | 21.2 | 21.5     | 0.0      | 21.1  | 35.6 | 19.7       | 19.2        | 36.3     | 10.6       | 10.6     |
| LnGrp LOS                    | С    | A        | С    | С        | Α        | С     | D    | В          | В           | D        | В          | <u>B</u> |
| Approach Vol, veh/h          |      | 286      |      |          | 18       |       |      | 1206       |             |          | 469        |          |
| Approach Delay, s/veh        |      | 26.5     |      |          | 21.3     |       |      | 19.8       |             |          | 11.7       |          |
| Approach LOS                 |      | С        |      |          | С        |       |      | В          |             |          | В          |          |
| Timer - Assigned Phs         | 1    | 2        |      | 4        | 5        | 6     |      | 8          |             |          |            |          |
| Phs Duration (G+Y+Rc), s     | 6.7  | 44.7     |      | 23.6     | 7.4      | 44.0  |      | 23.6       |             |          |            |          |
| Change Period (Y+Rc), s      | 4.0  | 5.1      |      | 4.6      | 4.0      | 5.1   |      | 4.6        |             |          |            |          |
| Max Green Setting (Gmax), s  | 10.4 | 20.0     |      | 30.9     | 10.4     | 20.0  |      | 30.9       |             |          |            |          |
| Max Q Clear Time (g_c+I1), s | 2.8  | 20.0     |      | 16.0     | 3.1      | 7.4   |      | 3.0        |             |          |            |          |
| Green Ext Time (p_c), s      | 0.0  | 0.0      |      | 0.4      | 0.0      | 1.4   |      | 0.0        |             |          |            |          |
| Intersection Summary         |      |          |      |          |          |       |      |            |             |          |            |          |
| HCM 6th Ctrl Delay           |      |          | 18.9 |          |          |       |      |            |             |          |            |          |
| HCM 6th LOS                  |      |          | В    |          |          |       |      |            |             |          |            |          |

|                              | <b>→</b> | •    | •     | •        | 4    | /    |      |
|------------------------------|----------|------|-------|----------|------|------|------|
| Movement                     | EBT      | EBR  | WBL   | WBT      | NBL  | NBR  |      |
| Lane Configurations          | <b>^</b> | LDIT | ሻ     | <b>^</b> | ሻ    | 77   |      |
| Traffic Volume (veh/h)       | 839      | 141  | 12    | 3341     | 422  | 322  |      |
| Future Volume (veh/h)        | 839      | 141  | 12    | 3341     | 422  | 322  |      |
| Initial Q (Qb), veh          | 0        | 0    | 0     | 0        | 5    | 0    |      |
| Ped-Bike Adj(A_pbT)          | •        | 0.96 | 1.00  | •        | 1.00 | 1.00 |      |
| Parking Bus, Adj             | 1.00     | 1.00 | 1.00  | 1.00     | 1.00 | 1.00 |      |
| Work Zone On Approach        | No       | 1.00 | 1.00  | No       | No   | 1.00 |      |
| Adj Sat Flow, veh/h/ln       | 1781     | 1781 | 1856  | 1856     | 1781 | 1781 |      |
| Adj Flow Rate, veh/h         | 847      | 125  | 12    | 3375     | 426  | 0    |      |
| Peak Hour Factor             | 0.99     | 0.99 | 0.99  | 0.99     | 0.99 | 0.99 |      |
| Percent Heavy Veh, %         | 8        | 8    | 3     | 3        | 8    | 8    |      |
| Cap, veh/h                   | 2186     | 320  | 30    | 2583     | 489  |      |      |
| Arrive On Green              | 1.00     | 1.00 | 0.02  | 0.64     | 0.28 | 0.00 |      |
| Sat Flow, veh/h              | 4416     | 624  | 1767  | 5233     | 1697 | 2657 |      |
| Grp Volume(v), veh/h         | 644      | 328  | 12    | 3375     | 426  | 0    |      |
| Grp Sat Flow(s), veh/h/ln    | 1621     | 1637 | 1767  | 1689     | 1697 | 1329 |      |
| Q Serve(g_s), s              | 0.0      | 0.0  | 0.7   | 64.2     | 24.2 | 0.0  |      |
| Cycle Q Clear(g_c), s        | 0.0      | 0.0  | 0.7   | 64.2     | 24.2 | 0.0  |      |
| Prop In Lane                 | 0.0      | 0.38 | 1.00  | •        | 1.00 | 1.00 |      |
| Lane Grp Cap(c), veh/h       | 1666     | 840  | 30    | 2583     | 489  |      |      |
| V/C Ratio(X)                 | 0.39     | 0.39 | 0.40  | 1.31     | 0.87 |      |      |
| Avail Cap(c_a), veh/h        | 1896     | 957  | 141   | 3251     | 696  |      |      |
| HCM Platoon Ratio            | 2.00     | 2.00 | 1.00  | 1.00     | 1.00 | 1.00 |      |
| Upstream Filter(I)           | 0.98     | 0.98 | 0.09  | 0.09     | 1.00 | 0.00 |      |
| Uniform Delay (d), s/veh     | 1.5      | 1.5  | 48.6  | 24.5     | 34.4 | 0.0  |      |
| Incr Delay (d2), s/veh       | 0.7      | 1.3  | 0.3   | 138.1    | 8.6  | 0.0  |      |
| Initial Q Delay(d3),s/veh    | 0.0      | 0.0  | 0.0   | 0.0      | 5.9  | 0.0  |      |
| %ile BackOfQ(50%),veh/ln     | 0.5      | 0.7  | 0.3   | 51.9     | 12.2 | 0.0  |      |
| Unsig. Movement Delay, s/vel | h        |      |       |          |      |      |      |
| LnGrp Delay(d),s/veh         | 2.1      | 2.8  | 48.9  | 162.6    | 48.8 | 0.0  |      |
| LnGrp LOS                    | Α        | Α    | D     | F        | D    |      |      |
| Approach Vol, veh/h          | 972      |      |       | 3387     | 426  | Α    |      |
| Approach Delay, s/veh        | 2.4      |      |       | 162.2    | 48.8 |      |      |
| Approach LOS                 | Α        |      |       | F        | D    |      |      |
| Timer - Assigned Phs         | 1        | 2    |       |          |      | 6    | 8    |
| Phs Duration (G+Y+Rc), s     | 5.7      | 62.5 |       |          |      | 68.2 | 31.8 |
| Change Period (Y+Rc), s      | 4.0      | 4.0  |       |          |      | 4.0  | 4.0  |
| Max Green Setting (Gmax), s  | 8.0      | 39.0 |       |          |      | 51.0 | 41.0 |
| Max Q Clear Time (g_c+I1), s | 2.7      | 2.0  |       |          |      | 66.2 | 26.2 |
| Green Ext Time (p_c), s      | 0.0      | 4.7  |       |          |      | 0.0  | 1.6  |
| Intersection Summary         |          |      |       |          |      |      |      |
| HCM 6th Ctrl Delay           |          |      | 119.7 |          |      |      |      |
| HCM 6th LOS                  |          |      | F     |          |      |      |      |
| Notes                        |          |      |       |          |      |      |      |

|                              | ۶    | <b>→</b> | •     | •     | <b>←</b> | •     | •     | <b>†</b> | <b>/</b> | <b>/</b> | ţ     | 4    |
|------------------------------|------|----------|-------|-------|----------|-------|-------|----------|----------|----------|-------|------|
| Movement                     | EBL  | EBT      | EBR   | WBL   | WBT      | WBR   | NBL   | NBT      | NBR      | SBL      | SBT   | SBR  |
| Lane Configurations          |      | <b>^</b> | 7     | ሻሻ    | ተተኈ      |       | ሻ     |          | 7        | ች        |       | 7    |
| Traffic Volume (veh/h)       | 162  | 808      | 191   | 762   | 1992     | 490   | 577   | 157      | 416      | 124      | 351   | 771  |
| Future Volume (veh/h)        | 162  | 808      | 191   | 762   | 1992     | 490   | 577   | 157      | 416      | 124      | 351   | 771  |
| Initial Q (Qb), veh          | 0    | 0        | 0     | 0     | 34       | 0     | 0     | 0        | 0        | 0        | 32    | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 0.99  | 1.00  |          | 0.94  | 1.00  |          | 1.00     | 1.00     |       | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00  | 1.00  | 1.00     | 1.00  | 1.00  | 1.00     | 1.00     | 1.00     | 1.00  | 1.00 |
| Work Zone On Approach        |      | No       |       |       | No       |       |       | No       |          |          | No    |      |
| Adj Sat Flow, veh/h/ln       | 1722 | 1722     | 1722  | 1870  | 1870     | 1870  | 1767  | 1767     | 1767     | 1856     | 1856  | 1856 |
| Adj Flow Rate, veh/h         | 164  | 816      | 41    | 770   | 2012     | 467   | 583   | 159      | 0        | 125      | 355   | 0    |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99  | 0.99  | 0.99     | 0.99  | 0.99  | 0.99     | 0.99     | 0.99     | 0.99  | 0.99 |
| Percent Heavy Veh, %         | 12   | 12       | 12    | 2     | 2        | 2     | 9     | 9        | 9        | 3        | 3     | 3    |
| Cap, veh/h                   | 704  | 2959     | 910   | 461   | 1563     | 130   | 325   | 650      |          | 164      | 563   |      |
| Arrive On Green              | 0.22 | 0.42     | 0.42  | 0.18  | 0.44     | 0.44  | 0.19  | 0.23     | 0.00     | 0.09     | 0.13  | 0.00 |
| Sat Flow, veh/h              | 1640 | 4701     | 1440  | 3456  | 4130     | 911   | 1682  | 1767     | 1497     | 1767     | 3526  | 1572 |
| Grp Volume(v), veh/h         | 164  | 816      | 41    | 770   | 1639     | 840   | 583   | 159      | 0        | 125      | 355   | 0    |
| Grp Sat Flow(s),veh/h/ln     | 1640 | 1567     | 1440  | 1728  | 1702     | 1637  | 1682  | 1767     | 1497     | 1767     | 1763  | 1572 |
| Q Serve(g_s), s              | 13.0 | 18.2     | 1.4   | 20.0  | 49.1     | 49.1  | 29.0  | 11.4     | 0.0      | 10.4     | 14.6  | 0.0  |
| Cycle Q Clear(g_c), s        | 13.0 | 18.2     | 1.4   | 20.0  | 49.1     | 49.1  | 29.0  | 11.4     | 0.0      | 10.4     | 14.6  | 0.0  |
| Prop In Lane                 | 1.00 |          | 1.00  | 1.00  |          | 0.56  | 1.00  |          | 1.00     | 1.00     |       | 1.00 |
| Lane Grp Cap(c), veh/h       | 704  | 2959     | 910   | 461   | 1114     | 579   | 325   | 650      |          | 164      | 563   |      |
| V/C Ratio(X)                 | 0.23 | 0.28     | 0.05  | 1.67  | 1.47     | 1.45  | 1.79  | 0.24     |          | 0.76     | 0.63  |      |
| Avail Cap(c_a), veh/h        | 364  | 1983     | 607   | 461   | 1114     | 536   | 325   | 625      |          | 224      | 1020  |      |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00  | 1.33  | 1.33     | 1.33  | 1.00  | 1.00     | 1.00     | 1.00     | 1.00  | 1.00 |
| Upstream Filter(I)           | 0.95 | 0.95     | 0.95  | 0.09  | 0.09     | 0.09  | 1.00  | 1.00     | 0.00     | 1.00     | 1.00  | 0.00 |
| Uniform Delay (d), s/veh     | 27.8 | 13.2     | 16.2  | 61.7  | 42.3     | 42.3  | 60.5  | 33.2     | 0.0      | 66.4     | 61.4  | 0.0  |
| Incr Delay (d2), s/veh       | 0.1  | 0.2      | 0.1   | 302.9 | 212.6    | 203.5 | 368.6 | 0.1      | 0.0      | 6.2      | 0.4   | 0.0  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0   | 0.0   | 73.2     | 70.5  | 0.0   | 0.0      | 0.0      | 0.0      | 62.8  | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 3.8  | 4.2      | 0.5   | 27.9  | 63.6     | 64.2  | 45.6  | 4.1      | 0.0      | 5.0      | 13.9  | 0.0  |
| Unsig. Movement Delay, s/veh |      |          |       |       |          |       |       |          |          |          |       |      |
| LnGrp Delay(d),s/veh         | 27.9 | 13.4     | 16.3  | 364.6 | 328.1    | 316.3 | 429.1 | 33.3     | 0.0      | 72.7     | 124.6 | 0.0  |
| LnGrp LOS                    | С    | В        | В     | F     | F        | F     | F     | С        |          | Е        | F     |      |
| Approach Vol, veh/h          |      | 1021     |       |       | 3249     |       |       | 742      | Α        |          | 480   | Α    |
| Approach Delay, s/veh        |      | 15.9     |       |       | 333.7    |       |       | 344.3    |          |          | 111.1 |      |
| Approach LOS                 |      | В        |       |       | F        |       |       | F        |          |          | F     |      |
| Timer - Assigned Phs         | 1    | 2        | 3     | 4     | 5        | 6     | 7     | 8        |          |          |       |      |
| Phs Duration (G+Y+Rc), s     | 24.0 | 68.2     | 33.9  | 23.9  | 38.2     | 54.0  | 17.9  | 39.9     |          |          |       |      |
| Change Period (Y+Rc), s      | 4.0  | 4.9      | 4.9   | * 4.6 | 4.9      | * 4.9 | 4.0   | 4.9      |          |          |       |      |
| Max Green Setting (Gmax), s  | 20.0 | 40.1     | 29.0  | * 43  | 11.0     | * 49  | 19.0  | 53.1     |          |          |       |      |
| Max Q Clear Time (g_c+l1), s | 22.0 | 20.2     | 31.0  | 16.6  | 15.0     | 51.1  | 12.4  | 13.4     |          |          |       |      |
| Green Ext Time (p_c), s      | 0.0  | 3.9      | 0.0   | 1.4   | 0.0      | 0.0   | 0.1   | 0.5      |          |          |       |      |
| Intersection Summary         |      |          |       |       |          |       |       |          |          |          |       |      |
| HCM 6th Ctrl Delay           |      |          | 256.6 |       |          |       |       |          |          |          |       |      |
| HCM 6th LOS                  |      |          | F     |       |          |       |       |          |          |          |       |      |
|                              |      |          | •     |       |          |       |       |          |          |          |       |      |

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|                                   | ۶          | <b>→</b>  | •          | •          | <b>←</b>   | 4          | 1         | <b>†</b>  | ~         | <b>/</b>  | <b>†</b>  | ✓          |
|-----------------------------------|------------|-----------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|------------|
| Movement                          | EBL        | EBT       | EBR        | WBL        | WBT        | WBR        | NBL       | NBT       | NBR       | SBL       | SBT       | SBR        |
| Lane Configurations               | 14         | <b>^</b>  | 7          | 14.54      | ተተኈ        |            | ሻ         | <b>^</b>  | 7         | ሻ         | <b>†</b>  | 77         |
| Traffic Volume (veh/h)            | 360        | 807       | 181        | 308        | 2390       | 14         | 308       | 60        | 35        | 43        | 448       | 556        |
| Future Volume (veh/h)             | 360        | 807       | 181        | 308        | 2390       | 14         | 308       | 60        | 35        | 43        | 448       | 556        |
| Initial Q (Qb), veh               | 0          | 0         | 0          | 0          | 0          | 0          | 0         | 0         | 0         | 0         | 0         | 0          |
| Ped-Bike Adj(A_pbT)               | 1.00       |           | 0.98       | 1.00       |            | 0.92       | 1.00      |           | 0.98      | 1.00      |           | 0.97       |
| Parking Bus, Adj                  | 1.00       | 1.00      | 1.00       | 1.00       | 1.00       | 1.00       | 1.00      | 1.00      | 1.00      | 1.00      | 1.00      | 1.00       |
| Work Zone On Approach             |            | No        |            |            | No         |            |           | No        |           |           | No        |            |
| Adj Sat Flow, veh/h/ln            | 1663       | 1663      | 1663       | 1856       | 1856       | 1856       | 1767      | 1767      | 1767      | 1826      | 1826      | 1826       |
| Adj Flow Rate, veh/h              | 364        | 815       | 183        | 311        | 2414       | 13         | 311       | 61        | 5         | 43        | 453       | 300        |
| Peak Hour Factor                  | 0.99       | 0.99      | 0.99       | 0.99       | 0.99       | 0.99       | 0.99      | 0.99      | 0.99      | 0.99      | 0.99      | 0.99       |
| Percent Heavy Veh, %              | 16         | 16        | 16         | 3          | 3          | 3          | 9         | 9         | 9         | 5         | 5         | 5          |
| Cap, veh/h                        | 410        | 1430      | 434        | 362        | 1493       | 8          | 326       | 651       | 285       | 464       | 487       | 707        |
| Arrive On Green                   | 0.27       | 0.63      | 0.63       | 0.11       | 0.29       | 0.29       | 0.19      | 0.19      | 0.19      | 0.27      | 0.27      | 0.27       |
| Sat Flow, veh/h                   | 3072       | 4540      | 1378       | 3428       | 5197       | 28         | 1682      | 3357      | 1467      | 1739      | 1826      | 2652       |
| Grp Volume(v), veh/h              | 364        | 815       | 183        | 311        | 1568       | 859        | 311       | 61        | 5         | 43        | 453       | 300        |
| Grp Sat Flow(s),veh/h/ln          | 1536       | 1513      | 1378       | 1714       | 1689       | 1848       | 1682      | 1678      | 1467      | 1739      | 1826      | 1326       |
| Q Serve(g_s), s                   | 17.1       | 15.5      | 10.0       | 13.4       | 43.1       | 43.1       | 27.4      | 2.2       | 0.4       | 2.8       | 36.3      | 14.0       |
| Cycle Q Clear(g_c), s             | 17.1       | 15.5      | 10.0       | 13.4       | 43.1       | 43.1       | 27.4      | 2.2       | 0.4       | 2.8       | 36.3      | 14.0       |
| Prop In Lane                      | 1.00       | 4.400     | 1.00       | 1.00       | 0=0        | 0.02       | 1.00      | 0=4       | 1.00      | 1.00      | 40=       | 1.00       |
| Lane Grp Cap(c), veh/h            | 410        | 1430      | 434        | 362        | 970        | 531        | 326       | 651       | 285       | 464       | 487       | 707        |
| V/C Ratio(X)                      | 0.89       | 0.57      | 0.42       | 0.86       | 1.62       | 1.62       | 0.95      | 0.09      | 0.02      | 0.09      | 0.93      | 0.42       |
| Avail Cap(c_a), veh/h             | 410        | 1430      | 434        | 487        | 970        | 531        | 326       | 651       | 285       | 498       | 523       | 760        |
| HCM Platoon Ratio                 | 2.00       | 2.00      | 2.00       | 1.00       | 1.00       | 1.00       | 1.00      | 1.00      | 1.00      | 1.00      | 1.00      | 1.00       |
| Upstream Filter(I)                | 0.83       | 0.83      | 0.83       | 1.00       | 1.00       | 1.00       | 1.00      | 1.00      | 1.00      | 1.00      | 1.00      | 1.00       |
| Uniform Delay (d), s/veh          | 53.9       | 21.9      | 20.9       | 66.0       | 53.4       | 53.5       | 59.8      | 49.6      | 48.9      | 41.4      | 53.6      | 45.5       |
| Incr Delay (d2), s/veh            | 17.8       | 1.4       | 2.5<br>0.0 | 8.9        | 281.8      | 287.0      | 37.0      | 0.0       | 0.0       | 0.0       | 21.9      | 0.2        |
| Initial Q Delay(d3),s/veh         | 0.0        | 0.0       | 3.0        | 0.0<br>6.3 | 0.0        | 0.0        | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0<br>4.7 |
| %ile BackOfQ(50%),veh/ln          |            | 4.3       | 3.0        | 0.3        | 56.2       | 62.3       | 15.0      | 0.9       | 0.2       | 1.2       | 19.6      | 4.7        |
| Unsig. Movement Delay, s/veh      | 71.7       | 23.3      | 23.3       | 74.9       | 335.3      | 340.4      | 96.8      | 49.6      | 48.9      | 41.4      | 75.5      | 45.6       |
| LnGrp Delay(d),s/veh<br>LnGrp LOS | / I./<br>E | 23.3<br>C | 23.3<br>C  | 74.9<br>E  | აან.ა<br>F | 340.4<br>F | 90.0<br>F | 49.0<br>D | 40.9<br>D | 41.4<br>D | 75.5<br>E | 45.0<br>D  |
| -                                 |            |           | U          | <u> </u>   |            | Г          | Г         |           | U         | U         | 796       | D          |
| Approach Vol, veh/h               |            | 1362      |            |            | 2738       |            |           | 377       |           |           |           |            |
| Approach LOS                      |            | 36.2      |            |            | 307.3      |            |           | 88.5      |           |           | 62.4      |            |
| Approach LOS                      |            | D         |            |            | F          |            |           | F         |           |           | Е         |            |
| Timer - Assigned Phs              | 1          | 2         |            | 4          | 5          | 6          |           | 8         |           |           |           |            |
| Phs Duration (G+Y+Rc), s          | 24.0       | 48.0      |            | 44.0       | 20.7       | 51.3       |           | 34.0      |           |           |           |            |
| Change Period (Y+Rc), s           | 4.0        | 4.9       |            | 4.0        | 4.9        | 4.0        |           | 4.9       |           |           |           |            |
| Max Green Setting (Gmax), s       | 17.0       | 43.1      |            | 43.0       | 21.3       | 38.8       |           | 29.1      |           |           |           |            |
| Max Q Clear Time (g_c+I1), s      | 19.1       | 45.1      |            | 38.3       | 15.4       | 17.5       |           | 29.4      |           |           |           |            |
| Green Ext Time (p_c), s           | 0.0        | 0.0       |            | 1.4        | 0.5        | 6.2        |           | 0.0       |           |           |           |            |
| Intersection Summary              |            |           |            |            |            |            |           |           |           |           |           |            |
| HCM 6th Ctrl Delay                |            |           | 184.7      |            |            |            |           |           |           |           |           |            |
| HCM 6th LOS                       |            |           | F          |            |            |            |           |           |           |           |           |            |

|                              | •    | <b>→</b> | •    | •    | -    | 4    | 4    | <b>†</b>   | <b>/</b> | <b>/</b> | <b>↓</b> | 4     |
|------------------------------|------|----------|------|------|------|------|------|------------|----------|----------|----------|-------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT  | WBR  | NBL  | NBT        | NBR      | SBL      | SBT      | SBR   |
| Lane Configurations          | 1,1  | <b>†</b> | 77   | J.   | ተተተ  | 7    | 77   | <b>↑</b> ↑ |          | 7        | <b>†</b> | 77    |
| Traffic Volume (veh/h)       | 110  | 148      | 485  | 130  | 1119 | 14   | 468  | 712        | 175      | 10       | 260      | 1207  |
| Future Volume (veh/h)        | 110  | 148      | 485  | 130  | 1119 | 14   | 468  | 712        | 175      | 10       | 260      | 1207  |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0    | 0    | 0    | 0          | 0        | 0        | 0        | 0     |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 0.97 | 1.00 |      | 0.97 | 1.00 |            | 1.00     | 1.00     |          | 0.96  |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00       | 1.00     | 1.00     | 1.00     | 1.00  |
| Work Zone On Approach        |      | No       |      |      | No   |      |      | No         |          |          | No       |       |
| Adj Sat Flow, veh/h/ln       | 1781 | 1781     | 1781 | 1811 | 1811 | 1811 | 1767 | 1767       | 1767     | 1841     | 1841     | 1841  |
| Adj Flow Rate, veh/h         | 111  | 149      | 106  | 131  | 1130 | 3    | 473  | 719        | 0        | 10       | 263      | 926   |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99       | 0.99     | 0.99     | 0.99     | 0.99  |
| Percent Heavy Veh, %         | 8    | 8        | 8    | 6    | 6    | 6    | 9    | 9          | 9        | 4        | 4        | 4     |
| Cap, veh/h                   | 301  | 421      | 611  | 161  | 1177 | 355  | 752  | 773        |          | 469      | 493      | 705   |
| Arrive On Green              | 0.09 | 0.24     | 0.24 | 0.09 | 0.24 | 0.24 | 0.23 | 0.23       | 0.00     | 0.27     | 0.27     | 0.27  |
| Sat Flow, veh/h              | 3291 | 1781     | 2584 | 1725 | 4944 | 1492 | 3264 | 3445       | 0        | 1753     | 1841     | 2633  |
| Grp Volume(v), veh/h         | 111  | 149      | 106  | 131  | 1130 | 3    | 473  | 719        | 0        | 10       | 263      | 926   |
| Grp Sat Flow(s),veh/h/ln     | 1646 | 1781     | 1292 | 1725 | 1648 | 1492 | 1632 | 1678       | 0        | 1753     | 1841     | 1316  |
| Q Serve(g_s), s              | 3.3  | 7.3      | 3.4  | 7.8  | 23.7 | 0.2  | 13.7 | 22.0       | 0.0      | 0.4      | 12.8     | 28.1  |
| Cycle Q Clear(g_c), s        | 3.3  | 7.3      | 3.4  | 7.8  | 23.7 | 0.2  | 13.7 | 22.0       | 0.0      | 0.4      | 12.8     | 28.1  |
| Prop In Lane                 | 1.00 |          | 1.00 | 1.00 |      | 1.00 | 1.00 |            | 0.00     | 1.00     |          | 1.00  |
| Lane Grp Cap(c), veh/h       | 301  | 421      | 611  | 161  | 1177 | 355  | 752  | 773        |          | 469      | 493      | 705   |
| V/C Ratio(X)                 | 0.37 | 0.35     | 0.17 | 0.82 | 0.96 | 0.01 | 0.63 | 0.93       |          | 0.02     | 0.53     | 1.31  |
| Avail Cap(c_a), veh/h        | 313  | 424      | 615  | 164  | 1177 | 355  | 752  | 773        |          | 469      | 493      | 705   |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00       | 1.00     | 1.00     | 1.00     | 1.00  |
| Upstream Filter(I)           | 0.73 | 0.73     | 0.73 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00       | 0.00     | 1.00     | 1.00     | 1.00  |
| Uniform Delay (d), s/veh     | 44.8 | 33.4     | 31.9 | 46.7 | 39.5 | 30.5 | 36.4 | 39.6       | 0.0      | 28.3     | 32.9     | 38.5  |
| Incr Delay (d2), s/veh       | 0.2  | 0.3      | 0.1  | 24.1 | 17.3 | 0.0  | 4.0  | 19.2       | 0.0      | 0.0      | 0.6      | 151.4 |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0        | 0.0      | 0.0      | 0.0      | 0.0   |
| %ile BackOfQ(50%),veh/ln     | 1.4  | 3.2      | 1.1  | 4.4  | 11.3 | 0.1  | 5.8  | 10.9       | 0.0      | 0.2      | 5.7      | 23.7  |
| Unsig. Movement Delay, s/veh |      |          |      |      |      |      |      |            |          | •        |          |       |
| LnGrp Delay(d),s/veh         | 45.0 | 33.7     | 32.0 | 70.8 | 56.8 | 30.5 | 40.3 | 58.7       | 0.0      | 28.3     | 33.4     | 189.8 |
| LnGrp LOS                    | D    | C        | C    | E    | E    | С    | D    | E          | 0.0      | C        | С        | F     |
| Approach Vol, veh/h          |      | 366      |      |      | 1264 |      |      | 1192       | А        |          | 1199     |       |
| Approach Delay, s/veh        |      | 36.6     |      |      | 58.2 |      |      | 51.4       | , ,      |          | 154.2    |       |
| Approach LOS                 |      | D        |      |      | E    |      |      | D          |          |          | F        |       |
| •                            |      |          |      |      |      |      |      |            |          |          |          |       |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5    | 6    |      | 8          |          |          |          |       |
| Phs Duration (G+Y+Rc), s     | 13.8 | 29.4     |      | 28.8 | 13.6 | 29.6 |      | 33.0       |          |          |          |       |
| Change Period (Y+Rc), s      | 4.0  | 4.6      |      | 4.6  | 4.0  | 4.6  |      | 4.9        |          |          |          |       |
| Max Green Setting (Gmax), s  | 10.0 | 25.0     |      | 23.8 | 10.0 | 25.0 |      | 28.1       |          |          |          |       |
| Max Q Clear Time (g_c+l1), s | 9.8  | 9.3      |      | 24.0 | 5.3  | 25.7 |      | 30.1       |          |          |          |       |
| Green Ext Time (p_c), s      | 0.0  | 0.9      |      | 0.0  | 0.1  | 0.0  |      | 0.0        |          |          |          |       |
| Intersection Summary         |      |          |      |      |      |      |      |            |          |          |          |       |
| HCM 6th Ctrl Delay           |      |          | 82.8 |      |      |      |      |            |          |          |          |       |
| HCM 6th LOS                  |      |          | F    |      |      |      |      |            |          |          |          |       |
| Notes                        |      |          |      |      |      |      |      |            |          |          |          |       |

|   | ۶           | <b>→</b>     | •     | •            | •           | •     | 1           | <b>†</b>     | <b>/</b> | <b>/</b>    | <b>↓</b>     | 4    |
|---|-------------|--------------|-------|--------------|-------------|-------|-------------|--------------|----------|-------------|--------------|------|
| Movement                                    | EBL         | EBT          | EBR   | WBL          | WBT         | WBR   | NBL         | NBT          | NBR      | SBL         | SBT          | SBR  |
| Lane Configurations                         | ሻ           | 41∱          | 7     | 444          | <b>†</b>    | 7     | ሻ           | <b>^</b>     | 7        | ሻ           | <b>^</b>     | 7    |
| Traffic Volume (veh/h)                      | 169         | 262          | 208   | 1977         | 311         | 416   | 112         | 29           | 362      | 158         | 1139         | 183  |
| Future Volume (veh/h)                       | 169         | 262          | 208   | 1977         | 311         | 416   | 112         | 29           | 362      | 158         | 1139         | 183  |
| Initial Q (Qb), veh                         | 0           | 0            | 0     | 0            | 0           | 0     | 0           | 0            | 0        | 0           | 0            | 0    |
| Ped-Bike Adj(A_pbT)                         | 1.00        |              | 1.00  | 1.00         |             | 1.00  | 1.00        |              | 1.00     | 1.00        |              | 1.00 |
| Parking Bus, Adj                            | 1.00        | 1.00         | 1.00  | 1.00         | 1.00        | 1.00  | 1.00        | 1.00         | 1.00     | 1.00        | 1.00         | 1.00 |
| Work Zone On Approach                       | 1011        | No           | 1011  | 1011         | No          | 1011  | 40=0        | No           | 40=0     | 10-0        | No           | 10=0 |
| Adj Sat Flow, veh/h/ln                      | 1811        | 1811         | 1811  | 1811         | 1811        | 1811  | 1678        | 1678         | 1678     | 1856        | 1856         | 1856 |
| Adj Flow Rate, veh/h                        | 145         | 301          | 0     | 1997         | 314         | 0     | 113         | 29           | 0        | 160         | 1151         | 0    |
| Peak Hour Factor                            | 0.99        | 0.99         | 0.99  | 0.99         | 0.99        | 0.99  | 0.99        | 0.99         | 0.99     | 0.99        | 0.99         | 0.99 |
| Percent Heavy Veh, %                        | 6           | 6            | 6     | 6            | 6           | 6     | 15          | 15           | 15       | 3           | 3            | 3    |
| Cap, veh/h                                  | 199         | 417          | 0.00  | 1475         | 549         | 0.00  | 143         | 757          | 0.00     | 328         | 1203         | 0.00 |
| Arrive On Green                             | 0.12        | 0.12         | 0.00  | 0.30         | 0.30        | 0.00  | 0.09        | 0.24         | 0.00     | 0.19        | 0.34         | 0.00 |
| Sat Flow, veh/h                             | 1725        | 3622         | 1535  | 4864         | 1811        | 1535  | 1598        | 3188         | 1422     | 1767        | 3526         | 1572 |
| Grp Volume(v), veh/h                        | 145         | 301          | 0     | 1997         | 314         | 0     | 113         | 29           | 0        | 160         | 1151         | 0    |
| Grp Sat Flow(s),veh/h/ln                    | 1725        | 1811         | 1535  | 1621         | 1811        | 1535  | 1598        | 1594         | 1422     | 1767        | 1763         | 1572 |
| Q Serve(g_s), s                             | 9.7         | 9.6          | 0.0   | 36.4         | 17.5        | 0.0   | 8.3         | 0.8          | 0.0      | 9.7         | 38.3         | 0.0  |
| Cycle Q Clear(g_c), s                       | 9.7         | 9.6          | 0.0   | 36.4         | 17.5        | 0.0   | 8.3         | 8.0          | 0.0      | 9.7         | 38.3         | 0.0  |
| Prop In Lane                                | 1.00        | 447          | 1.00  | 1.00         | E 40        | 1.00  | 1.00        | 757          | 1.00     | 1.00        | 4000         | 1.00 |
| Lane Grp Cap(c), veh/h                      | 199         | 417          |       | 1475         | 549         |       | 143         | 757          |          | 328         | 1203         |      |
| V/C Ratio(X)                                | 0.73        | 0.72         |       | 1.35         | 0.57        |       | 0.79        | 0.04         |          | 0.49        | 0.96         |      |
| Avail Cap(c_a), veh/h                       | 316<br>1.00 | 664          | 1.00  | 1475<br>1.00 | 549<br>1.00 | 1.00  | 146<br>1.00 | 757          | 1.00     | 328<br>1.00 | 1203         | 1.00 |
| HCM Platoon Ratio                           | 1.00        | 1.00<br>1.00 | 0.00  | 0.09         | 0.09        | 0.00  | 1.00        | 1.00<br>1.00 | 0.00     | 1.00        | 1.00<br>1.00 | 0.00 |
| Upstream Filter(I) Uniform Delay (d), s/veh | 51.3        | 51.2         | 0.00  | 41.8         | 35.2        | 0.00  | 53.5        | 35.2         | 0.00     | 43.7        | 38.7         | 0.00 |
| Incr Delay (d2), s/veh                      | 1.9         | 0.9          | 0.0   | 159.5        | 0.1         | 0.0   | 22.2        | 0.1          | 0.0      | 0.4         | 17.5         | 0.0  |
| Initial Q Delay(d3),s/veh                   | 0.0         | 0.9          | 0.0   | 0.0          | 0.0         | 0.0   | 0.0         | 0.0          | 0.0      | 0.4         | 0.0          | 0.0  |
| %ile BackOfQ(50%),veh/ln                    | 4.3         | 4.4          | 0.0   | 36.3         | 7.8         | 0.0   | 4.2         | 0.0          | 0.0      | 4.3         | 19.0         | 0.0  |
| Unsig. Movement Delay, s/veh                |             | 7.7          | 0.0   | 30.3         | 7.0         | 0.0   | 4.2         | 0.5          | 0.0      | 4.0         | 13.0         | 0.0  |
| LnGrp Delay(d),s/veh                        | 53.2        | 52.1         | 0.0   | 201.3        | 35.4        | 0.0   | 75.7        | 35.3         | 0.0      | 44.2        | 56.2         | 0.0  |
| LnGrp LOS                                   | D           | D            | 0.0   | 201.5<br>F   | D           | 0.0   | 75.7<br>E   | D            | 0.0      | D           | 50.2<br>E    | 0.0  |
| Approach Vol, veh/h                         |             | 446          | А     | '            | 2311        | А     |             | 142          | Α        |             | 1311         | A    |
| Approach Delay, s/veh                       |             | 52.5         | А     |              | 178.8       | А     |             | 67.5         | А        |             | 54.7         | A    |
| Approach LOS                                |             | D D          |       |              | 170.0       |       |             | 67.5<br>E    |          |             | D            |      |
|   |             |              |       |              |             |       |             |              |          |             |              |      |
| Timer - Assigned Phs                        | 1           | 2            |       | 4            | 5           | 6     |             | 8            |          |             |              |      |
| Phs Duration (G+Y+Rc), s                    | 14.7        | 45.8         |       | 18.4         | 27.2        | 33.4  |             | 41.0         |          |             |              |      |
| Change Period (Y+Rc), s                     | 4.0         | 4.9          |       | 4.6          | 4.9         | * 4.9 |             | 4.6          |          |             |              |      |
| Max Green Setting (Gmax), s                 | 11.0        | 32.5         |       | 22.0         | 15.0        | * 29  |             | 36.4         |          |             |              |      |
| Max Q Clear Time (g_c+l1), s                | 10.3        | 40.3         |       | 11.7         | 11.7        | 2.8   |             | 38.4         |          |             |              |      |
| Green Ext Time (p_c), s                     | 0.0         | 0.0          |       | 1.2          | 0.1         | 0.1   |             | 0.0          |          |             |              |      |
| Intersection Summary                        |             |              |       |              |             |       |             |              |          |             |              |      |
| HCM 6th Ctrl Delay                          |             |              | 123.0 |              |             |       |             |              |          |             |              |      |
| HCM 6th LOS                                 |             |              | F     |              |             |       |             |              |          |             |              |      |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b> | •     | 4    | <b>†</b>   | /    | <b>&gt;</b> | ļ          | 4    |
|------------------------------|------|----------|------|------|----------|-------|------|------------|------|-------------|------------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR   | NBL  | NBT        | NBR  | SBL         | SBT        | SBR  |
| Lane Configurations          |      | 4        | 7    |      | 4        |       | ሻ    | <b>↑</b> ⊅ |      | 7           | <b>∱</b> } |      |
| Traffic Volume (veh/h)       | 203  | Ö        | 20   | 4    | 0        | 45    | 3    | 1455       | 3    | 104         | 501        | 9    |
| Future Volume (veh/h)        | 203  | 0        | 20   | 4    | 0        | 45    | 3    | 1455       | 3    | 104         | 501        | 9    |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0     | 0    | 44         | 0    | 0           | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.99 |          | 0.99 | 0.99 |          | 0.99  | 1.00 |            | 0.98 | 1.00        |            | 0.99 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00  | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |       |      | No         |      |             | No         |      |
| Adj Sat Flow, veh/h/ln       | 1900 | 1900     | 1900 | 1900 | 1900     | 1900  | 1841 | 1841       | 1841 | 1796        | 1796       | 1796 |
| Adj Flow Rate, veh/h         | 205  | 0        | 2    | 4    | 0        | 2     | 3    | 1470       | 3    | 105         | 506        | 8    |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99  | 0.99 | 0.99       | 0.99 | 0.99        | 0.99       | 0.99 |
| Percent Heavy Veh, %         | 0    | 0        | 0    | 0    | 0        | 0     | 4    | 4          | 4    | 7           | 7          | 7    |
| Cap, veh/h                   | 356  | 0        | 317  | 124  | 15       | 31    | 6    | 2016       | 3    | 134         | 2193       | 35   |
| Arrive On Green              | 0.20 | 0.00     | 0.20 | 0.20 | 0.00     | 0.20  | 0.00 | 0.56       | 0.56 | 0.08        | 0.64       | 0.64 |
| Sat Flow, veh/h              | 1324 | 0        | 1591 | 239  | 76       | 158   | 1753 | 3581       | 7    | 1711        | 3438       | 54   |
| Grp Volume(v), veh/h         | 205  | 0        | 2    | 6    | 0        | 0     | 3    | 718        | 755  | 105         | 251        | 263  |
| Grp Sat Flow(s), veh/h/ln    | 1324 | 0        | 1591 | 473  | 0        | 0     | 1753 | 1749       | 1839 | 1711        | 1706       | 1786 |
| Q Serve(g_s), s              | 0.0  | 0.0      | 0.1  | 0.0  | 0.0      | 0.0   | 0.1  | 23.9       | 23.9 | 4.7         | 4.9        | 4.9  |
| Cycle Q Clear(g_c), s        | 11.8 | 0.0      | 0.1  | 11.9 | 0.0      | 0.0   | 0.1  | 23.9       | 23.9 | 4.7         | 4.9        | 4.9  |
| Prop In Lane                 | 1.00 | 0.0      | 1.00 | 0.67 | 0.0      | 0.33  | 1.00 |            | 0.00 | 1.00        |            | 0.03 |
| Lane Grp Cap(c), veh/h       | 356  | 0        | 317  | 171  | 0        | 0     | 6    | 984        | 1035 | 134         | 1088       | 1139 |
| V/C Ratio(X)                 | 0.58 | 0.00     | 0.01 | 0.04 | 0.00     | 0.00  | 0.53 | 0.73       | 0.73 | 0.78        | 0.23       | 0.23 |
| Avail Cap(c_a), veh/h        | 508  | 0        | 487  | 329  | 0        | 0     | 537  | 984        | 1035 | 524         | 1088       | 1139 |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00  | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 0.00  | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Uniform Delay (d), s/veh     | 29.9 | 0.0      | 25.2 | 26.0 | 0.0      | 0.0   | 39.0 | 14.2       | 14.1 | 35.5        | 6.0        | 6.0  |
| Incr Delay (d2), s/veh       | 0.5  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0   | 25.7 | 4.7        | 4.5  | 3.8         | 0.5        | 0.5  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0   | 0.0  | 13.3       | 12.0 | 0.0         | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 3.6  | 0.0      | 0.0  | 0.1  | 0.0      | 0.0   | 0.1  | 15.3       | 15.5 | 2.1         | 1.6        | 1.7  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |       |      |            |      |             |            |      |
| LnGrp Delay(d),s/veh         | 30.4 | 0.0      | 25.2 | 26.0 | 0.0      | 0.0   | 64.7 | 32.2       | 30.6 | 39.2        | 6.5        | 6.5  |
| LnGrp LOS                    | С    | A        | C    | C    | A        | A     | E    | C          | С    | D           | A          | A    |
| Approach Vol, veh/h          |      | 207      |      |      | 6        | - ' ' | _    | 1476       |      |             | 619        |      |
| Approach Delay, s/veh        |      | 30.4     |      |      | 26.0     |       |      | 31.5       |      |             | 12.1       |      |
| Approach LOS                 |      | C        |      |      | C        |       |      | C          |      |             | В          |      |
|                              | 1    | 2        |      | 4    |          | 6     |      | 0          |      |             |            |      |
| Timer - Assigned Phs         | 1    | 2        |      | •    | 5        | 6     |      | 8          |      |             |            |      |
| Phs Duration (G+Y+Rc), s     | 10.1 | 48.6     |      | 19.6 | 4.3      | 54.5  |      | 19.6       |      |             |            |      |
| Change Period (Y+Rc), s      | 4.0  | 4.5      |      | 4.0  | 4.0      | 4.5   |      | 4.0        |      |             |            |      |
| Max Green Setting (Gmax), s  | 24.0 | 30.0     |      | 24.0 | 24.0     | 50.0  |      | 24.0       |      |             |            |      |
| Max Q Clear Time (g_c+l1), s | 6.7  | 25.9     |      | 13.8 | 2.1      | 6.9   |      | 13.9       |      |             |            |      |
| Green Ext Time (p_c), s      | 0.1  | 2.6      |      | 0.5  | 0.0      | 2.1   |      | 0.0        |      |             |            |      |
| Intersection Summary         |      |          |      |      |          |       |      |            |      |             |            |      |
| HCM 6th Ctrl Delay           |      |          | 26.2 |      |          |       |      |            |      |             |            |      |
| HCM 6th LOS                  |      |          | С    |      |          |       |      |            |      |             |            |      |
| Notes                        |      |          |      |      |          |       |      |            |      |             |            |      |

User approved pedestrian interval to be less than phase max green.

|                              | ۶        | <b>→</b>   | $\rightarrow$ | •          | <b>←</b>   | •    | •    | <b>†</b>  | ~    | <b>&gt;</b> | ļ   | 1   |
|------------------------------|----------|------------|---------------|------------|------------|------|------|-----------|------|-------------|-----|-----|
| Movement                     | EBL      | EBT        | EBR           | WBL        | WBT        | WBR  | NBL  | NBT       | NBR  | SBL         | SBT | SBR |
| Lane Configurations          | ሻሻ       | <b>∱</b> β | 7             | 1,1        | <b>∱</b> } | 77   | 44   | <b></b>   | 77   |             |     |     |
| Traffic Volume (veh/h)       | 253      | 839        | 295           | 1788       | 1145       | 2326 | 541  | 166       | 215  | 0           | 0   | 0   |
| Future Volume (veh/h)        | 253      | 839        | 295           | 1788       | 1145       | 2326 | 541  | 166       | 215  | 0           | 0   | 0   |
| Initial Q (Qb), veh          | 0        | 0          | 0             | 32         | 16         | 0    | 10   | 0         | 5    |             |     |     |
| Ped-Bike Adj(A_pbT)          | 1.00     |            | 0.96          | 1.00       |            | 1.00 | 1.00 |           | 1.00 |             |     |     |
| Parking Bus, Adj             | 1.00     | 1.00       | 1.00          | 1.00       | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 |             |     |     |
| Work Zone On Approach        |          | No         |               |            | No         |      |      | No        |      |             |     |     |
| Adj Sat Flow, veh/h/ln       | 1841     | 1841       | 1841          | 1870       | 1870       | 1870 | 1826 | 1826      | 1826 |             |     |     |
| Adj Flow Rate, veh/h         | 256      | 847        | 115           | 1806       | 1466       | 1775 | 546  | 168       | 217  |             |     |     |
| Peak Hour Factor             | 0.99     | 0.99       | 0.99          | 0.99       | 0.99       | 0.99 | 0.99 | 0.99      | 0.99 |             |     |     |
| Percent Heavy Veh, %         | 4        | 4          | 4             | 2          | 2          | 2    | 5    | 5         | 5    |             |     |     |
| Cap, veh/h                   | 247      | 976        | 398           | 1388       | 2259       | 1881 | 682  | 390       | 1651 |             |     |     |
| Arrive On Green              | 0.07     | 0.27       | 0.27          | 0.41       | 0.61       | 0.61 | 0.20 | 0.20      | 0.20 |             |     |     |
| Sat Flow, veh/h              | 3506     | 3681       | 1503          | 3563       | 3741       | 3170 | 3374 | 1826      | 2723 |             |     |     |
| Grp Volume(v), veh/h         | 256      | 847        | 115           | 1806       | 1466       | 1775 | 546  | 168       | 217  |             |     |     |
| Grp Sat Flow(s), veh/h/ln    | 1753     | 1841       | 1503          | 1781       | 1870       | 1585 | 1687 | 1826      | 1362 |             |     |     |
| Q Serve(g_s), s              | 7.4      | 22.1       | 6.1           | 41.5       | 25.7       | 50.7 | 15.7 | 8.3       | 3.5  |             |     |     |
| Cycle Q Clear(g_c), s        | 7.4      | 22.1       | 6.1           | 41.5       | 25.7       | 50.7 | 15.7 | 8.3       | 3.5  |             |     |     |
| Prop In Lane                 | 1.00     | <b></b> ., | 1.00          | 1.00       | 20.1       | 1.00 | 1.00 | 0.0       | 1.00 |             |     |     |
| Lane Grp Cap(c), veh/h       | 247      | 976        | 398           | 1388       | 2259       | 1881 | 682  | 390       | 1651 |             |     |     |
| V/C Ratio(X)                 | 1.04     | 0.87       | 0.29          | 1.30       | 0.65       | 0.94 | 0.80 | 0.43      | 0.13 |             |     |     |
| Avail Cap(c_a), veh/h        | 260      | 1000       | 408           | 1460       | 2272       | 1925 | 833  | 451       | 1788 |             |     |     |
| HCM Platoon Ratio            | 1.00     | 1.00       | 1.00          | 1.00       | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 |             |     |     |
| Upstream Filter(I)           | 1.00     | 1.00       | 1.00          | 1.00       | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 |             |     |     |
| Uniform Delay (d), s/veh     | 49.5     | 36.4       | 30.3          | 32.5       | 13.8       | 19.5 | 39.3 | 35.3      | 8.7  |             |     |     |
| Incr Delay (d2), s/veh       | 66.5     | 8.4        | 0.6           | 140.8      | 0.7        | 10.2 | 3.7  | 0.3       | 0.0  |             |     |     |
| Initial Q Delay(d3),s/veh    | 0.0      | 0.0        | 0.0           | 83.0       | 1.0        | 0.0  | 7.7  | 0.0       | 0.1  |             |     |     |
| %ile BackOfQ(50%),veh/ln     | 5.6      | 11.3       | 2.4           | 60.6       | 12.1       | 20.9 | 8.2  | 3.7       | 4.7  |             |     |     |
| Unsig. Movement Delay, s/veh |          | 11.0       | ∠.⊤           | 00.0       | 12.1       | 20.0 | 0.2  | 0.1       | 7.7  |             |     |     |
| LnGrp Delay(d),s/veh         | 116.0    | 44.8       | 30.9          | 256.3      | 15.6       | 29.7 | 50.8 | 35.6      | 8.8  |             |     |     |
| LnGrp LOS                    | F        | D          | C             | 200.0<br>F | В          | C    | D    | D         | A    |             |     |     |
| Approach Vol, veh/h          | <u> </u> | 1218       |               | <u> </u>   | 5047       |      |      | 931       |      |             |     |     |
| Approach Delay, s/veh        |          | 58.4       |               |            | 106.7      |      |      | 38.2      |      |             |     |     |
| Approach LOS                 |          | 50.4<br>E  |               |            | 100.7      |      |      | 30.2<br>D |      |             |     |     |
| Approach 200                 |          | _          |               |            |            |      |      | D         |      |             |     |     |
| Timer - Assigned Phs         | 1        | 2          |               | 4          | 5          | 6    |      |           |      |             |     |     |
| Phs Duration (G+Y+Rc), s     | 45.0     | 32.4       |               | 23.8       | 11.0       | 66.4 |      |           |      |             |     |     |
| Change Period (Y+Rc), s      | 3.5      | 5.0        |               | 4.0        | 3.5        | 5.0  |      |           |      |             |     |     |
| Max Green Setting (Gmax), s  | 41.5     | 27.5       |               | 25.0       | 7.5        | 61.5 |      |           |      |             |     |     |
| Max Q Clear Time (g_c+l1), s | 43.5     | 24.1       |               | 17.7       | 9.4        | 52.7 |      |           |      |             |     |     |
| Green Ext Time (p_c), s      | 0.0      | 2.5        |               | 2.1        | 0.0        | 8.7  |      |           |      |             |     |     |
| Intersection Summary         |          |            |               |            |            |      |      |           |      |             |     |     |
| HCM 6th Ctrl Delay           |          |            | 89.7          |            |            |      |      |           |      |             |     |     |
| HCM 6th LOS                  |          |            | F             |            |            |      |      |           |      |             |     |     |
| Notes                        |          |            |               |            |            |      |      |           |      |             |     |     |

User approved volume balancing among the lanes for turning movement.

|                                    | ۶           | <b>→</b>     | *            | •          | <b>←</b>     | 4            | 1           | <b>†</b> | ~           | <b>/</b>   | Ţ    | 1    |
|------------------------------------|-------------|--------------|--------------|------------|--------------|--------------|-------------|----------|-------------|------------|------|------|
| Movement                           | EBL         | EBT          | EBR          | WBL        | WBT          | WBR          | NBL         | NBT      | NBR         | SBL        | SBT  | SBR  |
| Lane Configurations                | ሻሻ          | <b>∱</b> ∱   |              | ሻ          | ተተኈ          |              | ሻ           | <b>₽</b> |             |            | र्स  | 77   |
| Traffic Volume (veh/h)             | 237         | 1022         | 30           | 7          | 2922         | 41           | 150         | 1        | 18          | 27         | 10   | 275  |
| Future Volume (veh/h)              | 237         | 1022         | 30           | 7          | 2922         | 41           | 150         | 1        | 18          | 27         | 10   | 275  |
| Initial Q (Qb), veh                | 0           | 32           | 0            | 0          | 140          | 0            | 0           | 0        | 0           | 0          | 0    | 0    |
| Ped-Bike Adj(A_pbT)                | 1.00        |              | 0.96         | 1.00       |              | 0.99         | 1.00        |          | 0.96        | 1.00       |      | 1.00 |
| Parking Bus, Adj                   | 1.00        | 1.00         | 1.00         | 1.00       | 1.00         | 1.00         | 1.00        | 1.00     | 1.00        | 1.00       | 1.00 | 1.00 |
| Work Zone On Approach              |             | No           |              |            | No           |              |             | No       |             |            | No   |      |
| Adj Sat Flow, veh/h/ln             | 1678        | 1678         | 1678         | 1870       | 1870         | 1870         | 1841        | 1841     | 1841        | 1870       | 1870 | 1870 |
| Adj Flow Rate, veh/h               | 239         | 1032         | 29           | 7          | 2952         | 40           | 152         | 1        | 1           | 27         | 10   | 0    |
| Peak Hour Factor                   | 0.99        | 0.99         | 0.99         | 0.99       | 0.99         | 0.99         | 0.99        | 0.99     | 0.99        | 0.99       | 0.99 | 0.99 |
| Percent Heavy Veh, %               | 15          | 15           | 15           | 2          | 2            | 2            | 4           | 4        | 4           | 2          | 2    | 2    |
| Cap, veh/h                         | 199         | 2257         | 59           | 15         | 3431         | 25           | 225         | 106      | 106         | 43         | 16   | 91   |
| Arrive On Green                    | 0.06        | 0.71         | 0.71         | 0.01       | 0.66         | 0.66         | 0.13        | 0.13     | 0.13        | 0.03       | 0.03 | 0.00 |
| Sat Flow, veh/h                    | 3100        | 3162         | 89           | 1781       | 5191         | 70           | 1753        | 824      | 824         | 1317       | 488  | 2790 |
| Grp Volume(v), veh/h               | 239         | 520          | 541          | 7          | 1931         | 1061         | 152         | 0        | 2           | 37         | 0    | 0    |
| Grp Sat Flow(s),veh/h/ln           | 1550        | 1594         | 1657         | 1781       | 1702         | 1857         | 1753        | 0        | 1647        | 1805       | 0    | 1395 |
| Q Serve(g_s), s                    | 9.0         | 19.5         | 19.5         | 0.5        | 63.1         | 64.2         | 11.6        | 0.0      | 0.1         | 2.8        | 0.0  | 0.0  |
| Cycle Q Clear(g_c), s              | 9.0         | 19.5         | 19.5         | 0.5        | 63.1         | 64.2         | 11.6        | 0.0      | 0.1         | 2.8        | 0.0  | 0.0  |
| Prop In Lane                       | 1.00        | 1105         | 0.05         | 1.00       | 2024         | 0.04         | 1.00        | ٥        | 0.50<br>211 | 0.73<br>59 | 0    | 1.00 |
| Lane Grp Cap(c), veh/h             | 199<br>1.20 | 1135<br>0.46 | 1181<br>0.46 | 15<br>0.46 | 2234<br>0.86 | 1222<br>0.87 | 225<br>0.68 | 0.00     | 0.01        | 0.63       | 0.00 | 91   |
| V/C Ratio(X) Avail Cap(c_a), veh/h | 1.20        | 1135         | 1180         | 64         | 2234         | 1218         | 338         | 0.00     | 318         | 77         | 0.00 | 120  |
| HCM Platoon Ratio                  | 1.00        | 1.00         | 1.00         | 1.00       | 1.00         | 1.00         | 1.00        | 1.00     | 1.00        | 1.00       | 1.00 | 1.00 |
| Upstream Filter(I)                 | 0.45        | 0.45         | 0.45         | 1.00       | 1.00         | 1.00         | 1.00        | 0.00     | 1.00        | 1.00       | 0.00 | 0.00 |
| Uniform Delay (d), s/veh           | 65.5        | 9.8          | 9.8          | 69.1       | 24.1         | 24.1         | 58.2        | 0.00     | 53.3        | 66.9       | 0.00 | 0.00 |
| Incr Delay (d2), s/veh             | 109.7       | 0.6          | 0.6          | 7.9        | 4.8          | 8.5          | 1.3         | 0.0      | 0.0         | 4.0        | 0.0  | 0.0  |
| Initial Q Delay(d3),s/veh          | 0.0         | 2.6          | 2.4          | 0.0        | 89.4         | 78.0         | 0.0         | 0.0      | 0.0         | 0.0        | 0.0  | 0.0  |
| %ile BackOfQ(50%),veh/ln           | 6.6         | 10.0         | 10.2         | 0.3        | 62.6         | 65.9         | 5.3         | 0.0      | 0.1         | 1.4        | 0.0  | 0.0  |
| Unsig. Movement Delay, s/veh       |             | 10.0         | 10.2         | 0.0        | 02.0         | 00.0         | 0.0         | 0.0      | 0.1         | 1.4        | 0.0  | 0.0  |
| LnGrp Delay(d),s/veh               | 175.2       | 13.1         | 12.8         | 77.0       | 118.3        | 110.6        | 59.6        | 0.0      | 53.3        | 70.9       | 0.0  | 0.0  |
| LnGrp LOS                          | F           | В            | В            | E          | F            | F            | E           | A        | D           | E          | A    | A    |
| Approach Vol, veh/h                |             | 1300         |              |            | 2999         | ·            |             | 154      |             |            | 37   |      |
| Approach Delay, s/veh              |             | 42.8         |              |            | 115.4        |              |             | 59.5     |             |            | 70.9 |      |
| Approach LOS                       |             | D            |              |            | F            |              |             | E        |             |            | E    |      |
| Timer - Assigned Phs               | 1           | 2            |              | 4          | 5            | 6            |             | 8        |             |            |      |      |
| Phs Duration (G+Y+Rc), s           | 13.0        | 96.5         |              | 22.0       | 5.2          | 104.3        |             | 8.6      |             |            |      |      |
| Change Period (Y+Rc), s            | 4.0         | 4.6          |              | 4.0        | 4.0          | 4.6          |             | 4.0      |             |            |      |      |
| Max Green Setting (Gmax), s        | 9.0         | 81.4         |              | 27.0       | 5.0          | 85.4         |             | 6.0      |             |            |      |      |
| Max Q Clear Time (g_c+l1), s       | 11.0        | 66.2         |              | 13.6       | 2.5          | 21.5         |             | 4.8      |             |            |      |      |
| Green Ext Time (p_c), s            | 0.0         | 14.2         |              | 0.3        | 0.0          | 8.4          |             | 0.0      |             |            |      |      |
| Intersection Summary               |             |              |              |            |              |              |             |          |             |            |      |      |
| HCM 6th Ctrl Delay                 |             |              | 92.1         |            |              |              |             |          |             |            |      |      |
| HCM 6th LOS                        |             |              | 52.1<br>F    |            |              |              |             |          |             |            |      |      |
|                                    |             |              | •            |            |              |              |             |          |             |            |      |      |

|                              | •         | <b>→</b>        | •    | •         | <b>←</b>   | •         | 4    | <b>†</b>  | /    | <b>&gt;</b> | ļ         | 4         |
|------------------------------|-----------|-----------------|------|-----------|------------|-----------|------|-----------|------|-------------|-----------|-----------|
| Movement                     | EBL       | EBT             | EBR  | WBL       | WBT        | WBR       | NBL  | NBT       | NBR  | SBL         | SBT       | SBR       |
| Lane Configurations          | Ť         | ተተ <sub>ጉ</sub> |      | 14.54     | <b>↑</b> ↑ |           | Ĭ    | <b></b>   | 77   | 44          | <b>^</b>  | 7         |
| Traffic Volume (veh/h)       | 118       | 402             | 40   | 273       | 1063       | 350       | 68   | 285       | 369  | 616         | 636       | 521       |
| Future Volume (veh/h)        | 118       | 402             | 40   | 273       | 1063       | 350       | 68   | 285       | 369  | 616         | 636       | 521       |
| Initial Q (Qb), veh          | 0         | 0               | 0    | 0         | 10         | 0         | 0    | 0         | 32   | 0           | 36        | 18        |
| Ped-Bike Adj(A_pbT)          | 1.00      |                 | 0.98 | 1.00      |            | 0.98      | 1.00 |           | 1.00 | 1.00        |           | 0.96      |
| Parking Bus, Adj             | 1.00      | 1.00            | 1.00 | 1.00      | 1.00       | 1.00      | 1.00 | 1.00      | 1.00 | 1.00        | 1.00      | 1.00      |
| Work Zone On Approach        |           | No              |      |           | No         |           |      | No        |      |             | No        |           |
| Adj Sat Flow, veh/h/ln       | 1870      | 1870            | 1870 | 1885      | 1885       | 1885      | 1870 | 1870      | 1870 | 1870        | 1870      | 1870      |
| Adj Flow Rate, veh/h         | 119       | 406             | 29   | 276       | 1074       | 325       | 69   | 288       | 373  | 622         | 642       | 350       |
| Peak Hour Factor             | 0.99      | 0.99            | 0.99 | 0.99      | 0.99       | 0.99      | 0.99 | 0.99      | 0.99 | 0.99        | 0.99      | 0.99      |
| Percent Heavy Veh, %         | 2         | 2               | 2    | 1         | 1          | 1         | 2    | 2         | 2    | 2           | 2         | 2         |
| Cap, veh/h                   | 149       | 1724            | 122  | 387       | 1268       | 112       | 114  | 435       | 862  | 582         | 1142      | 504       |
| Arrive On Green              | 0.08      | 0.35            | 0.35 | 0.11      | 0.38       | 0.38      | 0.06 | 0.18      | 0.18 | 0.18        | 0.31      | 0.31      |
| Sat Flow, veh/h              | 1781      | 4861            | 343  | 3483      | 2702       | 808       | 1781 | 1870      | 2790 | 3456        | 3554      | 1529      |
| Grp Volume(v), veh/h         | 119       | 283             | 152  | 276       | 708        | 691       | 69   | 288       | 373  | 622         | 642       | 350       |
| Grp Sat Flow(s),veh/h/ln     | 1781      | 1702            | 1800 | 1742      | 1791       | 1719      | 1781 | 1870      | 1395 | 1728        | 1777      | 1529      |
| Q Serve(g_s), s              | 7.2       | 6.4             | 6.6  | 8.4       | 42.0       | 42.0      | 4.1  | 16.4      | 0.0  | 19.7        | 16.8      | 17.2      |
| Cycle Q Clear(g_c), s        | 7.2       | 6.4             | 6.6  | 8.4       | 42.0       | 42.0      | 4.1  | 16.4      | 0.0  | 19.7        | 16.8      | 17.2      |
| Prop In Lane                 | 1.00      | 0.1             | 0.19 | 1.00      | 12.0       | 0.47      | 1.00 | 10.1      | 1.00 | 1.00        | 10.0      | 1.00      |
| Lane Grp Cap(c), veh/h       | 149       | 1207            | 638  | 387       | 684        | 697       | 114  | 435       | 862  | 582         | 1142      | 504       |
| V/C Ratio(X)                 | 0.80      | 0.23            | 0.24 | 0.71      | 1.04       | 0.99      | 0.61 | 0.66      | 0.43 | 1.07        | 0.56      | 0.69      |
| Avail Cap(c_a), veh/h        | 162       | 1207            | 638  | 412       | 684        | 656       | 130  | 493       | 1046 | 619         | 1090      | 469       |
| HCM Platoon Ratio            | 1.00      | 1.00            | 1.00 | 1.00      | 1.00       | 1.00      | 1.00 | 1.00      | 1.00 | 1.00        | 1.00      | 1.00      |
| Upstream Filter(I)           | 1.00      | 1.00            | 1.00 | 0.23      | 0.23       | 0.23      | 1.00 | 1.00      | 1.00 | 1.00        | 1.00      | 1.00      |
| Uniform Delay (d), s/veh     | 49.5      | 25.0            | 25.0 | 47.2      | 34.0       | 34.0      | 50.1 | 38.4      | 32.2 | 45.7        | 32.7      | 21.3      |
| Incr Delay (d2), s/veh       | 19.8      | 0.5             | 0.9  | 1.0       | 26.5       | 14.6      | 3.4  | 7.7       | 1.6  | 57.3        | 2.0       | 7.7       |
| Initial Q Delay(d3),s/veh    | 0.0       | 0.0             | 0.0  | 0.0       | 26.3       | 22.3      | 0.0  | 0.0       | 17.5 | 0.0         | 16.4      | 30.1      |
| %ile BackOfQ(50%),veh/ln     | 4.1       | 2.7             | 3.0  | 3.6       | 27.2       | 24.6      | 1.9  | 7.8       | 7.3  | 12.4        | 12.1      | 13.4      |
| Unsig. Movement Delay, s/veh |           | 2.1             | 0.0  | 0.0       | 21.2       | 24.0      | 1.0  | 7.0       | 1.0  | 12.7        | 12.1      | 10.4      |
| LnGrp Delay(d),s/veh         | 69.3      | 25.4            | 25.9 | 48.2      | 86.8       | 70.9      | 53.5 | 46.1      | 51.3 | 103.1       | 51.0      | 59.2      |
| LnGrp LOS                    | 65.5<br>E | 23.4<br>C       | C C  | 70.2<br>D | F          | 70.5<br>E | D    | D         | D D  | F           | D D       | 55.2<br>E |
| Approach Vol, veh/h          |           | 554             |      |           | 1675       |           |      | 730       |      | <u> </u>    | 1614      |           |
| Approach Delay, s/veh        |           | 35.0            |      |           | 73.9       |           |      | 49.4      |      |             | 72.8      |           |
|                              |           | 33.0<br>C       |      |           | 73.9<br>E  |           |      | 49.4<br>D |      |             | 72.0<br>E |           |
| Approach LOS                 |           | C               |      |           |            |           |      | D         |      |             |           |           |
| Timer - Assigned Phs         | 1         | 2               | 3    | 4         | 5          | 6         | 7    | 8         |      |             |           |           |
| Phs Duration (G+Y+Rc), s     | 11.0      | 38.7            | 13.2 | 47.0      | 24.7       | 25.1      | 16.2 | 44.0      |      |             |           |           |
| Change Period (Y+Rc), s      | 4.0       | 5.0             | 4.0  | 5.0       | 5.0        | * 5       | 4.0  | 5.0       |      |             |           |           |
| Max Green Setting (Gmax), s  | 8.0       | 32.0            | 10.0 | 42.0      | 11.0       | * 29      | 13.0 | 39.0      |      |             |           |           |
| Max Q Clear Time (g_c+l1), s | 6.1       | 19.2            | 9.2  | 44.0      | 21.7       | 18.4      | 10.4 | 8.6       |      |             |           |           |
| Green Ext Time (p_c), s      | 0.0       | 3.2             | 0.0  | 0.0       | 0.0        | 1.7       | 0.2  | 1.9       |      |             |           |           |
| Intersection Summary         |           |                 |      |           |            |           |      |           |      |             |           |           |
| HCM 6th Ctrl Delay           |           |                 | 64.9 |           |            |           |      |           |      |             |           |           |
| HCM 6th LOS                  |           |                 | E    |           |            |           |      |           |      |             |           |           |
| Notes                        |           |                 |      |           |            |           |      |           |      |             |           |           |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|   | ۶           | <b>→</b> | •           | •         | <b>—</b> | •    | 1           | <b>†</b> | <b>/</b>     | <b>/</b> | <b>+</b>     |              |
|---|-------------|----------|-------------|-----------|----------|------|-------------|----------|--------------|----------|--------------|--------------|
| Movement                                | EBL         | EBT      | EBR         | WBL       | WBT      | WBR  | NBL         | NBT      | NBR          | SBL      | SBT          | SBR          |
| Lane Configurations                     | ሻሻ          | ₽        |             |           | 4        |      | ሻ           | ₽        |              |          | <b>+</b>     | 77           |
| Traffic Volume (veh/h)                  | 668         | 2        | 75          | 2         | 0        | 3    | 63          | 251      | 3            | 0        | 130          | 1953         |
| Future Volume (veh/h)                   | 668         | 2        | 75          | 2         | 0        | 3    | 63          | 251      | 3            | 0        | 130          | 1953         |
| Initial Q (Qb), veh                     | 0           | 0        | 0           | 0         | 0        | 0    | 12          | 12       | 0            | 0        | 0            | 24           |
| Ped-Bike Adj(A_pbT)                     | 1.00        | 4.00     | 1.00        | 1.00      |          | 1.00 | 1.00        | 4.00     | 0.96         | 1.00     | 4.00         | 1.00         |
| Parking Bus, Adj                        | 1.00        | 1.00     | 1.00        | 1.00      | 1.00     | 1.00 | 1.00        | 1.00     | 1.00         | 1.00     | 1.00         | 1.00         |
| Work Zone On Approach                   | 4044        | No       | 4044        | 4000      | No       | 4000 | 4044        | No       | 4044         | 0        | No           | 4050         |
| Adj Sat Flow, veh/h/ln                  | 1841        | 1841     | 1841        | 1900      | 1900     | 1900 | 1841        | 1841     | 1841         | 0        | 1856         | 1856         |
| Adj Flow Rate, veh/h                    | 675         | 2        | 27          | 2         | 0        | 0    | 64          | 254      | 2            | 0        | 131          | 1587         |
| Peak Hour Factor                        | 0.99        | 0.99     | 0.99        | 0.99      | 0.99     | 0.99 | 0.99        | 0.99     | 0.99         | 0.99     | 0.99         | 0.99         |
| Percent Heavy Veh, %                    | 4           | 4        | 4           | 0         | 0        | 0    | 4           | 4        | 4            | 0        | 3            | 3            |
| Cap, veh/h                              | 802         | 26       | 346         | 4         | 0        | 0    | 111         | 1175     | 8            | 0        | 1023         | 2138         |
| Arrive On Green                         | 0.25        | 0.25     | 0.25        | 0.00      | 0.00     | 0.00 | 0.05        | 0.61     | 0.61         | 0.00     | 0.52         | 0.52         |
| Sat Flow, veh/h                         | 3401        | 109      | 1468        | 1809      | 0        | 0    | 1753        | 1823     | 14           | 0        | 1856         | 2768         |
| Grp Volume(v), veh/h                    | 675         | 0        | 29          | 2         | 0        | 0    | 64          | 0        | 256          | 0        | 131          | 1587         |
| Grp Sat Flow(s),veh/h/ln                | 1700        | 0        | 1577        | 1810      | 0        | 0    | 1753        | 0        | 1837         | 0        | 1856         | 1384         |
| Q Serve(g_s), s                         | 12.5        | 0.0      | 0.9         | 0.1       | 0.0      | 0.0  | 2.4         | 0.0      | 4.2          | 0.0      | 2.4          | 21.2         |
| Cycle Q Clear(g_c), s                   | 12.5        | 0.0      | 0.9         | 0.1       | 0.0      | 0.0  | 2.4         | 0.0      | 4.2          | 0.0      | 2.4          | 21.2         |
| Prop In Lane                            | 1.00        | ٥        | 0.93        | 1.00      | ٥        | 0.00 | 1.00        | ٥        | 0.01         | 0.00     | 1000         | 1.00         |
| Lane Grp Cap(c), veh/h                  | 802<br>0.84 | 0        | 372<br>0.08 | 4<br>0.51 | 0.00     | 0.00 | 111         | 0.00     | 1129<br>0.23 | 0.00     | 1023<br>0.13 | 2138         |
| V/C Ratio(X)                            | 1423        | 0.00     | 660         | 108       | 0.00     | 0.00 | 0.57<br>183 | 0.00     | 2087         | 0.00     | 1830         | 0.74<br>3409 |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 1.00        | 1.00     | 1.00        | 1.00      | 1.00     | 1.00 | 1.00        | 1.00     | 1.00         | 1.00     | 1.00         | 1.00         |
| Upstream Filter(I)                      | 1.00        | 0.00     | 1.00        | 1.00      | 0.00     | 0.00 | 1.00        | 0.00     | 1.00         | 0.00     | 1.00         | 1.00         |
| Uniform Delay (d), s/veh                | 30.9        | 0.00     | 25.2        | 41.9      | 0.00     | 0.00 | 51.5        | 0.00     | 6.4          | 0.00     | 8.8          | 4.8          |
| Incr Delay (d2), s/veh                  | 0.9         | 0.0      | 0.0         | 76.3      | 0.0      | 0.0  | 4.6         | 0.0      | 0.4          | 0.0      | 0.0          | 0.5          |
| Initial Q Delay(d3),s/veh               | 0.0         | 0.0      | 0.0         | 0.0       | 0.0      | 0.0  | 195.9       | 0.0      | 1.1          | 0.0      | 0.0          | 3.5          |
| %ile BackOfQ(50%),veh/ln                | 6.4         | 0.0      | 0.4         | 0.0       | 0.0      | 0.0  | 9.3         | 0.0      | 2.9          | 0.0      | 1.1          | 15.3         |
| Unsig. Movement Delay, s/veh            |             | 0.0      | 0.4         | 0.1       | 0.0      | 0.0  | 5.0         | 0.0      | 2.5          | 0.0      | 1.1          | 10.0         |
| LnGrp Delay(d),s/veh                    | 31.8        | 0.0      | 25.2        | 118.2     | 0.0      | 0.0  | 252.0       | 0.0      | 7.6          | 0.0      | 8.8          | 8.8          |
| LnGrp LOS                               | C           | Α        | C           | F         | Α        | Α    | F           | Α        | Α            | A        | Α            | A            |
| Approach Vol, veh/h                     |             | 704      |             | <u> </u>  | 2        |      |             | 320      |              |          | 1718         |              |
| Approach Delay, s/veh                   |             | 31.5     |             |           | 118.2    |      |             | 56.4     |              |          | 8.8          |              |
| Approach LOS                            |             | C        |             |           | F        |      |             | E        |              |          | A            |              |
|   |             |          |             |           | •        | •    |             |          |              |          |              |              |
| Timer - Assigned Phs                    | 1           | 2        |             | 4         |          | 6    |             | 8        |              |          |              |              |
| Phs Duration (G+Y+Rc), s                | 6.1         | 38.3     |             | 3.1       |          | 44.3 |             | 19.4     |              |          |              |              |
| Change Period (Y+Rc), s                 | 3.0         | 3.5      |             | 3.0       |          | 3.5  |             | 3.0      |              |          |              |              |
| Max Green Setting (Gmax), s             | 7.0         | 66.0     |             | 4.0       |          | 76.0 |             | 28.0     |              |          |              |              |
| Max Q Clear Time (g_c+l1), s            | 4.4         | 23.2     |             | 2.1       |          | 6.2  |             | 14.5     |              |          |              |              |
| Green Ext Time (p_c), s                 | 0.0         | 11.6     |             | 0.0       |          | 0.8  |             | 1.9      |              |          |              |              |
| Intersection Summary                    |             |          |             |           |          |      |             |          |              |          |              |              |
| HCM 6th Ctrl Delay                      |             |          | 20.3        |           |          |      |             |          |              |          |              |              |
| HCM 6th LOS                             |             |          | С           |           |          |      |             |          |              |          |              |              |

|                                 | ۶         | <b>→</b> | $\rightarrow$ | •     | <b>←</b>   | •          | •       | <b>†</b> | ~      | <b>&gt;</b> | ļ        | 1    |
|---------------------------------|-----------|----------|---------------|-------|------------|------------|---------|----------|--------|-------------|----------|------|
| Movement                        | EBL       | EBT      | EBR           | WBL   | WBT        | WBR        | NBL     | NBT      | NBR    | SBL         | SBT      | SBR  |
| Lane Configurations             | *         | 1•       |               | 777   | <b>†</b>   | 7          | ች       | <b>^</b> | 7      | 777         | <b>^</b> | 7    |
| Traffic Volume (vph)            | 160       | 191      | 85            | 1403  | 488        | 744        | 64      | 482      | 166    | 656         | 447      | 138  |
| Future Volume (vph)             | 160       | 191      | 85            | 1403  | 488        | 744        | 64      | 482      | 166    | 656         | 447      | 138  |
| Ideal Flow (vphpl)              | 1900      | 1900     | 1900          | 1900  | 1900       | 1900       | 1900    | 1900     | 1900   | 1900        | 1900     | 1900 |
| Total Lost time (s)             | 4.0       | 4.0      |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      | 4.9    | 4.9         | 4.9      | 4.9  |
| Lane Util. Factor               | 1.00      | 1.00     |               | 0.97  | 1.00       | 1.00       | 1.00    | 0.95     | 1.00   | 0.97        | 0.95     | 1.00 |
| Frpb, ped/bikes                 | 1.00      | 0.96     |               | 1.00  | 1.00       | 0.98       | 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    | 1.00     | 1.00   | 1.00        | 1.00     | 1.00 |
| Frt                             | 1.00      | 0.95     |               | 1.00  | 1.00       | 0.85       | 1.00    | 1.00     | 0.85   | 1.00        | 1.00     | 0.85 |
| Flt Protected                   | 0.95      | 1.00     |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00   | 0.95        | 1.00     | 1.00 |
| Satd. Flow (prot)               | 1608      | 1558     |               | 3060  | 1660       | 1388       | 1547    | 3094     | 1384   | 3001        | 3094     | 1333 |
| Flt Permitted                   | 0.95      | 1.00     |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00   | 0.95        | 1.00     | 1.00 |
| Satd. Flow (perm)               | 1608      | 1558     |               | 3060  | 1660       | 1388       | 1547    | 3094     | 1384   | 3001        | 3094     | 1333 |
| 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)                 | 162       | 193      | 86            | 1417  | 493        | 752        | 65      | 487      | 168    | 663         | 452      | 139  |
| RTOR Reduction (vph)            | 0         | 14       | 0             | 0     | 0          | 388        | 0       | 0        | 0      | 0           | 0        | 109  |
| Lane Group Flow (vph)           | 162       | 265      | 0             | 1417  | 493        | 364        | 65      | 487      | 168    | 663         | 452      | 30   |
| Confl. Peds. (#/hr)             |           |          | 74            |       |            |            |         |          |        |             |          | 5    |
| Confl. Bikes (#/hr)             |           |          | 2             |       |            | 6          |         |          | 4      |             |          |      |
| Heavy Vehicles (%)              | 1%        | 1%       | 1%            | 3%    | 3%         | 3%         | 5%      | 5%       | 5%     | 5%          | 5%       | 5%   |
| Turn Type                       | Split     | NA       |               | Split | NA         | Perm       | Split   | NA       | custom | Split       | NA       | Perm |
| Protected Phases                | 4         | 4        |               | . 7   | 7          |            | 6       | 6        | 2 6 7! | 2!          | 2        |      |
| Permitted Phases                |           |          |               |       |            | 7          |         |          |        |             |          | 2    |
| Actuated Green, G (s)           | 23.6      | 23.6     |               | 37.1  | 37.1       | 37.1       | 15.1    | 15.1     | 87.5   | 25.5        | 25.5     | 25.5 |
| Effective Green, g (s)          | 23.6      | 23.6     |               | 37.1  | 37.1       | 37.1       | 15.1    | 15.1     | 87.5   | 25.5        | 25.5     | 25.5 |
| Actuated g/C Ratio              | 0.20      | 0.20     |               | 0.31  | 0.31       | 0.31       | 0.13    | 0.13     | 0.73   | 0.21        | 0.21     | 0.21 |
| Clearance Time (s)              | 4.0       | 4.0      |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      |        | 4.9         | 4.9      | 4.9  |
| Vehicle Extension (s)           | 3.0       | 3.0      |               | 3.0   | 3.0        | 3.0        | 2.5     | 2.5      |        | 2.0         | 2.0      | 2.0  |
| Lane Grp Cap (vph)              | 316       | 306      |               | 946   | 513        | 429        | 194     | 389      | 1009   | 637         | 657      | 283  |
| v/s Ratio Prot                  | 0.10      | c0.17    |               | c0.46 | 0.30       |            | 0.04    | c0.16    | 0.12   | c0.22       | 0.15     |      |
| v/s Ratio Perm                  |           |          |               |       |            | 0.26       |         |          |        |             |          | 0.02 |
| v/c Ratio                       | 0.51      | 0.87     |               | 1.50  | 0.96       | 0.85       | 0.34    | 1.25     | 0.17   | 1.04        | 0.69     | 0.10 |
| Uniform Delay, d1               | 43.1      | 46.7     |               | 41.5  | 40.7       | 38.8       | 47.9    | 52.5     | 5.0    | 47.2        | 43.6     | 38.1 |
| 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           | 1.4       | 21.8     |               | 229.6 | 29.9       | 14.4       | 0.7     | 133.0    | 0.1    | 46.7        | 5.8      | 0.7  |
| Delay (s)                       | 44.5      | 68.5     |               | 271.1 | 70.7       | 53.2       | 48.6    | 185.4    | 5.1    | 94.0        | 49.4     | 38.8 |
| Level of Service                | D         | Е        |               | F     | Е          | D          | D       | F        | Α      | F           | D        | D    |
| Approach Delay (s)              |           | 59.7     |               |       | 172.4      |            |         | 131.0    |        |             | 71.8     |      |
| Approach LOS                    |           | E        |               |       | F          |            |         | F        |        |             | Е        |      |
| Intersection Summary            |           |          |               |       |            |            |         |          |        |             |          |      |
| HCM 2000 Control Delay          |           |          | 131.9         | Н     | CM 2000    | Level of S | Service |          | F      |             |          |      |
| HCM 2000 Volume to Capac        | ity ratio |          | 1.20          |       |            |            |         |          |        |             |          |      |
| Actuated Cycle Length (s)       |           |          | 120.0         |       | um of lost |            |         |          | 18.7   |             |          |      |
| Intersection Capacity Utilizati | ion       |          | 117.1%        | IC    | U Level    | of Service |         |          | Н      |             |          |      |
| Analysis Period (min)           |           |          | 15            |       |            |            |         |          |        |             |          |      |
| ! Phase conflict between la     | ne groups | i.       |               |       |            |            |         |          |        |             |          |      |
| c Critical Lane Group           |           |          |               |       |            |            |         |          |        |             |          |      |

|                              | •          | <b>→</b> | <b>←</b>    | •        | <b>&gt;</b> | 4            |      |      |  |
|------------------------------|------------|----------|-------------|----------|-------------|--------------|------|------|--|
| Movement                     | EBL        | EBT      | WBT         | WBR      | SBL         | SBR          |      |      |  |
| Lane Configurations          | *          | <b>^</b> | <b>†††</b>  | 11511    | <u> </u>    | 7            |      |      |  |
| Traffic Volume (vph)         | 66         | 950      | 3647        | 116      | 30          | 75           |      |      |  |
| Future Volume (vph)          | 66         | 950      | 3647        | 116      | 30          | 75           |      |      |  |
| Ideal Flow (vphpl)           | 1900       | 1900     | 1900        | 1900     | 1900        | 1900         |      |      |  |
| Total Lost time (s)          | 4.0        | 4.9      | 4.9         | 1000     | 4.2         | 4.2          |      |      |  |
| Lane Util. Factor            | 1.00       | 0.91     | 0.91        |          | 1.00        | 1.00         |      |      |  |
| Frpb, ped/bikes              | 1.00       | 1.00     | 1.00        |          | 1.00        | 1.00         |      |      |  |
| Flpb, ped/bikes              | 1.00       | 1.00     | 1.00        |          | 1.00        | 1.00         |      |      |  |
| Frt                          | 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)            | 1687       | 4848     | 2700        |          | 1770        | 1583         |      |      |  |
| Flt Permitted                | 0.95       | 1.00     | 1.00        |          | 0.95        | 1.00         |      |      |  |
| Satd. Flow (perm)            | 1687       | 4848     | 5058        |          | 1770        | 1583         |      |      |  |
| Peak-hour factor, PHF        | 0.99       | 0.99     | 0.99        | 0.99     | 0.99        | 0.99         |      |      |  |
| •                            | 0.99<br>67 | 960      | 3684        | 117      | 30          | 76           |      |      |  |
| Adj. Flow (vph)              |            |          | 3004        |          | 0           | 69           |      |      |  |
| RTOR Reduction (vph)         | 0<br>67    | 060      | 3799        | 0        | 30          | 7            |      |      |  |
| Lane Group Flow (vph)        | 70         | 960      | 3/99        | 0        | 30          | 1            |      |      |  |
| Confl. Peds. (#/hr)          |            |          |             | 1        |             |              |      |      |  |
| Confl. Bikes (#/hr)          | 7%         | 70/      | 2%          | 6<br>20/ | 2%          | 2%           |      |      |  |
| Heavy Vehicles (%)           |            | 7%       |             | 2%       |             |              |      |      |  |
| Turn Type                    | Prot       | NA       | NA          |          | Prot        | Perm         |      |      |  |
| Protected Phases             | 5          | 2        | 6           |          | 3           |              |      |      |  |
| Permitted Phases             | 0.0        | 70.0     | <b>50.0</b> |          | 0.0         | 3            |      |      |  |
| Actuated Green, G (s)        | 8.0        | 70.9     | 58.9        |          | 9.6         | 9.6          |      |      |  |
| Effective Green, g (s)       | 8.0        | 70.9     | 58.9        |          | 9.6         | 9.6          |      |      |  |
| Actuated g/C Ratio           | 0.08       | 0.71     | 0.59        |          | 0.10        | 0.10         |      |      |  |
| Clearance Time (s)           | 4.0        | 4.9      | 4.9         |          | 4.2         | 4.2          |      |      |  |
| Vehicle Extension (s)        | 2.0        | 2.0      | 2.0         |          | 2.0         | 2.0          |      |      |  |
| Lane Grp Cap (vph)           | 134        | 3437     | 1590        |          | 169         | 151          |      |      |  |
| v/s Ratio Prot               | c0.04      | 0.20     | c1.41       |          | c0.02       |              |      |      |  |
| v/s Ratio Perm               |            |          |             |          |             | 0.00         |      |      |  |
| v/c Ratio                    | 0.50       | 0.28     | 2.39        |          | 0.18        | 0.05         |      |      |  |
| Uniform Delay, d1            | 44.1       | 5.3      | 20.6        |          | 41.6        | 41.1         |      |      |  |
| Progression Factor           | 1.00       | 1.00     | 1.48        |          | 1.00        | 1.00         |      |      |  |
| Incremental Delay, d2        | 1.1        | 0.2      | 625.3       |          | 0.2         | 0.0          |      |      |  |
| Delay (s)                    | 45.2       | 5.5      | 655.7       |          | 41.8        | 41.1         |      |      |  |
| Level of Service             | D          | Α        | F           |          | D           | D            |      |      |  |
| Approach Delay (s)           |            | 8.1      | 655.7       |          | 41.3        |              |      |      |  |
| Approach LOS                 |            | Α        | F           |          | D           |              |      |      |  |
| Intersection Summary         |            |          |             |          |             |              |      |      |  |
| HCM 2000 Control Delay       |            |          | 507.7       | H        | CM 2000     | Level of Ser | vice | F    |  |
| HCM 2000 Volume to Cap       |            |          | 1.77        |          |             |              |      |      |  |
| Actuated Cycle Length (s)    |            |          | 100.0       |          | um of lost  |              |      | 17.1 |  |
| Intersection Capacity Utiliz | zation     |          | 90.6%       | IC       | CU Level of | of Service   |      | Е    |  |
| Analysis Period (min)        |            |          | 15          |          |             |              |      |      |  |
| c Critical Lane Group        |            |          |             |          |             |              |      |      |  |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩20& Oyster Po

|                                 | •         | ۶        | <b>→</b> | •         | •         | <b>←</b>   | •       | ₽I    | 4     | †     | /    | <b>\</b> |
|---------------------------------|-----------|----------|----------|-----------|-----------|------------|---------|-------|-------|-------|------|----------|
| Movement                        | EBU       | EBL      | EBT      | EBR       | WBL2      | WBT        | WBR     | NBU   | NBL   | NBT   | NBR  | SBL      |
| Lane Configurations             |           | Ţ        | ተተኈ      |           | ¥         | ተተኈ        |         |       | 1,4   | ર્ન   | 7    |          |
| Traffic Volume (vph)            | 4         | 49       | 757      | 244       | 152       | 3174       | 19      | 2     | 1650  | 32    | 80   | 8        |
| Future Volume (vph)             | 4         | 49       | 757      | 244       | 152       | 3174       | 19      | 2     | 1650  | 32    | 80   | 8        |
| Ideal Flow (vphpl)              | 1900      | 1900     | 1900     | 1900      | 1900      | 1900       | 1900    | 1900  | 1900  | 1900  | 1900 | 1900     |
| Total Lost time (s)             |           | 4.0      | 4.6      |           | 4.0       | 4.6        |         |       | 4.0   | 4.0   | 4.0  |          |
| Lane Util. Factor               |           | 1.00     | 0.91     |           | 1.00      | 0.91       |         |       | 0.91  | 0.91  | 1.00 |          |
| Frpb, ped/bikes                 |           | 1.00     | 1.00     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 0.94 |          |
| Flpb, ped/bikes                 |           | 1.00     | 1.00     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 1.00 |          |
| Frt                             |           | 1.00     | 0.96     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 0.85 |          |
| Flt Protected                   |           | 0.95     | 1.00     |           | 0.95      | 1.00       |         |       | 0.95  | 0.95  | 1.00 |          |
| Satd. Flow (prot)               |           | 1597     | 4408     |           | 1770      | 5079       |         |       | 3189  | 1603  | 1478 |          |
| Flt Permitted                   |           | 0.95     | 1.00     |           | 0.95      | 1.00       |         |       | 0.95  | 0.95  | 1.00 |          |
| Satd. Flow (perm)               |           | 1597     | 4408     |           | 1770      | 5079       |         |       | 3189  | 1603  | 1478 |          |
| 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)                 | 4         | 49       | 765      | 246       | 154       | 3206       | 19      | 2     | 1667  | 32    | 81   | 8        |
| RTOR Reduction (vph)            | 0         | 0        | 0        | 0         | 0         | 1          | 0       | 0     | 0     | 0     | 61   | 0        |
| Lane Group Flow (vph)           | 0         | 53       | 1011     | 0         | 154       | 3224       | 0       | 0     | 1136  | 565   | 20   | 0        |
| Confl. Peds. (#/hr)             |           |          |          |           |           |            | 8       |       |       |       | 37   |          |
| Confl. Bikes (#/hr)             |           |          |          | 2         |           |            | 5       |       |       |       | 4    |          |
| Heavy Vehicles (%)              | 13%       | 13%      | 13%      | 13%       | 2%        | 2%         | 2%      | 3%    | 3%    | 3%    | 3%   | 1%       |
| Turn Type                       | Prot      | Prot     | NA       |           | Prot      | NA         |         | Split | Split | NA    | Perm | Split    |
| Protected Phases                | 1         | 1        | 6        |           | 5         | 2          |         | 4     | 4     | 4     | . 0  | 7        |
| Permitted Phases                | •         | •        | · ·      |           | •         | =          |         | •     | •     | •     | 4    | •        |
| Actuated Green, G (s)           |           | 7.8      | 35.1     |           | 13.5      | 40.8       |         |       | 34.0  | 34.0  | 34.0 |          |
| Effective Green, g (s)          |           | 7.8      | 35.1     |           | 13.5      | 40.8       |         |       | 34.0  | 34.0  | 34.0 |          |
| Actuated g/C Ratio              |           | 0.06     | 0.26     |           | 0.10      | 0.30       |         |       | 0.25  | 0.25  | 0.25 |          |
| Clearance Time (s)              |           | 4.0      | 4.6      |           | 4.0       | 4.6        |         |       | 4.0   | 4.0   | 4.0  |          |
| Vehicle Extension (s)           |           | 2.0      | 3.0      |           | 2.0       | 3.0        |         |       | 2.0   | 2.0   | 2.0  |          |
| Lane Grp Cap (vph)              |           | 91       | 1139     |           | 175       | 1525       |         |       | 798   | 401   | 370  |          |
| v/s Ratio Prot                  |           | 0.03     | 0.23     |           | c0.09     | c0.63      |         |       | c0.36 | 0.35  | 010  |          |
| v/s Ratio Perm                  |           | 0.00     | 0.20     |           | 00.00     | 00.00      |         |       | 00.00 | 0.00  | 0.01 |          |
| v/c Ratio                       |           | 0.58     | 0.89     |           | 0.88      | 2.11       |         |       | 1.42  | 1.41  | 0.05 |          |
| Uniform Delay, d1               |           | 62.4     | 48.5     |           | 60.4      | 47.5       |         |       | 50.9  | 50.9  | 38.7 |          |
| Progression Factor              |           | 1.00     | 1.00     |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 1.00 |          |
| Incremental Delay, d2           |           | 6.0      | 8.6      |           | 35.6      | 503.7      |         |       | 197.9 | 198.4 | 0.0  |          |
| Delay (s)                       |           | 68.4     | 57.1     |           | 96.0      | 551.2      |         |       | 248.8 | 249.3 | 38.7 |          |
| Level of Service                |           | E        | E        |           | 50.0<br>F | F          |         |       | F     | F     | D    |          |
| Approach Delay (s)              |           |          | 57.6     |           | •         | 530.4      |         |       | •     | 239.4 |      |          |
| Approach LOS                    |           |          | E        |           |           | F          |         |       |       | F     |      |          |
| Intersection Summary            |           |          |          |           |           |            |         |       |       |       |      |          |
| HCM 2000 Control Delay          |           |          | 320.6    | Н         | ICM 2000  | Level of   | Service |       | F     |       |      |          |
| HCM 2000 Volume to Capaci       | ity ratio |          | 1.44     |           |           |            |         |       |       |       |      |          |
| Actuated Cycle Length (s)       | •         |          | 135.8    | S         | um of los | t time (s) |         |       | 21.1  |       |      |          |
| Intersection Capacity Utilizati | on        |          | 140.3%   |           |           | of Service |         |       | Н     |       |      |          |
| Analysis Period (min)           |           |          | 15       |           |           |            |         |       |       |       |      |          |
| dr Defacto Right Lane. Red      | code with | 1 though |          | right lan | e.        |            |         |       |       |       |      |          |
| c Critical Lane Group           |           |          |          |           |           |            |         |       |       |       |      |          |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩020& Oyster Po

|                        | <b>↓</b>  | 4    | /         | 4         |
|------------------------|-----------|------|-----------|-----------|
| Movement               | SBT       | SBR2 | NER       | NER2      |
| Lane Configurations    | र्सीक     |      | 11        | 7         |
| Traffic Volume (vph)   | 27        | 431  | 444       | 176       |
| Future Volume (vph)    | 27        | 431  | 444       | 176       |
| Ideal Flow (vphpl)     | 1900      | 1900 | 1990      | 1900      |
| Total Lost time (s)    | 4.0       |      | 4.5       | 4.5       |
| Lane Util. Factor      | 0.95      |      | *0.95     | 1.00      |
| Frpb, ped/bikes        | 0.96      |      | 1.00      | 1.00      |
| Flpb, ped/bikes        | 1.00      |      | 1.00      | 1.00      |
| Frt                    | 0.86      |      | 1.00      | 0.85      |
| Flt Protected          | 1.00      |      | 1.00      | 1.00      |
| Satd. Flow (prot)      | 2963      |      | 3376      | 1442      |
| Flt Permitted          | 1.00      |      | 1.00      | 1.00      |
| Satd. Flow (perm)      | 2963      |      | 3376      | 1442      |
|                        |           | 0.00 |           |           |
| Peak-hour factor, PHF  | 0.99      | 0.99 | 0.99      | 0.99      |
| Adj. Flow (vph)        | 27        | 435  | 448       | 178       |
| RTOR Reduction (vph)   | 372       | 0    | 0         | 0         |
| Lane Group Flow (vph)  | 98        | 0    | 448       | 178       |
| Confl. Peds. (#/hr)    |           |      |           | 54        |
| Confl. Bikes (#/hr)    | 40/       | 8    | 4.007     | 100/      |
| Heavy Vehicles (%)     | 1%        | 1%   | 12%       | 12%       |
| Turn Type              | NA        |      | Prot      | Prot      |
| Protected Phases       | 7         |      | 3         | 3         |
| Permitted Phases       |           |      |           |           |
| Actuated Green, G (s)  | 8.8       |      | 23.3      | 23.3      |
| Effective Green, g (s) | 8.8       |      | 23.3      | 23.3      |
| Actuated g/C Ratio     | 0.06      |      | 0.17      | 0.17      |
| Clearance Time (s)     | 4.0       |      | 4.5       | 4.5       |
| Vehicle Extension (s)  | 2.0       |      | 2.0       | 2.0       |
| Lane Grp Cap (vph)     | 192       |      | 579       | 247       |
| v/s Ratio Prot         | c0.03     |      | c0.13     | 0.12      |
| v/s Ratio Perm         | 00.00     |      | 00.10     | 0.12      |
| v/c Ratio              | 0.92dr    |      | 0.77      | 0.72      |
| Uniform Delay, d1      | 61.4      |      | 53.7      | 53.2      |
| Progression Factor     | 1.00      |      | 1.00      | 1.00      |
| Incremental Delay, d2  | 0.8       |      | 5.8       | 8.5       |
| Delay (s)              | 62.2      |      | 59.6      | 61.6      |
| Level of Service       | 62.2<br>E |      | 59.0<br>E | 61.6<br>E |
|                        | 62.2      |      |           |           |
| Approach LOS           | 62.2<br>E |      |           |           |
| Approach LOS           | E         |      |           |           |
| Intersection Summary   |           |      |           |           |
| Intersection Summary   |           |      |           |           |

|                                   | ۶        | <b>→</b>   | •     | •    | <b>←</b>   | •          | 1       | †     | <i>&gt;</i> | <b>/</b> | <b>+</b> | ✓    |
|-----------------------------------|----------|------------|-------|------|------------|------------|---------|-------|-------------|----------|----------|------|
| Movement                          | EBL      | EBT        | EBR   | WBL  | WBT        | WBR        | NBL     | NBT   | NBR         | SBL      | SBT      | SBR  |
| Lane Configurations               | ሻ        | <b>∱</b> β |       | ሻ    | <b>∱</b> ∱ |            |         | 4     |             |          | 4        | 7    |
| Traffic Volume (vph)              | 113      | 174        | 3     | 1    | 861        | 61         | 3       | 1     | 1           | 27       | 1        | 421  |
| Future Volume (vph)               | 113      | 174        | 3     | 1    | 861        | 61         | 3       | 1     | 1           | 27       | 1        | 421  |
| Ideal Flow (vphpl)                | 1900     | 1900       | 1900  | 1900 | 1900       | 1900       | 1900    | 1900  | 1900        | 1900     | 1900     | 1900 |
| Total Lost time (s)               | 4.0      | 4.0        |       | 4.0  | 4.0        |            |         | 4.0   |             |          | 4.0      | 4.0  |
| Lane Util. Factor                 | 1.00     | 0.95       |       | 1.00 | 0.95       |            |         | 1.00  |             |          | 0.95     | 0.95 |
| Frpb, ped/bikes                   | 1.00     | 1.00       |       | 1.00 | 1.00       |            |         | 1.00  |             |          | 1.00     | 1.00 |
| Flpb, ped/bikes                   | 1.00     | 1.00       |       | 1.00 | 1.00       |            |         | 1.00  |             |          | 1.00     | 1.00 |
| Frt                               | 1.00     | 1.00       |       | 1.00 | 0.99       |            |         | 0.97  |             |          | 0.87     | 0.85 |
| Flt Protected                     | 0.95     | 1.00       |       | 0.95 | 1.00       |            |         | 0.97  |             |          | 0.99     | 1.00 |
| Satd. Flow (prot)                 | 1492     | 2975       |       | 1656 | 3273       |            |         | 1795  |             |          | 1484     | 1461 |
| Flt Permitted                     | 0.95     | 1.00       |       | 0.95 | 1.00       |            |         | 0.64  |             |          | 0.96     | 1.00 |
| Satd. Flow (perm)                 | 1492     | 2975       |       | 1656 | 3273       |            |         | 1174  |             |          | 1431     | 1461 |
| 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)                   | 114      | 176        | 3     | 1    | 870        | 62         | 3       | 1     | 1           | 27       | 1        | 425  |
| RTOR Reduction (vph)              | 0        | 0          | 0     | 0    | 0          | 0          | 0       | 1     | 0           | 0        | 181      | 204  |
| Lane Group Flow (vph)             | 114      | 179        | 0     | 1    | 932        | 0          | 0       | 4     | 0           | 0        | 47       | 21   |
| Confl. Peds. (#/hr)               |          |            | 1     |      |            | 2          |         |       |             |          |          |      |
| Confl. Bikes (#/hr)               |          |            |       |      |            | 3          |         |       |             |          |          |      |
| Heavy Vehicles (%)                | 21%      | 21%        | 21%   | 9%   | 9%         | 9%         | 0%      | 0%    | 0%          | 5%       | 5%       | 5%   |
| Turn Type                         | Prot     | NA         |       | Prot | NA         |            | Perm    | NA    |             | Perm     | NA       | Perm |
| Protected Phases                  | 5        | 2          |       | 1    | 6          |            |         | 3     |             |          | 4        |      |
| Permitted Phases                  |          |            |       |      |            |            | 3       |       |             | 4        |          | 4    |
| Actuated Green, G (s)             | 11.6     | 48.5       |       | 0.8  | 37.7       |            |         | 19.4  |             |          | 8.7      | 8.7  |
| Effective Green, g (s)            | 11.6     | 48.5       |       | 8.0  | 37.7       |            |         | 19.4  |             |          | 8.7      | 8.7  |
| Actuated g/C Ratio                | 0.12     | 0.52       |       | 0.01 | 0.40       |            |         | 0.21  |             |          | 0.09     | 0.09 |
| Clearance Time (s)                | 4.0      | 4.0        |       | 4.0  | 4.0        |            |         | 4.0   |             |          | 4.0      | 4.0  |
| Vehicle Extension (s)             | 2.0      | 2.5        |       | 2.0  | 2.5        |            |         | 2.0   |             |          | 2.0      | 2.0  |
| Lane Grp Cap (vph)                | 185      | 1544       |       | 14   | 1321       |            |         | 243   |             |          | 133      | 136  |
| v/s Ratio Prot                    | c0.08    | 0.06       |       | 0.00 | c0.28      |            |         |       |             |          |          |      |
| v/s Ratio Perm                    |          |            |       |      |            |            |         | c0.00 |             |          | c0.03    | 0.01 |
| v/c Ratio                         | 0.62     | 0.12       |       | 0.07 | 0.71       |            |         | 0.02  |             |          | 0.35     | 0.15 |
| Uniform Delay, d1                 | 38.8     | 11.5       |       | 45.9 | 23.2       |            |         | 29.4  |             |          | 39.7     | 39.0 |
| Progression Factor                | 1.00     | 1.00       |       | 1.00 | 1.00       |            |         | 1.00  |             |          | 1.00     | 1.00 |
| Incremental Delay, d2             | 4.2      | 0.0        |       | 0.8  | 1.6        |            |         | 0.1   |             |          | 0.6      | 0.2  |
| Delay (s)                         | 43.0     | 11.5       |       | 46.7 | 24.8       |            |         | 29.6  |             |          | 40.3     | 39.2 |
| Level of Service                  | D        | В          |       | D    | С          |            |         | С     |             |          | D        | D    |
| Approach Delay (s)                |          | 23.8       |       |      | 24.9       |            |         | 29.6  |             |          | 39.7     |      |
| Approach LOS                      |          | С          |       |      | С          |            |         | С     |             |          | D        |      |
| Intersection Summary              |          |            |       |      |            |            |         |       |             |          |          |      |
| HCM 2000 Control Delay            |          |            | 28.7  | H    | CM 2000    | Level of S | Service |       | С           |          |          |      |
| HCM 2000 Volume to Capacit        | ty ratio |            | 0.48  |      |            |            |         |       |             |          |          |      |
| Actuated Cycle Length (s)         |          |            | 93.4  |      | um of lost |            |         |       | 16.0        |          |          |      |
| Intersection Capacity Utilization | on       |            | 56.5% | IC   | U Level o  | of Service |         |       | В           |          |          |      |
| Analysis Period (min)             |          |            | 15    |      |            |            |         |       |             |          |          |      |
| c Critical Lane Group             |          |            |       |      |            |            |         |       |             |          |          |      |

| Intersection              |       |
|---------------------------|-------|
| Intersection Delay, s/veh | 199.6 |
| Intersection LOS          | F     |

| Movement                   | EBL   | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations        |       | ર્ન  | 7    | ň    | ĵ.   |      |      | ર્ન  | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 21    | 911  | 145  | 211  | 265  | 10   | 63   | 16   | 135  | 9    | 7    | 25   |
| Future Vol, veh/h          | 21    | 911  | 145  | 211  | 265  | 10   | 63   | 16   | 135  | 9    | 7    | 25   |
| Peak Hour Factor           | 0.94  | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles, %          | 4     | 4    | 4    | 10   | 10   | 10   | 16   | 16   | 16   | 50   | 50   | 50   |
| Mvmt Flow                  | 22    | 969  | 154  | 224  | 282  | 11   | 67   | 17   | 144  | 10   | 7    | 27   |
| Number of Lanes            | 0     | 1    | 1    | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB    |      |      | WB   |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |      |      | EB   |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 2     |      |      | 2    |      |      | 1    |      |      | 2    |      |      |
| Conflicting Approach Left  | SB    |      |      | NB   |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |      |      | 2    |      |      | 2    |      |      | 2    |      |      |
| Conflicting Approach Right | NB    |      |      | SB   |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 2     |      |      | 1    |      |      | 2    |      |      | 2    |      |      |
| HCM Control Delay          | 325.4 |      |      | 18   |      |      | 14.3 |      |      | 14.3 |      |      |
| HCM LOS                    | F     |      |      | С    |      |      | В    |      |      | В    |      |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1  |  |
|------------------------|-------|-------|-------|-------|-------|-------|--------|--|
| Vol Left, %            | 80%   | 0%    | 2%    | 0%    | 100%  | 0%    | 22%    |  |
| Vol Thru, %            | 20%   | 0%    | 98%   | 0%    | 0%    | 96%   | 17%    |  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 4%    | 61%    |  |
| Sign Control           | Stop   |  |
| Traffic Vol by Lane    | 79    | 135   | 932   | 145   | 211   | 275   | 41     |  |
| LT Vol                 | 63    | 0     | 21    | 0     | 211   | 0     | 9      |  |
| Through Vol            | 16    | 0     | 911   | 0     | 0     | 265   | 7      |  |
| RT Vol                 | 0     | 135   | 0     | 145   | 0     | 10    | 25     |  |
| Lane Flow Rate         | 84    | 144   | 991   | 154   | 224   | 293   | 44     |  |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6      |  |
| Degree of Util (X)     | 0.194 | 0.288 | 1.78  | 0.246 | 0.449 | 0.542 | 0.106  |  |
| Departure Headway (Hd) | 9.424 | 8.283 | 6.463 | 5.739 | 8.016 | 7.476 | 10.106 |  |
| Convergence, Y/N       | Yes    |  |
| Cap                    | 383   | 437   | 565   | 626   | 453   | 486   | 357    |  |
| Service Time           | 7.124 | 5.983 | 4.197 | 3.473 | 5.716 | 5.176 | 8.106  |  |
| HCM Lane V/C Ratio     | 0.219 | 0.33  | 1.754 | 0.246 | 0.494 | 0.603 | 0.123  |  |
| HCM Control Delay      | 14.4  | 14.3  | 374.4 | 10.3  | 17.1  | 18.7  | 14.3   |  |
| HCM Lane LOS           | В     | В     | F     | В     | С     | С     | В      |  |
| HCM 95th-tile Q        | 0.7   | 1.2   | 60.2  | 1     | 2.3   | 3.2   | 0.4    |  |

# HCM 6th Signalized Intersection Summary 1: Gateway & Gatewa Business Pkwy/Larkspur Landing Dwy

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b> | •    | 1    | <b>†</b>   | <b>/</b> | <b>/</b> | <b>↓</b>   | 4    |
|------------------------------|------|----------|------|------|----------|------|------|------------|----------|----------|------------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT        | NBR      | SBL      | SBT        | SBR  |
| Lane Configurations          | ሻ    | <b>₽</b> |      | ሻ    | ₽        |      | ሻ    | <b>ተ</b> ኈ |          | ሻ        | <b>∱</b> ∱ |      |
| Traffic Volume (veh/h)       | 60   | 0        | 43   | 14   | 0        | 44   | 42   | 594        | 3        | 52       | 1105       | 271  |
| Future Volume (veh/h)        | 60   | 0        | 43   | 14   | 0        | 44   | 42   | 594        | 3        | 52       | 1105       | 271  |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 0          | 0        | 0        | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.96 |          | 0.96 | 0.96 |          | 0.96 | 1.00 |            | 0.96     | 1.00     |            | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00     | 1.00     | 1.00       | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No         |          |          | No         |      |
| Adj Sat Flow, veh/h/ln       | 1826 | 1826     | 1826 | 1781 | 1781     | 1781 | 1796 | 1796       | 1796     | 1767     | 1767       | 1767 |
| Adj Flow Rate, veh/h         | 61   | 0        | 6    | 14   | 0        | 6    | 42   | 600        | 3        | 53       | 1116       | 258  |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99 | 0.99       | 0.99     | 0.99     | 0.99       | 0.99 |
| Percent Heavy Veh, %         | 5    | 5        | 5    | 8    | 8        | 8    | 7    | 7          | 7        | 9        | 9          | 9    |
| Cap, veh/h                   | 282  | 0        | 215  | 278  | 0        | 209  | 106  | 2094       | 10       | 120      | 1640       | 376  |
| Arrive On Green              | 0.14 | 0.00     | 0.14 | 0.14 | 0.00     | 0.14 | 0.06 | 0.60       | 0.60     | 0.07     | 0.61       | 0.61 |
| Sat Flow, veh/h              | 1323 | 0        | 1486 | 1291 | 0        | 1450 | 1711 | 3481       | 17       | 1682     | 2686       | 616  |
| Grp Volume(v), veh/h         | 61   | 0        | 6    | 14   | 0        | 6    | 42   | 294        | 309      | 53       | 694        | 680  |
| Grp Sat Flow(s),veh/h/ln     | 1323 | 0        | 1486 | 1291 | 0        | 1450 | 1711 | 1706       | 1792     | 1682     | 1678       | 1623 |
| Q Serve(g_s), s              | 3.1  | 0.0      | 0.3  | 0.7  | 0.0      | 0.3  | 1.8  | 6.2        | 6.2      | 2.3      | 20.6       | 21.1 |
| Cycle Q Clear(g_c), s        | 3.4  | 0.0      | 0.3  | 1.0  | 0.0      | 0.3  | 1.8  | 6.2        | 6.2      | 2.3      | 20.6       | 21.1 |
| Prop In Lane                 | 1.00 |          | 1.00 | 1.00 |          | 1.00 | 1.00 |            | 0.01     | 1.00     |            | 0.38 |
| Lane Grp Cap(c), veh/h       | 282  | 0        | 215  | 278  | 0        | 209  | 106  | 1027       | 1078     | 120      | 1025       | 991  |
| V/C Ratio(X)                 | 0.22 | 0.00     | 0.03 | 0.05 | 0.00     | 0.03 | 0.39 | 0.29       | 0.29     | 0.44     | 0.68       | 0.69 |
| Avail Cap(c_a), veh/h        | 619  | 0        | 593  | 606  | 0        | 578  | 237  | 1027       | 1078     | 233      | 1025       | 991  |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00     | 1.00     | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 1.00 | 1.00 | 1.00       | 1.00     | 0.71     | 0.71       | 0.71 |
| Uniform Delay (d), s/veh     | 29.0 | 0.0      | 27.6 | 28.0 | 0.0      | 27.6 | 33.8 | 7.2        | 7.2      | 33.4     | 9.7        | 9.8  |
| Incr Delay (d2), s/veh       | 0.1  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.9  | 0.7        | 0.7      | 0.7      | 2.6        | 2.8  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 0.0        | 0.0      | 0.0      | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 1.0  | 0.0      | 0.1  | 0.2  | 0.0      | 0.1  | 0.7  | 2.1        | 2.2      | 0.9      | 6.9        | 6.9  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |      |      |            |          |          |            |      |
| LnGrp Delay(d),s/veh         | 29.2 | 0.0      | 27.6 | 28.0 | 0.0      | 27.6 | 34.7 | 7.9        | 7.9      | 34.1     | 12.3       | 12.6 |
| LnGrp LOS                    | С    | Α        | C    | С    | Α        | C    | С    | A          | A        | С        | В          | В    |
| Approach Vol, veh/h          |      | 67       |      |      | 20       |      |      | 645        |          |          | 1427       |      |
| Approach Delay, s/veh        |      | 29.0     |      |      | 27.9     |      |      | 9.6        |          |          | 13.2       |      |
| Approach LOS                 |      | C        |      |      | C        |      |      | A          |          |          | В          |      |
|                              | 4    |          |      |      |          | ^    |      |            |          |          |            |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8          |          |          |            |      |
| Phs Duration (G+Y+Rc), s     | 9.3  | 50.2     |      | 15.4 | 8.7      | 50.9 |      | 15.4       |          |          |            |      |
| Change Period (Y+Rc), s      | 4.0  | 5.1      |      | 4.6  | 4.0      | 5.1  |      | 4.6        |          |          |            |      |
| Max Green Setting (Gmax), s  | 10.4 | 21.0     |      | 29.9 | 10.4     | 21.0 |      | 29.9       |          |          |            |      |
| Max Q Clear Time (g_c+l1), s | 4.3  | 8.2      |      | 5.4  | 3.8      | 23.1 |      | 3.0        |          |          |            |      |
| Green Ext Time (p_c), s      | 0.0  | 2.0      |      | 0.1  | 0.0      | 0.0  |      | 0.0        |          |          |            |      |
| Intersection Summary         |      |          |      |      |          |      |      |            |          |          |            |      |
| HCM 6th Ctrl Delay           |      |          | 12.8 |      |          |      |      |            |          |          |            |      |
| HCM 6th LOS                  |      |          | В    |      |          |      |      |            |          |          |            |      |
| Notes                        |      |          |      |      |          |      |      |            |          |          |            |      |

User approved pedestrian interval to be less than phase max green.

|                              | <b>→</b> | •    | •    | ←          | •           | ~    |      |
|------------------------------|----------|------|------|------------|-------------|------|------|
| Movement                     | EBT      | EBR  | WBL  | WBT        | NBL         | NBR  |      |
| Lane Configurations          | <b>^</b> | LDIT | ሻ    | <b>^</b>   | ሻ           | 77   |      |
| Traffic Volume (veh/h)       | 2062     | 133  | 16   | 757        | 216         | 722  |      |
| Future Volume (veh/h)        | 2062     | 133  | 16   | 757        | 216         | 722  |      |
| Initial Q (Qb), veh          | 45       | 0    | 0    | 0          | 10          | 51   |      |
| Ped-Bike Adj(A_pbT)          | 40       | 0.95 | 1.00 | O .        | 1.00        | 1.00 |      |
| Parking Bus, Adj             | 1.00     | 1.00 | 1.00 | 1.00       | 1.00        | 1.00 |      |
| Work Zone On Approach        | No       | 1.00 | 1.00 | No         | No          | 1.00 |      |
| Adj Sat Flow, veh/h/ln       | 1841     | 1841 | 1707 | 1707       | 1811        | 1811 |      |
| Adj Flow Rate, veh/h         | 2083     | 128  | 16   | 765        | 218         | 0    |      |
| Peak Hour Factor             | 0.99     | 0.99 | 0.99 | 0.99       | 0.99        | 0.99 |      |
| Percent Heavy Veh, %         | 4        | 4    | 13   | 13         | 6           | 6    |      |
| Cap, veh/h                   | 3252     | 173  | 35   | 3436       | 293         |      |      |
| Arrive On Green              | 0.23     | 0.23 | 0.02 | 0.77       | 0.15        | 0.00 |      |
| Sat Flow, veh/h              | 4992     | 295  | 1626 | 4815       | 1725        | 2701 |      |
| Grp Volume(v), veh/h         | 1441     | 770  | 16   | 765        | 218         | 0    |      |
| Grp Sat Flow(s), veh/h/ln    | 1675     | 1771 | 1626 | 1554       | 1725        | 1351 |      |
| Q Serve(g_s), s              | 38.4     | 38.9 | 1.0  | 4.5        | 12.3        | 0.0  |      |
| Cycle Q Clear(g_c), s        | 38.4     | 38.9 | 1.0  | 4.5        | 12.3        | 0.0  |      |
| Prop In Lane                 | 30.4     | 0.17 | 1.00 | 4.5        | 1.00        | 1.00 |      |
| _ane Grp Cap(c), veh/h       | 2233     | 1195 | 35   | 3436       | 293         | 1.00 |      |
| //C Ratio(X)                 | 0.65     | 0.64 | 0.46 | 0.22       | 0.74        |      |      |
| Avail Cap(c_a), veh/h        | 2374     | 1255 | 130  | 3590       | 517         |      |      |
| HCM Platoon Ratio            | 0.33     | 0.33 | 1.00 | 1.00       | 1.00        | 1.00 |      |
|                              | 0.85     | 0.85 | 0.95 | 0.95       | 1.00        | 0.00 |      |
| Jpstream Filter(I)           | 30.0     | 29.7 | 48.3 | 4.4        | 40.5        | 0.00 |      |
| Jniform Delay (d), s/veh     | 1.2      | 29.7 | 3.3  | 0.1        | 3.7         | 0.0  |      |
| ncr Delay (d2), s/veh        | 3.7      |      |      |            |             |      |      |
| nitial Q Delay(d3),s/veh     |          | 3.2  | 0.0  | 0.0<br>1.4 | 32.7<br>9.1 | 0.0  |      |
| %ile BackOfQ(50%),veh/ln     | 20.8     | 22.3 | 0.4  | 1.4        | 9.1         | 0.0  |      |
| Jnsig. Movement Delay, s/veh |          | 25.0 | E4.6 | A E        | 77.0        | 0.0  |      |
| _nGrp Delay(d),s/veh         | 34.9     | 35.2 | 51.6 | 4.5        | 77.0        | 0.0  |      |
| nGrp LOS                     | C        | D    | D    | A          | E           |      |      |
| Approach Vol, veh/h          | 2211     |      |      | 781        | 218         | Α    |      |
| Approach Delay, s/veh        | 35.0     |      |      | 5.5        | 77.0        |      |      |
| Approach LOS                 | D        |      |      | Α          | Е           |      |      |
| imer - Assigned Phs          | 1        | 2    |      |            |             | 6    | 8    |
| Phs Duration (G+Y+Rc), s     | 6.2      | 74.9 |      |            |             | 81.0 | 19.0 |
| Change Period (Y+Rc), s      | 4.0      | 4.0  |      |            |             | 4.0  | 4.0  |
| Max Green Setting (Gmax), s  | 8.0      | 50.0 |      |            |             | 62.0 | 30.0 |
| Max Q Clear Time (g_c+l1), s | 3.0      | 40.9 |      |            |             | 6.5  | 14.3 |
| Green Ext Time (p_c), s      | 0.0      | 6.7  |      |            |             | 3.9  | 0.7  |
| ntersection Summary          |          |      |      |            |             |      |      |
| HCM 6th Ctrl Delay           |          |      | 30.7 |            |             |      |      |
| HCM 6th LOS                  |          |      | C    |            |             |      |      |
| Notes                        |          |      |      |            |             |      |      |

|                              | •         | <b>→</b>  | •         | •          | <b>←</b>    | •         | 4         | <b>†</b>  | /    | <b>&gt;</b> | ļ            | 1    |
|------------------------------|-----------|-----------|-----------|------------|-------------|-----------|-----------|-----------|------|-------------|--------------|------|
| Movement                     | EBL       | EBT       | EBR       | WBL        | WBT         | WBR       | NBL       | NBT       | NBR  | SBL         | SBT          | SBR  |
| Lane Configurations          | ሻ         | ተተተ       | 7         | ሻሻ         | <b>↑</b> ↑₽ |           | ሻ         | <b>↑</b>  | 7    | ሻ           | <b>^</b>     | 7    |
| Traffic Volume (veh/h)       | 172       | 2325      | 287       | 531        | 546         | 104       | 115       | 167       | 738  | 265         | 181          | 112  |
| Future Volume (veh/h)        | 172       | 2325      | 287       | 531        | 546         | 104       | 115       | 167       | 738  | 265         | 181          | 112  |
| Initial Q (Qb), veh          | 5         | 0         | 0         | 0          | 0           | 0         | 0         | 0         | 0    | 0           | 0            | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00      |           | 0.97      | 1.00       |             | 0.98      | 1.00      |           | 1.00 | 1.00        |              | 1.00 |
| Parking Bus, Adj             | 1.00      | 1.00      | 1.00      | 1.00       | 1.00        | 1.00      | 1.00      | 1.00      | 1.00 | 1.00        | 1.00         | 1.00 |
| Work Zone On Approach        |           | No        |           |            | No          |           |           | No        |      |             | No           |      |
| Adj Sat Flow, veh/h/ln       | 1841      | 1841      | 1841      | 1633       | 1633        | 1633      | 1752      | 1752      | 1752 | 1767        | 1767         | 1767 |
| Adj Flow Rate, veh/h         | 174       | 2348      | 204       | 536        | 552         | 88        | 116       | 169       | 0    | 268         | 183          | 0    |
| Peak Hour Factor             | 0.99      | 0.99      | 0.99      | 0.99       | 0.99        | 0.99      | 0.99      | 0.99      | 0.99 | 0.99        | 0.99         | 0.99 |
| Percent Heavy Veh, %         | 4         | 4         | 4         | 18         | 18          | 18        | 10        | 10        | 10   | 9           | 9            | 9    |
| Cap, veh/h                   | 214       | 2802      | 844       | 302        | 1942        | 304       | 154       | 205       | 0.00 | 179         | 440          | 2.00 |
| Arrive On Green              | 0.11      | 0.56      | 0.56      | 0.10       | 0.54        | 0.54      | 0.09      | 0.12      | 0.00 | 0.11        | 0.13         | 0.00 |
| Sat Flow, veh/h              | 1753      | 5025      | 1514      | 3018       | 3875        | 606       | 1668      | 1752      | 1485 | 1682        | 3357         | 1497 |
| Grp Volume(v), veh/h         | 174       | 2348      | 204       | 536        | 421         | 219       | 116       | 169       | 0    | 268         | 183          | 0    |
| Grp Sat Flow(s),veh/h/ln     | 1753      | 1675      | 1514      | 1509       | 1486        | 1509      | 1668      | 1752      | 1485 | 1682        | 1678         | 1497 |
| Q Serve(g_s), s              | 14.7      | 58.2      | 10.3      | 15.0       | 11.3        | 11.6      | 10.2      | 14.1      | 0.0  | 16.0        | 7.5          | 0.0  |
| Cycle Q Clear(g_c), s        | 14.7      | 58.2      | 10.3      | 15.0       | 11.3        | 11.6      | 10.2      | 14.1      | 0.0  | 16.0        | 7.5          | 0.0  |
| Prop In Lane                 | 1.00      | 2222      | 1.00      | 1.00       |             | 0.40      | 1.00      |           | 1.00 | 1.00        |              | 1.00 |
| Lane Grp Cap(c), veh/h       | 214       | 2802      | 844       | 302        | 1490        | 756       | 154       | 205       |      | 179         | 440          |      |
| V/C Ratio(X)                 | 0.81      | 0.84      | 0.24      | 1.78       | 0.28        | 0.29      | 0.75      | 0.82      |      | 1.49        | 0.42         |      |
| Avail Cap(c_a), veh/h        | 304       | 2802      | 844       | 302        | 1620        | 822       | 200       | 445       | 4.00 | 179         | 815          | 4.00 |
| HCM Platoon Ratio            | 1.00      | 1.00      | 1.00      | 1.00       | 1.00        | 1.00      | 1.00      | 1.00      | 1.00 | 1.00        | 1.00         | 1.00 |
| Upstream Filter(I)           | 0.58      | 0.58      | 0.58      | 0.86       | 0.86        | 0.86      | 1.00      | 1.00      | 0.00 | 1.00        | 1.00         | 0.00 |
| Uniform Delay (d), s/veh     | 65.0      | 27.6      | 17.0      | 67.5       | 21.8        | 21.9      | 66.4      | 64.7      | 0.0  | 67.0        | 59.9         | 0.0  |
| Incr Delay (d2), s/veh       | 4.3       | 1.9       | 0.4       | 360.7      | 0.4         | 0.8       | 7.5       | 3.2       | 0.0  | 249.1       | 0.2          | 0.0  |
| Initial Q Delay(d3),s/veh    | 21.1      | 0.0       | 0.0       | 0.0        | 0.0         | 0.0       | 0.0       | 0.0       | 0.0  | 0.0         | 0.0          | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 8.9       | 23.3      | 3.7       | 20.9       | 4.5         | 4.8       | 4.6       | 6.5       | 0.0  | 19.3        | 3.2          | 0.0  |
| Unsig. Movement Delay, s/veh | 90.5      | 29.4      | 17 /      | 428.2      | 22.2        | 22.7      | 72.0      | 67.0      | 0.0  | 316.1       | 60.1         | 0.0  |
| LnGrp Delay(d),s/veh         | 90.5<br>F | 29.4<br>C | 17.4<br>B | 420.2<br>F | 22.2<br>C   | 22.7<br>C | 73.8<br>E | 67.9<br>E | 0.0  | 510.1<br>F  | 60.1<br>E    | 0.0  |
| LnGrp LOS                    |           |           | В         |            |             | U         | 드         |           | Λ    |             |              | Δ.   |
| Approach Vol, veh/h          |           | 2726      |           |            | 1176        |           |           | 285       | Α    |             | 451<br>212.2 | Α    |
| Approach LOS                 |           | 32.4      |           |            | 207.3<br>F  |           |           | 70.3      |      |             | 212.2<br>F   |      |
| Approach LOS                 |           | С         |           |            | Г           |           |           | Е         |      |             | F            |      |
| Timer - Assigned Phs         | 1         | 2         | 3         | 4          | 5           | 6         | 7         | 8         |      |             |              |      |
| Phs Duration (G+Y+Rc), s     | 19.0      | 88.5      | 17.9      | 24.6       | 20.9        | 86.6      | 20.0      | 22.5      |      |             |              |      |
| Change Period (Y+Rc), s      | 4.0       | 4.9       | 4.0       | * 4.9      | 4.0         | 4.9       | 4.0       | 4.9       |      |             |              |      |
| Max Green Setting (Gmax), s  | 15.0      | 63.1      | 18.0      | * 36       | 26.0        | 52.1      | 16.0      | 38.1      |      |             |              |      |
| Max Q Clear Time (g_c+l1), s | 17.0      | 60.2      | 12.2      | 9.5        | 16.7        | 13.6      | 18.0      | 16.1      |      |             |              |      |
| Green Ext Time (p_c), s      | 0.0       | 2.6       | 0.1       | 0.7        | 0.2         | 2.9       | 0.0       | 0.5       |      |             |              |      |
| Intersection Summary         |           |           |           |            |             |           |           |           |      |             |              |      |
| HCM 6th Ctrl Delay           |           |           | 96.6      |            |             |           |           |           |      |             |              |      |
| HCM 6th LOS                  |           |           | F         |            |             |           |           |           |      |             |              |      |

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|                              | •    | <b>→</b> | •         | •    | <b>←</b> | •    | •    | <b>†</b> | /    | <b>&gt;</b> | ļ        | 4           |
|------------------------------|------|----------|-----------|------|----------|------|------|----------|------|-------------|----------|-------------|
| Movement                     | EBL  | EBT      | EBR       | WBL  | WBT      | WBR  | NBL  | NBT      | NBR  | SBL         | SBT      | SBR         |
| Lane Configurations          | ሻሻ   | <b>^</b> | 7         | 77   | ተተኈ      |      | *    | <b>^</b> | 7    | 7           | <b>^</b> | 77          |
| Traffic Volume (veh/h)       | 546  | 2599     | 183       | 34   | 644      | 18   | 168  | 724      | 260  | 195         | 84       | 369         |
| Future Volume (veh/h)        | 546  | 2599     | 183       | 34   | 644      | 18   | 168  | 724      | 260  | 195         | 84       | 369         |
| Initial Q (Qb), veh          | 0    | 0        | 0         | 0    | 0        | 0    | 0    | 0        | 0    | 0           | 0        | 0           |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 0.97      | 1.00 |          | 0.94 | 1.00 |          | 0.98 | 1.00        |          | 0.97        |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00      | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00     | 1.00        |
| Work Zone On Approach        |      | No       |           |      | No       |      |      | No       |      |             | No       |             |
| Adj Sat Flow, veh/h/ln       | 1811 | 1811     | 1811      | 1618 | 1618     | 1618 | 1752 | 1752     | 1752 | 1663        | 1663     | 1663        |
| Adj Flow Rate, veh/h         | 552  | 2625     | 185       | 34   | 651      | 17   | 170  | 731      | 169  | 197         | 85       | 50          |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99      | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99        | 0.99     | 0.99        |
| Percent Heavy Veh, %         | 6    | 6        | 6         | 19   | 19       | 19   | 10   | 10       | 10   | 16          | 16       | 16          |
| Cap, veh/h                   | 911  | 2263     | 681       | 211  | 1105     | 29   | 316  | 630      | 276  | 253         | 266      | 383         |
| Arrive On Green              | 0.27 | 0.46     | 0.46      | 0.07 | 0.25     | 0.25 | 0.19 | 0.19     | 0.19 | 0.16        | 0.16     | 0.16        |
| Sat Flow, veh/h              | 3346 | 4944     | 1489      | 2990 | 4420     | 115  | 1668 | 3328     | 1458 | 1584        | 1663     | 2397        |
| Grp Volume(v), veh/h         | 552  | 2625     | 185       | 34   | 433      | 235  | 170  | 731      | 169  | 197         | 85       | 50          |
| Grp Sat Flow(s), veh/h/ln    | 1673 | 1648     | 1489      | 1495 | 1473     | 1590 | 1668 | 1664     | 1458 | 1584        | 1663     | 1198        |
| Q Serve(g_s), s              | 21.6 | 68.6     | 11.5      | 1.6  | 19.4     | 19.5 | 13.8 | 28.4     | 15.9 | 17.9        | 6.8      | 2.7         |
| Cycle Q Clear(g_c), s        | 21.6 | 68.6     | 11.5      | 1.6  | 19.4     | 19.5 | 13.8 | 28.4     | 15.9 | 17.9        | 6.8      | 2.7         |
| Prop In Lane                 | 1.00 | 00.0     | 1.00      | 1.00 | 13.4     | 0.07 | 1.00 | 20.4     | 1.00 | 1.00        | 0.0      | 1.00        |
| Lane Grp Cap(c), veh/h       | 911  | 2263     | 681       | 211  | 736      | 397  | 316  | 630      | 276  | 253         | 266      | 383         |
| V/C Ratio(X)                 | 0.61 | 1.16     | 0.27      | 0.16 | 0.59     | 0.59 | 0.54 | 1.16     | 0.61 | 0.78        | 0.32     | 0.13        |
| Avail Cap(c_a), veh/h        | 911  | 2263     | 681       | 279  | 736      | 397  | 316  | 630      | 276  | 382         | 401      | 578         |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00      | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00     | 1.00        |
| Upstream Filter(I)           | 0.09 | 0.09     | 0.09      | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00        | 1.00     | 1.00        |
| Uniform Delay (d), s/veh     | 47.6 | 40.7     | 25.2      | 65.5 | 49.5     | 49.5 | 54.9 | 60.8     | 55.8 | 60.5        | 55.8     | 54.1        |
|                              | 0.1  | 72.6     | 0.1       | 03.3 | 3.4      | 6.3  | 1.0  | 88.8     | 2.9  | 2.7         |          | 0.1         |
| Incr Delay (d2), s/veh       | 0.1  | 0.0      | 0.0       | 0.1  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0         | 0.3      | 0.0         |
| Initial Q Delay(d3),s/veh    | 9.0  | 42.3     | 4.1       | 0.6  | 7.5      |      | 5.9  | 19.7     | 6.1  | 7.4         | 2.9      | 0.0         |
| %ile BackOfQ(50%),veh/ln     |      | 42.3     | 4.1       | 0.0  | 7.5      | 8.5  | 5.9  | 19.7     | 0.1  | 7.4         | 2.9      | 0.0         |
| Unsig. Movement Delay, s/veh |      | 440.0    | 05.0      | CF C | F0 0     | FF 0 | FF 0 | 110.0    | F0.7 | CO 4        | FC 4     | <b>FA 4</b> |
| LnGrp Delay(d),s/veh         | 47.7 | 113.3    | 25.3      | 65.6 | 52.9     | 55.8 | 55.9 | 149.6    | 58.7 | 63.1        | 56.1     | 54.1        |
| LnGrp LOS                    | D    | F        | С         | E    | D        | E    | E    | F        | E    | E           | E        | D           |
| Approach Vol, veh/h          |      | 3362     |           |      | 702      |      |      | 1070     |      |             | 332      |             |
| Approach Delay, s/veh        |      | 97.7     |           |      | 54.5     |      |      | 120.3    |      |             | 60.0     |             |
| Approach LOS                 |      | F        |           |      | D        |      |      | F        |      |             | Е        |             |
| Timer - Assigned Phs         | 1    | 2        |           | 4    | 5        | 6    |      | 8        |      |             |          |             |
| Phs Duration (G+Y+Rc), s     | 45.7 | 42.4     |           | 28.9 | 14.6     | 73.5 |      | 33.0     |      |             |          |             |
| Change Period (Y+Rc), s      | 4.9  | * 4.9    |           | 4.9  | 4.0      | 4.9  |      | 4.6      |      |             |          |             |
| Max Green Setting (Gmax), s  | 30.0 | * 38     |           | 36.2 | 14.0     | 53.5 |      | 28.4     |      |             |          |             |
| Max Q Clear Time (g_c+l1), s | 23.6 | 21.5     |           | 19.9 | 3.6      | 70.6 |      | 30.4     |      |             |          |             |
| Green Ext Time (p_c), s      | 1.5  | 2.6      |           | 0.8  | 0.0      | 0.0  |      | 0.0      |      |             |          |             |
| Intersection Summary         |      |          |           |      |          |      |      |          |      |             |          |             |
| HCM 6th Ctrl Delay           |      |          | 94.3      |      |          |      |      |          |      |             |          |             |
| HCM 6th LOS                  |      |          | 94.3<br>F |      |          |      |      |          |      |             |          |             |
|                              |      |          | Г         |      |          |      |      |          |      |             |          |             |
| Notes                        |      |          |           |      |          |      |      |          |      |             |          |             |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b>   | •     | 4     | <b>†</b>   | /    | <b>/</b> | ţ    | 4        |
|------------------------------|------|----------|------|------|------------|-------|-------|------------|------|----------|------|----------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT        | WBR   | NBL   | NBT        | NBR  | SBL      | SBT  | SBR      |
| Lane Configurations          | 14   | <b>†</b> | 77   | ሻ    | <b>^</b> ^ | 7     | ሻሻ    | <b>∱</b> ∱ |      | ሻ        |      | 77       |
| Traffic Volume (veh/h)       | 156  | 366      | 456  | 37   | 417        | 30    | 466   | 1041       | 1265 | 22       | 116  | 658      |
| Future Volume (veh/h)        | 156  | 366      | 456  | 37   | 417        | 30    | 466   | 1041       | 1265 | 22       | 116  | 658      |
| Initial Q (Qb), veh          | 0    | 13       | 0    | 0    | 0          | 0     | 0     | 0          | 0    | 0        | 0    | 0        |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 0.97 | 1.00 |            | 0.97  | 1.00  |            | 1.00 | 1.00     |      | 0.96     |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00  | 1.00  | 1.00       | 1.00 | 1.00     | 1.00 | 1.00     |
| Work Zone On Approach        |      | No       |      |      | No         |       |       | No         |      |          | No   |          |
| Adj Sat Flow, veh/h/ln       | 1722 | 1722     | 1722 | 1574 | 1574       | 1574  | 1811  | 1811       | 1811 | 1663     | 1663 | 1663     |
| Adj Flow Rate, veh/h         | 158  | 370      | 90   | 37   | 421        | 3     | 471   | 1052       | 0    | 22       | 117  | 272      |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99       | 0.99  | 0.99  | 0.99       | 0.99 | 0.99     | 0.99 | 0.99     |
| Percent Heavy Veh, %         | 12   | 12       | 12   | 22   | 22         | 22    | 6     | 6          | 6    | 16       | 16   | 16       |
| Cap, veh/h                   | 493  | 410      | 592  | 94   | 603        | 181   | 1277  | 1313       |      | 230      | 241  | 344      |
| Arrive On Green              | 0.05 | 0.08     | 0.08 | 0.06 | 0.14       | 0.14  | 0.39  | 0.39       | 0.00 | 0.14     | 0.14 | 0.14     |
| Sat Flow, veh/h              | 3182 | 1722     | 2485 | 1499 | 4297       | 1288  | 3346  | 3532       | 0    | 1584     | 1663 | 2376     |
| Grp Volume(v), veh/h         | 158  | 370      | 90   | 37   | 421        | 3     | 471   | 1052       | 0    | 22       | 117  | 272      |
| Grp Sat Flow(s),veh/h/ln     | 1591 | 1722     | 1242 | 1499 | 1432       | 1288  | 1673  | 1721       | 0    | 1584     | 1663 | 1188     |
| Q Serve(g_s), s              | 5.0  | 22.4     | 3.6  | 2.5  | 9.8        | 0.2   | 10.6  | 28.4       | 0.0  | 1.3      | 6.8  | 11.6     |
| Cycle Q Clear(g_c), s        | 5.0  | 22.4     | 3.6  | 2.5  | 9.8        | 0.2   | 10.6  | 28.4       | 0.0  | 1.3      | 6.8  | 11.6     |
| Prop In Lane                 | 1.00 |          | 1.00 | 1.00 |            | 1.00  | 1.00  |            | 0.00 | 1.00     |      | 1.00     |
| Lane Grp Cap(c), veh/h       | 493  | 410      | 592  | 94   | 603        | 181   | 1277  | 1313       |      | 230      | 241  | 344      |
| V/C Ratio(X)                 | 0.32 | 0.90     | 0.15 | 0.39 | 0.70       | 0.02  | 0.37  | 0.80       |      | 0.10     | 0.49 | 0.79     |
| Avail Cap(c_a), veh/h        | 480  | 410      | 592  | 143  | 1023       | 307   | 1291  | 1327       |      | 347      | 364  | 521      |
| HCM Platoon Ratio            | 0.33 | 0.33     | 0.33 | 1.00 | 1.00       | 1.00  | 1.00  | 1.00       | 1.00 | 1.00     | 1.00 | 1.00     |
| Upstream Filter(I)           | 0.63 | 0.63     | 0.63 | 1.00 | 1.00       | 1.00  | 1.00  | 1.00       | 0.00 | 1.00     | 1.00 | 1.00     |
| Uniform Delay (d), s/veh     | 44.5 | 48.4     | 38.5 | 47.3 | 43.0       | 38.9  | 23.4  | 28.9       | 0.0  | 38.9     | 41.3 | 43.3     |
| Incr Delay (d2), s/veh       | 0.1  | 15.7     | 0.1  | 1.0  | 0.6        | 0.0   | 0.8   | 5.2        | 0.0  | 0.1      | 0.6  | 2.3      |
| Initial Q Delay(d3),s/veh    | 0.0  | 70.2     | 0.0  | 0.0  | 0.0        | 0.0   | 0.0   | 0.0        | 0.0  | 0.0      | 0.0  | 0.0      |
| %ile BackOfQ(50%),veh/ln     | 2.1  | 21.3     | 1.1  | 1.0  | 3.5        | 0.1   | 4.2   | 12.3       | 0.0  | 0.5      | 2.8  | 3.5      |
| Unsig. Movement Delay, s/veh |      | 1010     |      | 10.0 | 40.0       |       | 0.1.0 | 0.1.1      |      |          | 44.0 |          |
| LnGrp Delay(d),s/veh         | 44.6 | 134.3    | 38.5 | 48.3 | 43.6       | 38.9  | 24.2  | 34.1       | 0.0  | 39.0     | 41.8 | 45.7     |
| LnGrp LOS                    | D    | F        | D    | D    | D          | D     | С     | С          |      | D        | D    | <u>D</u> |
| Approach Vol, veh/h          |      | 618      |      |      | 461        |       |       | 1523       | Α    |          | 411  |          |
| Approach Delay, s/veh        |      | 97.4     |      |      | 43.9       |       |       | 31.0       |      |          | 44.2 |          |
| Approach LOS                 |      | F        |      |      | D          |       |       | С          |      |          | D    |          |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5          | 6     |       | 8          |      |          |      |          |
| Phs Duration (G+Y+Rc), s     | 10.6 | 29.2     |      | 45.1 | 20.5       | 19.3  |       | 20.1       |      |          |      |          |
| Change Period (Y+Rc), s      | 4.0  | 4.6      |      | 4.6  | 4.6        | * 4.6 |       | 4.9        |      |          |      |          |
| Max Green Setting (Gmax), s  | 10.0 | 25.0     |      | 28.9 | 10.0       | * 25  |       | 23.0       |      |          |      |          |
| Max Q Clear Time (g_c+I1), s | 4.5  | 24.4     |      | 30.4 | 7.0        | 11.8  |       | 13.6       |      |          |      |          |
| Green Ext Time (p_c), s      | 0.0  | 0.2      |      | 0.0  | 0.1        | 1.6   |       | 1.0        |      |          |      |          |
| Intersection Summary         |      |          |      |      |            |       |       |            |      |          |      |          |
| HCM 6th Ctrl Delay           |      |          | 48.4 |      |            |       |       |            |      |          |      |          |
| HCM 6th LOS                  |      |          | D    |      |            |       |       |            |      |          |      |          |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier. Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

|  | •          | <b>→</b>   | •    | •           | <b>←</b>   | •     | 4           | <b>†</b>   | ~    | -          | ţ          | 1    |
|--|------------|------------|------|-------------|------------|-------|-------------|------------|------|------------|------------|------|
| Movement   | EBL        | EBT        | EBR  | WBL         | WBT        | WBR   | NBL         | NBT        | NBR  | SBL        | SBT        | SBR  |
| Lane Configurations                                      | ሻ          | 4₽         | 7    | 444         |            | 7     | ሻ           | <b>^</b>   | 7    | ሻ          | <b>^</b>   | 7    |
| Traffic Volume (veh/h)                                   | 122        | 289        | 149  | 1025        | 261        | 282   | 192         | 46         | 520  | 202        | 783        | 99   |
| Future Volume (veh/h)                                    | 122        | 289        | 149  | 1025        | 261        | 282   | 192         | 46         | 520  | 202        | 783        | 99   |
| Initial Q (Qb), veh                                      | 0          | 0          | 0    | 0           | 0          | 0     | 0           | 0          | 0    | 0          | 0          | 0    |
| Ped-Bike Adj(A_pbT)                                      | 1.00       |            | 1.00 | 1.00        |            | 1.00  | 1.00        |            | 1.00 | 1.00       |            | 1.00 |
| Parking Bus, Adj   | 1.00       | 1.00       | 1.00 | 1.00        | 1.00       | 1.00  | 1.00        | 1.00       | 1.00 | 1.00       | 1.00       | 1.00 |
| Work Zone On Approach                                    |            | No         |      |             | No         |       |             | No         |      |            | No         |      |
| Adj Sat Flow, veh/h/ln                                   | 1441       | 1441       | 1441 | 1618        | 1618       | 1618  | 1796        | 1796       | 1796 | 1811       | 1811       | 1811 |
| Adj Flow Rate, veh/h                                     | 123        | 292        | 0    | 1035        | 264        | 0     | 194         | 46         | 0    | 204        | 791        | 0    |
| Peak Hour Factor   | 0.99       | 0.99       | 0.99 | 0.99        | 0.99       | 0.99  | 0.99        | 0.99       | 0.99 | 0.99       | 0.99       | 0.99 |
| Percent Heavy Veh, %                                     | 31         | 31         | 31   | 19          | 19         | 19    | 7           | 7          | 7    | 6          | 6          | 6    |
| Cap, veh/h   | 180        | 378        | 0.00 | 1093        | 407        | 0.00  | 196         | 453        | 0.00 | 524        | 1138       | 0.00 |
| Arrive On Green  | 0.13       | 0.13       | 0.00 | 0.08        | 0.08       | 0.00  | 0.11        | 0.13       | 0.00 | 0.30       | 0.33       | 0.00 |
| Sat Flow, veh/h  | 1372       | 2881       | 1221 | 4347        | 1618       | 1372  | 1711        | 3413       | 1522 | 1725       | 3441       | 1535 |
| Grp Volume(v), veh/h                                     | 123        | 292        | 0    | 1035        | 264        | 0     | 194         | 46         | 0    | 204        | 791        | 0    |
| Grp Sat Flow(s),veh/h/ln                                 | 1372       | 1441       | 1221 | 1449        | 1618       | 1372  | 1711        | 1706       | 1522 | 1725       | 1721       | 1535 |
| Q Serve(g_s), s  | 9.0        | 10.3       | 0.0  | 24.9        | 16.6       | 0.0   | 11.9        | 1.2        | 0.0  | 9.8        | 21.0       | 0.0  |
| Cycle Q Clear(g_c), s                                    | 9.0        | 10.3       | 0.0  | 24.9        | 16.6       | 0.0   | 11.9        | 1.2        | 0.0  | 9.8        | 21.0       | 0.0  |
| Prop In Lane   | 1.00       | 070        | 1.00 | 1.00        | 407        | 1.00  | 1.00        | 450        | 1.00 | 1.00       | 4400       | 1.00 |
| Lane Grp Cap(c), veh/h                                   | 180        | 378        |      | 1093        | 407        |       | 196         | 453        |      | 524        | 1138       |      |
| V/C Ratio(X)   | 0.68       | 0.77       |      | 0.95        | 0.65       |       | 0.99        | 0.10       |      | 0.39       | 0.70       |      |
| Avail Cap(c_a), veh/h                                    | 287        | 604        | 4.00 | 1093        | 407        | 0.00  | 196         | 686        | 4.00 | 524        | 1138       | 4.00 |
| HCM Platoon Ratio  | 1.00       | 1.00       | 1.00 | 0.33        | 0.33       | 0.33  | 1.00        | 1.00       | 1.00 | 1.00       | 1.00       | 1.00 |
| Upstream Filter(I)                                       | 1.00       | 1.00       | 0.00 | 0.70        | 0.70       | 0.00  | 1.00        | 1.00       | 0.00 | 1.00       | 1.00       | 0.00 |
| Uniform Delay (d), s/veh                                 | 43.5       | 44.1       | 0.0  | 47.4        | 43.7       | 0.0   | 46.5        | 40.0       | 0.0  | 28.9       | 30.5       | 0.0  |
| Incr Delay (d2), s/veh                                   | 1.7<br>0.0 | 1.3        | 0.0  | 12.4        | 2.5<br>0.0 | 0.0   | 61.9<br>0.0 | 0.0        | 0.0  | 0.2<br>0.0 | 3.5        | 0.0  |
| Initial Q Delay(d3),s/veh                                | 3.1        | 0.0<br>3.7 | 0.0  | 0.0<br>10.9 | 7.5        | 0.0   | 8.3         | 0.0<br>0.5 | 0.0  | 4.0        | 0.0<br>9.0 | 0.0  |
| %ile BackOfQ(50%),veh/ln<br>Unsig. Movement Delay, s/veh |            | 3.1        | 0.0  | 10.9        | 1.5        | 0.0   | 0.3         | 0.5        | 0.0  | 4.0        | 9.0        | 0.0  |
| LnGrp Delay(d),s/veh                                     | 45.2       | 45.4       | 0.0  | 59.9        | 46.2       | 0.0   | 108.4       | 40.1       | 0.0  | 29.1       | 34.1       | 0.0  |
| LnGrp LOS  | 45.2<br>D  | 45.4<br>D  | 0.0  | 59.9<br>E   | 40.2<br>D  | 0.0   | F           | 40.1<br>D  | 0.0  | 29.1<br>C  | C C        | 0.0  |
| Approach Vol, veh/h                                      | <u> </u>   | 415        | Α    | <u> </u>    | 1299       | Α     | l l         | 240        | А    |            | 995        | A    |
| Approach Delay, s/veh                                    |            | 45.3       | А    |             | 57.1       | А     |             | 95.3       | А    |            | 33.0       | А    |
| Approach LOS   |            | 45.5<br>D  |      |             | 57.1<br>E  |       |             | 95.5<br>F  |      |            | 33.0<br>C  |      |
|  |            |            |      |             |            |       |             | •          |      |            | C          |      |
| Timer - Assigned Phs                                     | 1          | 2          |      | 4           | 5          | 6     |             | 8          |      |            |            |      |
| Phs Duration (G+Y+Rc), s                                 | 16.0       | 39.6       |      | 18.4        | 36.8       | 18.8  |             | 31.0       |      |            |            |      |
| Change Period (Y+Rc), s                                  | 4.0        | 4.9        |      | 4.6         | 4.9        | * 4.9 |             | 4.6        |      |            |            |      |
| Max Green Setting (Gmax), s                              | 12.0       | 26.5       |      | 22.0        | 17.4       | * 21  |             | 26.4       |      |            |            |      |
| Max Q Clear Time (g_c+l1), s                             | 13.9       | 23.0       |      | 12.3        | 11.8       | 3.2   |             | 26.9       |      |            |            |      |
| Green Ext Time (p_c), s                                  | 0.0        | 1.8        |      | 1.1         | 0.2        | 0.1   |             | 0.0        |      |            |            |      |
| Intersection Summary                                     |            |            |      |             |            |       |             |            |      |            |            |      |
| HCM 6th Ctrl Delay                                       |            |            | 50.4 |             |            |       |             |            |      |            |            |      |
| HCM 6th LOS  |            |            | D    |             |            |       |             |            |      |            |            |      |

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|  | ۶           | <b>→</b>     | •           | •         | <b>←</b>  | 4    | 1           | <b>†</b>     | <b>/</b> | <b>/</b>    | <b>+</b>     | 4            |
|--|-------------|--------------|-------------|-----------|-----------|------|-------------|--------------|----------|-------------|--------------|--------------|
| Movement   | EBL         | EBT          | EBR         | WBL       | WBT       | WBR  | NBL         | NBT          | NBR      | SBL         | SBT          | SBR          |
| Lane Configurations                                |             | र्स          | 7           |           | 4         |      |             | <b>ተ</b> ኈ   |          | *           | <b>∱</b> ∱   |              |
| Traffic Volume (veh/h)                             | 61          | 0            | 34          | 3         | 0         | 25   | 41          | 675          | 5        | 52          | 1419         | 155          |
| Future Volume (veh/h)                              | 61          | 0            | 34          | 3         | 0         | 25   | 41          | 675          | 5        | 52          | 1419         | 155          |
| Initial Q (Qb), veh                                | 0           | 0            | 0           | 0         | 0         | 0    | 0           | 0            | 0        | 0           | 0            | 0            |
| Ped-Bike Adj(A_pbT)                                | 0.96        | 4.00         | 1.00        | 0.96      | 4.00      | 1.00 | 1.00        | 4.00         | 0.96     | 1.00        |              | 0.96         |
| Parking Bus, Adj                                   | 1.00        | 1.00         | 1.00        | 1.00      | 1.00      | 1.00 | 1.00        | 1.00         | 1.00     | 1.00        | 1.00         | 1.00         |
| Work Zone On Approach                              | 4750        | No           | 4750        | 4500      | No        | 4500 | 4707        | No           | 4707     | 4700        | No           | 4700         |
| Adj Sat Flow, veh/h/ln                             | 1752        | 1752         | 1752        | 1500      | 1500      | 1500 | 1707        | 1707         | 1707     | 1796        | 1796         | 1796         |
| Adj Flow Rate, veh/h                               | 62          | 0            | -4          | 3         | 0         | 0    | 41          | 682          | 5        | 53          | 1433         | 151          |
| Peak Hour Factor                                   | 0.99        | 0.99         | 0.99        | 0.99      | 0.99      | 0.99 | 0.99        | 0.99         | 0.99     | 0.99        | 0.99         | 0.99         |
| Percent Heavy Veh, %                               | 10          | 10           | 10          | 27        | 27        | 27   | 13          | 13           | 13       | 7           | 7            | 7            |
| Cap, veh/h   | 281         | 0            | 218         | 0         | 0         | 0    | 50          | 2144         | 16       | 66          | 2044         | 213          |
| Arrive On Green                                    | 0.15        | 0.00         | 0.00        | 0.15      | 0.00      | 0.00 | 0.03        | 0.65         | 0.65     | 0.04        | 0.66         | 0.66         |
| Sat Flow, veh/h                                    | 1268        | 0            | 1485        | 0         | 0         | 0    | 1626        | 3300         | 24       | 1711        | 3105         | 324          |
| Grp Volume(v), veh/h                               | 62          | 0            | -4          | 3         | 0         | 0    | 41          | 335          | 352      | 53          | 782          | 802          |
| Grp Sat Flow(s),veh/h/ln                           | 1268        | 0            | 1485        | 0         | 0         | 0    | 1626        | 1622         | 1702     | 1711        | 1706         | 1722         |
| Q Serve(g_s), s                                    | 3.3         | 0.0          | 0.0         | 0.0       | 0.0       | 0.0  | 1.9         | 6.9          | 6.9      | 2.3         | 22.0         | 22.6         |
| Cycle Q Clear(g_c), s                              | 3.3         | 0.0          | 0.0         | 0.0       | 0.0       | 0.0  | 1.9         | 6.9          | 6.9      | 2.3         | 22.0         | 22.6         |
| Prop In Lane                                       | 1.00        | 0            | 1.00        | 1.00      | 0         | 0.00 | 1.00        | 1051         | 0.01     | 1.00        | 4400         | 0.19         |
| Lane Grp Cap(c), veh/h                             | 281         | 0            | 218         | 0         | 0         | 0    | 50          | 1054         | 1106     | 66          | 1123         | 1134         |
| V/C Ratio(X)                                       | 0.22        | 0.00         | -0.02       | 0.00      | 0.00      | 0.00 | 0.83        | 0.32         | 0.32     | 0.80        | 0.70         | 0.71         |
| Avail Cap(c_a), veh/h                              | 495<br>1.00 | 1.00         | 469<br>1.00 | 0<br>1.00 | 0<br>1.00 | 1.00 | 514<br>1.00 | 1054<br>1.00 | 1106     | 540<br>1.00 | 1123<br>1.00 | 1134<br>1.00 |
| HCM Platoon Ratio                                  | 1.00        | 1.00<br>0.00 | 0.00        | 1.00      | 0.00      | 0.00 | 1.00        | 1.00         | 1.00     | 1.00        | 1.00         | 1.00         |
| Upstream Filter(I)                                 | 29.1        | 0.00         | 0.00        | 0.0       | 0.00      | 0.00 | 36.6        | 5.9          | 5.9      | 36.2        | 8.2          | 8.3          |
| Uniform Delay (d), s/veh<br>Incr Delay (d2), s/veh | 0.1         | 0.0          | 0.0         | 0.0       | 0.0       | 0.0  | 12.1        | 0.8          | 0.8      | 7.9         | 3.6          | 3.7          |
| Initial Q Delay(d3),s/veh                          | 0.0         | 0.0          | 0.0         | 0.0       | 0.0       | 0.0  | 0.0         | 0.0          | 0.0      | 0.0         | 0.0          | 0.0          |
| %ile BackOfQ(50%),veh/ln                           | 1.0         | 0.0          | 0.0         | 0.0       | 0.0       | 0.0  | 0.0         | 2.1          | 2.2      | 1.1         | 7.3          | 7.7          |
| Unsig. Movement Delay, s/veh                       |             | 0.0          | 0.0         | 0.0       | 0.0       | 0.0  | 0.9         | ۷.۱          | ۷.۷      | 1.1         | 1.5          | 1.1          |
| LnGrp Delay(d),s/veh                               | 29.2        | 0.0          | 0.0         | 0.0       | 0.0       | 0.0  | 48.7        | 6.7          | 6.6      | 44.1        | 11.8         | 12.0         |
| LnGrp LOS  | 29.2<br>C   | Α            | Α           | Α         | Α         | Α    | 40.7<br>D   | Α            | Α        | D           | В            | 12.0<br>B    |
| Approach Vol, veh/h                                |             | 58           |             |           | 3         |      | <u> </u>    | 728          |          | <u> </u>    | 1637         |              |
| Approach Delay, s/veh                              |             | 31.2         |             |           | 0.0       |      |             | 9.0          |          |             | 12.9         |              |
| Approach LOS                                       |             | 31.2<br>C    |             |           | Α         |      |             | 9.0<br>A     |          |             | 12.9<br>B    |              |
| Approach LOS                                       |             | C            |             |           | A         |      |             |              |          |             | Ь            |              |
| Timer - Assigned Phs                               | 1           | 2            |             | 4         | 5         | 6    |             | 8            |          |             |              |              |
| Phs Duration (G+Y+Rc), s                           | 6.9         | 53.9         |             | 15.1      | 6.3       | 54.5 |             | 15.1         |          |             |              |              |
| Change Period (Y+Rc), s                            | 4.0         | 4.5          |             | 4.0       | 4.0       | 4.5  |             | 4.0          |          |             |              |              |
| Max Green Setting (Gmax), s                        | 24.0        | 30.0         |             | 24.0      | 24.0      | 50.0 |             | 24.0         |          |             |              |              |
| Max Q Clear Time (g_c+l1), s                       | 4.3         | 8.9          |             | 5.3       | 3.9       | 24.6 |             | 2.0          |          |             |              |              |
| Green Ext Time (p_c), s                            | 0.0         | 2.8          |             | 0.1       | 0.0       | 9.2  |             | 0.0          |          |             |              |              |
| Intersection Summary                               |             |              |             |           |           |      |             |              |          |             |              |              |
| HCM 6th Ctrl Delay                                 |             |              | 12.2        |           |           |      |             |              |          |             |              |              |
| HCM 6th LOS  |             |              | В           |           |           |      |             |              |          |             |              |              |

|   | ၨ        | <b>→</b>     | •         | •     | <b>←</b> | •    | •    | <b>†</b>     | /     | <b>&gt;</b> | ļ   | 1   |
|---|----------|--------------|-----------|-------|----------|------|------|--------------|-------|-------------|-----|-----|
| Movement                                | EBL      | EBT          | EBR       | WBL   | WBT      | WBR  | NBL  | NBT          | NBR   | SBL         | SBT | SBR |
| Lane Configurations                     | 1,1      | <b>∱</b> }   | 7         | 1,1   | <b>+</b> | 77   | 1,4  | <b>†</b>     | 77    |             |     |     |
| Traffic Volume (veh/h)                  | 501      | 1984         | 642       | 465   | 222      | 769  | 227  | 64           | 1192  | 0           | 0   | 0   |
| Future Volume (veh/h)                   | 501      | 1984         | 642       | 465   | 222      | 769  | 227  | 64           | 1192  | 0           | 0   | 0   |
| Initial Q (Qb), veh                     | 16       | 8            | 16        | 0     | 0        | 0    | 0    | 0            | 10    |             |     |     |
| Ped-Bike Adj(A_pbT)                     | 1.00     |              | 0.97      | 1.00  |          | 1.00 | 1.00 |              | 1.00  |             |     |     |
| Parking Bus, Adj                        | 1.00     | 1.00         | 1.00      | 1.00  | 1.00     | 1.00 | 1.00 | 1.00         | 1.00  |             |     |     |
| Work Zone On Approach                   |          | No           |           |       | No       |      |      | No           |       |             |     |     |
| Adj Sat Flow, veh/h/ln                  | 1870     | 1870         | 1870      | 1648  | 1648     | 1648 | 1856 | 1856         | 1856  |             |     |     |
| Adj Flow Rate, veh/h                    | 506      | 2004         | 447       | 470   | 224      | 307  | 229  | 65           | 1204  |             |     |     |
| Peak Hour Factor                        | 0.99     | 0.99         | 0.99      | 0.99  | 0.99     | 0.99 | 0.99 | 0.99         | 0.99  |             |     |     |
| Percent Heavy Veh, %                    | 2        | 2            | 2         | 17    | 17       | 17   | 3    | 3            | 3     |             |     |     |
| Cap, veh/h                              | 642      | 1914         | 790       | 415   | 731      | 1090 | 805  | 828          | 1026  |             |     |     |
| Arrive On Green                         | 0.17     | 0.51         | 0.51      | 0.14  | 0.48     | 0.48 | 0.23 | 0.23         | 0.23  |             |     |     |
| Sat Flow, veh/h                         | 3563     | 3741         | 1544      | 3045  | 1648     | 2458 | 3428 | 3526         | 2768  |             |     |     |
| Grp Volume(v), veh/h                    | 506      | 2004         | 447       | 470   | 224      | 307  | 229  | 65           | 1204  |             |     |     |
| Grp Sat Flow(s), veh/h/ln               | 1781     | 1870         | 1544      | 1522  | 1648     | 1229 | 1714 | 1763         | 1384  |             |     |     |
| Q Serve(g_s), s                         | 14.7     | 54.5         | 21.2      | 14.5  | 8.7      | 7.9  | 5.8  | 1.5          | 25.0  |             |     |     |
| Cycle Q Clear(g_c), s                   | 14.7     | 54.5         | 21.2      | 14.5  | 8.7      | 7.9  | 5.8  | 1.5          | 25.0  |             |     |     |
| Prop In Lane                            | 1.00     | 34.3         | 1.00      | 1.00  | 0.1      | 1.00 | 1.00 | 1.5          | 1.00  |             |     |     |
| Lane Grp Cap(c), veh/h                  | 642      | 1914         | 790       | 415   | 731      | 1090 | 805  | 828          | 1026  |             |     |     |
| V/C Ratio(X)                            | 0.79     | 1.05         | 0.57      | 1.13  | 0.31     | 0.28 | 0.28 | 0.08         | 1.17  |             |     |     |
|   | 789      | 1914         | 790       | 415   | 791      | 1180 | 805  | 828          | 1026  |             |     |     |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 1.00     | 1.00         | 1.00      | 1.00  | 1.00     | 1.00 | 1.00 | 1.00         | 1.00  |             |     |     |
|   |          |              | 1.00      |       | 1.00     | 1.00 | 1.00 |              | 1.00  |             |     |     |
| Upstream Filter(I)                      | 1.00     | 1.00<br>26.0 | 19.4      | 1.00  | 19.1     | 18.9 |      | 1.00<br>31.8 |       |             |     |     |
| Uniform Delay (d), s/veh                | 42.6     |              |           | 46.0  |          |      | 33.4 |              | 33.5  |             |     |     |
| Incr Delay (d2), s/veh                  | 4.0      | 34.1         | 1.2       | 85.9  | 0.3      | 0.2  | 0.1  | 0.0          | 88.3  |             |     |     |
| Initial Q Delay(d3),s/veh               | 21.2     | 15.0         | 6.8       | 0.0   | 0.0      | 0.0  | 0.0  | 0.0          | 35.1  |             |     |     |
| %ile BackOfQ(50%),veh/ln                | 9.6      | 36.1         | 11.3      | 10.4  | 3.6      | 2.4  | 2.5  | 0.7          | 42.3  |             |     |     |
| Unsig. Movement Delay, s/veh            |          | 75.4         | 07.0      | 404.0 | 40.5     | 40.4 | 22.5 | 24.0         | 450.0 |             |     |     |
| LnGrp Delay(d),s/veh                    | 67.8     | 75.1         | 27.3      | 131.9 | 19.5     | 19.1 | 33.5 | 31.8         | 156.9 |             |     |     |
| LnGrp LOS                               | <u>E</u> | F            | С         | F     | В        | В    | С    | С            | F     |             |     |     |
| Approach Vol, veh/h                     |          | 2957         |           |       | 1001     |      |      | 1498         |       |             |     |     |
| Approach Delay, s/veh                   |          | 66.7         |           |       | 72.2     |      |      | 132.6        |       |             |     |     |
| Approach LOS                            |          | Е            |           |       | Е        |      |      | F            |       |             |     |     |
| Timer - Assigned Phs                    | 1        | 2            |           | 4     | 5        | 6    |      |              |       |             |     |     |
| Phs Duration (G+Y+Rc), s                | 18.0     | 59.5         |           | 29.0  | 21.4     | 56.1 |      |              |       |             |     |     |
| Change Period (Y+Rc), s                 | 3.5      | 5.0          |           | 4.0   | 3.5      | 5.0  |      |              |       |             |     |     |
| Max Green Setting (Gmax), s             | 14.5     | 54.5         |           | 25.0  | 23.6     | 45.4 |      |              |       |             |     |     |
| Max Q Clear Time (g_c+l1), s            | 16.5     | 56.5         |           | 27.0  | 16.7     | 10.7 |      |              |       |             |     |     |
| Green Ext Time (p_c), s                 | 0.0      | 0.0          |           | 0.0   | 1.2      | 5.7  |      |              |       |             |     |     |
| Intersection Summary                    |          |              |           |       |          |      |      |              |       |             |     |     |
| HCM 6th Ctrl Delay                      |          |              | 85.8      |       |          |      |      |              |       |             |     |     |
| HCM 6th LOS                             |          |              | 65.6<br>F |       |          |      |      |              |       |             |     |     |
| Notes                                   |          |              |           |       |          |      |      |              |       |             |     |     |

User approved volume balancing among the lanes for turning movement.

|                              | ۶    | <b>→</b>   | *     | •    | <b>←</b>    | 4    | 1    | <b>†</b> | ~    | <b>/</b> | <b>†</b> | √    |
|------------------------------|------|------------|-------|------|-------------|------|------|----------|------|----------|----------|------|
| Movement                     | EBL  | EBT        | EBR   | WBL  | WBT         | WBR  | NBL  | NBT      | NBR  | SBL      | SBT      | SBR  |
| Lane Configurations          | ሻሻ   | <b>∱</b> ₽ |       | ች    | <b>↑</b> ↑₽ |      | ሻ    | ₽        |      |          | र्स      | 77   |
| Traffic Volume (veh/h)       | 773  | 3098       | 95    | 4    | 803         | 25   | 60   | 4        | 10   | 42       | 2        | 93   |
| Future Volume (veh/h)        | 773  | 3098       | 95    | 4    | 803         | 25   | 60   | 4        | 10   | 42       | 2        | 93   |
| Initial Q (Qb), veh          | 0    | 32         | 0     | 0    | 26          | 0    | 0    | 0        | 0    | 0        | 0        | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |            | 0.96  | 1.00 |             | 0.99 | 1.00 |          | 0.95 | 1.00     |          | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00       | 1.00  | 1.00 | 1.00        | 1.00 | 1.00 | 1.00     | 1.00 | 1.00     | 1.00     | 1.00 |
| Work Zone On Approach        |      | No         |       |      | No          |      |      | No       |      |          | No       |      |
| Adj Sat Flow, veh/h/ln       | 1856 | 1856       | 1856  | 1574 | 1574        | 1574 | 1366 | 1366     | 1366 | 1678     | 1678     | 1678 |
| Adj Flow Rate, veh/h         | 781  | 3129       | 95    | 4    | 811         | 23   | 61   | 4        | 1    | 42       | 2        | 0    |
| Peak Hour Factor             | 0.99 | 0.99       | 0.99  | 0.99 | 0.99        | 0.99 | 0.99 | 0.99     | 0.99 | 0.99     | 0.99     | 0.99 |
| Percent Heavy Veh, %         | 3    | 3          | 3     | 22   | 22          | 22   | 36   | 36       | 36   | 15       | 15       | 15   |
| Cap, veh/h                   | 779  | 2400       | 63    | 9    | 1996        | 53   | 153  | 123      | 31   | 62       | 3        | 101  |
| Arrive On Green              | 0.23 | 0.68       | 0.68  | 0.01 | 0.46        | 0.46 | 0.12 | 0.12     | 0.12 | 0.04     | 0.04     | 0.00 |
| Sat Flow, veh/h              | 3428 | 3489       | 105   | 1499 | 4293        | 122  | 1301 | 1042     | 260  | 1528     | 73       | 2502 |
| Grp Volume(v), veh/h         | 781  | 1571       | 1653  | 4    | 541         | 293  | 61   | 0        | 5    | 44       | 0        | 0    |
| Grp Sat Flow(s),veh/h/ln     | 1714 | 1763       | 1832  | 1499 | 1432        | 1550 | 1301 | 0        | 1302 | 1601     | 0        | 1251 |
| Q Serve(g_s), s              | 25.0 | 75.3       | 75.3  | 0.3  | 13.7        | 13.8 | 4.8  | 0.0      | 0.4  | 3.0      | 0.0      | 0.0  |
| Cycle Q Clear(g_c), s        | 25.0 | 75.3       | 75.3  | 0.3  | 13.7        | 13.8 | 4.8  | 0.0      | 0.4  | 3.0      | 0.0      | 0.0  |
| Prop In Lane                 | 1.00 |            | 0.06  | 1.00 |             | 0.08 | 1.00 | _        | 0.20 | 0.95     |          | 1.00 |
| Lane Grp Cap(c), veh/h       | 779  | 1207       | 1256  | 9    | 1328        | 719  | 153  | 0        | 153  | 65       | 0        | 101  |
| V/C Ratio(X)                 | 1.00 | 1.30       | 1.32  | 0.43 | 0.41        | 0.41 | 0.40 | 0.00     | 0.03 | 0.68     | 0.00     | 0.00 |
| Avail Cap(c_a), veh/h        | 779  | 1207       | 1254  | 82   | 1328        | 719  | 367  | 0        | 367  | 87       | 0        | 136  |
| HCM Platoon Ratio            | 1.00 | 1.00       | 1.00  | 1.00 | 1.00        | 1.00 | 1.00 | 1.00     | 1.00 | 1.00     | 1.00     | 1.00 |
| Upstream Filter(I)           | 0.09 | 0.09       | 0.09  | 1.00 | 1.00        | 1.00 | 1.00 | 0.00     | 1.00 | 1.00     | 0.00     | 0.00 |
| Uniform Delay (d), s/veh     | 42.5 | 17.3       | 17.3  | 54.5 | 20.4        | 20.3 | 44.9 | 0.0      | 43.0 | 52.1     | 0.0      | 0.0  |
| Incr Delay (d2), s/veh       | 10.2 | 136.2      | 142.8 | 10.9 | 0.9         | 1.7  | 0.6  | 0.0      | 0.0  | 5.0      | 0.0      | 0.0  |
| Initial Q Delay(d3),s/veh    | 0.0  | 47.7       | 45.9  | 0.0  | 2.1         | 1.8  | 0.0  | 0.0      | 0.0  | 0.0      | 0.0      | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 11.4 | 86.6       | 91.8  | 0.1  | 6.0         | 6.5  | 1.6  | 0.0      | 0.1  | 1.3      | 0.0      | 0.0  |
| Unsig. Movement Delay, s/veh |      | 004.0      | 000.0 | 05.4 | 00.4        | 00.0 | 45.5 | 0.0      | 40.0 | F7.4     | 0.0      | 0.0  |
| LnGrp Delay(d),s/veh         | 52.7 | 201.3      | 206.0 | 65.4 | 23.4        | 23.8 | 45.5 | 0.0      | 43.0 | 57.1     | 0.0      | 0.0  |
| LnGrp LOS                    | F    | F          | F     | E    | C           | С    | D    | Α        | D    | E        | A        | A    |
| Approach Vol, veh/h          |      | 4005       |       |      | 838         |      |      | 66       |      |          | 44       |      |
| Approach Delay, s/veh        |      | 174.3      |       |      | 23.7        |      |      | 45.3     |      |          | 57.1     |      |
| Approach LOS                 |      | F          |       |      | С           |      |      | D        |      |          | E        |      |
| Timer - Assigned Phs         | 1    | 2          |       | 4    | 5           | 6    |      | 8        |      |          |          |      |
| Phs Duration (G+Y+Rc), s     | 29.0 | 55.6       |       | 17.0 | 4.7         | 79.9 |      | 8.4      |      |          |          |      |
| Change Period (Y+Rc), s      | 4.0  | 4.6        |       | 4.0  | 4.0         | 4.6  |      | 4.0      |      |          |          |      |
| Max Green Setting (Gmax), s  | 25.0 | 31.4       |       | 31.0 | 6.0         | 50.4 |      | 6.0      |      |          |          |      |
| Max Q Clear Time (g_c+l1), s | 27.0 | 15.8       |       | 6.8  | 2.3         | 77.3 |      | 5.0      |      |          |          |      |
| Green Ext Time (p_c), s      | 0.0  | 4.7        |       | 0.1  | 0.0         | 0.0  |      | 0.0      |      |          |          |      |
| Intersection Summary         |      |            |       |      |             |      |      |          |      |          |          |      |
| HCM 6th Ctrl Delay           |      |            | 146.1 |      |             |      |      |          |      |          |          |      |
| HCM 6th LOS                  |      |            | F     |      |             |      |      |          |      |          |          |      |

|                              | ۶    | <b>→</b>    | •    | •    | •    | •    | 4    | <b>†</b> | ~        | <b>&gt;</b> | ļ        | 4        |
|------------------------------|------|-------------|------|------|------|------|------|----------|----------|-------------|----------|----------|
| Movement                     | EBL  | EBT         | EBR  | WBL  | WBT  | WBR  | NBL  | NBT      | NBR      | SBL         | SBT      | SBR      |
| Lane Configurations          |      | <b>↑</b> ↑₽ |      | ሻሻ   | ħβ   |      | ሻ    | <b>•</b> | 77       | 444         | <b>+</b> | 7        |
| Traffic Volume (veh/h)       | 142  | 1725        | 38   | 106  | 181  | 162  | 23   | 205      | 585      | 817         | 328      | 211      |
| Future Volume (veh/h)        | 142  | 1725        | 38   | 106  | 181  | 162  | 23   | 205      | 585      | 817         | 328      | 211      |
| Initial Q (Qb), veh          | 0    | 50          | 0    | 0    | 0    | 0    | 0    | 0        | 12       | 24          | 24       | 0        |
| Ped-Bike Adj(A_pbT)          | 1.00 |             | 0.98 | 1.00 |      | 1.00 | 1.00 |          | 1.00     | 1.00        |          | 0.97     |
| Parking Bus, Adj             | 1.00 | 1.00        | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00     | 1.00     | 1.00        | 1.00     | 1.00     |
| Work Zone On Approach        |      | No          |      |      | No   |      |      | No       |          |             | No       |          |
| Adj Sat Flow, veh/h/ln       | 1885 | 1885        | 1885 | 1826 | 1826 | 1826 | 1870 | 1870     | 1870     | 1826        | 1826     | 1826     |
| Adj Flow Rate, veh/h         | 143  | 1742        | 35   | 107  | 183  | 39   | 23   | 207      | 591      | 825         | 331      | 61       |
| Peak Hour Factor             | 0.99 | 0.99        | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99     | 0.99     | 0.99        | 0.99     | 0.99     |
| Percent Heavy Veh, %         | 1    | 1           | 1    | 5    | 5    | 5    | 2    | 2        | 2        | 5           | 5        | 5        |
| Cap, veh/h                   | 180  | 1912        | 12   | 674  | 1357 | 283  | 80   | 274      | 641      | 919         | 523      | 435      |
| Arrive On Green              | 0.10 | 0.36        | 0.36 | 0.07 | 0.35 | 0.35 | 0.05 | 0.14     | 0.14     | 0.19        | 0.28     | 0.28     |
| Sat Flow, veh/h              | 1795 | 5190        | 104  | 3374 | 2857 | 596  | 1781 | 1870     | 2790     | 4904        | 1826     | 1505     |
| Grp Volume(v), veh/h         | 143  | 1151        | 626  | 107  | 110  | 112  | 23   | 207      | 591      | 825         | 331      | 61       |
| Grp Sat Flow(s),veh/h/ln     | 1795 | 1716        | 1864 | 1687 | 1735 | 1719 | 1781 | 1870     | 1395     | 1635        | 1826     | 1505     |
| Q Serve(g_s), s              | 6.2  | 25.8        | 25.8 | 2.4  | 3.5  | 3.6  | 1.0  | 8.6      | 8.3      | 13.1        | 12.7     | 2.4      |
| Cycle Q Clear(g_c), s        | 6.2  | 25.8        | 25.8 | 2.4  | 3.5  | 3.6  | 1.0  | 8.6      | 8.3      | 13.1        | 12.7     | 2.4      |
| Prop In Lane                 | 1.00 |             | 0.06 | 1.00 |      | 0.35 | 1.00 |          | 1.00     | 1.00        |          | 1.00     |
| Lane Grp Cap(c), veh/h       | 180  | 1244        | 681  | 674  | 824  | 816  | 80   | 274      | 641      | 919         | 523      | 435      |
| V/C Ratio(X)                 | 0.80 | 0.93        | 0.92 | 0.16 | 0.13 | 0.14 | 0.29 | 0.75     | 0.92     | 0.90        | 0.63     | 0.14     |
| Avail Cap(c_a), veh/h        | 292  | 1244        | 676  | 253  | 606  | 600  | 200  | 281      | 625      | 919         | 513      | 423      |
| HCM Platoon Ratio            | 1.00 | 1.00        | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00     | 1.00     | 1.00        | 1.00     | 1.00     |
| Upstream Filter(I)           | 1.00 | 1.00        | 1.00 | 0.97 | 0.97 | 0.97 | 1.00 | 1.00     | 1.00     | 1.00        | 1.00     | 1.00     |
| Uniform Delay (d), s/veh     | 35.2 | 25.5        | 25.5 | 26.7 | 12.0 | 12.1 | 37.0 | 32.8     | 16.4     | 32.5        | 26.7     | 21.1     |
| Incr Delay (d2), s/veh       | 3.1  | 13.0        | 19.5 | 0.0  | 0.3  | 0.3  | 0.7  | 9.6      | 19.3     | 11.2        | 2.0      | 0.1      |
| Initial Q Delay(d3),s/veh    | 0.0  | 63.0        | 51.7 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0      | 32.6     | 47.7        | 41.4     | 0.0      |
| %ile BackOfQ(50%),veh/ln     | 2.8  | 24.3        | 25.7 | 0.8  | 1.0  | 1.1  | 0.4  | 4.4      | 6.6      | 10.7        | 13.6     | 0.8      |
| Unsig. Movement Delay, s/veh |      | 1015        | 00.7 | 00.0 | 40.4 | 40.4 | 07.7 | 40.4     | 00.0     | 04.4        | 70.4     | 04.4     |
| LnGrp Delay(d),s/veh         | 38.3 | 101.5       | 96.7 | 26.8 | 12.4 | 12.4 | 37.7 | 42.4     | 68.3     | 91.4        | 70.1     | 21.1     |
| LnGrp LOS                    | D    | F           | F    | С    | В    | В    | D    | D        | <u>E</u> | F           | E        | <u>C</u> |
| Approach Vol, veh/h          |      | 1920        |      |      | 329  |      |      | 821      |          |             | 1217     |          |
| Approach Delay, s/veh        |      | 95.3        |      |      | 17.1 |      |      | 60.9     |          |             | 82.1     |          |
| Approach LOS                 |      | F           |      |      | В    |      |      | E        |          |             | F        |          |
| Timer - Assigned Phs         | 1    | 2           | 3    | 4    | 5    | 6    | 7    | 8        |          |             |          |          |
| Phs Duration (G+Y+Rc), s     | 7.6  | 27.5        | 12.0 | 32.9 | 19.0 | 16.1 | 10.9 | 34.0     |          |             |          |          |
| Change Period (Y+Rc), s      | 4.0  | 5.0         | 4.0  | 5.0  | 4.0  | 5.0  | 5.0  | * 5      |          |             |          |          |
| Max Green Setting (Gmax), s  | 9.0  | 18.0        | 13.0 | 22.0 | 15.0 | 12.0 | 6.0  | * 29     |          |             |          |          |
| Max Q Clear Time (g_c+l1), s | 3.0  | 14.7        | 8.2  | 5.6  | 15.1 | 10.6 | 4.4  | 27.8     |          |             |          |          |
| Green Ext Time (p_c), s      | 0.0  | 0.5         | 0.1  | 0.6  | 0.0  | 0.5  | 0.0  | 1.0      |          |             |          |          |
| Intersection Summary         |      |             |      |      |      |      |      |          |          |             |          |          |
| HCM 6th Ctrl Delay           |      |             | 78.9 |      |      |      |      |          |          |             |          |          |
| HCM 6th LOS                  |      |             | Е    |      |      |      |      |          |          |             |          |          |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier. User approved changes to right turn type.

|                              | ۶    | <b>→</b> | •    | •    | <b>←</b> | 4    | 1    | <b>†</b> | ~    | <b>/</b> | <b>†</b> | ✓    |
|------------------------------|------|----------|------|------|----------|------|------|----------|------|----------|----------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT      | NBR  | SBL      | SBT      | SBR  |
| Lane Configurations          | ሻሻ   | 1>       |      |      | 4        |      | 7    | 4î       |      |          | र्स      | 77   |
| Traffic Volume (veh/h)       | 1364 | 2        | 74   | 1    | 0        | 5    | 40   | 114      | 3    | 2        | 150      | 955  |
| Future Volume (veh/h)        | 1364 | 2        | 74   | 1    | 0        | 5    | 40   | 114      | 3    | 2        | 150      | 955  |
| Initial Q (Qb), veh          | 24   | 0        | 0    | 0    | 0        | 0    | 0    | 0        | 0    | 0        | 0        | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 1.00 | 1.00 |          | 1.00 | 1.00 |          | 0.96 | 0.99     |          | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00     | 1.00     | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No       |      |          | No       |      |
| Adj Sat Flow, veh/h/ln       | 1856 | 1856     | 1856 | 1411 | 1411     | 1411 | 1781 | 1781     | 1781 | 1767     | 1767     | 1767 |
| Adj Flow Rate, veh/h         | 1378 | 2        | 34   | 1    | 0        | 0    | 40   | 115      | 3    | 2        | 152      | 675  |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99     | 0.99     | 0.99 |
| Percent Heavy Veh, %         | 3    | 3        | 3    | 33   | 33       | 33   | 8    | 8        | 8    | 9        | 9        | 9    |
| Cap, veh/h                   | 1765 | 45       | 771  | 3    | 0        | 0    | 57   | 514      | 13   | 73       | 361      | 1897 |
| Arrive On Green              | 0.50 | 0.50     | 0.50 | 0.00 | 0.00     | 0.00 | 0.03 | 0.31     | 0.31 | 0.21     | 0.21     | 0.21 |
| Sat Flow, veh/h              | 3428 | 88       | 1498 | 1344 | 0        | 0    | 1697 | 1726     | 45   | 6        | 1758     | 2635 |
| Grp Volume(v), veh/h         | 1378 | 0        | 36   | 1    | 0        | 0    | 40   | 0        | 118  | 154      | 0        | 675  |
| Grp Sat Flow(s),veh/h/ln     | 1714 | 0        | 1586 | 1344 | 0        | 0    | 1697 | 0        | 1771 | 1764     | 0        | 1317 |
| Q Serve(g_s), s              | 16.5 | 0.0      | 0.6  | 0.0  | 0.0      | 0.0  | 1.1  | 0.0      | 2.4  | 0.0      | 0.0      | 4.9  |
| Cycle Q Clear(g_c), s        | 16.5 | 0.0      | 0.6  | 0.0  | 0.0      | 0.0  | 1.1  | 0.0      | 2.4  | 3.7      | 0.0      | 4.9  |
| Prop In Lane                 | 1.00 |          | 0.94 | 1.00 | _        | 0.00 | 1.00 |          | 0.03 | 0.01     |          | 1.00 |
| Lane Grp Cap(c), veh/h       | 1765 | 0        | 817  | 3    | 0        | 0    | 57   | 0        | 527  | 433      | 0        | 1897 |
| V/C Ratio(X)                 | 0.78 | 0.00     | 0.04 | 0.38 | 0.00     | 0.00 | 0.70 | 0.00     | 0.22 | 0.36     | 0.00     | 0.36 |
| Avail Cap(c_a), veh/h        | 4791 | 0        | 2216 | 177  | 0        | 0    | 209  | 0        | 1223 | 964      | 0        | 2638 |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00     | 1.00     | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 0.00 | 1.00 | 0.00     | 1.00 | 1.00     | 0.00     | 1.00 |
| Uniform Delay (d), s/veh     | 10.7 | 0.0      | 6.1  | 26.5 | 0.0      | 0.0  | 25.4 | 0.0      | 14.4 | 18.7     | 0.0      | 2.7  |
| Incr Delay (d2), s/veh       | 0.3  | 0.0      | 0.0  | 71.4 | 0.0      | 0.0  | 14.1 | 0.0      | 0.2  | 0.5      | 0.0      | 0.1  |
| Initial Q Delay(d3),s/veh    | 6.1  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0      | 0.0      | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 7.6  | 0.0      | 0.2  | 0.1  | 0.0      | 0.0  | 0.7  | 0.0      | 1.0  | 1.6      | 0.0      | 4.0  |
| Unsig. Movement Delay, s/veh |      | 0.0      | 0.0  | 07.0 | 0.0      | 0.0  | 20.5 | 0.0      | 44.0 | 40.0     | 0.0      | 0.0  |
| LnGrp Delay(d),s/veh         | 17.1 | 0.0      | 6.2  | 97.9 | 0.0      | 0.0  | 39.5 | 0.0      | 14.6 | 19.2     | 0.0      | 2.8  |
| LnGrp LOS                    | В    | Α        | Α    | F    | A        | A    | D    | A        | В    | В        | A        | A    |
| Approach Vol, veh/h          |      | 1414     |      |      | 1        |      |      | 158      |      |          | 829      |      |
| Approach Delay, s/veh        |      | 16.8     |      |      | 97.9     |      |      | 20.9     |      |          | 5.8      |      |
| Approach LOS                 |      | В        |      |      | F        |      |      | С        |      |          | Α        |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    |          | 6    |      | 8        |      |          |          |      |
| Phs Duration (G+Y+Rc), s     | 4.7  | 13.8     |      | 3.1  |          | 18.5 |      | 27.1     |      |          |          |      |
| Change Period (Y+Rc), s      | 3.0  | 3.5      |      | 3.0  |          | 3.5  |      | 3.0      |      |          |          |      |
| Max Green Setting (Gmax), s  | 6.0  | 24.6     |      | 6.4  |          | 33.6 |      | 68.0     |      |          |          |      |
| Max Q Clear Time (g_c+l1), s | 3.1  | 6.9      |      | 2.0  |          | 4.4  |      | 18.5     |      |          |          |      |
| Green Ext Time (p_c), s      | 0.0  | 3.4      |      | 0.0  |          | 0.3  |      | 5.6      |      |          |          |      |
| Intersection Summary         |      |          |      |      |          |      |      |          |      |          |          |      |
| HCM 6th Ctrl Delay           |      |          | 13.3 |      |          |      |      |          |      |          |          |      |
| HCM 6th LOS                  |      |          | В    |      |          |      |      |          |      |          |          |      |

|                                | •          | <b>→</b>   | $\rightarrow$ | •     | <b>←</b>  | •          | •       | <b>†</b> | <b>/</b> | <b>&gt;</b> | ļ        | 1    |
|--------------------------------|------------|------------|---------------|-------|-----------|------------|---------|----------|----------|-------------|----------|------|
| Movement                       | EBL        | EBT        | EBR           | WBL   | WBT       | WBR        | NBL     | NBT      | NBR      | SBL         | SBT      | SBR  |
| Lane Configurations            | *          | <b>f</b> a |               | 1/1   | <b>†</b>  | 7          | ች       | <b>^</b> | 7        | 777         | <b>^</b> | 7    |
| Traffic Volume (vph)           | 186        | 297        | 119           | 445   | 199       | 154        | 35      | 434      | 469      | 1483        | 556      | 124  |
| Future Volume (vph)            | 186        | 297        | 119           | 445   | 199       | 154        | 35      | 434      | 469      | 1483        | 556      | 124  |
| Ideal Flow (vphpl)             | 1900       | 1900       | 1900          | 1900  | 1900      | 1900       | 1900    | 1900     | 1900     | 1900        | 1900     | 1900 |
| Total Lost time (s)            | 4.0        | 4.0        |               | 4.9   | 4.9       | 4.9        | 4.9     | 4.9      | 4.9      | 4.9         | 4.9      | 4.9  |
| Lane Util. Factor              | 1.00       | 1.00       |               | 0.97  | 1.00      | 1.00       | 1.00    | 0.95     | 1.00     | 0.97        | 0.95     | 1.00 |
| Frpb, ped/bikes                | 1.00       | 0.97       |               | 1.00  | 1.00      | 1.00       | 1.00    | 1.00     | 1.00     | 1.00        | 1.00     | 0.92 |
| 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       | 0.96       |               | 1.00  | 1.00      | 0.85       | 1.00    | 1.00     | 0.85     | 1.00        | 1.00     | 0.85 |
| Flt Protected                  | 0.95       | 1.00       |               | 0.95  | 1.00      | 1.00       | 0.95    | 1.00     | 1.00     | 0.95        | 1.00     | 1.00 |
| Satd. Flow (prot)              | 1593       | 1564       |               | 2814  | 1527      | 1298       | 1464    | 2927     | 1309     | 3030        | 3124     | 1281 |
| Flt Permitted                  | 0.95       | 1.00       |               | 0.95  | 1.00      | 1.00       | 0.95    | 1.00     | 1.00     | 0.95        | 1.00     | 1.00 |
| Satd. Flow (perm)              | 1593       | 1564       |               | 2814  | 1527      | 1298       | 1464    | 2927     | 1309     | 3030        | 3124     | 1281 |
| 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)                | 188        | 300        | 120           | 449   | 201       | 156        | 35      | 438      | 474      | 1498        | 562      | 125  |
| RTOR Reduction (vph)           | 0          | 14         | 0             | 0     | 0         | 137        | 0       | 0        | 0        | 0           | 0        | 83   |
| Lane Group Flow (vph)          | 188        | 406        | 0             | 449   | 201       | 19         | 35      | 438      | 474      | 1498        | 562      | 42   |
| Confl. Peds. (#/hr)            |            |            | 58            |       |           |            |         |          |          |             |          | 20   |
| Confl. Bikes (#/hr)            |            |            | 9             |       |           |            |         |          | 3        |             |          | 3    |
| Heavy Vehicles (%)             | 2%         | 2%         | 2%            | 12%   | 12%       | 12%        | 11%     | 11%      | 11%      | 4%          | 4%       | 4%   |
| Turn Type                      | Split      | NA         |               | Split | NA        | Perm       | Split   | NA       | custom   | Split       | NA       | Perm |
| Protected Phases               | 4          | 4          |               | 7     | 7         |            | 6       | 6        | 2 6 7!   | 2!          | 2        |      |
| Permitted Phases               |            |            |               |       |           | 7          |         |          |          |             |          | 2    |
| Actuated Green, G (s)          | 26.0       | 26.0       |               | 13.1  | 13.1      | 13.1       | 12.1    | 12.1     | 70.1     | 35.1        | 35.1     | 35.1 |
| Effective Green, g (s)         | 26.0       | 26.0       |               | 13.1  | 13.1      | 13.1       | 12.1    | 12.1     | 70.1     | 35.1        | 35.1     | 35.1 |
| Actuated g/C Ratio             | 0.25       | 0.25       |               | 0.12  | 0.12      | 0.12       | 0.12    | 0.12     | 0.67     | 0.33        | 0.33     | 0.33 |
| Clearance Time (s)             | 4.0        | 4.0        |               | 4.9   | 4.9       | 4.9        | 4.9     | 4.9      |          | 4.9         | 4.9      | 4.9  |
| Vehicle Extension (s)          | 2.0        | 2.0        |               | 3.0   | 3.0       | 3.0        | 2.5     | 2.5      |          | 2.0         | 2.0      | 2.0  |
| Lane Grp Cap (vph)             | 394        | 387        |               | 351   | 190       | 161        | 168     | 337      | 873      | 1012        | 1044     | 428  |
| v/s Ratio Prot                 | 0.12       | c0.26      |               | c0.16 | 0.13      |            | 0.02    | c0.15    | 0.36     | c0.49       | 0.18     |      |
| v/s Ratio Perm                 |            |            |               |       |           | 0.01       |         |          |          |             |          | 0.03 |
| v/c Ratio                      | 0.48       | 1.05       |               | 1.28  | 1.06      | 0.12       | 0.21    | 1.30     | 0.54     | 1.48        | 0.54     | 0.10 |
| Uniform Delay, d1              | 33.7       | 39.5       |               | 46.0  | 46.0      | 40.8       | 42.1    | 46.5     | 9.1      | 35.0        | 28.4     | 24.1 |
| 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          | 0.3        | 59.5       |               | 145.9 | 81.4      | 0.3        | 0.5     | 155.0    | 0.5      | 221.5       | 2.0      | 0.5  |
| Delay (s)                      | 34.0       | 99.0       |               | 191.8 | 127.4     | 41.2       | 42.6    | 201.5    | 9.6      | 256.4       | 30.4     | 24.5 |
| Level of Service               | С          | F          |               | F     | F         | D          | D       | F        | A        | F           | С        | С    |
| Approach Delay (s)             |            | 78.9       |               |       | 146.6     |            |         | 99.6     |          |             | 185.0    |      |
| Approach LOS                   |            | E          |               |       | F         |            |         | F        |          |             | F        |      |
| Intersection Summary           |            |            |               |       |           |            |         |          | _        |             |          |      |
| HCM 2000 Control Delay         |            |            | 146.2         | Н     | CM 2000   | Level of S | Service |          | F        |             |          |      |
| HCM 2000 Volume to Capac       | city ratio |            | 1.29          |       |           |            |         |          |          |             |          |      |
| Actuated Cycle Length (s)      |            |            | 105.0         |       | um of los |            |         |          | 18.7     |             |          |      |
| Intersection Capacity Utilizat | tion       |            | 117.4%        | IC    | CU Level  | of Service |         |          | Н        |             |          |      |
| Analysis Period (min)          |            |            | 15            |       |           |            |         |          |          |             |          |      |
| ! Phase conflict between la    | ane groups | <b>3.</b>  |               |       |           |            |         |          |          |             |          |      |
| c Critical Lane Group          |            |            |               |       |           |            |         |          |          |             |          |      |

|                               | ٠          | <b>→</b>   | <b>←</b>        | •    | <b>/</b>   | 4              |    |      |
|-------------------------------|------------|------------|-----------------|------|------------|----------------|----|------|
| Movement                      | EBL        | EBT        | WBT             | WBR  | SBL        | SBR            |    |      |
| Lane Configurations           | ሻ          | <b>^</b> ^ | <del>ተ</del> ተኈ |      | *          | 7              |    |      |
| Traffic Volume (vph)          | 108        | 2141       | 930             | 43   | 54         | 38             |    |      |
| Future Volume (vph)           | 108        | 2141       | 930             | 43   | 54         | 38             |    |      |
| Ideal Flow (vphpl)            | 1900       | 1900       | 1900            | 1900 | 1900       | 1900           |    |      |
| Total Lost time (s)           | 4.0        | 4.9        | 4.9             |      | 4.2        | 4.2            |    |      |
| Lane Util. Factor             | 1.00       | 0.91       | 0.91            |      | 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)             | 1736       | 4988       | 4560            |      | 1703       | 1524           |    |      |
| Flt Permitted                 | 0.95       | 1.00       | 1.00            |      | 0.95       | 1.00           |    |      |
| Satd. Flow (perm)             | 1736       | 4988       | 4560            |      | 1703       | 1524           |    |      |
| Peak-hour factor, PHF         | 0.99       | 0.99       | 0.99            | 0.99 | 0.99       | 0.99           |    |      |
| Adj. Flow (vph)               | 109        | 2163       | 939             | 43   | 55         | 38             |    |      |
| RTOR Reduction (vph)          | 0          | 0          | 2               | 0    | 0          | 34             |    |      |
| Lane Group Flow (vph)         | 109        | 2163       | 980             | 0    | 55         | 4              |    |      |
| Heavy Vehicles (%)            | 4%         | 4%         | 13%             | 13%  | 6%         | 6%             |    |      |
| Turn Type                     | Prot       | NA         | NA              |      | Prot       | Perm           |    |      |
| Protected Phases              | 5          | 2          | 6               |      | 3          |                |    |      |
| Permitted Phases              |            |            |                 |      |            | 3              |    |      |
| Actuated Green, G (s)         | 10.1       | 81.3       | 67.2            |      | 9.6        | 9.6            |    |      |
| Effective Green, g (s)        | 10.1       | 81.3       | 67.2            |      | 9.6        | 9.6            |    |      |
| Actuated g/C Ratio            | 0.10       | 0.81       | 0.67            |      | 0.10       | 0.10           |    |      |
| Clearance Time (s)            | 4.0        | 4.9        | 4.9             |      | 4.2        | 4.2            |    |      |
| Vehicle Extension (s)         | 2.0        | 2.0        | 2.0             |      | 2.0        | 2.0            |    |      |
| Lane Grp Cap (vph)            | 175        | 4055       | 3064            | -    | 163        | 146            |    |      |
| v/s Ratio Prot                | c0.06      | c0.43      | 0.21            |      | c0.03      |                |    |      |
| v/s Ratio Perm                |            |            |                 |      |            | 0.00           |    |      |
| v/c Ratio                     | 0.62       | 0.53       | 0.32            |      | 0.34       | 0.02           |    |      |
| Uniform Delay, d1             | 43.1       | 3.1        | 6.9             |      | 42.2       | 41.0           |    |      |
| Progression Factor            | 1.00       | 1.00       | 1.05            |      | 1.00       | 1.00           |    |      |
| Incremental Delay, d2         | 4.9        | 0.5        | 0.3             |      | 0.4        | 0.0            |    |      |
| Delay (s)                     | 48.0       | 3.6        | 7.4             |      | 42.7       | 41.0           |    |      |
| Level of Service              | D          | Α          | Α               |      | D          | D              |    |      |
| Approach Delay (s)            |            | 5.7        | 7.4             |      | 42.0       |                |    |      |
| Approach LOS                  |            | Α          | Α               |      | D          |                |    |      |
| Intersection Summary          |            |            |                 |      |            |                |    |      |
| HCM 2000 Control Delay        |            |            | 7.2             | H    | CM 2000    | Level of Servi | ce | Α    |
| HCM 2000 Volume to Capac      | city ratio |            | 0.56            |      |            |                |    |      |
| Actuated Cycle Length (s)     |            |            | 100.0           | Sı   | um of lost | t time (s)     |    | 17.1 |
| Intersection Capacity Utiliza | tion       |            | 59.0%           |      |            | of Service     |    | В    |
| Analysis Period (min)         |            |            | 15              |      |            |                |    |      |
| c Critical Lane Group         |            |            |                 |      |            |                |    |      |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ0yster Po

|                                 | <b></b>   | ٠     | <b>→</b>        | •    | •         | <b>—</b>   | •       | •     | <b>†</b> | ~    | <b>\</b> | <del> </del> |
|---------------------------------|-----------|-------|-----------------|------|-----------|------------|---------|-------|----------|------|----------|--------------|
| Movement                        | EBU       | EBL   | EBT             | EBR  | WBL2      | WBT        | WBR     | NBL   | NBT      | NBR  | SBL      | SBT          |
| Lane Configurations             |           | ă     | ተተ <sub>ጉ</sub> |      | ሻ         | ተተኈ        |         | ሻሻ    | ર્ન      | 7    |          | 414          |
| Traffic Volume (vph)            | 1         | 320   | 2016            | 839  | 48        | 887        | 21      | 532   | 92       | 127  | 10       | 16           |
| Future Volume (vph)             | 1         | 320   | 2016            | 839  | 48        | 887        | 21      | 532   | 92       | 127  | 10       | 16           |
| Ideal Flow (vphpl)              | 1900      | 1900  | 1900            | 1900 | 1900      | 1900       | 1900    | 1900  | 1900     | 1900 | 1900     | 1900         |
| Total Lost time (s)             |           | 4.0   | 4.6             |      | 4.0       | 4.6        |         | 4.0   | 4.0      | 4.0  |          | 4.0          |
| Lane Util. Factor               |           | 1.00  | 0.91            |      | 1.00      | 0.91       |         | 0.91  | 0.91     | 1.00 |          | 0.95         |
| Frpb, ped/bikes                 |           | 1.00  | 0.99            |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 0.93 |          | 0.98         |
| Flpb, ped/bikes                 |           | 1.00  | 1.00            |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 1.00 |          | 1.00         |
| Frt                             |           | 1.00  | 0.96            |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 0.85 |          | 0.91         |
| Flt Protected                   |           | 0.95  | 1.00            |      | 0.95      | 1.00       |         | 0.95  | 0.97     | 1.00 |          | 0.99         |
| Satd. Flow (prot)               |           | 1752  | 4788            |      | 1480      | 4233       |         | 3042  | 1557     | 1390 |          | 2749         |
| Flt Permitted                   |           | 0.95  | 1.00            |      | 0.95      | 1.00       |         | 0.95  | 0.97     | 1.00 |          | 0.99         |
| Satd. Flow (perm)               |           | 1752  | 4788            |      | 1480      | 4233       |         | 3042  | 1557     | 1390 |          | 2749         |
| 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)                 | 1         | 323   | 2036            | 847  | 48        | 896        | 21      | 537   | 93       | 128  | 10       | 16           |
| RTOR Reduction (vph)            | 0         | 0     | 0               | 0    | 0         | 1          | 0       | 0     | 0        | 101  | 0        | 60           |
| Lane Group Flow (vph)           | 0         | 324   | 2883            | 0    | 48        | 916        | 0       | 419   | 211      | 27   | 0        | 2            |
| Confl. Peds. (#/hr)             |           |       |                 |      |           |            | 9       |       |          | 51   |          |              |
| Confl. Bikes (#/hr)             |           |       |                 | 9    |           |            | 1       |       |          | 4    |          |              |
| Heavy Vehicles (%)              | 2%        | 3%    | 3%              | 3%   | 22%       | 22%        | 22%     | 8%    | 8%       | 8%   | 17%      | 17%          |
| Turn Type                       | Prot      | Prot  | NA              |      | Prot      | NA         |         | Split | NA       | Perm | Split    | NA           |
| Protected Phases                | 1         | 1     | 6               |      | 5         | 2          |         | 4     | 4        |      | . 7      | 7            |
| Permitted Phases                |           |       |                 |      |           |            |         |       |          | 4    |          |              |
| Actuated Green, G (s)           |           | 14.3  | 40.9            |      | 7.4       | 34.0       |         | 26.9  | 26.9     | 26.9 |          | 3.5          |
| Effective Green, g (s)          |           | 14.3  | 40.9            |      | 7.4       | 34.0       |         | 26.9  | 26.9     | 26.9 |          | 3.5          |
| Actuated g/C Ratio              |           | 0.11  | 0.32            |      | 0.06      | 0.27       |         | 0.21  | 0.21     | 0.21 |          | 0.03         |
| Clearance Time (s)              |           | 4.0   | 4.6             |      | 4.0       | 4.6        |         | 4.0   | 4.0      | 4.0  |          | 4.0          |
| Vehicle Extension (s)           |           | 2.0   | 3.0             |      | 2.0       | 3.0        |         | 2.0   | 2.0      | 2.0  |          | 2.0          |
| Lane Grp Cap (vph)              |           | 196   | 1539            |      | 86        | 1131       |         | 643   | 329      | 293  |          | 75           |
| v/s Ratio Prot                  |           | c0.18 | c0.60           |      | 0.03      | 0.22       |         | c0.14 | 0.14     |      |          | c0.00        |
| v/s Ratio Perm                  |           |       |                 |      |           |            |         |       |          | 0.02 |          |              |
| v/c Ratio                       |           | 1.65  | 1.87            |      | 0.56      | 0.81       |         | 0.65  | 0.64     | 0.09 |          | 0.02         |
| Uniform Delay, d1               |           | 56.5  | 43.2            |      | 58.3      | 43.6       |         | 45.9  | 45.7     | 40.3 |          | 60.2         |
| Progression Factor              |           | 1.00  | 1.00            |      | 1.00      | 1.00       |         | 1.00  | 1.00     | 1.00 |          | 1.00         |
| Incremental Delay, d2           |           | 315.5 | 395.5           |      | 4.4       | 4.4        |         | 1.8   | 3.2      | 0.1  |          | 0.0          |
| Delay (s)                       |           | 372.0 | 438.6           |      | 62.7      | 47.9       |         | 47.7  | 48.9     | 40.4 |          | 60.2         |
| Level of Service                |           | F     | F               |      | Е         | D          |         | D     | D        | D    |          | Е            |
| Approach Delay (s)              |           |       | 431.9           |      |           | 48.7       |         |       | 46.8     |      |          | 60.2         |
| Approach LOS                    |           |       | F               |      |           | D          |         |       | D        |      |          | Е            |
| Intersection Summary            |           |       |                 |      |           |            |         |       |          |      |          |              |
| HCM 2000 Control Delay          |           |       | 394.8           | Н    | ICM 2000  | Level of   | Service |       | F        |      |          |              |
| HCM 2000 Volume to Capaci       | ity ratio |       | 1.61            |      |           |            |         |       |          |      |          |              |
| Actuated Cycle Length (s)       |           |       | 127.2           | S    | um of los | t time (s) |         |       | 21.1     |      |          |              |
| Intersection Capacity Utilizati | on        |       | 163.0%          |      | CU Level  |            | )       |       | Н        |      |          |              |
| Analysis Period (min)           |           |       | 15              |      |           |            |         |       |          |      |          |              |
| c Critical Lane Group           |           |       |                 |      |           |            |         |       |          |      |          |              |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ0yster Po

| 4    | /                                   | 4   |
|------|-------------------------------------|---|
| SBR2 | NER                                 | NER2  |
|      | 77                                  | 7   |
| 36   | 1813                                | 701   |
| 36   | 1813                                | 701   |
|      |                                     | 1900  |
|      | 4.5                                 | 4.5   |
|      | *0.95                               | 1.00  |
|      | 1.00                                | 1.00  |
|      | 1.00                                | 1.00  |
|      |                                     | 0.85  |
|      | 1.00                                | 1.00  |
|      |                                     | 1615  |
|      | 1.00                                | 1.00  |
|      | 3781                                | 1615  |
| 0.99 |                                     | 0.99  |
|      |                                     | 708   |
| 0    | 0                                   | 0   |
| 0    | 1831                                | 708   |
|      |                                     | 63  |
| 2    |                                     |   |
| 17%  | 0%                                  | 0%  |
|      | Prot                                | Prot  |
|      | 3                                   | 3   |
|      |                                     |   |
|      | 27.4                                | 27.4  |
|      | 27.4                                | 27.4  |
|      | 0.22                                | 0.22  |
|      | 4.5                                 | 4.5   |
|      | 2.0                                 | 2.0   |
|      | 814                                 | 347   |
|      | c0.48                               | 0.44  |
|      |                                     | •   |
|      | 2.25                                | 2.04  |
|      |                                     | 49.9  |
|      |                                     | 1.00  |
|      |                                     | 478.1   |
|      |                                     | 528.0   |
|      | F                                   | F   |
|      |                                     |   |
|      |                                     |   |
|      |                                     |   |
|      |                                     |   |
|      | 36<br>36<br>1900<br>0.99<br>36<br>0 | 36 1813<br>36 1813<br>1900 1990<br>4.5<br>*0.95<br>1.00<br>1.00<br>1.00<br>3781<br>1.00<br>3781<br>0.99 0.99<br>36 1831<br>0 0 1831<br>2 17% 0%<br>Prot<br>3 27.4<br>27.4<br>0.22<br>4.5<br>2.0<br>814<br>c0.48<br>2.25<br>49.9<br>1.00<br>566.2<br>616.1 |

|                               | ۶          | <b>→</b>    | •     | •    | <b>←</b>   | •          | 4       | <b>†</b> | <b>/</b> | <b>/</b> | <b>↓</b> | -√   |
|-------------------------------|------------|-------------|-------|------|------------|------------|---------|----------|----------|----------|----------|------|
| Movement                      | EBL        | EBT         | EBR   | WBL  | WBT        | WBR        | NBL     | NBT      | NBR      | SBL      | SBT      | SBR  |
| Lane Configurations           | Ť          | <b>∱</b> î≽ |       | Ť    | <b>∱</b> ∱ |            |         | 4        |          |          | 4        | 7    |
| Traffic Volume (vph)          | 187        | 750         | 3     | 1    | 188        | 36         | 2       | 2        | 1        | 59       | 2        | 120  |
| Future Volume (vph)           | 187        | 750         | 3     | 1    | 188        | 36         | 2       | 2        | 1        | 59       | 2        | 120  |
| Ideal Flow (vphpl)            | 1900       | 1900        | 1900  | 1900 | 1900       | 1900       | 1900    | 1900     | 1900     | 1900     | 1900     | 1900 |
| Total Lost time (s)           | 4.0        | 4.0         |       | 4.0  | 4.0        |            |         | 4.0      |          |          | 4.0      | 4.0  |
| Lane Util. Factor             | 1.00       | 0.95        |       | 1.00 | 0.95       |            |         | 1.00     |          |          | 0.95     | 0.95 |
| Frpb, ped/bikes               | 1.00       | 1.00        |       | 1.00 | 0.99       |            |         | 1.00     |          |          | 1.00     | 1.00 |
| Flpb, ped/bikes               | 1.00       | 1.00        |       | 1.00 | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00 |
| Frt                           | 1.00       | 1.00        |       | 1.00 | 0.98       |            |         | 0.97     |          |          | 0.95     | 0.85 |
| Flt Protected                 | 0.95       | 1.00        |       | 0.95 | 1.00       |            |         | 0.98     |          |          | 0.97     | 1.00 |
| Satd. Flow (prot)             | 1752       | 3502        |       | 1378 | 2676       |            |         | 1812     |          |          | 1394     | 1289 |
| Flt Permitted                 | 0.95       | 1.00        |       | 0.95 | 1.00       |            |         | 1.00     |          |          | 0.81     | 1.00 |
| Satd. Flow (perm)             | 1752       | 3502        |       | 1378 | 2676       |            |         | 1849     |          |          | 1158     | 1289 |
| 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)               | 189        | 758         | 3     | 1    | 190        | 36         | 2       | 2        | 1        | 60       | 2        | 121  |
| RTOR Reduction (vph)          | 0          | 0           | 0     | 0    | 0          | 0          | 0       | 1        | 0        | 0        | 16       | 76   |
| Lane Group Flow (vph)         | 189        | 761         | 0     | 1    | 226        | 0          | 0       | 4        | 0        | 0        | 79       | 12   |
| Confl. Peds. (#/hr)           |            |             |       |      |            | 11         |         |          |          |          |          |      |
| Confl. Bikes (#/hr)           |            |             | 1     |      |            | 1          |         |          |          |          |          |      |
| Heavy Vehicles (%)            | 3%         | 3%          | 3%    | 31%  | 31%        | 31%        | 0%      | 0%       | 0%       | 19%      | 19%      | 19%  |
| Turn Type                     | Prot       | NA          |       | Prot | NA         |            | Perm    | NA       |          | Perm     | NA       | Perm |
| Protected Phases              | 5          | 2           |       | 1    | 6          |            |         | 3        |          |          | 4        |      |
| Permitted Phases              |            |             |       |      |            |            | 3       |          |          | 4        |          | 4    |
| Actuated Green, G (s)         | 10.8       | 28.1        |       | 0.5  | 17.8       |            |         | 0.6      |          |          | 6.9      | 6.9  |
| Effective Green, g (s)        | 10.8       | 28.1        |       | 0.5  | 17.8       |            |         | 0.6      |          |          | 6.9      | 6.9  |
| Actuated g/C Ratio            | 0.21       | 0.54        |       | 0.01 | 0.34       |            |         | 0.01     |          |          | 0.13     | 0.13 |
| Clearance Time (s)            | 4.0        | 4.0         |       | 4.0  | 4.0        |            |         | 4.0      |          |          | 4.0      | 4.0  |
| Vehicle Extension (s)         | 2.0        | 2.5         |       | 2.0  | 2.5        |            |         | 2.0      |          |          | 2.0      | 2.0  |
| Lane Grp Cap (vph)            | 363        | 1888        |       | 13   | 914        |            |         | 21       |          |          | 153      | 170  |
| v/s Ratio Prot                | c0.11      | c0.22       |       | 0.00 | 0.08       |            |         |          |          |          |          |      |
| v/s Ratio Perm                |            |             |       |      |            |            |         | c0.00    |          |          | c0.07    | 0.01 |
| v/c Ratio                     | 0.52       | 0.40        |       | 0.08 | 0.25       |            |         | 0.19     |          |          | 0.52     | 0.07 |
| Uniform Delay, d1             | 18.3       | 7.1         |       | 25.6 | 12.3       |            |         | 25.5     |          |          | 21.1     | 19.8 |
| Progression Factor            | 1.00       | 1.00        |       | 1.00 | 1.00       |            |         | 1.00     |          |          | 1.00     | 1.00 |
| Incremental Delay, d2         | 0.6        | 0.1         |       | 0.9  | 0.1        |            |         | 1.6      |          |          | 1.2      | 0.1  |
| Delay (s)                     | 19.0       | 7.2         |       | 26.5 | 12.4       |            |         | 27.1     |          |          | 22.3     | 19.8 |
| Level of Service              | В          | Α           |       | С    | В          |            |         | С        |          |          | С        | В    |
| Approach Delay (s)            |            | 9.5         |       |      | 12.5       |            |         | 27.1     |          |          | 21.1     |      |
| Approach LOS                  |            | Α           |       |      | В          |            |         | С        |          |          | С        |      |
| Intersection Summary          |            |             |       |      |            |            |         |          |          |          |          |      |
| HCM 2000 Control Delay        |            |             | 11.6  | Н    | CM 2000    | Level of   | Service |          | В        |          |          | ,    |
| HCM 2000 Volume to Capa       | citv ratio |             | 0.48  |      |            |            |         |          |          |          |          |      |
| Actuated Cycle Length (s)     | ,          |             | 52.1  | S    | um of lost | t time (s) |         |          | 16.0     |          |          |      |
| Intersection Capacity Utiliza | ition      |             | 43.1% |      |            | of Service | !       |          | А        |          |          |      |
| Analysis Period (min)         |            |             | 15    |      |            |            |         |          |          |          |          |      |
| c Critical Lane Group         |            |             |       |      |            |            |         |          |          |          |          |      |

| ersection                  |    |
|----------------------------|----|
| ersection Delay, s/veh 261 | .1 |
| ersection LOS              | F  |

| Movement                   | EBL  | EBT  | EBR  | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|----------------------------|------|------|------|-------|------|------|------|------|------|------|------|------|
| Lane Configurations        |      | ર્ન  | 7    | 7     | ĵ»   |      |      | ર્ન  | 7    |      | 4    |      |
| Traffic Vol, veh/h         | 8    | 257  | 43   | 104   | 928  | 13   | 319  | 0    | 112  | 4    | 12   | 39   |
| Future Vol, veh/h          | 8    | 257  | 43   | 104   | 928  | 13   | 319  | 0    | 112  | 4    | 12   | 39   |
| Peak Hour Factor           | 0.95 | 0.95 | 0.95 | 0.95  | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles, %          | 22   | 22   | 22   | 10    | 10   | 10   | 7    | 7    | 7    | 100  | 100  | 100  |
| Mvmt Flow                  | 8    | 271  | 45   | 109   | 977  | 14   | 336  | 0    | 118  | 4    | 13   | 41   |
| Number of Lanes            | 0    | 1    | 1    | 1     | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB   |      |      | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 2    |      |      | 2     |      |      | 1    |      |      | 2    |      |      |
| Conflicting Approach Left  | SB   |      |      | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1    |      |      | 2     |      |      | 2    |      |      | 2    |      |      |
| Conflicting Approach Right | NB   |      |      | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 2    |      |      | 1     |      |      | 2    |      |      | 2    |      |      |
| HCM Control Delay          | 23.8 |      |      | 438.6 |      |      | 31.2 |      |      | 17.7 |      |      |
| HCM LOS                    | С    |      |      | F     |      |      | D    |      |      | С    |      |      |

| Lane                   | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1  |  |
|------------------------|-------|-------|-------|-------|-------|-------|--------|--|
| Vol Left, %            | 100%  | 0%    | 3%    | 0%    | 100%  | 0%    | 7%     |  |
| Vol Thru, %            | 0%    | 0%    | 97%   | 0%    | 0%    | 99%   | 22%    |  |
| Vol Right, %           | 0%    | 100%  | 0%    | 100%  | 0%    | 1%    | 71%    |  |
| Sign Control           | Stop   |  |
| Traffic Vol by Lane    | 319   | 112   | 265   | 43    | 104   | 941   | 55     |  |
| LT Vol                 | 319   | 0     | 8     | 0     | 104   | 0     | 4      |  |
| Through Vol            | 0     | 0     | 257   | 0     | 0     | 928   | 12     |  |
| RT Vol                 | 0     | 112   | 0     | 43    | 0     | 13    | 39     |  |
| Lane Flow Rate         | 336   | 118   | 279   | 45    | 109   | 991   | 58     |  |
| Geometry Grp           | 7     | 7     | 7     | 7     | 7     | 7     | 6      |  |
| Degree of Util (X)     | 0.76  | 0.228 | 0.617 | 0.091 | 0.24  | 2.025 | 0.162  |  |
| Departure Headway (Hd) | 9.701 | 8.452 | 9.231 | 8.482 | 7.882 | 7.359 | 12.321 |  |
| Convergence, Y/N       | Yes    |  |
| Cap                    | 376   | 428   | 393   | 425   | 454   | 495   | 293    |  |
| Service Time           | 7.401 | 6.152 | 6.931 | 6.182 | 5.646 | 5.123 | 10.321 |  |
| HCM Lane V/C Ratio     | 0.894 | 0.276 | 0.71  | 0.106 | 0.24  | 2.002 | 0.198  |  |
| HCM Control Delay      | 37.4  | 13.6  | 25.7  | 12    | 13.1  | 485.6 | 17.7   |  |
| HCM Lane LOS           | Е     | В     | D     | В     | В     | F     | С      |  |
| HCM 95th-tile Q        | 6.1   | 0.9   | 4     | 0.3   | 0.9   | 67.6  | 0.6    |  |

| 1. Catoway a corpor          | ۶    | <b>→</b> | •    | •    | <b>←</b> | •    | 4    | †    | ~    | <b>\</b> | <b>+</b>   | 4    |
|------------------------------|------|----------|------|------|----------|------|------|------|------|----------|------------|------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT  | NBR  | SBL      | SBT        | SBR  |
| Lane Configurations          | ¥    | f)       |      | 7    | f)       |      | 7    | ħβ   |      | 7        | <b>∱</b> ∱ |      |
| Traffic Volume (veh/h)       | 265  | 4        | 61   | 8    | 4        | 27   | 27   | 1169 | 5    | 20       | 476        | 29   |
| Future Volume (veh/h)        | 265  | 4        | 61   | 8    | 4        | 27   | 27   | 1169 | 5    | 20       | 476        | 29   |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 22   | 0    | 0        | 0          | 0    |
| Ped-Bike Adj(A_pbT)          | 0.97 |          | 0.97 | 0.97 |          | 0.96 | 1.00 |      | 0.97 | 1.00     |            | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00 | 1.00 | 1.00     | 1.00       | 1.00 |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No   |      |          | No         |      |
| Adj Sat Flow, veh/h/ln       | 1885 | 1885     | 1885 | 1648 | 1648     | 1648 | 1796 | 1796 | 1796 | 1811     | 1811       | 1811 |
| Adj Flow Rate, veh/h         | 268  | 4        | 14   | 8    | 4        | 6    | 27   | 1181 | 5    | 20       | 481        | 25   |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99 | 0.99 | 0.99 | 0.99     | 0.99       | 0.99 |
| Percent Heavy Veh, %         | 1    | 1        | 1    | 17   | 17       | 17   | 7    | 7    | 7    | 6        | 6          | 6    |
| Cap, veh/h                   | 438  | 91       | 319  | 389  | 147      | 220  | 79   | 1840 | 7    | 63       | 1721       | 89   |
| Arrive On Green              | 0.25 | 0.25     | 0.25 | 0.25 | 0.25     | 0.25 | 0.05 | 0.53 | 0.53 | 0.04     | 0.52       | 0.52 |
| Sat Flow, veh/h              | 1380 | 360      | 1259 | 1198 | 580      | 870  | 1711 | 3485 | 15   | 1725     | 3321       | 172  |
| Grp Volume(v), veh/h         | 268  | 0        | 18   | 8    | 0        | 10   | 27   | 578  | 608  | 20       | 249        | 257  |
| Grp Sat Flow(s),veh/h/ln     | 1380 | 0        | 1619 | 1198 | 0        | 1450 | 1711 | 1706 | 1793 | 1725     | 1721       | 1773 |
| Q Serve(g_s), s              | 13.6 | 0.0      | 0.6  | 0.4  | 0.0      | 0.4  | 1.1  | 18.2 | 18.2 | 8.0      | 6.1        | 6.1  |
| Cycle Q Clear(g_c), s        | 14.0 | 0.0      | 0.6  | 1.0  | 0.0      | 0.4  | 1.1  | 18.2 | 18.2 | 0.8      | 6.1        | 6.1  |
| Prop In Lane                 | 1.00 |          | 0.78 | 1.00 |          | 0.60 | 1.00 |      | 0.01 | 1.00     |            | 0.10 |
| Lane Grp Cap(c), veh/h       | 438  | 0        | 410  | 389  | 0        | 367  | 79   | 901  | 947  | 63       | 892        | 919  |
| V/C Ratio(X)                 | 0.61 | 0.00     | 0.04 | 0.02 | 0.00     | 0.03 | 0.34 | 0.64 | 0.64 | 0.32     | 0.28       | 0.28 |
| Avail Cap(c_a), veh/h        | 657  | 0        | 667  | 580  | 0        | 597  | 237  | 901  | 947  | 239      | 892        | 919  |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00 | 1.00 | 1.00     | 1.00       | 1.00 |
| Upstream Filter(I)           | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 1.00 | 1.00 | 1.00 | 1.00 | 0.98     | 0.98       | 0.98 |
| Uniform Delay (d), s/veh     | 26.3 | 0.0      | 21.2 | 21.5 | 0.0      | 21.1 | 34.7 | 13.3 | 13.3 | 35.2     | 10.2       | 10.2 |
| Incr Delay (d2), s/veh       | 0.5  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 1.0  | 3.5  | 3.3  | 1.1      | 8.0        | 0.7  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 3.0  | 2.7  | 0.0      | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 4.3  | 0.0      | 0.2  | 0.1  | 0.0      | 0.1  | 0.5  | 8.7  | 9.0  | 0.4      | 2.3        | 2.3  |
| Unsig. Movement Delay, s/veh |      |          |      |      |          |      |      |      |      |          |            |      |
| LnGrp Delay(d),s/veh         | 26.8 | 0.0      | 21.2 | 21.5 | 0.0      | 21.1 | 35.6 | 19.8 | 19.4 | 36.3     | 10.9       | 10.9 |
| LnGrp LOS                    | С    | Α        | С    | С    | Α        | С    | D    | В    | В    | D        | В          | В    |
| Approach Vol, veh/h          |      | 286      |      |      | 18       |      |      | 1213 |      |          | 526        |      |
| Approach Delay, s/veh        |      | 26.5     |      |      | 21.3     |      |      | 19.9 |      |          | 11.9       |      |
| Approach LOS                 |      | С        |      |      | С        |      |      | В    |      |          | В          |      |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8    |      |          |            |      |
| Phs Duration (G+Y+Rc), s     | 6.7  | 44.7     |      | 23.6 | 7.4      | 44.0 |      | 23.6 |      |          |            |      |
| Change Period (Y+Rc), s      | 4.0  | 5.1      |      | 4.6  | 4.0      | 5.1  |      | 4.6  |      |          |            |      |
| Max Green Setting (Gmax), s  | 10.4 | 20.0     |      | 30.9 | 10.4     | 20.0 |      | 30.9 |      |          |            |      |
| Max Q Clear Time (g_c+l1), s | 2.8  | 20.2     |      | 16.0 | 3.1      | 8.1  |      | 3.0  |      |          |            |      |
| Green Ext Time (p_c), s      | 0.0  | 0.0      |      | 0.4  | 0.0      | 1.6  |      | 0.0  |      |          |            |      |
| Intersection Summary         |      |          |      |      |          |      |      |      |      |          |            |      |
| HCM 6th Ctrl Delay           |      |          | 18.8 |      |          |      |      |      |      |          |            |      |
| HCM 6th LOS                  |      |          | В    |      |          |      |      |      |      |          |            |      |

| Phs Duration (G+Y+Rc), s       5.7       62.5       68.2       31.8         Change Period (Y+Rc), s       4.0       4.0       4.0       4.0         Max Green Setting (Gmax), s       8.0       39.0       51.0       41.0         Max Q Clear Time (g_c+l1), s       2.7       2.0       66.2       26.2         Green Ext Time (p_c), s       0.0       4.7       0.0       1.6         Intersection Summary         HCM 6th Ctrl Delay       121.1         HCM 6th LOS       F  |                          | <b>→</b> | •    | •     | <b>←</b> | •    | ~    |      |
|--|--------------------------|----------|------|-------|----------|------|------|------|
| Lane Configurations  | Movement                 | EBT      | FBR  | WBL   | WBT      | NBL  | NBR  |      |
| Traffic Volume (veh/h) 838 141 12 3352 422 326 Future Volume (veh/h) 838 141 12 3352 422 326 Initial Q (Qb), veh 0 0 0 0 0 5 0 Ped-Bike Adj(A_pbT) 0.96 1.00 1.00 1.00 1.00 1.00 Parking Bus, Adj 1.00 1.00 1.00 1.00 1.00 1.00 Mork Zone On Approach No No No No Adj Sat Flow, veh/h/ln 1781 1781 1856 1856 1781 1781 1781 Adj Flow Rate, veh/h 846 125 12 3386 426 0 Peak Hour Factor 0.99 0.99 0.99 0.99 0.99 0.99 0.99 0.9   |                          |          |      |       |          |      |      |      |
| Future Volume (veh/h) 838 141 12 3352 422 326  initial Q (Ob), veh 0 0 0 0 0 5 0 0 Ped-Bike Adj(A_pbT) 0.96 1.00 1.00 1.00 1.00 1.00 1.00 Parking Bus, Adj 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0  |                          | 838      | 141  |       |          |      |      |      |
| Initial Q (Qb), veh  |                          |          |      |       |          |      |      |      |
| Ped-Bike Adji(A_pbT)   | , ,                      |          |      |       |          |      |      |      |
| Parking Bus, Adj 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Mork Zone On Approach No No No Adj Sat Flow, veh/h/ln 1781 1781 1856 1856 1781 1781 1781 Adj Flow Rate, veh/h 846 125 12 3386 426 0 Peak Hour Factor 0.99 0.99 0.99 0.99 0.99 0.99 0.99 0.9  |                          | U        |      |       | U        |      |      |      |
| Work Zone On Ápproach         No         No         No         Add Sat Flow, veh/h/ln         1781         1781         1856         1856         1781         1782         1783         1883  |                          | 1 00     |      |       | 1.00     |      |      |      |
| Adj Sat Flow, veh/h/ln   |                          |          | 1.00 | 1.00  |          |      | 1.00 |      |
| Adj Flow Rate, veh/h Peak Hour Factor O.99 O.99 O.99 O.99 O.99 O.99 O.99 O.9   |                          |          | 1781 | 1856  |          |      | 1781 |      |
| Peak Hour Factor 0.99 0.99 0.99 0.99 0.99 0.99 0.99 Percent Heavy Veh, % 8 8 8 3 3 8 8 8 Cap, veh/h 2186 321 30 2583 489 Arrive On Green 1.00 0.02 0.64 0.28 0.00 Sat Flow, veh/h 4415 624 1767 5233 1697 2657 Grp Volume(v), veh/h 643 328 12 3386 426 0 Grp Sat Flow(s), veh/h/ln 1621 1637 1767 1689 1697 1329 2 Q Serve(g_s), s 0.0 0.0 0.7 64.2 24.2 0.0 Cycle Q Clear(g_c), s 0.0 0.0 0.7 64.2 24.2 0.0 Cycle Q Clear(g_c), s 0.0 0.0 0.7 64.2 24.2 0.0 Cycle Q Clear(g_c), s 0.0 0.0 0.7 64.2 24.2 0.0 Cycle Q Clear(g_c), veh/h 1666 840 30 2583 489 V/C Ratio(X) 0.39 0.39 0.40 1.31 0.87 Avail Cap(c_a), veh/h 1896 957 141 3251 696 HCM Platoon Ratio 2.00 2.00 1.00 1.00 1.00 1.00 Jpstream Filter(I) 0.98 0.98 0.09 0.09 1.00 0.00 Jniform Delay (d), s/veh 1.5 1.5 48.6 24.5 34.4 0.0 Incr Delay (d2), s/veh 0.7 1.3 0.3 140.1 8.6 0.0 Initial Q Delay(d3), s/veh 0.7 1.3 0.3 140.1 8.6 0.0 Initial Q Delay(d3), s/veh 0.7 1.3 0.3 140.1 8.6 0.0 Initial Q Delay(d3), s/veh 0.5 0.7 0.3 52.3 12.2 0.0 Jnsig. Movement Delay, s/veh InGrp Delay (d), s/veh 2.1 2.8 48.9 164.6 48.8 0.0 InGrp LOS A A D F D Approach Vol, veh/h 971 3398 426 A Approach LOS A F D Timer - Assigned Phs 1 2 6 8 8 Phs Duration (G+Y+Rc), s 5.7 62.5 68.2 31.8 Change Period (Y+Rc), s 4.0 4.0 4.0 Max Green Setting (Gmax), s 8.0 39.0 51.0 41.0 Max Q Clear Time (g_c-H), s 2.7 2.0 66.2 26.2 Green Ext Time (g_c-H), s 2.7 2.0 66.2 26.2 Green Ext Time (g_c-H), s 2.7 2.0 66.2 26.2 Green Ext Time (g_c-H), s 2.7 2.0 66.2 26.2 Green Ext Time (g_c-H), s 2.7 2.0 66.2 26.2 Green Ext Time (g_c-H), s 2.7 2.0 66.2 26.2 Green Ext Time (g_c-H), s 2.7 2.0 66.2 26.2  |                          |          |      |       |          |      |      |      |
| Percent Heavy Veh, %   8   |                          |          |      |       |          |      |      |      |
| Cap, veh/h   |                          |          |      |       |          |      |      |      |
| Arrive On Green  |                          |          |      |       |          |      |      |      |
| Sat Flow, veh/h Sat Flow, veh/h Sat Flow, veh/h Sat Flow(s), veh/h Sat   |                          |          |      |       |          |      | 0.00 |      |
| Strp Volume(v), veh/h   643   328   12   3386   426   0  |                          |          |      |       |          |      |      |      |
| Serve(g_s), veh/h/ln   1621   1637   1767   1689   1697   1329   1329   1329   1697   1329   1697   1329   1697   1329   1697   1329   1697   1329   1697   1329   1697   1329   1697   1329   1697   1329   1697    |                          |          |      |       |          |      |      |      |
| R Serve(g_s), s  |                          |          |      |       |          |      |      |      |
| Cycle Q Clear(g_c), s  |                          |          |      |       |          |      |      |      |
| Trop In Lane   |                          |          |      |       |          |      |      |      |
| arie Grp Cap(c), veh/h  arie Grp Cap(c), veh/h  1666  840  30  2583  489  2//C Ratio(X)  0.39  0.39  0.40  1.31  0.87  Avail Cap(c_a), veh/h  1896  957  141  3251  696  40M Platoon Ratio  2.00  2.00  1.00 |                          | 0.0      |      |       | 04.2     |      |      |      |
| Avail Cap(c_a), veh/h       1896       957       141       3251       696         HCM Platoon Ratio       2.00       2.00       1.00       1.00       1.00       1.00         Jpstream Filter(I)       0.98       0.98       0.09       0.09       1.00       0.00         Jniform Delay (d), s/veh       1.5       1.5       48.6       24.5       34.4       0.0         ncr Delay (d2), s/veh       0.7       1.3       0.3       140.1       8.6       0.0         nitial Q Delay(d3),s/veh       0.0       0.0       0.0       0.0       5.9       0.0         Mile BackOfQ(50%),veh/ln       0.5       0.7       0.3       52.3       12.2       0.0         Jnsig. Movement Delay, s/veh       0.0       0.0       0.0       5.9       0.0         Approach Vol, veh/h       971       3398       426       A         Approach Delay, s/veh       2.4       164.6       48.8       0.0         Approach LOS       A       F       D         Finer - Assigned Phs       1       2       6       8         Phs Duration (G+Y+Rc), s       5.7       62.5       68.2       31.8         Change Period (Y+Rc), s       4  |                          | 1666     |      |       | 2583     |      | 1.00 |      |
| Avail Cap(c_a), veh/h HCM Platoon Ratio  2.00  2.00  1 |                          |          |      |       |          |      |      |      |
| ## ACM Platoon Ratio   | ` ,                      |          |      |       |          |      |      |      |
| Spstream Filter(I)   |                          |          |      |       |          |      | 1.00 |      |
| Iniform Delay (d), s/veh I.5 I.5 I.5 I.5 I.5 I.6 I.5 I.6 I.7 I.7 I.7 I.7 I.8   |                          |          |      |       |          |      |      |      |
| nor Delay (d2), s/veh         0.7         1.3         0.3         140.1         8.6         0.0           nitial Q Delay(d3),s/veh         0.0         0.0         0.0         5.9         0.0           file BackOfQ(50%),veh/ln         0.5         0.7         0.3         52.3         12.2         0.0           Insig. Movement Delay, s/veh         2.1         2.8         48.9         164.6         48.8         0.0           InGrp LOS         A         A         D         F         D           Inproach Vol, veh/h         971         3398         426         A           Inproach Delay, s/veh         2.4         164.1         48.8           Inproach LOS         A         F         D           Immer - Assigned Phs         1         2         6         8           Ish Duration (G+Y+Rc), s         5.7         62.5         68.2         31.8           Ish Duration (G+Y+Rc), s         4.0         4.0         4.0         4.0           Idax Green Setting (Gmax), s         8.0         39.0         51.0         41.0           Idax Q Clear Time (g_c+I1), s         2.7         2.0         66.2         26.2           Green Ext Time (p_c), s         0.0 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>  |                          |          |      |       |          |      |      |      |
| nitial Q Delay(d3),s/veh       0.0       0.0       0.0       5.9       0.0         bile BackOfQ(50%),veh/ln       0.5       0.7       0.3       52.3       12.2       0.0         Insig. Movement Delay, s/veh       2.1       2.8       48.9       164.6       48.8       0.0         InGrp LOS       A       A       D       F       D         Approach Vol, veh/h       971       3398       426       A         Approach Delay, s/veh       2.4       164.1       48.8         Approach LOS       A       F       D         Timer - Assigned Phs       1       2       6       8         Phs Duration (G+Y+Rc), s       5.7       62.5       68.2       31.8         Change Period (Y+Rc), s       4.0       4.0       4.0       4.0         Max Green Setting (Gmax), s       8.0       39.0       51.0       41.0         Max Q Clear Time (g_c+l1), s       2.7       2.0       66.2       26.2         Green Ext Time (p_c), s       0.0       4.7       0.0       1.6         Intersection Summary       121.1       121.1       121.1       121.1         ICM 6th LOS       F       121.1       121.1       <  |                          |          |      |       |          |      |      |      |
| Sile BackOfQ(50%),veh/In       0.5       0.7       0.3       52.3       12.2       0.0         Insig. Movement Delay, s/veh       2.1       2.8       48.9       164.6       48.8       0.0         InGrp LOS       A       A       D       F       D         Improach Vol, veh/h       971       3398       426       A         Improach Delay, s/veh       2.4       164.1       48.8         Improach LOS       A       F       D         Imer - Assigned Phs       1       2       6       8         Is Duration (G+Y+Rc), s       5.7       62.5       68.2       31.8         Is hange Period (Y+Rc), s       4.0       4.0       4.0       4.0         Iax Green Setting (Gmax), s       8.0       39.0       51.0       41.0         Iax Q Clear Time (g_c+I1), s       2.7       2.0       66.2       26.2         Green Ext Time (p_c), s       0.0       4.7       0.0       1.6         Intersection Summary       121.1       121.1       121.1         ICM 6th LOS       F       121.1       121.1       121.1   |                          |          |      |       |          |      |      |      |
| Unsig. Movement Delay, s/veh InGrp Delay(d),s/veh InGrp Delay(d),s/veh InGrp LOS InGrp |                          |          |      |       |          |      |      |      |
| ### A Part   | , , ,                    |          | 0.7  | 0.5   | 52.5     | 12.2 | 0.0  |      |
| A  |                          |          | 2.0  | 10 O  | 164.6    | 100  | 0.0  |      |
| Approach Vol, veh/h 971 3398 426 A Approach Delay, s/veh 2.4 164.1 48.8 Approach LOS A F D  Timer - Assigned Phs 1 2 6 8 Phs Duration (G+Y+Rc), s 5.7 62.5 68.2 31.8 Change Period (Y+Rc), s 4.0 4.0 4.0 4.0 Max Green Setting (Gmax), s 8.0 39.0 51.0 41.0 Max Q Clear Time (g_c+l1), s 2.7 2.0 66.2 26.2 Green Ext Time (p_c), s 0.0 4.7 0.0 1.6  Theresection Summary HCM 6th Ctrl Delay 121.1 HCM 6th LOS F  |                          |          |      |       |          |      | 0.0  |      |
| A 164.1 48.8 Approach LOS A F D  Timer - Assigned Phs 1 2 6 8  This Duration (G+Y+Rc), s 5.7 62.5 68.2 31.8  Change Period (Y+Rc), s 4.0 4.0 4.0 4.0  Max Green Setting (Gmax), s 8.0 39.0 51.0 41.0  Max Q Clear Time (g_c+I1), s 2.7 2.0 66.2 26.2  Green Ext Time (p_c), s 0.0 4.7 0.0 1.6  Intersection Summary  ICM 6th Ctrl Delay 121.1  ICM 6th LOS F   |                          |          | A    | U     |          |      | Α    |      |
| A F D  Timer - Assigned Phs 1 2 6 8  Phs Duration (G+Y+Rc), s 5.7 62.5 68.2 31.8  Change Period (Y+Rc), s 4.0 4.0 4.0 4.0  Max Green Setting (Gmax), s 8.0 39.0 51.0 41.0  Max Q Clear Time (g_c+I1), s 2.7 2.0 66.2 26.2  Green Ext Time (p_c), s 0.0 4.7 0.0 1.6  Intersection Summary  HCM 6th Ctrl Delay 121.1  HCM 6th LOS F  | • •                      |          |      |       |          |      | Α    |      |
| imer - Assigned Phs 1 2 6 8 hs Duration (G+Y+Rc), s 5.7 62.5 68.2 31.8 change Period (Y+Rc), s 4.0 4.0 4.0 4.0 hax Green Setting (Gmax), s 8.0 39.0 51.0 41.0 hax Q Clear Time (g_c+l1), s 2.7 2.0 66.2 26.2 hereen Ext Time (p_c), s 0.0 4.7 0.0 1.6 httersection Summary http://dx.doi.org/10.1001/1 | • •                      |          |      |       |          |      |      |      |
| Phs Duration (G+Y+Rc), s 5.7 62.5 68.2 31.8 Change Period (Y+Rc), s 4.0 4.0 4.0 4.0 4.0 Ax Green Setting (Gmax), s 8.0 39.0 51.0 41.0 Ax Q Clear Time (g_c+l1), s 2.7 2.0 66.2 26.2 Green Ext Time (p_c), s 0.0 4.7 0.0 1.6 Intersection Summary ICM 6th Ctrl Delay 121.1 ICM 6th LOS F  | pproach LOS              | Α        |      |       | F        | ט    |      |      |
| Change Period (Y+Rc), s       4.0       4.0       4.0         Max Green Setting (Gmax), s       8.0       39.0       51.0       41.0         Max Q Clear Time (g_c+l1), s       2.7       2.0       66.2       26.2         Green Ext Time (p_c), s       0.0       4.7       0.0       1.6         Itersection Summary         ICM 6th Ctrl Delay       121.1         ICM 6th LOS       F   | imer - Assigned Phs      | 1        | 2    |       |          |      | 6    | 8    |
| Change Period (Y+Rc), s       4.0       4.0       4.0       4.0         Max Green Setting (Gmax), s       8.0       39.0       51.0       41.0         Max Q Clear Time (g_c+l1), s       2.7       2.0       66.2       26.2         Green Ext Time (p_c), s       0.0       4.7       0.0       1.6         Intersection Summary         HCM 6th Ctrl Delay       121.1         HCM 6th LOS       F  | Phs Duration (G+Y+Rc), s | 5.7      | 62.5 |       |          |      | 68.2 | 31.8 |
| Max Green Setting (Gmax), s       8.0       39.0       51.0       41.0         Max Q Clear Time (g_c+l1), s       2.7       2.0       66.2       26.2         Green Ext Time (p_c), s       0.0       4.7       0.0       1.6         Intersection Summary         HCM 6th Ctrl Delay       121.1         HCM 6th LOS       F  |                          |          |      |       |          |      |      |      |
| Max Q Clear Time (g_c+l1), s 2.7 2.0 66.2 26.2  Green Ext Time (p_c), s 0.0 4.7 0.0 1.6  Intersection Summary  HCM 6th Ctrl Delay 121.1  HCM 6th LOS F   | · ,                      |          |      |       |          |      |      |      |
| Green Ext Time (p_c), s         0.0         4.7         0.0         1.6           Intersection Summary         ICM 6th Ctrl Delay         121.1         ICM 6th LOS         F  |                          |          |      |       |          |      |      |      |
| ntersection Summary  ICM 6th Ctrl Delay  ICM 6th LOS  F  |                          |          |      |       |          |      |      |      |
| CM 6th Ctrl Delay 121.1 CM 6th LOS F   | .,                       |          |      |       |          |      |      |      |
| CM 6th LOS F   |                          |          |      | 121 1 |          |      |      |      |
|  |                          |          |      |       |          |      |      |      |
|  | Notes                    |          |      | '     |          |      |      |      |

|                              | ۶    | <b>→</b> | $\rightarrow$ | •     | <b>←</b> | •      | •     | <b>†</b> | <b>/</b> | <b>&gt;</b> | ļ        | 4    |
|------------------------------|------|----------|---------------|-------|----------|--------|-------|----------|----------|-------------|----------|------|
| Movement                     | EBL  | EBT      | EBR           | WBL   | WBT      | WBR    | NBL   | NBT      | NBR      | SBL         | SBT      | SBR  |
| Lane Configurations          | 7    | <b>^</b> | 7             | 44    | ተተኈ      |        | ሻ     | <b>↑</b> | 7        | 7           | <b>^</b> | 7    |
| Traffic Volume (veh/h)       | 165  | 808      | 191           | 762   | 1992     | 490    | 577   | 160      | 416      | 124         | 376      | 795  |
| Future Volume (veh/h)        | 165  | 808      | 191           | 762   | 1992     | 490    | 577   | 160      | 416      | 124         | 376      | 795  |
| Initial Q (Qb), veh          | 0    | 0        | 0             | 0     | 34       | 0      | 0     | 0        | 0        | 0           | 32       | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 0.99          | 1.00  |          | 0.94   | 1.00  |          | 1.00     | 1.00        |          | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00          | 1.00  | 1.00     | 1.00   | 1.00  | 1.00     | 1.00     | 1.00        | 1.00     | 1.00 |
| Work Zone On Approach        |      | No       |               |       | No       |        |       | No       |          |             | No       |      |
| Adj Sat Flow, veh/h/ln       | 1722 | 1722     | 1722          | 1870  | 1870     | 1870   | 1767  | 1767     | 1767     | 1856        | 1856     | 1856 |
| Adj Flow Rate, veh/h         | 167  | 816      | 41            | 770   | 2012     | 467    | 583   | 162      | 0        | 125         | 380      | 0    |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99          | 0.99  | 0.99     | 0.99   | 0.99  | 0.99     | 0.99     | 0.99        | 0.99     | 0.99 |
| Percent Heavy Veh, %         | 12   | 12       | 12            | 2     | 2        | 2      | 9     | 9        | 9        | 3           | 3        | 3    |
| Cap, veh/h                   | 704  | 2990     | 920           | 438   | 1563     | 130    | 314   | 650      |          | 164         | 588      |      |
| Arrive On Green              | 0.22 | 0.43     | 0.43          | 0.17  | 0.44     | 0.44   | 0.19  | 0.23     | 0.00     | 0.09        | 0.14     | 0.00 |
| Sat Flow, veh/h              | 1640 | 4701     | 1440          | 3456  | 4130     | 911    | 1682  | 1767     | 1497     | 1767        | 3526     | 1572 |
| Grp Volume(v), veh/h         | 167  | 816      | 41            | 770   | 1639     | 840    | 583   | 162      | 0        | 125         | 380      | 0    |
| Grp Sat Flow(s),veh/h/ln     | 1640 | 1567     | 1440          | 1728  | 1702     | 1637   | 1682  | 1767     | 1497     | 1767        | 1763     | 1572 |
| Q Serve(g_s), s              | 13.2 | 18.0     | 1.4           | 19.0  | 49.1     | 49.1   | 28.0  | 11.6     | 0.0      | 10.4        | 15.7     | 0.0  |
| Cycle Q Clear(g_c), s        | 13.2 | 18.0     | 1.4           | 19.0  | 49.1     | 49.1   | 28.0  | 11.6     | 0.0      | 10.4        | 15.7     | 0.0  |
| Prop In Lane                 | 1.00 |          | 1.00          | 1.00  |          | 0.56   | 1.00  |          | 1.00     | 1.00        |          | 1.00 |
| Lane Grp Cap(c), veh/h       | 704  | 2990     | 920           | 438   | 1114     | 579    | 314   | 650      |          | 164         | 588      |      |
| V/C Ratio(X)                 | 0.24 | 0.27     | 0.04          | 1.76  | 1.47     | 1.45   | 1.86  | 0.25     |          | 0.76        | 0.65     |      |
| Avail Cap(c_a), veh/h        | 363  | 2013     | 616           | 438   | 1114     | 536    | 314   | 625      |          | 224         | 1044     |      |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00          | 1.33  | 1.33     | 1.33   | 1.00  | 1.00     | 1.00     | 1.00        | 1.00     | 1.00 |
| Upstream Filter(I)           | 0.94 | 0.94     | 0.94          | 0.09  | 0.09     | 0.09   | 1.00  | 1.00     | 0.00     | 1.00        | 1.00     | 0.00 |
| Uniform Delay (d), s/veh     | 27.9 | 12.8     | 16.2          | 62.4  | 42.3     | 42.3   | 61.0  | 33.3     | 0.0      | 66.4        | 60.8     | 0.0  |
| Incr Delay (d2), s/veh       | 0.1  | 0.2      | 0.1           | 342.5 | 212.6    | 203.5  | 397.4 | 0.1      | 0.0      | 6.2         | 0.4      | 0.0  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0           | 0.0   | 73.2     | 70.5   | 0.0   | 0.0      | 0.0      | 0.0         | 60.3     | 0.0  |
| %ile BackOfQ(50%),veh/ln     | 3.9  | 4.1      | 0.5           | 28.9  | 63.6     | 64.2   | 46.6  | 4.2      | 0.0      | 5.0         | 14.4     | 0.0  |
| Unsig. Movement Delay, s/veh |      | 40.0     | 10.0          | 1010  |          | 0.40.0 | 4=0.4 |          |          |             | 1010     | 2.0  |
| LnGrp Delay(d),s/veh         | 27.9 | 13.0     | 16.3          | 404.8 | 328.1    | 316.3  | 458.4 | 33.3     | 0.0      | 72.7        | 121.6    | 0.0  |
| LnGrp LOS                    | С    | В        | В             | F     | F        | F      | F     | С        |          | E           | F        |      |
| Approach Vol, veh/h          |      | 1024     |               |       | 3249     |        |       | 745      | Α        |             | 505      | Α    |
| Approach Delay, s/veh        |      | 15.6     |               |       | 343.3    |        |       | 366.0    |          |             | 109.4    |      |
| Approach LOS                 |      | В        |               |       | F        |        |       | F        |          |             | F        |      |
| Timer - Assigned Phs         | 1    | 2        | 3             | 4     | 5        | 6      | 7     | 8        |          |             |          |      |
| Phs Duration (G+Y+Rc), s     | 23.0 | 69.1     | 32.9          | 25.0  | 38.1     | 54.0   | 17.9  | 40.0     |          |             |          |      |
| Change Period (Y+Rc), s      | 4.0  | 4.9      | 4.9           | * 4.6 | 4.9      | * 4.9  | 4.0   | 4.9      |          |             |          |      |
| Max Green Setting (Gmax), s  | 19.0 | 41.1     | 28.0          | * 44  | 11.0     | * 49   | 19.0  | 53.1     |          |             |          |      |
| Max Q Clear Time (g_c+I1), s | 21.0 | 20.0     | 30.0          | 17.7  | 15.2     | 51.1   | 12.4  | 13.6     |          |             |          |      |
| Green Ext Time (p_c), s      | 0.0  | 3.9      | 0.0           | 1.5   | 0.0      | 0.0    | 0.1   | 0.5      |          |             |          |      |
| Intersection Summary         |      |          |               |       |          |        |       |          |          |             |          |      |
| HCM 6th Ctrl Delay           |      |          | 264.2         |       |          |        |       |          |          |             |          |      |
| HCM 6th LOS                  |      |          | F             |       |          |        |       |          |          |             |          |      |

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|   | ۶           | <b>→</b> | •           | •           | <b>←</b>       | •           | 1           | <b>†</b> | ~           | <b>/</b>    | <b>+</b> | 4           |
|---|-------------|----------|-------------|-------------|----------------|-------------|-------------|----------|-------------|-------------|----------|-------------|
| Movement                                | EBL         | EBT      | EBR         | WBL         | WBT            | WBR         | NBL         | NBT      | NBR         | SBL         | SBT      | SBR         |
| Lane Configurations                     | ሻሻ          | <b>^</b> | 7           | 777         | ተተ <sub></sub> |             | ሻ           | 44       | 7           | ሻ           | <b>+</b> | 77          |
| Traffic Volume (veh/h)                  | 368         | 801      | 179         | 308         | 2346           | 14          | 302         | 60       | 35          | 43          | 448      | 596         |
| Future Volume (veh/h)                   | 368         | 801      | 179         | 308         | 2346           | 14          | 302         | 60       | 35          | 43          | 448      | 596         |
| Initial Q (Qb), veh                     | 0           | 0        | 0           | 0           | 0              | 0           | 0           | 0        | 0           | 0           | 0        | 0           |
| Ped-Bike Adj(A_pbT)                     | 1.00        | 4.00     | 0.98        | 1.00        | 4.00           | 0.92        | 1.00        | 4.00     | 0.98        | 1.00        | 4.00     | 0.97        |
| Parking Bus, Adj                        | 1.00        | 1.00     | 1.00        | 1.00        | 1.00           | 1.00        | 1.00        | 1.00     | 1.00        | 1.00        | 1.00     | 1.00        |
| Work Zone On Approach                   | 1000        | No       | 4000        | 4050        | No             | 4050        | 4707        | No       | 4707        | 4000        | No       | 4000        |
| Adj Sat Flow, veh/h/ln                  | 1663        | 1663     | 1663        | 1856        | 1856           | 1856        | 1767        | 1767     | 1767        | 1826        | 1826     | 1826        |
| Adj Flow Rate, veh/h                    | 372         | 809      | 181         | 311         | 2370           | 13          | 305         | 61       | 5           | 43          | 453      | 338         |
| Peak Hour Factor                        | 0.99        | 0.99     | 0.99        | 0.99        | 0.99           | 0.99        | 0.99        | 0.99     | 0.99        | 0.99        | 0.99     | 0.99        |
| Percent Heavy Veh, %                    | 16          | 16       | 16          | 3           | 3              | 3           | 9           | 9        | 9           | 5           | 5        | 5           |
| Cap, veh/h                              | 434         | 1436     | 436         | 362         | 1458           | 8           | 324         | 646      | 282         | 464         | 488      | 708         |
| Arrive On Green                         | 0.28        | 0.63     | 0.63        | 0.11        | 0.28           | 0.28        | 0.19        | 0.19     | 0.19        | 0.27        | 0.27     | 0.27        |
| Sat Flow, veh/h                         | 3072        | 4540     | 1378        | 3428        | 5196           | 28          | 1682        | 3357     | 1467        | 1739        | 1826     | 2652        |
| Grp Volume(v), veh/h                    | 372         | 809      | 181         | 311         | 1539           | 844         | 305         | 61       | 5           | 43          | 453      | 338         |
| Grp Sat Flow(s),veh/h/ln                | 1536        | 1513     | 1378        | 1714        | 1689           | 1847        | 1682        | 1678     | 1467        | 1739        | 1826     | 1326        |
| Q Serve(g_s), s                         | 17.2        | 15.3     | 9.8         | 13.4        | 42.1           | 42.1        | 26.8        | 2.2      | 0.4         | 2.8         | 36.3     | 16.1        |
| Cycle Q Clear(g_c), s                   | 17.2        | 15.3     | 9.8         | 13.4        | 42.1           | 42.1        | 26.8        | 2.2      | 0.4         | 2.8         | 36.3     | 16.1        |
| Prop In Lane                            | 1.00<br>434 | 1436     | 1.00<br>436 | 1.00<br>362 | 948            | 0.02<br>519 | 1.00<br>324 | 646      | 1.00<br>282 | 1.00<br>464 | 488      | 1.00<br>708 |
| Lane Grp Cap(c), veh/h                  | 0.86        | 0.56     | 0.42        | 0.86        | 1.62           | 1.63        | 0.94        | 0.09     | 0.02        | 0.09        | 0.93     | 0.48        |
| V/C Ratio(X)                            | 434         | 1436     | 436         | 494         | 948            | 519         | 326         | 651      | 285         | 498         | 523      | 760         |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 2.00        | 2.00     | 2.00        | 1.00        | 1.00           | 1.00        | 1.00        | 1.00     | 1.00        | 1.00        | 1.00     | 1.00        |
| Upstream Filter(I)                      | 0.83        | 0.83     | 0.83        | 1.00        | 1.00           | 1.00        | 1.00        | 1.00     | 1.00        | 1.00        | 1.00     | 1.00        |
| Uniform Delay (d), s/veh                | 52.4        | 21.7     | 20.7        | 66.0        | 53.9           | 54.0        | 59.7        | 49.8     | 49.1        | 41.3        | 53.6     | 46.2        |
| Incr Delay (d2), s/veh                  | 13.3        | 1.3      | 2.4         | 8.5         | 285.7          | 290.9       | 34.4        | 0.0      | 0.0         | 0.0         | 21.7     | 0.2         |
| Initial Q Delay(d3),s/veh               | 0.0         | 0.0      | 0.0         | 0.0         | 0.0            | 0.0         | 0.0         | 0.0      | 0.0         | 0.0         | 0.0      | 0.0         |
| %ile BackOfQ(50%),veh/ln                | 6.6         | 4.2      | 2.9         | 6.3         | 55.5           | 61.4        | 14.5        | 1.0      | 0.2         | 1.2         | 19.6     | 5.3         |
| Unsig. Movement Delay, s/veh            |             | ٦.۷      | 2.5         | 0.0         | 00.0           | 01.4        | 17.0        | 1.0      | 0.2         | 1.2         | 13.0     | 0.0         |
| LnGrp Delay(d),s/veh                    | 65.6        | 23.0     | 23.1        | 74.4        | 339.7          | 344.8       | 94.1        | 49.8     | 49.1        | 41.3        | 75.3     | 46.4        |
| LnGrp LOS                               | E           | C        | C           | E           | F              | F           | F           | D        | D           | D           | F        | D           |
| Approach Vol, veh/h                     |             | 1362     |             |             | 2694           | <u>'</u>    |             | 371      |             |             | 834      |             |
| Approach Delay, s/veh                   |             | 34.7     |             |             | 310.7          |             |             | 86.2     |             |             | 61.8     |             |
| Approach LOS                            |             | C        |             |             | F              |             |             | F        |             |             | E        |             |
|   |             |          |             |             |                | •           |             |          |             |             |          |             |
| Timer - Assigned Phs                    | 1           | 2        |             | 4           | 5              | 6           |             | 8        |             |             |          |             |
| Phs Duration (G+Y+Rc), s                | 25.2        | 47.0     |             | 44.1        | 20.8           | 51.4        |             | 33.8     |             |             |          |             |
| Change Period (Y+Rc), s                 | 4.0         | 4.9      |             | 4.0         | 4.9            | 4.0         |             | 4.9      |             |             |          |             |
| Max Green Setting (Gmax), s             | 18.0        | 42.1     |             | 43.0        | 21.6           | 38.5        |             | 29.1     |             |             |          |             |
| Max Q Clear Time (g_c+l1), s            | 19.2        | 44.1     |             | 38.3        | 15.4           | 17.3        |             | 28.8     |             |             |          |             |
| Green Ext Time (p_c), s                 | 0.0         | 0.0      |             | 1.5         | 0.5            | 6.2         |             | 0.0      |             |             |          |             |
| Intersection Summary                    |             |          |             |             |                |             |             |          |             |             |          |             |
| HCM 6th Ctrl Delay                      |             |          | 183.9       |             |                |             |             |          |             |             |          |             |
| HCM 6th LOS                             |             |          | F           |             |                |             |             |          |             |             |          |             |

|                              | •    | <b>→</b> | •    | •    | <b>←</b> | •    | 4    | <b>†</b>   | ~    | <b>&gt;</b> | ţ        | 4     |
|------------------------------|------|----------|------|------|----------|------|------|------------|------|-------------|----------|-------|
| Movement                     | EBL  | EBT      | EBR  | WBL  | WBT      | WBR  | NBL  | NBT        | NBR  | SBL         | SBT      | SBR   |
| Lane Configurations          | 1/1  | <b>†</b> | 77   | ሻ    | ተተተ      | 7    | ሻሻ   | <b>∱</b> } |      | ሻ           | <b>†</b> | 77    |
| Traffic Volume (veh/h)       | 110  | 148      | 485  | 130  | 1119     | 14   | 486  | 714        | 175  | 10          | 260      | 1247  |
| Future Volume (veh/h)        | 110  | 148      | 485  | 130  | 1119     | 14   | 486  | 714        | 175  | 10          | 260      | 1247  |
| Initial Q (Qb), veh          | 0    | 0        | 0    | 0    | 0        | 0    | 0    | 0          | 0    | 0           | 0        | 0     |
| Ped-Bike Adj(A_pbT)          | 1.00 |          | 0.97 | 1.00 |          | 0.97 | 1.00 |            | 1.00 | 1.00        |          | 0.96  |
| Parking Bus, Adj             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00     | 1.00  |
| Work Zone On Approach        |      | No       |      |      | No       |      |      | No         |      |             | No       |       |
| Adj Sat Flow, veh/h/ln       | 1781 | 1781     | 1781 | 1811 | 1811     | 1811 | 1767 | 1767       | 1767 | 1841        | 1841     | 1841  |
| Adj Flow Rate, veh/h         | 111  | 149      | 106  | 131  | 1130     | 3    | 491  | 721        | 0    | 10          | 263      | 970   |
| Peak Hour Factor             | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99 | 0.99 | 0.99       | 0.99 | 0.99        | 0.99     | 0.99  |
| Percent Heavy Veh, %         | 8    | 8        | 8    | 6    | 6        | 6    | 9    | 9          | 9    | 4           | 4        | 4     |
| Cap, veh/h                   | 301  | 421      | 611  | 161  | 1177     | 355  | 752  | 773        |      | 469         | 493      | 705   |
| Arrive On Green              | 0.09 | 0.24     | 0.24 | 0.09 | 0.24     | 0.24 | 0.23 | 0.23       | 0.00 | 0.27        | 0.27     | 0.27  |
| Sat Flow, veh/h              | 3291 | 1781     | 2584 | 1725 | 4944     | 1492 | 3264 | 3445       | 0    | 1753        | 1841     | 2633  |
| Grp Volume(v), veh/h         | 111  | 149      | 106  | 131  | 1130     | 3    | 491  | 721        | 0    | 10          | 263      | 970   |
| Grp Sat Flow(s),veh/h/ln     | 1646 | 1781     | 1292 | 1725 | 1648     | 1492 | 1632 | 1678       | 0    | 1753        | 1841     | 1316  |
| Q Serve(g_s), s              | 3.3  | 7.3      | 3.4  | 7.8  | 23.7     | 0.2  | 14.3 | 22.1       | 0.0  | 0.4         | 12.8     | 28.1  |
| Cycle Q Clear(g_c), s        | 3.3  | 7.3      | 3.4  | 7.8  | 23.7     | 0.2  | 14.3 | 22.1       | 0.0  | 0.4         | 12.8     | 28.1  |
| Prop In Lane                 | 1.00 |          | 1.00 | 1.00 |          | 1.00 | 1.00 |            | 0.00 | 1.00        |          | 1.00  |
| Lane Grp Cap(c), veh/h       | 301  | 421      | 611  | 161  | 1177     | 355  | 752  | 773        |      | 469         | 493      | 705   |
| V/C Ratio(X)                 | 0.37 | 0.35     | 0.17 | 0.82 | 0.96     | 0.01 | 0.65 | 0.93       |      | 0.02        | 0.53     | 1.38  |
| Avail Cap(c_a), veh/h        | 313  | 424      | 615  | 164  | 1177     | 355  | 752  | 773        |      | 469         | 493      | 705   |
| HCM Platoon Ratio            | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 1.00 | 1.00        | 1.00     | 1.00  |
| Upstream Filter(I)           | 0.73 | 0.73     | 0.73 | 1.00 | 1.00     | 1.00 | 1.00 | 1.00       | 0.00 | 1.00        | 1.00     | 1.00  |
| Uniform Delay (d), s/veh     | 44.8 | 33.4     | 31.9 | 46.7 | 39.5     | 30.5 | 36.6 | 39.6       | 0.0  | 28.3        | 32.9     | 38.5  |
| Incr Delay (d2), s/veh       | 0.2  | 0.3      | 0.1  | 24.1 | 17.3     | 0.0  | 4.4  | 19.5       | 0.0  | 0.0         | 0.6      | 178.4 |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0  | 0.0  | 0.0        | 0.0  | 0.0         | 0.0      | 0.0   |
| %ile BackOfQ(50%),veh/ln     | 1.4  | 3.2      | 1.1  | 4.4  | 11.3     | 0.1  | 6.0  | 11.0       | 0.0  | 0.2         | 5.7      | 26.3  |
| Unsig. Movement Delay, s/veh | l    |          |      |      |          |      |      |            |      |             |          |       |
| LnGrp Delay(d),s/veh         | 45.0 | 33.7     | 32.0 | 70.8 | 56.8     | 30.5 | 41.0 | 59.1       | 0.0  | 28.3        | 33.4     | 216.8 |
| LnGrp LOS                    | D    | С        | С    | Е    | Е        | С    | D    | Ε          |      | С           | С        | F     |
| Approach Vol, veh/h          |      | 366      |      |      | 1264     |      |      | 1212       | Α    |             | 1243     |       |
| Approach Delay, s/veh        |      | 36.6     |      |      | 58.2     |      |      | 51.8       |      |             | 176.5    |       |
| Approach LOS                 |      | D        |      |      | Е        |      |      | D          |      |             | F        |       |
| Timer - Assigned Phs         | 1    | 2        |      | 4    | 5        | 6    |      | 8          |      |             |          |       |
| Phs Duration (G+Y+Rc), s     | 13.8 | 29.4     |      | 28.8 | 13.6     | 29.6 |      | 33.0       |      |             |          |       |
| Change Period (Y+Rc), s      | 4.0  | 4.6      |      | 4.6  | 4.0      | 4.6  |      | 4.9        |      |             |          |       |
| Max Green Setting (Gmax), s  | 10.0 | 25.0     |      | 23.8 | 10.0     | 25.0 |      | 28.1       |      |             |          |       |
| Max Q Clear Time (g_c+l1), s | 9.8  | 9.3      |      | 24.1 | 5.3      | 25.7 |      | 30.1       |      |             |          |       |
| Green Ext Time (p_c), s      | 0.0  | 0.9      |      | 0.0  | 0.1      | 0.0  |      | 0.0        |      |             |          |       |
| Intersection Summary         |      |          |      |      |          |      |      |            |      |             |          |       |
| HCM 6th Ctrl Delay           |      |          | 90.4 |      |          |      |      |            |      |             |          |       |
| HCM 6th LOS                  |      |          | F    |      |          |      |      |            |      |             |          |       |
| Notos                        |      |          |      |      |          |      |      |            |      |             |          |       |

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

|  | ۶            | <b>→</b>     | •     | •            | •            | •     | 1            | <b>†</b>     | <b>/</b> | <b>/</b>     | <b>↓</b>     | 4    |
|--|--------------|--------------|-------|--------------|--------------|-------|--------------|--------------|----------|--------------|--------------|------|
| Movement   | EBL          | EBT          | EBR   | WBL          | WBT          | WBR   | NBL          | NBT          | NBR      | SBL          | SBT          | SBR  |
| Lane Configurations                              | ሻ            | 41∱          | 7     | 444          | <b>†</b>     | 7     | ሻ            | <b>^</b>     | 7        | ሻ            | <b>^</b>     | 7    |
| Traffic Volume (veh/h)                           | 169          | 262          | 208   | 2017         | 311          | 416   | 112          | 29           | 362      | 158          | 1139         | 183  |
| Future Volume (veh/h)                            | 169          | 262          | 208   | 2017         | 311          | 416   | 112          | 29           | 362      | 158          | 1139         | 183  |
| Initial Q (Qb), veh                              | 0            | 0            | 0     | 0            | 0            | 0     | 0            | 0            | 0        | 0            | 0            | 0    |
| Ped-Bike Adj(A_pbT)                              | 1.00         |              | 1.00  | 1.00         |              | 1.00  | 1.00         |              | 1.00     | 1.00         |              | 1.00 |
| Parking Bus, Adj                                 | 1.00         | 1.00         | 1.00  | 1.00         | 1.00         | 1.00  | 1.00         | 1.00         | 1.00     | 1.00         | 1.00         | 1.00 |
| Work Zone On Approach                            | 1011         | No           | 1011  | 1011         | No           | 1011  | 40=0         | No           | 40=0     | 10-0         | No           | 10=0 |
| Adj Sat Flow, veh/h/ln                           | 1811         | 1811         | 1811  | 1811         | 1811         | 1811  | 1678         | 1678         | 1678     | 1856         | 1856         | 1856 |
| Adj Flow Rate, veh/h                             | 145          | 301          | 0     | 2037         | 314          | 0     | 113          | 29           | 0        | 160          | 1151         | 0    |
| Peak Hour Factor                                 | 0.99         | 0.99         | 0.99  | 0.99         | 0.99         | 0.99  | 0.99         | 0.99         | 0.99     | 0.99         | 0.99         | 0.99 |
| Percent Heavy Veh, %                             | 6            | 6            | 6     | 6            | 6            | 6     | 15           | 15           | 15       | 3            | 3            | 3    |
| Cap, veh/h                                       | 199          | 417          | 0.00  | 1475         | 549          | 0.00  | 143          | 757          | 0.00     | 328          | 1203         | 0.00 |
| Arrive On Green                                  | 0.12         | 0.12         | 0.00  | 0.30         | 0.30         | 0.00  | 0.09         | 0.24         | 0.00     | 0.19         | 0.34         | 0.00 |
| Sat Flow, veh/h                                  | 1725         | 3622         | 1535  | 4864         | 1811         | 1535  | 1598         | 3188         | 1422     | 1767         | 3526         | 1572 |
| Grp Volume(v), veh/h                             | 145          | 301          | 0     | 2037         | 314          | 0     | 113          | 29           | 0        | 160          | 1151         | 0    |
| Grp Sat Flow(s),veh/h/ln                         | 1725         | 1811         | 1535  | 1621         | 1811         | 1535  | 1598         | 1594         | 1422     | 1767         | 1763         | 1572 |
| Q Serve(g_s), s                                  | 9.7          | 9.6          | 0.0   | 36.4         | 17.5         | 0.0   | 8.3          | 0.8          | 0.0      | 9.7          | 38.3         | 0.0  |
| Cycle Q Clear(g_c), s                            | 9.7          | 9.6          | 0.0   | 36.4         | 17.5         | 0.0   | 8.3          | 8.0          | 0.0      | 9.7          | 38.3         | 0.0  |
| Prop In Lane                                     | 1.00         | 447          | 1.00  | 1.00         | <b>540</b>   | 1.00  | 1.00         | 7.7          | 1.00     | 1.00         | 4000         | 1.00 |
| Lane Grp Cap(c), veh/h                           | 199          | 417          |       | 1475         | 549          |       | 143          | 757          |          | 328          | 1203         |      |
| V/C Ratio(X)                                     | 0.73         | 0.72         |       | 1.38         | 0.57         |       | 0.79         | 0.04         |          | 0.49         | 0.96         |      |
| Avail Cap(c_a), veh/h                            | 316          | 664          | 4.00  | 1475         | 549          | 4.00  | 146          | 757          | 4.00     | 328          | 1203         | 4.00 |
| HCM Platoon Ratio                                | 1.00         | 1.00         | 1.00  | 1.00         | 1.00         | 1.00  | 1.00         | 1.00         | 1.00     | 1.00         | 1.00         | 1.00 |
| Upstream Filter(I)                               | 1.00<br>51.3 | 1.00<br>51.2 | 0.00  | 0.09<br>41.8 | 0.09<br>35.2 | 0.00  | 1.00         | 1.00<br>35.2 | 0.00     | 1.00<br>43.7 | 1.00<br>38.7 | 0.00 |
| Uniform Delay (d), s/veh                         | 1.9          | 0.9          | 0.0   | 171.7        | 0.1          | 0.0   | 53.5<br>22.2 | 0.1          | 0.0      | 0.4          | 17.5         | 0.0  |
| Incr Delay (d2), s/veh Initial Q Delay(d3),s/veh | 0.0          | 0.9          | 0.0   | 0.0          | 0.1          | 0.0   | 0.0          | 0.1          | 0.0      | 0.4          | 0.0          | 0.0  |
| %ile BackOfQ(50%),veh/ln                         | 4.3          | 4.4          | 0.0   | 38.0         | 7.8          | 0.0   | 4.2          | 0.0          | 0.0      | 4.3          | 19.0         | 0.0  |
| Unsig. Movement Delay, s/veh                     |              | 4.4          | 0.0   | 30.0         | 7.0          | 0.0   | 4.2          | 0.5          | 0.0      | 4.3          | 19.0         | 0.0  |
| LnGrp Delay(d),s/veh                             | 53.2         | 52.1         | 0.0   | 213.5        | 35.4         | 0.0   | 75.7         | 35.3         | 0.0      | 44.2         | 56.2         | 0.0  |
| LnGrp LOS  | 55.2<br>D    | J2.1         | 0.0   | 213.5<br>F   | 55.4<br>D    | 0.0   | 73.7<br>E    | 55.5<br>D    | 0.0      | 44.2<br>D    | 50.2<br>E    | 0.0  |
| Approach Vol, veh/h                              |              | 446          | А     | <u>'</u>     | 2351         | А     | <u> </u>     | 142          | А        |              | 1311         | A    |
| Approach Delay, s/veh                            |              | 52.5         | A     |              | 189.7        | A     |              | 67.5         | A        |              | 54.7         | A    |
| Approach LOS                                     |              | 52.5<br>D    |       |              | F            |       |              | 67.5<br>E    |          |              | 54.7<br>D    |      |
| Apploach LOS                                     |              | U            |       |              | Г            |       |              |              |          |              | U            |      |
| Timer - Assigned Phs                             | 1            | 2            |       | 4            | 5            | 6     |              | 8            |          |              |              |      |
| Phs Duration (G+Y+Rc), s                         | 14.7         | 45.8         |       | 18.4         | 27.2         | 33.4  |              | 41.0         |          |              |              |      |
| Change Period (Y+Rc), s                          | 4.0          | 4.9          |       | 4.6          | 4.9          | * 4.9 |              | 4.6          |          |              |              |      |
| Max Green Setting (Gmax), s                      | 11.0         | 32.5         |       | 22.0         | 15.0         | * 29  |              | 36.4         |          |              |              |      |
| Max Q Clear Time (g_c+l1), s                     | 10.3         | 40.3         |       | 11.7         | 11.7         | 2.8   |              | 38.4         |          |              |              |      |
| Green Ext Time (p_c), s                          | 0.0          | 0.0          |       | 1.2          | 0.1          | 0.1   |              | 0.0          |          |              |              |      |
| Intersection Summary                             |              |              |       |              |              |       |              |              |          |              |              |      |
| HCM 6th Ctrl Delay                               |              |              | 129.6 |              |              |       |              |              |          |              |              |      |
| HCM 6th LOS                                      |              |              | F     |              |              |       |              |              |          |              |              |      |

## Notes

User approved volume balancing among the lanes for turning movement.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

|   | ۶    | <b>→</b> | •    | •    | <b>←</b> | •           | •    | <b>†</b>   | ~    | <b>&gt;</b> | ļ          | 4    |
|---|------|----------|------|------|----------|-------------|------|------------|------|-------------|------------|------|
| Movement                                      | EBL  | EBT      | EBR  | WBL  | WBT      | WBR         | NBL  | NBT        | NBR  | SBL         | SBT        | SBR  |
| Lane Configurations                           |      | 4        | 7    |      | 4        |             | ሻ    | <b>∱</b> } |      | ሻ           | <b>∱</b> ∱ |      |
| Traffic Volume (veh/h)                        | 274  | Ö        | 76   | 4    | 0        | 45          | 10   | 1455       | 3    | 104         | 501        | 44   |
| Future Volume (veh/h)                         | 274  | 0        | 76   | 4    | 0        | 45          | 10   | 1455       | 3    | 104         | 501        | 44   |
| Initial Q (Qb), veh                           | 0    | 0        | 0    | 0    | 0        | 0           | 0    | 44         | 0    | 0           | 0          | 0    |
| Ped-Bike Adj(A_pbT)                           | 1.00 |          | 0.99 | 1.00 |          | 0.99        | 1.00 |            | 0.98 | 1.00        |            | 0.99 |
| Parking Bus, Adj                              | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00        | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Work Zone On Approach                         |      | No       |      |      | No       |             |      | No         |      |             | No         |      |
| Adj Sat Flow, veh/h/ln                        | 1900 | 1900     | 1900 | 1900 | 1900     | 1900        | 1841 | 1841       | 1841 | 1796        | 1796       | 1796 |
| Adj Flow Rate, veh/h                          | 277  | 0        | 14   | 4    | 0        | 6           | 10   | 1470       | 3    | 105         | 506        | 38   |
| Peak Hour Factor                              | 0.99 | 0.99     | 0.99 | 0.99 | 0.99     | 0.99        | 0.99 | 0.99       | 0.99 | 0.99        | 0.99       | 0.99 |
| Percent Heavy Veh, %                          | 0    | 0        | 0    | 0    | 0        | 0           | 4    | 4          | 4    | 7           | 7          | 7    |
| Cap, veh/h                                    | 297  | 0        | 438  | 58   | 23       | 35          | 17   | 1807       | 3    | 133         | 1840       | 138  |
| Arrive On Green                               | 0.27 | 0.00     | 0.27 | 0.27 | 0.00     | 0.27        | 0.01 | 0.50       | 0.50 | 0.08        | 0.57       | 0.57 |
| Sat Flow, veh/h                               | 783  | 0        | 1596 | 0    | 85       | 128         | 1753 | 3581       | 7    | 1711        | 3214       | 241  |
| Grp Volume(v), veh/h                          | 277  | 0        | 14   | 10   | 0        | 0           | 10   | 718        | 755  | 105         | 268        | 276  |
| Grp Sat Flow(s),veh/h/ln                      | 783  | 0        | 1596 | 213  | 0        | 0           | 1753 | 1749       | 1839 | 1711        | 1706       | 1749 |
| Q Serve(g_s), s                               | 0.0  | 0.0      | 0.6  | 0.0  | 0.0      | 0.0         | 0.5  | 30.2       | 30.2 | 5.3         | 7.0        | 7.0  |
| Cycle Q Clear(g_c), s                         | 24.0 | 0.0      | 0.6  | 24.0 | 0.0      | 0.0         | 0.5  | 30.2       | 30.2 | 5.3         | 7.0        | 7.0  |
| Prop In Lane                                  | 1.00 |          | 1.00 | 0.40 |          | 0.60        | 1.00 |            | 0.00 | 1.00        |            | 0.14 |
| Lane Grp Cap(c), veh/h                        | 297  | 0        | 438  | 116  | 0        | 0           | 17   | 882        | 928  | 133         | 977        | 1001 |
| V/C Ratio(X)                                  | 0.93 | 0.00     | 0.03 | 0.09 | 0.00     | 0.00        | 0.58 | 0.81       | 0.81 | 0.79        | 0.27       | 0.28 |
| Avail Cap(c_a), veh/h                         | 297  | 0        | 438  | 116  | 0        | 0           | 482  | 882        | 928  | 470         | 977        | 1001 |
| HCM Platoon Ratio                             | 1.00 | 1.00     | 1.00 | 1.00 | 1.00     | 1.00        | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Upstream Filter(I)                            | 1.00 | 0.00     | 1.00 | 1.00 | 0.00     | 0.00        | 1.00 | 1.00       | 1.00 | 1.00        | 1.00       | 1.00 |
| Uniform Delay (d), s/veh                      | 34.4 | 0.0      | 23.2 | 25.6 | 0.0      | 0.0         | 43.1 | 20.1       | 20.0 | 39.6        | 9.5        | 9.5  |
| Incr Delay (d2), s/veh                        | 34.1 | 0.0      | 0.0  | 0.1  | 0.0      | 0.0         | 10.8 | 8.1        | 7.8  | 3.9         | 0.7        | 0.7  |
| Initial Q Delay(d3),s/veh                     | 0.0  | 0.0      | 0.0  | 0.0  | 0.0      | 0.0         | 0.0  | 24.1       | 21.7 | 0.0         | 0.0        | 0.0  |
| %ile BackOfQ(50%),veh/ln                      | 8.7  | 0.0      | 0.2  | 0.2  | 0.0      | 0.0         | 0.3  | 21.8       | 22.1 | 2.3         | 2.6        | 2.6  |
| Unsig. Movement Delay, s/veh                  |      |          |      |      |          |             |      |            |      |             |            |      |
| LnGrp Delay(d),s/veh                          | 68.5 | 0.0      | 23.2 | 25.8 | 0.0      | 0.0         | 53.9 | 52.3       | 49.5 | 43.5        | 10.2       | 10.2 |
| LnGrp LOS                                     | Е    | A        | С    | С    | Α        | Α           | D    | D          | D    | D           | В          | В    |
| Approach Vol, veh/h                           |      | 291      |      |      | 10       |             |      | 1483       |      |             | 649        |      |
| Approach Delay, s/veh                         |      | 66.3     |      |      | 25.8     |             |      | 50.9       |      |             | 15.6       |      |
| Approach LOS                                  |      | E        |      |      | C        |             |      | D          |      |             | В          |      |
|   | 1    | 2        |      | 4    |          | 6           |      | 8          |      |             |            |      |
| Timer - Assigned Phs Phs Duration (G+Y+Rc), s | 10.8 |          |      | •    | 5<br>4.9 |             |      | 28.0       |      |             |            |      |
| \ /'  | 4.0  | 48.6     |      | 28.0 | 4.9      | 54.5<br>4.5 |      | 4.0        |      |             |            |      |
| Change Period (Y+Rc), s                       |      | 4.5      |      | 4.0  |          |             |      |            |      |             |            |      |
| Max Green Setting (Gmax), s                   | 24.0 | 30.0     |      | 24.0 | 24.0     | 50.0        |      | 24.0       |      |             |            |      |
| Max Q Clear Time (g_c+l1), s                  | 7.3  | 32.2     |      | 26.0 | 2.5      | 9.0         |      | 26.0       |      |             |            |      |
| Green Ext Time (p_c), s                       | 0.1  | 0.0      |      | 0.0  | 0.0      | 2.3         |      | 0.0        |      |             |            |      |
| Intersection Summary                          |      |          |      |      |          |             |      |            |      |             |            |      |
| HCM 6th Ctrl Delay                            |      |          | 43.2 |      |          |             |      |            |      |             |            |      |
| HCM 6th LOS                                   |      |          | D    |      |          |             |      |            |      |             |            |      |
| Notes   |      |          |      |      |          |             |      |            |      |             |            |      |

User approved pedestrian interval to be less than phase max green.

|   | •     | <b>→</b>     | •                | •            | <b>←</b>     | •    | •           | <b>†</b>     | <b>/</b>    | <b>\</b> | ļ   | ∢   |
|---|-------|--------------|------------------|--------------|--------------|------|-------------|--------------|-------------|----------|-----|-----|
| Movement                                | EBL   | EBT          | EBR              | WBL          | WBT          | WBR  | NBL         | NBT          | NBR         | SBL      | SBT | SBR |
| Lane Configurations                     | 1,1   | <b>∱</b> }   | 7                | 77           | <b>↑</b> ↑   | 77   | 44          | <b>†</b>     | 77          |          |     |     |
| Traffic Volume (veh/h)                  | 253   | 842          | 295              | 1813         | 1147         | 2368 | 541         | 167          | 230         | 0        | 0   | 0   |
| Future Volume (veh/h)                   | 253   | 842          | 295              | 1813         | 1147         | 2368 | 541         | 167          | 230         | 0        | 0   | 0   |
| Initial Q (Qb), veh                     | 0     | 0            | 0                | 32           | 16           | 0    | 10          | 0            | 5           |          |     |     |
| Ped-Bike Adj(A_pbT)                     | 1.00  |              | 0.96             | 1.00         |              | 1.00 | 1.00        |              | 1.00        |          |     |     |
| Parking Bus, Adj                        | 1.00  | 1.00         | 1.00             | 1.00         | 1.00         | 1.00 | 1.00        | 1.00         | 1.00        |          |     |     |
| Work Zone On Approach                   |       | No           |                  |              | No           |      |             | No           |             |          |     |     |
| Adj Sat Flow, veh/h/ln                  | 1841  | 1841         | 1841             | 1870         | 1870         | 1870 | 1826        | 1826         | 1826        |          |     |     |
| Adj Flow Rate, veh/h                    | 256   | 851          | 114              | 1831         | 1483         | 1807 | 546         | 169          | 232         |          |     |     |
| Peak Hour Factor                        | 0.99  | 0.99         | 0.99             | 0.99         | 0.99         | 0.99 | 0.99        | 0.99         | 0.99        |          |     |     |
| Percent Heavy Veh, %                    | 4     | 4            | 4                | 2            | 2            | 2    | 5           | 5            | 5           |          |     |     |
| Cap, veh/h                              | 247   | 976          | 398              | 1388         | 2258         | 1881 | 683         | 390          | 1650        |          |     |     |
| Arrive On Green                         | 0.07  | 0.27         | 0.27             | 0.41         | 0.61         | 0.61 | 0.20        | 0.20         | 0.20        |          |     |     |
| Sat Flow, veh/h                         | 3506  | 3681         | 1503             | 3563         | 3741         | 3170 | 3374        | 1826         | 2723        |          |     |     |
| Grp Volume(v), veh/h                    | 256   | 851          | 114              | 1831         | 1483         | 1807 | 546         | 169          | 232         |          |     |     |
| Grp Sat Flow(s), veh/h/ln               | 1753  | 1841         | 1503             | 1781         | 1870         | 1585 | 1687        | 1826         | 1362        |          |     |     |
| Q Serve(g_s), s                         | 7.4   | 22.2         | 6.1              | 41.5         | 26.2         | 52.9 | 15.7        | 8.3          | 3.7         |          |     |     |
| Cycle Q Clear(g_c), s                   | 7.4   | 22.2         | 6.1              | 41.5         | 26.2         | 52.9 | 15.7        | 8.3          | 3.7         |          |     |     |
| Prop In Lane                            | 1.00  | 22.2         | 1.00             | 1.00         | 20.2         | 1.00 | 1.00        | 0.5          | 1.00        |          |     |     |
| Lane Grp Cap(c), veh/h                  | 247   | 976          | 398              | 1388         | 2258         | 1881 | 683         | 390          | 1650        |          |     |     |
| V/C Ratio(X)                            | 1.04  | 0.87         | 0.29             | 1.32         | 0.66         | 0.96 | 0.80        | 0.43         | 0.14        |          |     |     |
|   | 259   | 999          | 408              | 1459         | 2270         | 1924 | 832         | 450          | 1787        |          |     |     |
| Avail Cap(c_a), veh/h HCM Platoon Ratio | 1.00  | 1.00         | 1.00             | 1.00         | 1.00         | 1.00 | 1.00        | 1.00         | 1.00        |          |     |     |
|   |       |              | 1.00             |              |              | 1.00 | 1.00        |              |             |          |     |     |
| Upstream Filter(I)                      | 1.00  | 1.00<br>36.4 |                  | 1.00<br>32.5 | 1.00<br>13.9 | 20.0 |             | 1.00<br>35.3 | 1.00<br>8.8 |          |     |     |
| Uniform Delay (d), s/veh                | 49.5  |              | 30.3             |              |              |      | 39.3        |              |             |          |     |     |
| Incr Delay (d2), s/veh                  | 66.5  | 8.7          | 0.6              | 148.7        | 0.8          | 12.6 | 3.7         | 0.3          | 0.0         |          |     |     |
| Initial Q Delay(d3),s/veh               | 0.0   | 0.0          | 0.0              | 83.0         | 1.1          | 0.0  | 7.7         | 0.0          | 0.1         |          |     |     |
| %ile BackOfQ(50%),veh/ln                | 5.6   | 11.4         | 2.3              | 62.2         | 12.3         | 22.3 | 8.2         | 3.7          | 0.5         |          |     |     |
| Unsig. Movement Delay, s/veh            |       | 45.4         | 00.0             | 0040         | 45.7         | 00.0 | <b>50.7</b> | 05.0         | 0.0         |          |     |     |
| LnGrp Delay(d),s/veh                    | 116.0 | 45.1         | 30.9             | 264.2        | 15.7         | 32.6 | 50.7        | 35.6         | 8.9         |          |     |     |
| LnGrp LOS                               | F     | D            | С                | F            | В            | С    | D           | D            | Α           |          |     |     |
| Approach Vol, veh/h                     |       | 1221         |                  |              | 5121         |      |             | 947          |             |          |     |     |
| Approach Delay, s/veh                   |       | 58.6         |                  |              | 110.5        |      |             | 37.8         |             |          |     |     |
| Approach LOS                            |       | Е            |                  |              | F            |      |             | D            |             |          |     |     |
| Timer - Assigned Phs                    | 1     | 2            |                  | 4            | 5            | 6    |             |              |             |          |     |     |
| Phs Duration (G+Y+Rc), s                | 45.0  | 32.5         |                  | 23.9         | 11.0         | 66.5 |             |              |             |          |     |     |
| Change Period (Y+Rc), s                 | 3.5   | 5.0          |                  | 4.0          | 3.5          | 5.0  |             |              |             |          |     |     |
| Max Green Setting (Gmax), s             | 41.5  | 27.5         |                  | 25.0         | 7.5          | 61.5 |             |              |             |          |     |     |
| Max Q Clear Time (g_c+l1), s            | 43.5  | 24.2         |                  | 17.7         | 9.4          | 54.9 |             |              |             |          |     |     |
| Green Ext Time (p_c), s                 | 0.0   | 2.4          |                  | 2.2          | 0.0          | 6.6  |             |              |             |          |     |     |
| Intersection Summary                    |       |              |                  |              |              |      |             |              |             |          |     |     |
| HCM 6th Ctrl Delay                      |       |              | 92.4             |              |              |      |             |              |             |          |     |     |
| HCM 6th LOS                             |       |              | 52. <del>4</del> |              |              |      |             |              |             |          |     |     |
| Notes                                   |       |              |                  |              |              |      |             |              |             |          |     |     |

User approved volume balancing among the lanes for turning movement.

|   | ۶         | <b>→</b>    | •        | •         | <b>—</b>     | •       | 4        | <b>†</b> | ~        | <b>/</b> | <b>+</b> |           |
|---|-----------|-------------|----------|-----------|--------------|---------|----------|----------|----------|----------|----------|-----------|
| Movement                                      | EBL       | EBT         | EBR      | WBL       | WBT          | WBR     | NBL      | NBT      | NBR      | SBL      | SBT      | SBR       |
| Lane Configurations                           | ሻሻ        | <b>∱</b> β  |          | 7         | <b>↑</b> ↑₽  |         | ሻ        | ₽        |          |          | 4        | 77        |
| Traffic Volume (veh/h)                        | 236       | 1023        | 30       | 7         | 2921         | 41      | 150      | 1        | 18       | 27       | 10       | 274       |
| Future Volume (veh/h)                         | 236       | 1023        | 30       | 7         | 2921         | 41      | 150      | 1        | 18       | 27       | 10       | 274       |
| Initial Q (Qb), veh                           | 0         | 32          | 0        | 0         | 140          | 0       | 0        | 0        | 0        | 0        | 0        | 0         |
| Ped-Bike Adj(A_pbT)                           | 1.00      | 4.00        | 0.96     | 1.00      | 4.00         | 0.99    | 1.00     | 4.00     | 0.96     | 1.00     | 4.00     | 1.00      |
| Parking Bus, Adj                              | 1.00      | 1.00        | 1.00     | 1.00      | 1.00         | 1.00    | 1.00     | 1.00     | 1.00     | 1.00     | 1.00     | 1.00      |
| Work Zone On Approach                         | 4070      | No          | 4070     | 4070      | No           | 4070    | 4044     | No       | 4044     | 4070     | No       | 4070      |
| Adj Sat Flow, veh/h/ln                        | 1678      | 1678        | 1678     | 1870      | 1870         | 1870    | 1841     | 1841     | 1841     | 1870     | 1870     | 1870      |
| Adj Flow Rate, veh/h                          | 238       | 1033        | 29       | 7         | 2951         | 40      | 152      | 1        | 1        | 27       | 10       | 0         |
| Peak Hour Factor                              | 0.99      | 0.99        | 0.99     | 0.99      | 0.99         | 0.99    | 0.99     | 0.99     | 0.99     | 0.99     | 0.99     | 0.99      |
| Percent Heavy Veh, %                          | 15<br>199 | 15<br>2257  | 15<br>59 | 2<br>15   | 2<br>3431    | 2<br>25 | 4<br>225 | 4<br>106 | 4<br>106 | 2<br>43  | 2<br>16  | 2<br>91   |
| Cap, veh/h<br>Arrive On Green                 | 0.06      | 0.71        | 0.71     | 0.01      | 0.66         | 0.66    | 0.13     | 0.13     | 0.13     | 0.03     | 0.03     | 0.00      |
| Sat Flow, veh/h                               | 3100      | 3162        | 89       | 1781      | 5191         | 70      | 1753     | 824      | 824      | 1317     | 488      | 2790      |
|   | 238       |             | 541      |           |              | 1061    | 152      |          | 2        | 37       | 0        |           |
| Grp Volume(v), veh/h Grp Sat Flow(s),veh/h/ln | 1550      | 521<br>1594 | 1657     | 7<br>1781 | 1930<br>1702 | 1857    | 1753     | 0        | 1647     | 1805     | 0        | 0<br>1395 |
|   | 9.0       | 19.6        | 19.6     | 0.5       | 63.0         | 64.1    | 11.6     | 0.0      | 0.1      | 2.8      | 0.0      | 0.0       |
| Q Serve(g_s), s<br>Cycle Q Clear(g_c), s      | 9.0       | 19.6        | 19.6     | 0.5       | 63.0         | 64.1    | 11.6     | 0.0      | 0.1      | 2.8      | 0.0      | 0.0       |
| Prop In Lane                                  | 1.00      | 19.0        | 0.05     | 1.00      | 03.0         | 0.04    | 1.00     | 0.0      | 0.50     | 0.73     | 0.0      | 1.00      |
| Lane Grp Cap(c), veh/h                        | 199       | 1135        | 1181     | 1.00      | 2234         | 1222    | 225      | 0        | 211      | 59       | 0        | 91        |
| V/C Ratio(X)                                  | 1.19      | 0.46        | 0.46     | 0.46      | 0.86         | 0.87    | 0.68     | 0.00     | 0.01     | 0.63     | 0.00     | 0.00      |
| Avail Cap(c_a), veh/h                         | 199       | 1135        | 1180     | 64        | 2234         | 1218    | 338      | 0.00     | 318      | 77       | 0.00     | 120       |
| HCM Platoon Ratio                             | 1.00      | 1.00        | 1.00     | 1.00      | 1.00         | 1.00    | 1.00     | 1.00     | 1.00     | 1.00     | 1.00     | 1.00      |
| Upstream Filter(I)                            | 0.43      | 0.43        | 0.43     | 1.00      | 1.00         | 1.00    | 1.00     | 0.00     | 1.00     | 1.00     | 0.00     | 0.00      |
| Uniform Delay (d), s/veh                      | 65.5      | 9.8         | 9.8      | 69.1      | 24.1         | 24.1    | 58.2     | 0.0      | 53.3     | 66.9     | 0.0      | 0.0       |
| Incr Delay (d2), s/veh                        | 107.0     | 0.6         | 0.6      | 7.9       | 4.8          | 8.5     | 1.3      | 0.0      | 0.0      | 4.0      | 0.0      | 0.0       |
| Initial Q Delay(d3),s/veh                     | 0.0       | 2.6         | 2.4      | 0.0       | 89.3         | 77.9    | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0       |
| %ile BackOfQ(50%),veh/ln                      | 6.5       | 10.0        | 10.2     | 0.3       | 62.6         | 65.9    | 5.3      | 0.0      | 0.1      | 1.4      | 0.0      | 0.0       |
| Unsig. Movement Delay, s/veh                  |           |             |          |           | 0_10         |         |          |          |          |          |          |           |
| LnGrp Delay(d),s/veh                          | 172.5     | 13.0        | 12.8     | 77.0      | 118.1        | 110.4   | 59.6     | 0.0      | 53.3     | 70.9     | 0.0      | 0.0       |
| LnGrp LOS                                     | F         | В           | В        | Е         | F            | F       | Е        | Α        | D        | Е        | Α        | Α         |
| Approach Vol, veh/h                           |           | 1300        |          |           | 2998         |         |          | 154      |          |          | 37       |           |
| Approach Delay, s/veh                         |           | 42.1        |          |           | 115.3        |         |          | 59.5     |          |          | 70.9     |           |
| Approach LOS                                  |           | D           |          |           | F            |         |          | Е        |          |          | E        |           |
| Timer - Assigned Phs                          | 1         | 2           |          | 4         | 5            | 6       |          | 8        |          |          |          |           |
| Phs Duration (G+Y+Rc), s                      | 13.0      | 96.5        |          | 22.0      | 5.2          | 104.3   |          | 8.6      |          |          |          |           |
| Change Period (Y+Rc), s                       | 4.0       | 4.6         |          | 4.0       | 4.0          | 4.6     |          | 4.0      |          |          |          |           |
| Max Green Setting (Gmax), s                   | 9.0       | 81.4        |          | 27.0      | 5.0          | 85.4    |          | 6.0      |          |          |          |           |
| Max Q Clear Time (g_c+l1), s                  | 11.0      | 66.1        |          | 13.6      | 2.5          | 21.6    |          | 4.8      |          |          |          |           |
| Green Ext Time (p_c), s                       | 0.0       | 14.2        |          | 0.3       | 0.0          | 8.4     |          | 0.0      |          |          |          |           |
| Intersection Summary                          |           |             |          |           |              |         |          |          |          |          |          |           |
| HCM 6th Ctrl Delay                            |           |             | 91.8     |           |              |         |          |          |          |          |          |           |
| HCM 6th LOS                                   |           |             | F        |           |              |         |          |          |          |          |          |           |

|                              | •    | <b>→</b>  | •    | •     | <b>←</b>   | •    | 4    | <b>†</b>  | /    | <b>&gt;</b> | ļ         | 4    |
|------------------------------|------|-----------|------|-------|------------|------|------|-----------|------|-------------|-----------|------|
| Movement                     | EBL  | EBT       | EBR  | WBL   | WBT        | WBR  | NBL  | NBT       | NBR  | SBL         | SBT       | SBR  |
| Lane Configurations          | ň    | ተተኈ       |      | 14.54 | <b>∱</b> } |      | Ť    | <b></b>   | 77   | 1,1         | <b>^</b>  | 7    |
| Traffic Volume (veh/h)       | 118  | 405       | 40   | 273   | 1065       | 350  | 68   | 285       | 369  | 616         | 636       | 521  |
| Future Volume (veh/h)        | 118  | 405       | 40   | 273   | 1065       | 350  | 68   | 285       | 369  | 616         | 636       | 521  |
| Initial Q (Qb), veh          | 0    | 0         | 0    | 0     | 10         | 0    | 0    | 0         | 32   | 0           | 36        | 18   |
| Ped-Bike Adj(A_pbT)          | 1.00 |           | 0.98 | 1.00  |            | 0.98 | 1.00 |           | 1.00 | 1.00        |           | 0.96 |
| Parking Bus, Adj             | 1.00 | 1.00      | 1.00 | 1.00  | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 | 1.00        | 1.00      | 1.00 |
| Work Zone On Approach        |      | No        |      |       | No         |      |      | No        |      |             | No        |      |
| Adj Sat Flow, veh/h/ln       | 1870 | 1870      | 1870 | 1885  | 1885       | 1885 | 1870 | 1870      | 1870 | 1870        | 1870      | 1870 |
| Adj Flow Rate, veh/h         | 119  | 409       | 29   | 276   | 1076       | 325  | 69   | 288       | 373  | 622         | 642       | 351  |
| Peak Hour Factor             | 0.99 | 0.99      | 0.99 | 0.99  | 0.99       | 0.99 | 0.99 | 0.99      | 0.99 | 0.99        | 0.99      | 0.99 |
| Percent Heavy Veh, %         | 2    | 2         | 2    | 1     | 1          | 1    | 2    | 2         | 2    | 2           | 2         | 2    |
| Cap, veh/h                   | 149  | 1725      | 121  | 387   | 1268       | 112  | 114  | 435       | 862  | 582         | 1142      | 504  |
| Arrive On Green              | 0.08 | 0.35      | 0.35 | 0.11  | 0.38       | 0.38 | 0.06 | 0.18      | 0.18 | 0.18        | 0.31      | 0.31 |
| Sat Flow, veh/h              | 1781 | 4864      | 340  | 3483  | 2703       | 807  | 1781 | 1870      | 2790 | 3456        | 3554      | 1529 |
| Grp Volume(v), veh/h         | 119  | 285       | 153  | 276   | 709        | 692  | 69   | 288       | 373  | 622         | 642       | 351  |
| Grp Sat Flow(s),veh/h/ln     | 1781 | 1702      | 1800 | 1742  | 1791       | 1719 | 1781 | 1870      | 1395 | 1728        | 1777      | 1529 |
| Q Serve(g_s), s              | 7.2  | 6.5       | 6.6  | 8.4   | 42.0       | 42.0 | 4.1  | 16.4      | 0.0  | 19.7        | 16.8      | 17.3 |
| Cycle Q Clear(g_c), s        | 7.2  | 6.5       | 6.6  | 8.4   | 42.0       | 42.0 | 4.1  | 16.4      | 0.0  | 19.7        | 16.8      | 17.3 |
| Prop In Lane                 | 1.00 | 0.0       | 0.19 | 1.00  | 12.0       | 0.47 | 1.00 | 10.1      | 1.00 | 1.00        | 10.0      | 1.00 |
| Lane Grp Cap(c), veh/h       | 149  | 1207      | 638  | 387   | 684        | 697  | 114  | 435       | 862  | 582         | 1142      | 504  |
| V/C Ratio(X)                 | 0.80 | 0.24      | 0.24 | 0.71  | 1.04       | 0.99 | 0.61 | 0.66      | 0.43 | 1.07        | 0.56      | 0.70 |
| Avail Cap(c_a), veh/h        | 162  | 1207      | 638  | 412   | 684        | 657  | 130  | 493       | 1046 | 619         | 1090      | 469  |
| HCM Platoon Ratio            | 1.00 | 1.00      | 1.00 | 1.00  | 1.00       | 1.00 | 1.00 | 1.00      | 1.00 | 1.00        | 1.00      | 1.00 |
| Upstream Filter(I)           | 1.00 | 1.00      | 1.00 | 0.21  | 0.21       | 0.21 | 1.00 | 1.00      | 1.00 | 1.00        | 1.00      | 1.00 |
| Uniform Delay (d), s/veh     | 49.5 | 25.0      | 25.0 | 47.2  | 34.0       | 34.0 | 50.1 | 38.4      | 32.2 | 45.7        | 32.7      | 21.3 |
| Incr Delay (d2), s/veh       | 19.8 | 0.5       | 0.9  | 0.9   | 26.2       | 14.2 | 3.4  | 7.7       | 1.6  | 57.3        | 2.0       | 7.8  |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0       | 0.0  | 0.0   | 26.3       | 23.0 | 0.0  | 0.0       | 17.5 | 0.0         | 16.4      | 30.3 |
| %ile BackOfQ(50%),veh/ln     | 4.1  | 2.7       | 3.0  | 3.6   | 27.2       | 24.7 | 1.9  | 7.8       | 7.3  | 12.4        | 12.1      | 13.5 |
| Unsig. Movement Delay, s/veh |      | 2.1       | 0.0  | 0.0   | 21.2       | 21.1 | 1.0  | 7.0       | 1.0  | 12.1        | 12.1      | 10.0 |
| LnGrp Delay(d),s/veh         | 69.3 | 25.5      | 25.9 | 48.1  | 86.6       | 71.2 | 53.5 | 46.1      | 51.3 | 103.1       | 51.0      | 59.4 |
| LnGrp LOS                    | E    | C         | C    | D     | F          | F    | D    | D         | D    | F           | D         | E    |
| Approach Vol, veh/h          |      | 557       |      |       | 1677       |      |      | 730       |      | '           | 1615      |      |
| Approach Delay, s/veh        |      | 35.0      |      |       | 73.9       |      |      | 49.4      |      |             | 72.9      |      |
| Approach LOS                 |      | 00.0<br>C |      |       | 7 J. 9     |      |      | 43.4<br>D |      |             | 12.5<br>E |      |
| Approach LOS                 |      | C         |      |       |            |      |      | D         |      |             |           |      |
| Timer - Assigned Phs         | 1    | 2         | 3    | 4     | 5          | 6    | 7    | 8         |      |             |           |      |
| Phs Duration (G+Y+Rc), s     | 11.0 | 38.7      | 13.2 | 47.0  | 24.7       | 25.1 | 16.2 | 44.0      |      |             |           |      |
| Change Period (Y+Rc), s      | 4.0  | 5.0       | 4.0  | 5.0   | 5.0        | * 5  | 4.0  | 5.0       |      |             |           |      |
| Max Green Setting (Gmax), s  | 8.0  | 32.0      | 10.0 | 42.0  | 11.0       | * 29 | 13.0 | 39.0      |      |             |           |      |
| Max Q Clear Time (g_c+l1), s | 6.1  | 19.3      | 9.2  | 44.0  | 21.7       | 18.4 | 10.4 | 8.6       |      |             |           |      |
| Green Ext Time (p_c), s      | 0.0  | 3.2       | 0.0  | 0.0   | 0.0        | 1.7  | 0.2  | 1.9       |      |             |           |      |
| Intersection Summary         |      |           |      |       |            |      |      |           |      |             |           |      |
| HCM 6th Ctrl Delay           |      |           | 64.9 |       |            |      |      |           |      |             |           |      |
| HCM 6th LOS                  |      |           | E    |       |            |      |      |           |      |             |           |      |
| Notes                        |      |           |      |       |            |      |      |           |      |             |           |      |

<sup>\*</sup> HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

|   | ۶            | <b>→</b> | •           | •           | <b>←</b> | •         | 1            | <b>†</b>  | <b>/</b> | <b>/</b>     | <b>+</b>     |          |
|---|--------------|----------|-------------|-------------|----------|-----------|--------------|-----------|----------|--------------|--------------|----------|
| Movement                                    | EBL          | EBT      | EBR         | WBL         | WBT      | WBR       | NBL          | NBT       | NBR      | SBL          | SBT          | SBR      |
| Lane Configurations                         | ሻሻ           | ₽        |             |             | 4        |           | ሻ            | <b>₽</b>  |          |              | <b>+</b>     | 77       |
| Traffic Volume (veh/h)                      | 683          | 2        | 75          | 2           | 0        | 3         | 63           | 252       | 3        | 0            | 130          | 1978     |
| Future Volume (veh/h)                       | 683          | 2        | 75          | 2           | 0        | 3         | 63           | 252       | 3        | 0            | 130          | 1978     |
| Initial Q (Qb), veh                         | 0            | 0        | 0           | 0           | 0        | 0         | 12           | 12        | 0        | 0            | 0            | 24       |
| Ped-Bike Adj(A_pbT)                         | 1.00         | 4.00     | 1.00        | 1.00        |          | 1.00      | 1.00         | 4.00      | 0.96     | 1.00         | 4.00         | 1.00     |
| Parking Bus, Adj                            | 1.00         | 1.00     | 1.00        | 1.00        | 1.00     | 1.00      | 1.00         | 1.00      | 1.00     | 1.00         | 1.00         | 1.00     |
| Work Zone On Approach                       | 1011         | No       | 4044        | 4000        | No       | 4000      | 4044         | No        | 4044     | •            | No           | 4050     |
| Adj Sat Flow, veh/h/ln                      | 1841         | 1841     | 1841        | 1900        | 1900     | 1900      | 1841         | 1841      | 1841     | 0            | 1856         | 1856     |
| Adj Flow Rate, veh/h                        | 690          | 2        | 25          | 2           | 0        | 0         | 64           | 255       | 3        | 0            | 131          | 1624     |
| Peak Hour Factor                            | 0.99         | 0.99     | 0.99        | 0.99        | 0.99     | 0.99      | 0.99         | 0.99      | 0.99     | 0.99         | 0.99         | 0.99     |
| Percent Heavy Veh, %                        | 4            | 4        | 4           | 0           | 0        | 0         | 4            | 4         | 4        | 0            | 3            | 3        |
| Cap, veh/h                                  | 815          | 28       | 350         | 4           | 0        | 0         | 112          | 1170      | 13       | 0            | 1023         | 2156     |
| Arrive On Green                             | 0.25         | 0.25     | 0.25        | 0.00        | 0.00     | 0.00      | 0.05         | 0.61      | 0.61     | 0.00         | 0.52         | 0.52     |
| Sat Flow, veh/h                             | 3401         | 117      | 1461        | 1809        | 0        | 0         | 1753         | 1814      | 21       | 0            | 1856         | 2768     |
| Grp Volume(v), veh/h                        | 690          | 0        | 27          | 2           | 0        | 0         | 64           | 0         | 258      | 0            | 131          | 1624     |
| Grp Sat Flow(s),veh/h/ln                    | 1700         | 0        | 1578        | 1810        | 0        | 0         | 1753         | 0         | 1836     | 0            | 1856         | 1384     |
| Q Serve(g_s), s                             | 13.3         | 0.0      | 0.9         | 0.1         | 0.0      | 0.0       | 2.5          | 0.0       | 4.4      | 0.0          | 2.5          | 22.5     |
| Cycle Q Clear(g_c), s                       | 13.3         | 0.0      | 0.9         | 0.1         | 0.0      | 0.0       | 2.5          | 0.0       | 4.4      | 0.0          | 2.5          | 22.5     |
| Prop In Lane                                | 1.00         | ^        | 0.93        | 1.00        | ^        | 0.00      | 1.00         | 0         | 0.01     | 0.00         | 4000         | 1.00     |
| Lane Grp Cap(c), veh/h                      | 815          | 0        | 378         | 4           | 0        | 0         | 112          | 0         | 1132     | 0            | 1023         | 2156     |
| V/C Ratio(X)                                | 0.85         | 0.00     | 0.07        | 0.51        | 0.00     | 0.00      | 0.57         | 0.00      | 0.23     | 0.00         | 0.13         | 0.75     |
| Avail Cap(c_a), veh/h                       | 1416         | 1.00     | 657<br>1.00 | 104<br>1.00 | 1.00     | 0<br>1.00 | 176          | 0<br>1.00 | 1977     | 1.00         | 1732<br>1.00 | 3270     |
| HCM Platoon Ratio                           | 1.00<br>1.00 | 1.00     | 1.00        | 1.00        | 0.00     | 0.00      | 1.00<br>1.00 | 0.00      | 1.00     | 1.00<br>0.00 | 1.00         | 1.00     |
| Upstream Filter(I) Uniform Delay (d), s/veh | 31.2         | 0.00     | 25.3        | 42.6        | 0.00     | 0.00      | 51.3         | 0.00      | 6.6      | 0.00         | 9.0          | 4.9      |
| Incr Delay (d2), s/veh                      | 1.0          | 0.0      | 0.0         | 76.4        | 0.0      | 0.0       | 4.5          | 0.0       | 0.0      | 0.0          | 0.1          | 0.5      |
| Initial Q Delay(d3),s/veh                   | 0.0          | 0.0      | 0.0         | 0.0         | 0.0      | 0.0       | 192.8        | 0.0       | 1.0      | 0.0          | 0.0          | 3.6      |
| %ile BackOfQ(50%),veh/ln                    | 6.7          | 0.0      | 0.0         | 0.0         | 0.0      | 0.0       | 9.2          | 0.0       | 3.0      | 0.0          | 1.1          | 16.5     |
| Unsig. Movement Delay, s/veh                |              | 0.0      | 0.4         | 0.1         | 0.0      | 0.0       | 3.2          | 0.0       | 3.0      | 0.0          | 1.1          | 10.5     |
| LnGrp Delay(d),s/veh                        | 32.2         | 0.0      | 25.4        | 119.0       | 0.0      | 0.0       | 248.6        | 0.0       | 7.7      | 0.0          | 9.0          | 9.0      |
| LnGrp LOS                                   | 02.2<br>C    | Α        | 23.4<br>C   | F           | Α        | Α         | 240.0<br>F   | Α         | Α        | Α            | J.0          | 3.0<br>A |
| Approach Vol, veh/h                         |              | 717      |             | <u> </u>    | 2        |           | <u> </u>     | 322       |          |              | 1755         |          |
| Approach Delay, s/veh                       |              | 31.9     |             |             | 119.0    |           |              | 55.6      |          |              | 9.0          |          |
| Approach LOS                                |              | C C      |             |             | F        |           |              | 55.6<br>E |          |              | Α            |          |
|   |              |          |             |             |          |           |              |           |          |              | ,,           |          |
| Timer - Assigned Phs                        | 1            | 2        |             | 4           |          | 6         |              | 8         |          |              |              |          |
| Phs Duration (G+Y+Rc), s                    | 6.2          | 40.0     |             | 3.2         |          | 46.2      |              | 20.3      |          |              |              |          |
| Change Period (Y+Rc), s                     | 3.0          | 3.5      |             | 3.0         |          | 3.5       |              | 3.0       |          |              |              |          |
| Max Green Setting (Gmax), s                 | 7.0          | 65.0     |             | 4.0         |          | 75.0      |              | 29.0      |          |              |              |          |
| Max Q Clear Time (g_c+l1), s                | 4.5          | 24.5     |             | 2.1         |          | 6.4       |              | 15.3      |          |              |              |          |
| Green Ext Time (p_c), s                     | 0.0          | 11.9     |             | 0.0         |          | 8.0       |              | 2.0       |          |              |              |          |
| Intersection Summary                        |              |          |             |             |          |           |              |           |          |              |              |          |
| HCM 6th Ctrl Delay                          |              |          | 20.3        |             |          |           |              |           |          |              |              |          |
| HCM 6th LOS                                 |              |          | С           |             |          |           |              |           |          |              |              |          |

|                                 | ۶         | <b>→</b>   | $\rightarrow$ | •     | <b>←</b>   | •          | •       | <b>†</b> | <b>/</b> | <b>&gt;</b> | ļ        | 1    |
|---------------------------------|-----------|------------|---------------|-------|------------|------------|---------|----------|----------|-------------|----------|------|
| Movement                        | EBL       | EBT        | EBR           | WBL   | WBT        | WBR        | NBL     | NBT      | NBR      | SBL         | SBT      | SBR  |
| Lane Configurations             | *         | <b>f</b> a |               | 777   | <b>†</b>   | 7          | ሻ       | <b>^</b> | 7        | ሻሻ          | <b>^</b> | 7    |
| Traffic Volume (vph)            | 160       | 193        | 85            | 1404  | 491        | 747        | 64      | 482      | 166      | 656         | 447      | 138  |
| Future Volume (vph)             | 160       | 193        | 85            | 1404  | 491        | 747        | 64      | 482      | 166      | 656         | 447      | 138  |
| Ideal Flow (vphpl)              | 1900      | 1900       | 1900          | 1900  | 1900       | 1900       | 1900    | 1900     | 1900     | 1900        | 1900     | 1900 |
| Total Lost time (s)             | 4.0       | 4.0        |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      | 4.9      | 4.9         | 4.9      | 4.9  |
| Lane Util. Factor               | 1.00      | 1.00       |               | 0.97  | 1.00       | 1.00       | 1.00    | 0.95     | 1.00     | 0.97        | 0.95     | 1.00 |
| Frpb, ped/bikes                 | 1.00      | 0.97       |               | 1.00  | 1.00       | 0.98       | 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    | 1.00     | 1.00     | 1.00        | 1.00     | 1.00 |
| Frt                             | 1.00      | 0.95       |               | 1.00  | 1.00       | 0.85       | 1.00    | 1.00     | 0.85     | 1.00        | 1.00     | 0.85 |
| Flt Protected                   | 0.95      | 1.00       |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00     | 0.95        | 1.00     | 1.00 |
| Satd. Flow (prot)               | 1608      | 1559       |               | 3060  | 1660       | 1388       | 1547    | 3094     | 1384     | 3001        | 3094     | 1333 |
| Flt Permitted                   | 0.95      | 1.00       |               | 0.95  | 1.00       | 1.00       | 0.95    | 1.00     | 1.00     | 0.95        | 1.00     | 1.00 |
| Satd. Flow (perm)               | 1608      | 1559       |               | 3060  | 1660       | 1388       | 1547    | 3094     | 1384     | 3001        | 3094     | 1333 |
| 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)                 | 162       | 195        | 86            | 1418  | 496        | 755        | 65      | 487      | 168      | 663         | 452      | 139  |
| RTOR Reduction (vph)            | 0         | 14         | 0             | 0     | 0          | 388        | 0       | 0        | 0        | 0           | 0        | 110  |
| Lane Group Flow (vph)           | 162       | 267        | 0             | 1418  | 496        | 367        | 65      | 487      | 168      | 663         | 452      | 29   |
| Confl. Peds. (#/hr)             |           |            | 74            |       |            |            |         |          |          |             |          | 5    |
| Confl. Bikes (#/hr)             |           |            | 2             |       |            | 6          |         |          | 4        |             |          |      |
| Heavy Vehicles (%)              | 1%        | 1%         | 1%            | 3%    | 3%         | 3%         | 5%      | 5%       | 5%       | 5%          | 5%       | 5%   |
| Turn Type                       | Split     | NA         |               | Split | NA         | Perm       | Split   | NA       | custom   | Split       | NA       | Perm |
| Protected Phases                | 4         | 4          |               | 7     | 7          |            | 6       | 6        | 267!     | 2!          | 2        |      |
| Permitted Phases                |           |            |               |       |            | 7          |         |          |          |             |          | 2    |
| Actuated Green, G (s)           | 23.7      | 23.7       |               | 37.1  | 37.1       | 37.1       | 15.1    | 15.1     | 87.4     | 25.4        | 25.4     | 25.4 |
| Effective Green, g (s)          | 23.7      | 23.7       |               | 37.1  | 37.1       | 37.1       | 15.1    | 15.1     | 87.4     | 25.4        | 25.4     | 25.4 |
| Actuated g/C Ratio              | 0.20      | 0.20       |               | 0.31  | 0.31       | 0.31       | 0.13    | 0.13     | 0.73     | 0.21        | 0.21     | 0.21 |
| Clearance Time (s)              | 4.0       | 4.0        |               | 4.9   | 4.9        | 4.9        | 4.9     | 4.9      |          | 4.9         | 4.9      | 4.9  |
| Vehicle Extension (s)           | 3.0       | 3.0        |               | 3.0   | 3.0        | 3.0        | 2.5     | 2.5      |          | 2.0         | 2.0      | 2.0  |
| Lane Grp Cap (vph)              | 317       | 307        |               | 946   | 513        | 429        | 194     | 389      | 1008     | 635         | 654      | 282  |
| v/s Ratio Prot                  | 0.10      | c0.17      |               | c0.46 | 0.30       |            | 0.04    | c0.16    | 0.12     | c0.22       | 0.15     |      |
| v/s Ratio Perm                  |           |            |               |       |            | 0.26       |         |          |          |             |          | 0.02 |
| v/c Ratio                       | 0.51      | 0.87       |               | 1.50  | 0.97       | 0.85       | 0.34    | 1.25     | 0.17     | 1.04        | 0.69     | 0.10 |
| Uniform Delay, d1               | 43.0      | 46.7       |               | 41.5  | 40.8       | 38.9       | 47.9    | 52.5     | 5.0      | 47.3        | 43.7     | 38.1 |
| 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           | 1.4       | 22.6       |               | 230.1 | 31.1       | 15.2       | 0.7     | 133.0    | 0.1      | 47.7        | 5.9      | 0.7  |
| Delay (s)                       | 44.4      | 69.2       |               | 271.6 | 71.9       | 54.2       | 48.6    | 185.4    | 5.1      | 95.0        | 49.6     | 38.9 |
| Level of Service                | D         | E          |               | F     | Е          | D          | D       | F        | Α        | F           | D        | D    |
| Approach Delay (s)              |           | 60.1       |               |       | 173.0      |            |         | 131.0    |          |             | 72.4     |      |
| Approach LOS                    |           | Е          |               |       | F          |            |         | F        |          |             | Е        |      |
| Intersection Summary            |           |            |               |       |            |            |         |          |          |             |          |      |
| HCM 2000 Control Delay          |           |            | 132.4         | Н     | CM 2000    | Level of S | Service |          | F        |             |          |      |
| HCM 2000 Volume to Capaci       | ity ratio |            | 1.20          |       |            |            |         |          |          |             |          |      |
| Actuated Cycle Length (s)       |           |            | 120.0         |       | um of lost |            |         |          | 18.7     |             |          |      |
| Intersection Capacity Utilizati | ion       |            | 117.1%        | IC    | U Level    | of Service |         |          | Н        |             |          |      |
| Analysis Period (min)           |           |            | 15            |       |            |            |         |          |          |             |          |      |
| ! Phase conflict between la     | ne groups | i.         |               |       |            |            |         |          |          |             |          |      |
| c Critical Lane Group           |           |            |               |       |            |            |         |          |          |             |          |      |

|                              | •           | -        | •          | •    | -          | <b>√</b>      |     |      |
|------------------------------|-------------|----------|------------|------|------------|---------------|-----|------|
| Movement                     | EBL         | EBT      | WBT        | WBR  | SBL        | SBR           |     |      |
| Lane Configurations          | ች           | <b>^</b> | <b>†</b> † | WER  | ሻ          | Ť             |     |      |
| Traffic Volume (vph)         | 66          | 949      | 3658       | 116  | 30         | 75            |     |      |
| Future Volume (vph)          | 66          | 949      | 3658       | 116  | 30         | 75            |     |      |
| Ideal Flow (vphpl)           | 1900        | 1900     | 1900       | 1900 | 1900       | 1900          |     |      |
| Total Lost time (s)          | 4.0         | 4.9      | 4.9        | 1000 | 4.2        | 4.2           |     |      |
| Lane Util. Factor            | 1.00        | 0.91     | 0.91       |      | 1.00       | 1.00          |     |      |
| Frpb, ped/bikes              | 1.00        | 1.00     | 1.00       |      | 1.00       | 1.00          |     |      |
| Flpb, ped/bikes              | 1.00        | 1.00     | 1.00       |      | 1.00       | 1.00          |     |      |
| Frt                          | 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)            | 1687        | 4848     | 2700       |      | 1770       | 1583          |     |      |
| Flt Permitted                | 0.95        | 1.00     | 1.00       |      | 0.95       | 1.00          |     |      |
| Satd. Flow (perm)            | 1687        | 4848     | 5058       |      | 1770       | 1583          |     |      |
| Peak-hour factor, PHF        | 0.99        | 0.99     | 0.99       | 0.99 | 0.99       | 0.99          |     |      |
| Adj. Flow (vph)              | 67          | 959      | 3695       | 117  | 30         | 76            |     |      |
| RTOR Reduction (vph)         | 0           | 0        | 2          | 0    | 0          | 69            |     |      |
| Lane Group Flow (vph)        | 67          | 959      | 3810       | 0    | 30         | 7             |     |      |
| Confl. Peds. (#/hr)          |             |          |            | 1    |            |               |     |      |
| Confl. Bikes (#/hr)          |             |          |            | 6    |            |               |     |      |
| Heavy Vehicles (%)           | 7%          | 7%       | 2%         | 2%   | 2%         | 2%            |     |      |
| Turn Type                    | Prot        | NA       | NA         |      | Prot       | Perm          |     |      |
| Protected Phases             | 5           | 2        | 6          |      | 3          |               |     |      |
| Permitted Phases             |             |          |            |      |            | 3             |     |      |
| Actuated Green, G (s)        | 8.0         | 70.9     | 58.9       |      | 9.6        | 9.6           |     |      |
| Effective Green, g (s)       | 8.0         | 70.9     | 58.9       |      | 9.6        | 9.6           |     |      |
| Actuated g/C Ratio           | 0.08        | 0.71     | 0.59       |      | 0.10       | 0.10          |     |      |
| Clearance Time (s)           | 4.0         | 4.9      | 4.9        |      | 4.2        | 4.2           |     |      |
| Vehicle Extension (s)        | 2.0         | 2.0      | 2.0        |      | 2.0        | 2.0           |     |      |
| Lane Grp Cap (vph)           | 134         | 3437     | 1590       |      | 169        | 151           |     |      |
| v/s Ratio Prot               | c0.04       | 0.20     | c1.41      |      | c0.02      |               |     |      |
| v/s Ratio Perm               |             |          |            |      |            | 0.00          |     |      |
| v/c Ratio                    | 0.50        | 0.28     | 2.40       |      | 0.18       | 0.05          |     |      |
| Uniform Delay, d1            | 44.1        | 5.3      | 20.6       |      | 41.6       | 41.1          |     |      |
| Progression Factor           | 1.00        | 1.00     | 1.48       |      | 1.00       | 1.00          |     |      |
| Incremental Delay, d2        | 1.1         | 0.2      | 628.5      |      | 0.2        | 0.0           |     |      |
| Delay (s)                    | 45.2        | 5.5      | 658.8      |      | 41.8       | 41.1          |     |      |
| Level of Service             | D           | Α        | F          |      | D          | D             |     |      |
| Approach Delay (s)           |             | 8.1      | 658.8      |      | 41.3       |               |     |      |
| Approach LOS                 |             | Α        | F          |      | D          |               |     |      |
| Intersection Summary         |             |          |            |      |            |               |     |      |
| HCM 2000 Control Delay       |             |          | 510.5      | Н    | CM 2000    | Level of Serv | ice | F    |
| HCM 2000 Volume to Capa      | acity ratio |          | 1.77       |      |            |               |     |      |
| Actuated Cycle Length (s)    |             |          | 100.0      | Sı   | um of lost | t time (s)    |     | 17.1 |
| Intersection Capacity Utiliz | ation       |          | 90.8%      |      |            | of Service    |     | Е    |
| Analysis Period (min)        |             |          | 15         |      |            |               |     |      |
| c Critical Lane Group        |             |          |            |      |            |               |     |      |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩20& Oyster Po

|                                | •         | ۶        | <b>→</b>  | •         | •         | <b>—</b>   | 4       | ₹î    | 1     | †     | <b>/</b> | <b>/</b> |
|--------------------------------|-----------|----------|-----------|-----------|-----------|------------|---------|-------|-------|-------|----------|----------|
| Movement                       | EBU       | EBL      | EBT       | EBR       | WBL2      | WBT        | WBR     | NBU   | NBL   | NBT   | NBR      | SBL      |
| Lane Configurations            |           | ሻ        | ተተኈ       |           | ሻ         | ተተኈ        |         |       | 1/4   | ર્ન   | 7        |          |
| Traffic Volume (vph)           | 4         | 49       | 757       | 262       | 152       | 3174       | 19      | 2     | 1719  | 32    | 80       | 8        |
| Future Volume (vph)            | 4         | 49       | 757       | 262       | 152       | 3174       | 19      | 2     | 1719  | 32    | 80       | 8        |
| Ideal Flow (vphpl)             | 1900      | 1900     | 1900      | 1900      | 1900      | 1900       | 1900    | 1900  | 1900  | 1900  | 1900     | 1900     |
| Total Lost time (s)            |           | 4.0      | 4.6       |           | 4.0       | 4.6        |         |       | 4.0   | 4.0   | 4.0      |          |
| Lane Util. Factor              |           | 1.00     | 0.91      |           | 1.00      | 0.91       |         |       | 0.91  | 0.91  | 1.00     |          |
| Frpb, ped/bikes                |           | 1.00     | 1.00      |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 0.94     |          |
| Flpb, ped/bikes                |           | 1.00     | 1.00      |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 1.00     |          |
| Frt                            |           | 1.00     | 0.96      |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 0.85     |          |
| Flt Protected                  |           | 0.95     | 1.00      |           | 0.95      | 1.00       |         |       | 0.95  | 0.95  | 1.00     |          |
| Satd. Flow (prot)              |           | 1597     | 4398      |           | 1770      | 5079       |         |       | 3189  | 1603  | 1478     |          |
| Flt Permitted                  |           | 0.95     | 1.00      |           | 0.95      | 1.00       |         |       | 0.95  | 0.95  | 1.00     |          |
| Satd. Flow (perm)              |           | 1597     | 4398      |           | 1770      | 5079       |         |       | 3189  | 1603  | 1478     |          |
| 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)                | 4         | 49       | 765       | 265       | 154       | 3206       | 19      | 2     | 1736  | 32    | 81       | 8        |
| RTOR Reduction (vph)           | 0         | 0        | 0         | 0         | 0         | 1          | 0       | 0     | 0     | 0     | 61       | 0        |
| Lane Group Flow (vph)          | 0         | 53       | 1030      | 0         | 154       | 3224       | 0       | 0     | 1182  | 588   | 20       | 0        |
| Confl. Peds. (#/hr)            |           |          |           |           |           |            | 8       |       |       |       | 37       |          |
| Confl. Bikes (#/hr)            |           |          |           | 2         |           |            | 5       |       |       |       | 4        |          |
| Heavy Vehicles (%)             | 13%       | 13%      | 13%       | 13%       | 2%        | 2%         | 2%      | 3%    | 3%    | 3%    | 3%       | 1%       |
| Turn Type                      | Prot      | Prot     | NA        |           | Prot      | NA         |         | Split | Split | NA    | Perm     | Split    |
| Protected Phases               | 1         | 1        | 6         |           | 5         | 2          |         | 4     | 4     | 4     |          | 7        |
| Permitted Phases               | •         | •        |           |           |           | _          |         | •     |       | •     | 4        | •        |
| Actuated Green, G (s)          |           | 7.8      | 35.6      |           | 13.5      | 41.3       |         |       | 33.9  | 33.9  | 33.9     |          |
| Effective Green, g (s)         |           | 7.8      | 35.6      |           | 13.5      | 41.3       |         |       | 33.9  | 33.9  | 33.9     |          |
| Actuated g/C Ratio             |           | 0.06     | 0.26      |           | 0.10      | 0.30       |         |       | 0.25  | 0.25  | 0.25     |          |
| Clearance Time (s)             |           | 4.0      | 4.6       |           | 4.0       | 4.6        |         |       | 4.0   | 4.0   | 4.0      |          |
| Vehicle Extension (s)          |           | 2.0      | 3.0       |           | 2.0       | 3.0        |         |       | 2.0   | 2.0   | 2.0      |          |
| Lane Grp Cap (vph)             |           | 91       | 1149      |           | 175       | 1540       |         |       | 793   | 398   | 367      |          |
| v/s Ratio Prot                 |           | 0.03     | 0.23      |           | c0.09     | c0.63      |         |       | c0.37 | 0.37  | 00.      |          |
| v/s Ratio Perm                 |           | 0.00     | 0.20      |           | 00.00     | 00.00      |         |       | 00.01 | 0.01  | 0.01     |          |
| v/c Ratio                      |           | 0.58     | 0.90      |           | 0.88      | 2.09       |         |       | 1.49  | 1.48  | 0.05     |          |
| Uniform Delay, d1              |           | 62.6     | 48.5      |           | 60.6      | 47.4       |         |       | 51.1  | 51.1  | 39.0     |          |
| Progression Factor             |           | 1.00     | 1.00      |           | 1.00      | 1.00       |         |       | 1.00  | 1.00  | 1.00     |          |
| Incremental Delay, d2          |           | 6.0      | 9.3       |           | 35.6      | 494.4      |         |       | 227.4 | 228.0 | 0.0      |          |
| Delay (s)                      |           | 68.6     | 57.8      |           | 96.2      | 541.8      |         |       | 278.6 | 279.2 | 39.0     |          |
| Level of Service               |           | E        | E         |           | F         | F          |         |       | F F   | F     | D        |          |
| Approach Delay (s)             |           |          | 58.4      |           | •         | 521.5      |         |       | •     | 268.3 |          |          |
| Approach LOS                   |           |          | Е         |           |           | F          |         |       |       | F     |          |          |
| Intersection Summary           |           |          |           |           |           |            |         |       |       |       |          |          |
| HCM 2000 Control Delay         |           |          | 322.1     | Н         | ICM 2000  | Level of   | Service |       | F     |       |          |          |
| HCM 2000 Volume to Capac       | ity ratio |          | 1.46      |           |           |            |         |       |       |       |          |          |
| Actuated Cycle Length (s)      |           |          | 136.2     | S         | um of los | t time (s) |         |       | 21.1  |       |          |          |
| Intersection Capacity Utilizat | ion       |          | 141.6%    | 10        | CU Level  | of Service |         |       | Н     |       |          |          |
| Analysis Period (min)          |           |          | 15        |           |           |            |         |       |       |       |          |          |
| dr Defacto Right Lane. Re      | code with | 1 though | lane as a | right lan | e.        |            |         |       |       |       |          |          |
| c Critical Lane Group          |           |          |           |           |           |            |         |       |       |       |          |          |

HCM Signalized Intersection Capacity Analysis
17: 101 SB/Oyster Pt. Blvd. Off Ramp & Gateway Blvd./Future 101 NB Ramp/Gateway ੴ₩020& Oyster Po

|                        | <b>↓</b>  | 4    | /         | 4         |
|------------------------|-----------|------|-----------|-----------|
| Movement               | SBT       | SBR2 | NER       | NER2      |
| Lane Configurations    | र्सीक     |      | 77        | 7         |
| Traffic Volume (vph)   | 27        | 431  | 444       | 191       |
| Future Volume (vph)    | 27        | 431  | 444       | 191       |
| Ideal Flow (vphpl)     | 1900      | 1900 | 1990      | 1900      |
| Total Lost time (s)    | 4.0       |      | 4.5       | 4.5       |
| Lane Util. Factor      | 0.95      |      | *0.95     | 1.00      |
| Frpb, ped/bikes        | 0.96      |      | 1.00      | 1.00      |
| Flpb, ped/bikes        | 1.00      |      | 1.00      | 1.00      |
| Frt                    | 0.86      |      | 1.00      | 0.85      |
| Flt Protected          | 1.00      |      | 1.00      | 1.00      |
| Satd. Flow (prot)      | 2963      |      | 3376      | 1442      |
| Flt Permitted          | 1.00      |      | 1.00      | 1.00      |
| Satd. Flow (perm)      | 2963      |      | 3376      | 1442      |
|                        |           | 0.00 |           |           |
| Peak-hour factor, PHF  | 0.99      | 0.99 | 0.99      | 0.99      |
| Adj. Flow (vph)        | 27        | 435  | 448       | 193       |
| RTOR Reduction (vph)   | 372       | 0    | 0         | 0         |
| Lane Group Flow (vph)  | 98        | 0    | 448       | 193       |
| Confl. Peds. (#/hr)    |           |      |           | 54        |
| Confl. Bikes (#/hr)    |           | 8    |           |           |
| Heavy Vehicles (%)     | 1%        | 1%   | 12%       | 12%       |
| Turn Type              | NA        |      | Prot      | Prot      |
| Protected Phases       | 7         |      | 3         | 3         |
| Permitted Phases       |           |      |           |           |
| Actuated Green, G (s)  | 8.8       |      | 23.3      | 23.3      |
| Effective Green, g (s) | 8.8       |      | 23.3      | 23.3      |
| Actuated g/C Ratio     | 0.06      |      | 0.17      | 0.17      |
| Clearance Time (s)     | 4.0       |      | 4.5       | 4.5       |
| Vehicle Extension (s)  | 2.0       |      | 2.0       | 2.0       |
| Lane Grp Cap (vph)     | 191       |      | 577       | 246       |
| v/s Ratio Prot         | c0.03     |      | 0.13      | c0.13     |
| v/s Ratio Perm         | 00.00     |      | 0.10      | 00.10     |
| v/c Ratio              | 0.92dr    |      | 0.78      | 0.78      |
| Uniform Delay, d1      | 61.6      |      | 54.0      | 54.0      |
| Progression Factor     | 1.00      |      | 1.00      | 1.00      |
| Incremental Delay, d2  | 1.00      |      | 5.9       | 14.0      |
| Delay (s)              | 62.6      |      | 59.9      | 68.0      |
| Level of Service       | 62.0<br>E |      | 59.9<br>E | 00.0<br>E |
|                        | 62.6      |      |           |           |
| Approach LOS           |           |      |           |           |
| Approach LOS           | E         |      |           |           |
| Intersection Summary   |           |      |           |           |
|                        |           |      |           |           |

|                                      | ۶            | <b>→</b>     | •     | •            | <b>—</b>     | •          | •       | †            | ~    | <b>\</b> | <b>↓</b>     | ✓            |
|--------------------------------------|--------------|--------------|-------|--------------|--------------|------------|---------|--------------|------|----------|--------------|--------------|
| Movement                             | EBL          | EBT          | EBR   | WBL          | WBT          | WBR        | NBL     | NBT          | NBR  | SBL      | SBT          | SBR          |
| Lane Configurations                  | ሻ            | <b>∱</b> }   |       | ሻ            | ħβ           |            |         | 44           |      |          | 4            | 7            |
| Traffic Volume (vph)                 | 113          | 188          | 3     | 1            | 956          | 61         | 3       | 1            | 1    | 27       | 1            | 421          |
| Future Volume (vph)                  | 113          | 188          | 3     | 1            | 956          | 61         | 3       | 1            | 1    | 27       | 1            | 421          |
| Ideal Flow (vphpl)                   | 1900         | 1900         | 1900  | 1900         | 1900         | 1900       | 1900    | 1900         | 1900 | 1900     | 1900         | 1900         |
| Total Lost time (s)                  | 4.0          | 4.0          |       | 4.0          | 4.0          |            |         | 4.0          |      |          | 4.0          | 4.0          |
| Lane Util. Factor                    | 1.00         | 0.95         |       | 1.00         | 0.95         |            |         | 1.00         |      |          | 0.95         | 0.95         |
| Frpb, ped/bikes                      | 1.00         | 1.00         |       | 1.00         | 1.00         |            |         | 1.00         |      |          | 1.00         | 1.00         |
| Flpb, ped/bikes                      | 1.00         | 1.00         |       | 1.00         | 1.00         |            |         | 1.00         |      |          | 1.00         | 1.00         |
| Frt                                  | 1.00         | 1.00         |       | 1.00         | 0.99         |            |         | 0.97         |      |          | 0.87         | 0.85         |
| Flt Protected                        | 0.95         | 1.00         |       | 0.95         | 1.00         |            |         | 0.97         |      |          | 0.99         | 1.00         |
| Satd. Flow (prot)                    | 1492         | 2976         |       | 1656         | 3277         |            |         | 1795         |      |          | 1484         | 1461         |
| Flt Permitted                        | 0.95         | 1.00         |       | 0.95         | 1.00         |            |         | 0.63         |      |          | 0.96         | 1.00         |
| Satd. Flow (perm)                    | 1492         | 2976         |       | 1656         | 3277         |            |         | 1158         |      |          | 1430         | 1461         |
| 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)                      | 114          | 190          | 3     | 1            | 966          | 62         | 3       | 1            | 1    | 27       | 1            | 425          |
| RTOR Reduction (vph)                 | 0            | 0            | 0     | 0            | 0            | 0          | 0       | 1            | 0    | 0        | 182          | 205          |
| Lane Group Flow (vph)                | 114          | 193          | 0     | 1            | 1028         | 0          | 0       | 4            | 0    | 0        | 46           | 20           |
| Confl. Peds. (#/hr)                  |              |              | 1     |              |              | 2          |         |              |      |          |              |              |
| Confl. Bikes (#/hr)                  |              |              |       |              |              | 3          |         |              |      |          |              |              |
| Heavy Vehicles (%)                   | 21%          | 21%          | 21%   | 9%           | 9%           | 9%         | 0%      | 0%           | 0%   | 5%       | 5%           | 5%           |
| Turn Type                            | Prot         | NA           |       | Prot         | NA           |            | Perm    | NA           |      | Perm     | NA           | Perm         |
| Protected Phases                     | 5            | 2            |       | 1            | 6            |            | _       | 3            |      |          | 4            |              |
| Permitted Phases                     |              |              |       |              | 40.0         |            | 3       | 40.4         |      | 4        |              | 4            |
| Actuated Green, G (s)                | 11.7         | 54.4         |       | 0.9          | 43.6         |            |         | 19.1         |      |          | 8.7          | 8.7          |
| Effective Green, g (s)               | 11.7         | 54.4         |       | 0.9          | 43.6         |            |         | 19.1         |      |          | 8.7          | 8.7          |
| Actuated g/C Ratio                   | 0.12         | 0.55         |       | 0.01         | 0.44         |            |         | 0.19         |      |          | 0.09         | 0.09         |
| Clearance Time (s)                   | 4.0          | 4.0          |       | 4.0          | 4.0          |            |         | 4.0          |      |          | 4.0          | 4.0          |
| Vehicle Extension (s)                | 2.0          | 2.5          |       | 2.0          | 2.5          |            |         | 2.0          |      |          | 2.0          | 2.0          |
| Lane Grp Cap (vph)                   | 176          | 1633         |       | 15           | 1441         |            |         | 223          |      |          | 125          | 128          |
| v/s Ratio Prot                       | c0.08        | 0.06         |       | 0.00         | c0.31        |            |         | .0.00        |      |          | .0.00        | 0.04         |
| v/s Ratio Perm                       | 0.05         | 0.40         |       | 0.07         | 0.74         |            |         | c0.00        |      |          | c0.03        | 0.01         |
| v/c Ratio                            | 0.65<br>41.7 | 0.12<br>10.8 |       | 0.07<br>48.7 | 0.71<br>22.7 |            |         | 0.02<br>32.4 |      |          | 0.36<br>42.6 | 0.15<br>41.8 |
| Uniform Delay, d1 Progression Factor | 1.00         | 1.00         |       | 1.00         | 1.00         |            |         | 1.00         |      |          | 1.00         | 1.00         |
| Incremental Delay, d2                | 6.0          | 0.0          |       | 0.7          | 1.00         |            |         | 0.2          |      |          | 0.7          | 0.2          |
| Delay (s)                            | 47.7         | 10.8         |       | 49.4         | 24.2         |            |         | 32.6         |      |          | 43.3         | 42.0         |
| Level of Service                     | 47.7<br>D    | В            |       | 43.4<br>D    | 24.2<br>C    |            |         | 32.0<br>C    |      |          | 43.3<br>D    | 42.0<br>D    |
| Approach Delay (s)                   | U            | 24.5         |       | U            | 24.3         |            |         | 32.6         |      |          | 42.6         | U            |
| Approach LOS                         |              | C C          |       |              | C C          |            |         | C            |      |          | 42.0<br>D    |              |
| Intersection Summary                 |              |              |       |              |              |            |         |              |      |          |              |              |
| HCM 2000 Control Delay               |              |              | 29.0  | Н            | CM 2000      | Level of S | Service |              | С    |          |              |              |
| HCM 2000 Volume to Capacit           | ty ratio     |              | 0.51  |              |              |            |         |              |      |          |              |              |
| Actuated Cycle Length (s)            |              |              | 99.1  |              | um of lost   |            |         |              | 16.0 |          |              |              |
| Intersection Capacity Utilization    | on           |              | 59.1% | IC           | CU Level of  | of Service |         |              | В    |          |              |              |
| Analysis Period (min)                |              |              | 15    |              |              |            |         |              |      |          |              |              |
| c Critical Lane Group                |              |              |       |              |              |            |         |              |      |          |              |              |

## **Appendix E: Count Sheets**



Location: Driveway 1 West of Gateway Blvd Date Range: 12/11/2019 - 12/17/2019

Site Code: 01

|          | W     | ednesd               | ау    | 7     | hursda   | у     |    | Friday  | ,     | ;  | Saturda | y     |    | Sunda   | /     |    | Monda   | у     |    | Tuesda  | у     |       |         |        |
|----------|-------|----------------------|-------|-------|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|---------|--------|
|          | 12    | 2/11/20 <sup>-</sup> | 19    | 1     | 2/12/201 | 19    | 1  | 2/13/20 | 19    | 1  | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1  | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-V | Veek Av | verage |
| Time     | EB    | WB                   | Total | EB    | WB       | Total | ЕВ | WB      | Total | EB    | WB      | Total  |
| 12:00 AM | 1     | 0                    | 1     | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1     | 0       | 1      |
| 1:00 AM  | 0     | 0                    | 0     | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 0     | 0       | 0      |
| 2:00 AM  | 0     | 1                    | 1     | 1     | 1        | 2     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1     | 1       | 2      |
| 3:00 AM  | 2     | 0                    | 2     | 2     | 1        | 3     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 2     | 1       | 3      |
| 4:00 AM  | 0     | 3                    | 3     | 0     | 2        | 2     | -  | _       | -     | -  | -       | -     | -  | _       | -     | -  | -       | -     | -  | -       | -     | 0     | 3       | 3      |
| 5:00 AM  | 0     | 16                   | 16    | 1     | 17       | 18    | -  | _       | -     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | -     | 1     | 17      | 17     |
| 6:00 AM  | 5     | 43                   | 48    | 3     | 47       | 50    | -  | _       | _     | _  | _       | -     | _  | _       | _     | -  | -       | -     | -  | _       | _     | 4     | 45      | 49     |
| 7:00 AM  | 8     | 77                   | 85    | 3     | 80       | 83    | -  | -       | _     | -  | -       | -     | _  | -       | _     | -  | -       | -     | -  | _       | -     | 6     | 79      | 84     |
| 8:00 AM  | 6     | 111                  | 117   | 8     | 85       | 93    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 7     | 98      | 105    |
| 9:00 AM  | 10    | 51                   | 61    | 10    | 55       | 65    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | -       | _     | _  | _       | _     | 10    | 53      | 63     |
| 10:00 AM | 10    | 21                   | 31    | 18    | 25       | 43    | _  | _       | -     | -  | -       | -     | _  | _       | -     | -  | -       | -     | -  | -       | -     | 14    | 23      | 37     |
| 11:00 AM | 24    | 28                   | 52    | 0     | 6        | 6     | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 12    | 17      | 29     |
| 12:00 PM | 23    | 20                   | 43    | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 12    | 10      | 22     |
| 1:00 PM  | 11    | 22                   | 33    | 0     | 0        | 0     | _  | _       | _     | _  | _       | _     | _  | _       | _     | -  | -       | _     | -  | _       | _     | 6     | 11      | 17     |
| 2:00 PM  | 20    | 14                   | 34    | 14    | 2        | 16    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 17    | 8       | 25     |
| 3:00 PM  | 10    | 10                   | 20    | 14    | 10       | 24    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | -       | _     | _  | _       | _     | 12    | 10      | 22     |
| 4:00 PM  | 40    | 5                    | 45    | 29    | 6        | 35    | _  | _       | -     | _  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 35    | 6       | 40     |
| 5:00 PM  | 41    | 6                    | 47    | 43    | 11       | 54    | _  | _       | _     | _  | _       | _     | _  | _       | _     | -  | -       | -     | -  | _       | _     | 42    | 9       | 51     |
| 6:00 PM  | 16    | 5                    | 21    | 17    | 4        | 21    | -  | _       | -     | -  | -       | -     | -  | _       | -     | -  | -       | -     | -  | -       | -     | 17    | 5       | 21     |
| 7:00 PM  | 9     | 2                    | 11    | 6     | 3        | 9     | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 8     | 3       | 10     |
| 8:00 PM  | 6     | 1                    | 7     | 5     | 4        | 9     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 6     | 3       | 8      |
| 9:00 PM  | 3     | 2                    | 5     | 3     | 2        | 5     | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 3     | 2       | 5      |
| 10:00 PM | 4     | 2                    | 6     | 2     | 1        | 3     | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 3     | 2       | 5      |
| 11:00 PM | 1     | 1                    | 2     | 1     | 2        | 3     | _  | _       | _     | _  | _       | -     | _  | _       | _     | -  | _       | _     | -  | _       | _     | 1     | 2       | 3      |
| Total    | 250   | 441                  | 691   | 180   | 364      | 544   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 215   | 403     | 618    |
| Percent  | 36%   | 64%                  | -     | 33%   | 67%      | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 35%   | 65%     | -      |
| AM Peak  | 11:00 | 08:00                | 08:00 | 10:00 | 08:00    | 08:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 10:00 | 08:00   |        |
| Vol.     | 24    | 111                  | 117   | 18    | 85       | 93    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 14    | 98      | 105    |
| PM Peak  | 17:00 | 13:00                | 17:00 | 17:00 | 17:00    | 17:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 17:00 | 13:00   |        |
| Vol.     | 41    | 22                   | 47    | 43    | 11       | 54    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 42    | 11      | 51     |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.



Location: Driveway 2 West of Gateway Blvd Date Range: 12/11/2019 - 12/17/2019

Site Code: 02

|          | We    | ednesd   | ay    | Т     | hursda   | y     |    | Friday  |       | ;  | Saturda | y     |    | Sunda   | y     |    | Monda   | y     |    | Tuesda  | ıy    |       |        |        |
|----------|-------|----------|-------|-------|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|--------|--------|
|          | 12    | 2/11/201 | 19    | 1:    | 2/12/201 | 19    | 1  | 2/13/20 | 19    | 1  | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1  | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-V | Veek A | verage |
| Time     | EB    | WB       | Total | EB    | WB       | Total | ЕВ | WB      | Total | EB | WB      | Total | EB | WB      | Total | EB | WB      | Total | ЕВ | WB      | Total | EB    | WB     | Total  |
| 12:00 AM | 3     | 1        | 4     | 2     | 1        | 3     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 3     | 1      | 4      |
| 1:00 AM  | 0     | 0        | 0     | 1     | 0        | 1     | -  | _       | -     | -  | -       | -     | -  | -       | -     | -  | _       | -     | -  | -       | -     | 1     | 0      | 1      |
| 2:00 AM  | 7     | 2        | 9     | 6     | 2        | 8     | -  | _       | -     | -  | _       | -     | -  | -       | -     | _  | _       | -     | -  | -       | -     | 7     | 2      | 9      |
| 3:00 AM  | 0     | 1        | 1     | 1     | 3        | 4     | -  | _       | -     | -  | -       | -     | -  | -       | -     | _  | _       | -     | -  | -       | -     | 1     | 2      | 3      |
| 4:00 AM  | 3     | 8        | 11    | 2     | 8        | 10    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 3     | 8      | 11     |
| 5:00 AM  | 5     | 26       | 31    | 2     | 27       | 29    | _  | _       | _     | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | 4     | 27     | 30     |
| 6:00 AM  | 11    | 46       | 57    | 23    | 45       | 68    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 17    | 46     | 63     |
| 7:00 AM  | 39    | 69       | 108   | 28    | 60       | 88    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 34    | 65     | 98     |
| 8:00 AM  | 50    | 89       | 139   | 46    | 71       | 117   | _  | _       |       | -  | _       | -     | _  | -       | -     | _  | _       | -     | -  | _       | _     | 48    | 80     | 128    |
| 9:00 AM  | 44    | 77       | 121   | 35    | 62       | 97    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 40    | 70     | 109    |
| 10:00 AM | 56    | 35       | 91    | 60    | 40       | 100   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 58    | 38     | 96     |
| 11:00 AM | 97    | 50       | 147   | 40    | 19       | 59    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 69    | 35     | 103    |
| 12:00 PM | 96    | 46       | 142   | 0     | 0        | 0     | _  | _       | -     | -  | _       | _     | _  | _       | _     | -  | _       | _     | _  | _       | _     | 48    | 23     | 71     |
| 1:00 PM  | 73    | 44       | 117   | 0     | 0        | 0     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 37    | 22     | 59     |
| 2:00 PM  | 136   | 16       | 152   | 90    | 16       | 106   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 113   | 16     | 129    |
| 3:00 PM  | 113   | 17       | 130   | 122   | 10       | 132   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 118   | 14     | 131    |
| 4:00 PM  | 160   | 14       | 174   | 146   | 4        | 150   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 153   | 9      | 162    |
| 5:00 PM  | 169   | 11       | 180   | 185   | 11       | 196   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 177   | 11     | 188    |
| 6:00 PM  | 84    | 10       | 94    | 76    | 6        | 82    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 80    | 8      | 88     |
| 7:00 PM  | 29    | 3        | 32    | 22    | 3        | 25    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 26    | 3      | 29     |
| 8:00 PM  | 11    | 4        | 15    | 9     | 3        | 12    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 10    | 4      | 14     |
| 9:00 PM  | 10    | 5        | 15    | 13    | 3        | 16    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 12    | 4      | 16     |
| 10:00 PM | 1     | 1        | 2     | 8     | 2        | 10    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 5     | 2      | 6      |
| 11:00 PM | 3     | 0        | 3     | 4     | 0        | 4     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 4     | 0      | 4      |
| Total    | 1,200 | 575      | 1,775 | 921   | 396      | 1,317 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1,061 | 486    | 1,546  |
| Percent  | 68%   | 32%      | -     | 70%   | 30%      | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 69%   | 31%    | -      |
| AM Peak  | 11:00 | 08:00    | 11:00 | 10:00 | 08:00    | 08:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 11:00 | 08:00  | 08:00  |
| Vol.     | 97    | 89       | 147   | 60    | 71       | 117   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 69    | 80     | 128    |
| PM Peak  | 17:00 | 12:00    | 17:00 | 17:00 | 14:00    | 17:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 17:00 | 12:00  | 17:00  |
| Vol.     | 169   | 46       | 180   | 185   | 16       | 196   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 177   | 23     | 188    |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.



Location: Driveway 3 West of Gateway Blvd Date Range: 12/11/2019 - 12/17/2019

Site Code: 03

|          | W     | ednesd   | ay    | 1     | hursda   | у     |    | Friday  | ,     | ;  | Saturda | y     |    | Sunda   | у     |    | Monda   | у     |    | Tuesda  | у     | _     |        |        |
|----------|-------|----------|-------|-------|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|--------|--------|
|          | 1     | 2/11/201 | 19    | 1     | 2/12/201 | 19    | 1  | 2/13/20 | 19    | 1  | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1: | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-V | /eek A | verage |
| Time     | EB    | WB       | Total | EB    | WB       | Total | EB | WB      | Total | ЕВ | WB      | Total | EB | WB      | Total | EB | WB      | Total | EB | WB      | Total | ЕВ    | WB     | Total  |
| 12:00 AM | 2     | 0        | 2     | 5     | 0        | 5     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 4     | 0      | 4      |
| 1:00 AM  | 3     | 1        | 4     | 3     | 0        | 3     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 3     | 1      | 4      |
| 2:00 AM  | 1     | 1        | 2     | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1     | 1      | 1      |
| 3:00 AM  | 0     | 2        | 2     | 0     | 3        | 3     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 0     | 3      | 3      |
| 4:00 AM  | 10    | 17       | 27    | 5     | 6        | 11    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 8     | 12     | 19     |
| 5:00 AM  | 11    | 59       | 70    | 4     | 36       | 40    | -  | _       | -     | _  | _       | -     | _  | _       | -     | _  | -       | -     | _  | _       | _     | 8     | 48     | 55     |
| 6:00 AM  | 23    | 68       | 91    | 20    | 78       | 98    | _  | _       | -     | _  | _       | -     | _  | _       | -     | -  | -       | -     | _  | _       | _     | 22    | 73     | 95     |
| 7:00 AM  | 34    | 116      | 150   | 42    | 114      | 156   | _  | _       | -     | _  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 38    | 115    | 153    |
| 8:00 AM  | 46    | 154      | 200   | 47    | 139      | 186   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 47    | 147    | 193    |
| 9:00 AM  | 46    | 114      | 160   | 57    | 109      | 166   | _  | _       | -     | _  | -       | -     | _  | _       | -     | _  | _       | -     | _  | _       | -     | 52    | 112    | 163    |
| 10:00 AM | 52    | 69       | 121   | 52    | 69       | 121   | _  | _       | -     | -  | _       | -     | _  | _       | -     | -  | -       | -     | _  | _       | _     | 52    | 69     | 121    |
| 11:00 AM | 59    | 58       | 117   | 34    | 46       | 80    | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 47    | 52     | 99     |
| 12:00 PM | 76    | 65       | 141   | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 38    | 33     | 71     |
| 1:00 PM  | 60    | 60       | 120   | 0     | 0        | 0     | _  | _       | -     | _  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 30    | 30     | 60     |
| 2:00 PM  | 91    | 43       | 134   | 58    | 30       | 88    | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 75    | 37     | 111    |
| 3:00 PM  | 93    | 41       | 134   | 99    | 47       | 146   | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | -       | _     | _  | _       | _     | 96    | 44     | 140    |
| 4:00 PM  | 134   | 59       | 193   | 100   | 52       | 152   | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 117   | 56     | 173    |
| 5:00 PM  | 113   | 39       | 152   | 98    | 45       | 143   | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 106   | 42     | 148    |
| 6:00 PM  | 33    | 27       | 60    | 47    | 30       | 77    | _  | _       |       | _  | _       | -     | _  | _       | _     | -  | -       |       | _  | _       | _     | 40    | 29     | 69     |
| 7:00 PM  | 26    | 14       | 40    | 35    | 13       | 48    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 31    | 14     | 44     |
| 8:00 PM  | 9     | 2        | 11    | 9     | 5        | 14    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 9     | 4      | 13     |
| 9:00 PM  | 11    | 1        | 12    | 3     | 6        | 9     | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 7     | 4      | 11     |
| 10:00 PM | 4     | 3        | 7     | 8     | 1        | 9     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 6     | 2      | 8      |
| 11:00 PM | 4     | 2        | 6     | 5     | 1        | 6     | _  | _       | -     | _  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 5     | 2      | 6      |
| Total    | 941   | 1,015    | 1,956 | 731   | 830      | 1,561 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 836   | 923    | 1,759  |
| Percent  | 48%   | 52%      | -     | 47%   | 53%      | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 48%   | 52%    | -      |
| AM Peak  | 11:00 | 08:00    | 08:00 | 09:00 | 08:00    | 08:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 10:00 | 08:00  |        |
| Vol.     | 59    | 154      | 200   | 57    | 139      | 186   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 52    | 147    | 193    |
| PM Peak  | 16:00 | 12:00    | 16:00 | 16:00 | 16:00    | 16:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 16:00 | 16:00  |        |
| Vol.     | 134   | 65       | 193   | 100   | 52       | 152   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 117   | 56     | 173    |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.



Location: Driveway 4 West of Gateway Blvd Date Range: 12/11/2019 - 12/17/2019

Site Code: 04

|          | W     | ednesd   | ay    | T     | hursda   | у     |    | Friday  | ,     | ;  | Saturda | у     |    | Sunda   | у     |    | Monda   | y     |    | Tuesda  | у     | -     |        |        |
|----------|-------|----------|-------|-------|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|--------|--------|
|          | 12    | 2/11/201 | 19    | 1:    | 2/12/201 | 19    | 1  | 2/13/20 | 19    | 1  | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1  | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-V | Veek A | /erage |
| Time     | EB    | WB       | Total | EB    | WB       | Total | ЕВ | WB      | Total | ЕВ | WB      | Total | EB    | WB     | Total  |
| 12:00 AM | 3     | 1        | 4     | 2     | 2        | 4     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 3     | 2      | 4      |
| 1:00 AM  | 0     | 0        | 0     | 3     | 0        | 3     | _  | _       | -     | _  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 2     | 0      | 2      |
| 2:00 AM  | 7     | 1        | 8     | 11    | 3        | 14    | _  | _       | -     | -  | -       | -     | -  | _       | -     | _  | _       | -     | -  | _       | _     | 9     | 2      | 11     |
| 3:00 AM  | 0     | 1        | 1     | 0     | 0        | 0     | -  | _       | -     | -  | -       | -     | -  | -       | -     | _  | _       | -     | _  | _       | -     | 0     | 1      | 1      |
| 4:00 AM  | 11    | 13       | 24    | 8     | 9        | 17    | _  | _       | -     | _  | -       | -     | _  | _       | -     | _  | -       | _     | _  | -       | -     | 10    | 11     | 21     |
| 5:00 AM  | 15    | 35       | 50    | 17    | 29       | 46    | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | -       | -     | _  | _       | _     | 16    | 32     | 48     |
| 6:00 AM  | 49    | 56       | 105   | 52    | 52       | 104   | _  | _       | -     | -  | -       | -     | -  | _       | -     | -  | _       | -     | -  | _       | -     | 51    | 54     | 105    |
| 7:00 AM  | 116   | 118      | 234   | 105   | 112      | 217   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 111   | 115    | 226    |
| 8:00 AM  | 129   | 164      | 293   | 136   | 154      | 290   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 133   | 159    | 292    |
| 9:00 AM  | 135   | 119      | 254   | 132   | 111      | 243   | _  | -       | -     | -  | -       | -     | -  | -       | _     | -  | -       | -     | -  | -       | _     | 134   | 115    | 249    |
| 10:00 AM | 96    | 76       | 172   | 83    | 82       | 165   | _  | _       | -     | -  | -       | -     | -  | _       | -     | -  | _       | -     | -  | _       | -     | 90    | 79     | 169    |
| 11:00 AM | 97    | 84       | 181   | 94    | 67       | 161   | _  | _       | -     | -  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | -     | 96    | 76     | 171    |
| 12:00 PM | 102   | 57       | 159   | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 51    | 29     | 80     |
| 1:00 PM  | 96    | 63       | 159   | 9     | 7        | 16    | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 53    | 35     | 88     |
| 2:00 PM  | 136   | 48       | 184   | 160   | 47       | 207   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 148   | 48     | 196    |
| 3:00 PM  | 172   | 53       | 225   | 185   | 73       | 258   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 179   | 63     | 242    |
| 4:00 PM  | 209   | 80       | 289   | 198   | 62       | 260   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 204   | 71     | 275    |
| 5:00 PM  | 210   | 61       | 271   | 190   | 59       | 249   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 200   | 60     | 260    |
| 6:00 PM  | 108   | 30       | 138   | 107   | 29       | 136   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 108   | 30     | 137    |
| 7:00 PM  | 68    | 12       | 80    | 47    | 19       | 66    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 58    | 16     | 73     |
| 8:00 PM  | 25    | 6        | 31    | 39    | 7        | 46    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 32    | 7      | 39     |
| 9:00 PM  | 9     | 5        | 14    | 25    | 7        | 32    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 17    | 6      | 23     |
| 10:00 PM | 22    | 11       | 33    | 11    | 9        | 20    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 17    | 10     | 27     |
| 11:00 PM | 16    | 2        | 18    | 9     | 5        | 14    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 13    | 4      | 16     |
| Total    | 1,831 | 1,096    | 2,927 | 1,623 | 945      | 2,568 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1,727 | 1,021  | 2,748  |
| Percent  | 63%   | 37%      | -     | 63%   | 37%      | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 63%   | 37%    | -      |
| AM Peak  | 09:00 | 08:00    | 08:00 | 08:00 | 08:00    | 08:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 09:00 | 08:00  |        |
| Vol.     | 135   | 164      | 293   | 136   | 154      | 290   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 134   | 159    | 292    |
| PM Peak  | 17:00 | 16:00    | 16:00 | 16:00 | 15:00    | 16:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 16:00 | 16:00  | 16:00  |
| Vol.     | 210   | 80       | 289   | 198   | 73       | 260   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 204   | 71     | 275    |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.



Location: Driveway 5 West of Gateway Blvd Date Range: 12/11/2019 - 12/17/2019

Site Code: 05

|          | W     | ednesd               | lay   | T     | hursda   | у     |    | Friday  | 1     | ;  | Saturda | у     |    | Sunda   | у     |    | Monda   | у     |    | Tuesda  | у     | -     |        |        |
|----------|-------|----------------------|-------|-------|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|--------|--------|
|          | 12    | 2/11/20 <sup>-</sup> | 19    | 1:    | 2/12/201 | 19    | 1  | 2/13/20 | 19    | 1  | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1: | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-V | Veek A | verage |
| Time     | EB    | WB                   | Total | EB    | WB       | Total | EB | WB      | Total | ЕВ | WB      | Total | EB | WB      | Total | EB | WB      | Total | EB | WB      | Total | ЕВ    | WB     | Total  |
| 12:00 AM | 9     | 3                    | 12    | 7     | 0        | 7     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 8     | 2      | 10     |
| 1:00 AM  | 5     | 2                    | 7     | 5     | 0        | 5     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 5     | 1      | 6      |
| 2:00 AM  | 7     | 3                    | 10    | 7     | 2        | 9     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 7     | 3      | 10     |
| 3:00 AM  | 6     | 3                    | 9     | 0     | 2        | 2     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 3     | 3      | 6      |
| 4:00 AM  | 5     | 6                    | 11    | 11    | 6        | 17    | -  | _       | _     | _  | -       | _     | _  | _       | -     | -  | _       | -     | _  | _       | _     | 8     | 6      | 14     |
| 5:00 AM  | 20    | 23                   | 43    | 14    | 12       | 26    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | -     | _  | _       | _     | 17    | 18     | 35     |
| 6:00 AM  | 25    | 29                   | 54    | 33    | 26       | 59    | _  | -       | -     | -  | -       | -     | -  | _       | -     | -  | -       | -     | -  | _       | -     | 29    | 28     | 57     |
| 7:00 AM  | 45    | 52                   | 97    | 44    | 60       | 104   | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 45    | 56     | 101    |
| 8:00 AM  | 82    | 81                   | 163   | 127   | 76       | 203   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 105   | 79     | 183    |
| 9:00 AM  | 145   | 78                   | 223   | 136   | 74       | 210   | _  | _       | -     | -  | -       | -     | -  | -       | _     | -  | -       | -     | -  | -       | _     | 141   | 76     | 217    |
| 10:00 AM | 76    | 42                   | 118   | 91    | 46       | 137   | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 84    | 44     | 128    |
| 11:00 AM | 129   | 36                   | 165   | 130   | 51       | 181   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 130   | 44     | 173    |
| 12:00 PM | 101   | 72                   | 173   | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 51    | 36     | 87     |
| 1:00 PM  | 104   | 61                   | 165   | 22    | 12       | 34    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 63    | 37     | 100    |
| 2:00 PM  | 147   | 39                   | 186   | 149   | 50       | 199   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 148   | 45     | 193    |
| 3:00 PM  | 160   | 46                   | 206   | 167   | 58       | 225   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 164   | 52     | 216    |
| 4:00 PM  | 212   | 49                   | 261   | 235   | 59       | 294   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 224   | 54     | 278    |
| 5:00 PM  | 233   | 28                   | 261   | 216   | 32       | 248   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 225   | 30     | 255    |
| 6:00 PM  | 129   | 20                   | 149   | 131   | 17       | 148   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 130   | 19     | 149    |
| 7:00 PM  | 52    | 11                   | 63    | 55    | 3        | 58    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 54    | 7      | 61     |
| 8:00 PM  | 23    | 7                    | 30    | 26    | 7        | 33    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 25    | 7      | 32     |
| 9:00 PM  | 18    | 1                    | 19    | 20    | 6        | 26    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 19    | 4      | 23     |
| 10:00 PM | 18    | 2                    | 20    | 16    | 1        | 17    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 17    | 2      | 19     |
| 11:00 PM | 8     | 0                    | 8     | 11    | 4        | 15    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 10    | 2      | 12     |
| Total    | 1,759 | 694                  | 2,453 | 1,653 | 604      | 2,257 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1,706 | 649    | 2,355  |
| Percent  | 72%   | 28%                  | -     | 73%   | 27%      | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 72%   | 28%    | -      |
| AM Peak  | 09:00 | 08:00                | 09:00 | 09:00 | 08:00    | 09:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 09:00 | 08:00  | 09:00  |
| Vol.     | 145   | 81                   | 223   | 136   | 76       | 210   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 141   | 79     | 217    |
| PM Peak  | 17:00 | 12:00                | 16:00 | 16:00 | 16:00    | 16:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 17:00 | 16:00  |        |
| Vol.     | 233   | 72                   | 261   | 235   | 59       | 294   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 225   | 54     | 278    |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.



Location: Driveway 6 South of Corporate Dr Date Range: 12/11/2019 - 12/17/2019

Site Code: 06

|          | W     | ednesd  | ay    | 7     | Thursda              | y     |    | Friday  | ,     | ;  | Saturda | ıy    |    | Sunda   | у     |    | Monda   | у     | -  | Tuesda  | y     | _     |        |        |
|----------|-------|---------|-------|-------|----------------------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|--------|--------|
|          | 12    | 2/11/20 | 19    | 1     | 2/12/20 <sup>-</sup> | 19    | 1  | 2/13/20 | 19    | 1  | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1: | 2/16/20 | 19    | 1: | 2/17/20 | 19    | Mid-V | Veek A | /erage |
| Time     | NB    | SB      | Total | NB    | SB                   | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB    | SB     | Total  |
| 12:00 AM | 3     | 0       | 3     | 0     | 0                    | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 2     | 0      | 2      |
| 1:00 AM  | 0     | 1       | 1     | 2     | 0                    | 2     | -  | -       | -     | -  | _       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1     | 1      | 2      |
| 2:00 AM  | 2     | 0       | 2     | 2     | 0                    | 2     | -  | -       | -     | -  | _       | -     | _  | -       | -     | _  | -       | -     | -  | _       | -     | 2     | 0      | 2      |
| 3:00 AM  | 2     | 1       | 3     | 0     | 2                    | 2     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1     | 2      | 3      |
| 4:00 AM  | 3     | 3       | 6     | 1     | 1                    | 2     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 2     | 2      | 4      |
| 5:00 AM  | 2     | 5       | 7     | 0     | 3                    | 3     | _  | _       | -     | _  | _       | _     | _  | -       | -     | _  | _       | -     | _  | -       | _     | 1     | 4      | 5      |
| 6:00 AM  | 2     | 10      | 12    | 2     | 9                    | 11    | -  | _       | -     | -  | _       | _     | _  | -       | -     | -  | _       | -     | -  | -       | _     | 2     | 10     | 12     |
| 7:00 AM  | 3     | 16      | 19    | 3     | 26                   | 29    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 3     | 21     | 24     |
| 8:00 AM  | 4     | 45      | 49    | 6     | 54                   | 60    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 5     | 50     | 55     |
| 9:00 AM  | 5     | 65      | 70    | 11    | 50                   | 61    | _  | _       | _     | -  | _       | -     | _  | _       | _     | -  | -       | _     | _  | -       | -     | 8     | 58     | 66     |
| 10:00 AM | 4     | 20      | 24    | 15    | 13                   | 28    | -  | _       | -     | -  | _       | _     | _  | -       | -     | -  | _       | -     | -  | -       | _     | 10    | 17     | 26     |
| 11:00 AM | 25    | 10      | 35    | 24    | 18                   | 42    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | -       | _     | 25    | 14     | 39     |
| 12:00 PM | 19    | 19      | 38    | 1     | 3                    | 4     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 10    | 11     | 21     |
| 1:00 PM  | 10    | 23      | 33    | 1     | 5                    | 6     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 6     | 14     | 20     |
| 2:00 PM  | 14    | 10      | 24    | 6     | 5                    | 11    | _  | _       | -     | _  | _       | -     | _  | _       | -     | _  | _       | _     | -  | _       | _     | 10    | 8      | 18     |
| 3:00 PM  | 10    | 8       | 18    | 20    | 7                    | 27    | _  | _       | _     | _  | _       | _     | _  | _       | -     | _  | _       | _     | -  | _       | _     | 15    | 8      | 23     |
| 4:00 PM  | 35    | 6       | 41    | 36    | 10                   | 46    | _  | _       | _     | _  | _       | _     | _  | _       | -     | _  | _       | _     | _  | _       | _     | 36    | 8      | 44     |
| 5:00 PM  | 42    | 5       | 47    | 44    | 5                    | 49    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 43    | 5      | 48     |
| 6:00 PM  | 28    | 3       | 31    | 20    | 4                    | 24    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 24    | 4      | 28     |
| 7:00 PM  | 6     | 6       | 12    | 10    | 4                    | 14    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 8     | 5      | 13     |
| 8:00 PM  | 3     | 2       | 5     | 3     | 3                    | 6     | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 3     | 3      | 6      |
| 9:00 PM  | 1     | 0       | 1     | 5     | 6                    | 11    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 3     | 3      | 6      |
| 10:00 PM | 0     | 1       | 1     | 0     | 0                    | 0     | _  | _       | _     | _  | _       | _     | _  | _       | -     | _  | _       | _     | -  | _       | _     | 0     | 1      | 1      |
| 11:00 PM | 3     | 0       | 3     | 1     | 0                    | 1     | -  | _       | -     | -  | _       | -     | _  | _       | -     | _  | _       | -     | -  | _       | _     | 2     | 0      | 2      |
| Total    | 226   | 259     | 485   | 213   | 228                  | 441   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 220   | 244    | 463    |
| Percent  | 47%   | 53%     | -     | 48%   | 52%                  | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 47%   | 53%    | -      |
| AM Peak  | 11:00 | 09:00   | 09:00 | 11:00 | 08:00                | 09:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 11:00 | 09:00  | 09:00  |
| Vol.     | 25    | 65      | 70    | 24    | 54                   | 61    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 25    | 58     | 66     |
| PM Peak  | 17:00 | 13:00   | 17:00 | 17:00 | 16:00                | 17:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 17:00 | 13:00  | 17:00  |
| Vol.     | 42    | 23      | 47    | 44    | 10                   | 49    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 43    | 14     | 48     |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.



Location: Driveway 7 South of Corporate Dr Date Range: 12/11/2019 - 12/17/2019

Site Code: 07

|          | W     | ednesd               | ay    | 7     | hursda   | у     |    | Friday  | 1     | ,  | Saturda | ıy    |    | Sunda   | у     |    | Monda   | у     |    | Tuesda  | y     | _     |         |        |
|----------|-------|----------------------|-------|-------|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|---------|--------|
|          | 1     | 2/11/20 <sup>-</sup> | 19    | 1     | 2/12/201 | 19    | 1  | 2/13/20 | 19    | 1: | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1: | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-V | Veek Av | verage |
| Time     | NB    | SB                   | Total | NB    | SB       | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB    | SB      | Total  |
| 12:00 AM | 1     | 0                    | 1     | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1     | 0       | 1      |
| 1:00 AM  | 1     | 1                    | 2     | 0     | 2        | 2     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1     | 2       | 2      |
| 2:00 AM  | 0     | 1                    | 1     | 0     | 1        | 1     | -  | _       | -     | -  | -       | -     | -  | _       | _     | -  | -       | -     | -  | _       | -     | 0     | 1       | 1      |
| 3:00 AM  | 0     | 2                    | 2     | 0     | 0        | 0     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 0     | 1       | 1      |
| 4:00 AM  | 1     | 5                    | 6     | 2     | 10       | 12    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 2     | 8       | 9      |
| 5:00 AM  | 5     | 8                    | 13    | 2     | 3        | 5     | _  | _       | _     | -  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 4     | 6       | 9      |
| 6:00 AM  | 0     | 6                    | 6     | 2     | 6        | 8     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 1     | 6       | 7      |
| 7:00 AM  | 4     | 11                   | 15    | 2     | 3        | 5     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 3     | 7       | 10     |
| 8:00 AM  | 5     | 12                   | 17    | 7     | 15       | 22    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 6     | 14      | 20     |
| 9:00 AM  | 8     | 25                   | 33    | 10    | 34       | 44    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 9     | 30      | 39     |
| 10:00 AM | 14    | 19                   | 33    | 13    | 13       | 26    | _  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 14    | 16      | 30     |
| 11:00 AM | 8     | 11                   | 19    | 6     | 15       | 21    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 7     | 13      | 20     |
| 12:00 PM | 10    | 12                   | 22    | 4     | 4        | 8     | _  | _       | -     | _  | -       | _     | _  | -       | -     | -  | _       | _     | -  | _       | _     | 7     | 8       | 15     |
| 1:00 PM  | 13    | 5                    | 18    | 8     | 5        | 13    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 11    | 5       | 16     |
| 2:00 PM  | 11    | 7                    | 18    | 10    | 6        | 16    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 11    | 7       | 17     |
| 3:00 PM  | 4     | 5                    | 9     | 3     | 3        | 6     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 4     | 4       | 8      |
| 4:00 PM  | 6     | 6                    | 12    | 9     | 2        | 11    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 8     | 4       | 12     |
| 5:00 PM  | 8     | 1                    | 9     | 6     | 1        | 7     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 7     | 1       | 8      |
| 6:00 PM  | 5     | 1                    | 6     | 8     | 3        | 11    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 7     | 2       | 9      |
| 7:00 PM  | 3     | 0                    | 3     | 0     | 1        | 1     |    |         |       |    |         |       |    |         |       |    |         |       |    |         |       | 2     | 1       | 2      |
| 8:00 PM  | 0     | 0                    | 0     | 1     | 2        | 3     |    |         |       |    |         |       |    |         |       |    |         |       |    |         |       | 1     | 1       | 2      |
| 9:00 PM  | 2     | 0                    | 2     | 1     | 2        | 3     |    |         |       |    |         |       |    |         |       |    |         |       |    |         |       | 2     | 1       | 3      |
| 10:00 PM | 0     | 0                    | 0     | 1     | 0        | 1     |    |         |       |    |         |       |    |         |       |    | _       |       |    |         |       | 1     | 0       | 1      |
| 11:00 PM | 0     | 0                    | 0     | 0     | 1        | 1     |    |         |       |    |         |       |    |         |       |    |         |       |    |         |       | 0     | 1       | 1      |
| Total    | 109   | 138                  | 247   | 95    | 132      | 227   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 102   | 135     | 237    |
| Percent  | 44%   | 56%                  | -     | 42%   | 58%      | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 43%   | 57%     | -      |
| AM Peak  | 10:00 | 09:00                | 09:00 | 10:00 | 09:00    | 09:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 10:00 | 09:00   |        |
| Vol.     | 14    | 25                   | 33    | 13    | 34       | 44    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 14    | 30      | 39     |
| PM Peak  | 13:00 | 12:00                | 12:00 | 14:00 | 14:00    | 14:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 13:00 | 12:00   |        |
| Vol.     | 13    | 12                   | 22    | 10    | 6        | 16    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 11    | 8       | 17     |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.



Location: Driveway 8 East of Poletti Way Date Range: 12/11/2019 - 12/17/2019

Site Code: 08

|                      | W        | ednesd  | ау     | 1      | hursda               | у         |    | Friday  |       |    | Saturda  | у     |    | Sunda   | у     |    | Monda   | у     |    | Tuesda  | у     | -       |         |        |
|----------------------|----------|---------|--------|--------|----------------------|-----------|----|---------|-------|----|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|---------|---------|--------|
|                      | 1        | 2/11/20 | 19     | 1      | 2/12/20 <sup>-</sup> | 19        | 1  | 2/13/20 | 19    | 1  | 12/14/20 | 19    | 1: | 2/15/20 | 19    | 1  | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-W   | Veek Av | verage |
| Time                 | EB       | WB      | Total  | EB     | WB                   | Total     | EB | WB      | Total | EB | WB       | Total | EB | WB      | Total | EB | WB      | Total | EB | WB      | Total | EB      | WB      | Total  |
| 12:00 AM             | 3        | 1       | 4      | 3      | 0                    | 3         | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 3       | 1       | 4      |
| 1:00 AM              | 4        | 2       | 6      | 4      | 0                    | 4         | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 4       | 1       | 5      |
| 2:00 AM              | 1        | 2       | 3      | 0      | 1                    | 1         | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1       | 2       | 2      |
| 3:00 AM              | 1        | 0       | 1      | 0      | 0                    | 0         | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1       | 0       | 1      |
| 4:00 AM              | 11       | 0       | 11     | 13     | 0                    | 13        | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 12      | 0       | 12     |
| 5:00 AM              | 24       | 5       | 29     | 36     | 1                    | 37        | _  | _       | _     | _  | _        | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 30      | 3       | 33     |
| 6:00 AM              | 30       | 11      | 41     | 34     | 7                    | 41        | -  | _       | -     | _  | _        | -     | -  | -       | -     | -  | -       | -     | _  | _       | -     | 32      | 9       | 41     |
| 7:00 AM              | 62       | 15      | 77     | 60     | 19                   | 79        | _  | _       | -     | _  | -        | -     | _  | -       | -     | _  | -       | -     | _  | _       | -     | 61      | 17      | 78     |
| 8:00 AM              | 104      | 11      | 115    | 141    | 13                   | 154       | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 123     | 12      | 135    |
| 9:00 AM              | 164      | 9       | 173    | 155    | 23                   | 178       | _  | _       | _     | _  | _        | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 160     | 16      | 176    |
| 10:00 AM             | 38       | 10      | 48     | 42     | 18                   | 60        | _  | _       | _     | _  | _        | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 40      | 14      | 54     |
| 11:00 AM             | 43       | 10      | 53     | 36     | 12                   | 48        | _  | _       | _     | _  | _        | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 40      | 11      | 51     |
| 12:00 PM             | 38       | 17      | 55     | 19     | 15                   | 34        | _  | _       | _     | _  | _        | -     | -  | _       | _     | -  | _       | -     | _  | _       | _     | 29      | 16      | 45     |
| 1:00 PM              | 23       | 15      | 38     | 11     | 15                   | 26        | _  | _       | _     | _  | _        | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 17      | 15      | 32     |
| 2:00 PM              | 36       | 16      | 52     | 45     | 10                   | 55        |    |         |       |    |          |       |    |         |       |    |         |       |    |         |       | 41      | 13      | 54     |
| 3:00 PM              | 49       | 24      | 73     | 21     | 23                   | 44        |    |         |       |    |          |       |    |         |       |    |         |       |    |         |       | 35      | 24      | 59     |
| 4:00 PM              | 54       | 25      | 79     | 61     | 31                   | 92        |    |         |       |    |          |       |    |         |       |    |         |       |    |         |       | 58      | 28      | 86     |
| 5:00 PM              | 45       | 15      | 60     | 33     | 14                   | 47        |    |         |       |    |          |       |    |         |       |    |         |       |    |         |       | 39      | 15      | 54     |
| 6:00 PM              | 30       | 9       | 39     | 24     | 9                    | 33        |    |         |       |    |          |       |    |         |       |    |         |       |    |         |       | 27      | 9       | 36     |
| 7:00 PM              | 22       | 3       | 25     | 13     | 3                    | 16        |    |         |       |    |          |       |    |         |       |    |         |       |    |         |       | 18      | 3       | 21     |
|                      |          |         | 14     |        | 0                    |           | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     |         |         | 14     |
| 8:00 PM<br>9:00 PM   | 12<br>11 | 0       | 11     | 13     | 0                    | 13<br>6   | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 13<br>9 | 0       |        |
|                      | 5        |         |        | 6      | 0                    |           | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     |         |         | 9<br>5 |
| 10:00 PM<br>11:00 PM | 7        | 0       | 5<br>7 | 5<br>8 | 2                    | 5         | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 5<br>8  | 0       | 9      |
| Total                | 817      | 202     | 1,019  | 783    | 216                  | 10<br>999 |    | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 800     | 209     | 1,009  |
| Percent              | 80%      | 20%     | -      | 78%    | 22%                  | -         | _  | _       | _     | _  | _        | -     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 79%     | 21%     | -      |
| AM Peak              | 09:00    | 07:00   | 09:00  | 09:00  | 09:00                | 09:00     | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 09:00   | 07:00   | 09:00  |
| Vol.                 | 164      | 15      | 173    | 155    | 23                   | 178       | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 160     | 17      | 176    |
| PM Peak              | 16:00    | 16:00   | 16:00  | 16:00  | 16:00                | 16:00     | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 16:00   | 16:00   |        |
| Vol.                 | 54       | 25      | 79     | 61     | 31                   | 92        | -  | -       | -     | -  | -        | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 58      | 28      | 86     |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.

Project Manager: (415) 310-6469 project.manager.ca@idaxdata.com

1



Location: Driveway 9 North of Corporate Dr Date Range: 12/11/2019 - 12/17/2019

Site Code: 09

|          | W     | ednesd  | ay    | Т     | hursda   | у     |    | Friday  | 1     | :  | Saturda | ıy    |    | Sunda   | /     | ı  | Monda   | у     |    | Tuesda  | y     | _     |        |        |
|----------|-------|---------|-------|-------|----------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|----|---------|-------|-------|--------|--------|
|          | 1     | 2/11/20 | 19    | 1:    | 2/12/201 | 19    | 1  | 2/13/20 | 19    | 1: | 2/14/20 | 19    | 1  | 2/15/20 | 19    | 1: | 2/16/20 | 19    | 1  | 2/17/20 | 19    | Mid-W | leek A | verage |
| Time     | NB    | SB      | Total | NB    | SB       | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB | SB      | Total | NB    | SB     | Total  |
| 12:00 AM | 4     | 0       | 4     | 6     | 0        | 6     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 5     | 0      | 5      |
| 1:00 AM  | 2     | 0       | 2     | 2     | 0        | 2     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 2     | 0      | 2      |
| 2:00 AM  | 2     | 0       | 2     | 4     | 0        | 4     | -  | -       | -     | -  | -       | -     | -  | _       | -     | _  | -       | _     | -  | _       | -     | 3     | 0      | 3      |
| 3:00 AM  | 6     | 0       | 6     | 4     | 0        | 4     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 5     | 0      | 5      |
| 4:00 AM  | 25    | 0       | 25    | 22    | 1        | 23    | -  | _       | -     | -  | _       | -     | -  | -       | _     | _  | -       | _     | -  | _       | -     | 24    | 1      | 24     |
| 5:00 AM  | 84    | 0       | 84    | 89    | 1        | 90    | -  | _       | -     | _  | _       | -     | _  | -       | _     | _  | _       | _     | _  | -       | _     | 87    | 1      | 87     |
| 6:00 AM  | 132   | 1       | 133   | 171   | 0        | 171   | -  | _       | -     | _  | _       | _     | _  | -       | _     | _  | _       | _     | _  | -       | _     | 152   | 1      | 152    |
| 7:00 AM  | 227   | 5       | 232   | 249   | 1        | 250   | _  | _       | _     | -  | _       | -     | _  | _       | _     | _  | _       | _     | _  | _       | -     | 238   | 3      | 241    |
| 8:00 AM  | 344   | 6       | 350   | 357   | 7        | 364   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 351   | 7      | 357    |
| 9:00 AM  | 323   | 2       | 325   | 314   | 6        | 320   | _  | _       | _     | -  | _       | _     | _  | _       | _     | -  | _       | _     | _  | _       | _     | 319   | 4      | 323    |
| 10:00 AM | 155   | 3       | 158   | 120   | 5        | 125   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 138   | 4      | 142    |
| 11:00 AM | 85    | 12      | 97    | 92    | 10       | 102   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 89    | 11     | 100    |
| 12:00 PM | 66    | 17      | 83    | 46    | 8        | 54    | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 56    | 13     | 69     |
| 1:00 PM  | 90    | 10      | 100   | 56    | 3        | 59    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 73    | 7      | 80     |
| 2:00 PM  | 55    | 21      | 76    | 61    | 20       | 81    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 58    | 21     | 79     |
| 3:00 PM  | 65    | 26      | 91    | 78    | 7        | 85    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 72    | 17     | 88     |
| 4:00 PM  | 70    | 26      | 96    | 79    | 26       | 105   | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 75    | 26     | 101    |
| 5:00 PM  | 58    | 25      | 83    | 55    | 21       | 76    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 57    | 23     | 80     |
| 6:00 PM  | 38    | 12      | 50    | 36    | 12       | 48    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 37    | 12     | 49     |
| 7:00 PM  | 28    | 3       | 31    | 33    | 5        | 38    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 31    | 4      | 35     |
| 8:00 PM  | 12    | 1       | 13    | 21    | 2        | 23    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 17    | 2      | 18     |
| 9:00 PM  | 6     | 1       | 7     | 9     | 0        | 9     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 8     | 1      | 8      |
| 10:00 PM | 5     | 0       | 5     | 9     | 0        | 9     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 7     | 0      | 7      |
| 11:00 PM | 11    | 0       | 11    | 11    | 1        | 12    | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | _  | _       | _     | 11    | 1      | 12     |
| Total    | 1,893 | 171     | 2,064 | 1,924 | 136      | 2,060 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 1,909 | 154    | 2,062  |
| Percent  | 92%   | 8%      | -     | 93%   | 7%       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 93%   | 7%     | -      |
| AM Peak  | 08:00 | 11:00   | 08:00 | 08:00 | 11:00    | 08:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 08:00 | 11:00  |        |
| Vol.     | 344   | 12      | 350   | 357   | 10       | 364   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 351   | 11     | 357    |
| PM Peak  | 13:00 | 15:00   | 13:00 | 16:00 | 16:00    | 16:00 | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 16:00 | 16:00  |        |
| Vol.     | 90    | 26      | 100   | 79    | 26       | 105   | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | -  | -       | -     | 75    | 26     | 101    |

<sup>1.</sup> Mid-week average includes data between Tuesday and Thursday.