Appendix TIA

Transportation Impact Analysis

499 Forbes Boulevard

Administrative Draft Transportation Impact Analysis

Prepared for:
Rincon Consultants, Inc.

April 6, 2020

SF19-1076

FEHR PEERS

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1. Project Description

The transportation impact analysis (TIA) evaluates potential transportation effects associated with the 499 Forbes Boulevard development project ("Project"). The Project is a new 128,737 square foot Office/R&D building on an approximately three-acre site at 499 Forbes Boulevard in the City of South San Francisco's East of 101 employment area. The site was formerly occupied by an approximately 54,000 square foot industrial use which was demolished in Fall 2019. The site location is shown in **Figure 1-1** and Project site plan in **Figure 1-2**. Project parking facilities would include 322 off-street auto parking stalls within an above-grade 263 stall parking structure and 59 stall surface parking lot. Bicycle parking facilities include 20 long- and 33 short-term spaces concentrated in six locations, two of which are secure enclosures.

Primary bicycle, pedestrian, and motor vehicle site access is provided via the Forbes Boulevard frontage with a new driveway approach and dedicated pedestrian walkways connecting with existing public sidewalks. Removal of approximately 35 feet of center median within Forbes Boulevard is proposed to permit intuitive left turn movements departing and approaching the Project site. Secondary bicycle and pedestrian access is provided via a new Class I shared-use bicycle and pedestrian pathway along an abandoned railroad right-of-way to the rear of the Project site.

The new Class I shared-use path follows the railroad right-of-way beginning at the Project site and ending at an entrance to Forbes Boulevard approximately 1,400 feet to the northeast. At the southwesterly end, the pathway is configured to permit future westerly expansion should an active rail spur between the Project Site and Eccles Avenue be repurposed.

1.1 Alternative Mode Share Target

The Project is located in the Business and Technology Park zoning district and the proposed floor area ratio (FAR) exceeds base zoning maximums. Accordingly, the Project sponsor is requesting a FAR bonus under the City's floor area ratio and transportation demand management (TDM) incentive program. The following alternative mode share target applies to the Project:

Zoning District	Requested FAR	Minimum Alternative Mode Use (Percent of Total Trips)
Business and Technology Park	0.81-1.00	35%

Source: City of South San Francisco Zoning Ordinance, Chapter 20.400 Transportation Demand Management

The Project TDM plan identifies and proposes site design and program measures to achieve the non-drive alone mode share target. Key measures include: short- and long-term bicycle parking facilities; building entrances are directly linked to the public street via pedestrian pathways; and, office tenants will offer subsidies to employees who commute via transit, vanpool, bicycle, or walking and promote non drive-alone modes through ongoing marketing campaigns. Finally, performance will be evaluated in accordance with the City's TDM ordinance.

Figure 1-1: Project Location

Figure 1-2 Project Site Plan

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.

2.1 Roadway Facilities

The Project site is at the northwest corner of the Forbes Boulevard and Allerton Avenue intersection in the City of South San Francisco's East of 101 employment area. Regional access to the site is provided via US-101 and Gateway Boulevard to the north and, and US-101 and East Grand Avenue to the south. **Figure 1-1** shows the Project location and the surrounding roadway system. Project site vehicular access is provided via one, two-way driveway that intersects Forbes Boulevard west of Allerton Avenue. A dedicated pedestrian walkway parallels the driveway.

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 pionts. Near the Project, 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:
    - *Northern Access – Oyster Point Boulevard:* Northbound on- and off-ramps intersect Dubuque Aveneue at and immediately south of Oyster Point Boulevard. Southbound on-ramps are at Dubuque Ave, adjacent to the Northbound off-ramp. The southbound off-ramp intersects Gateway Boulevard / Oyster Point Boulevard as the intersection's fifth leg.
    - *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 Bouleavrd. Southbound off-ramps are at Airport Boulevard/Miller Avenue. There is no southbound freeway acccess at this location.
    - *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.
- *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 South 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.
- *Forbes Boulevard* is a four-lane street extending north from East Grand Avenue, then running east into the Genentech campus, terminting at DNA Way. East of Allerton, Forbes Boulevard has two lanes and Class II buffered bicycle lanes. Principle local Project is provided via Forbes Boulevard, immediatley west of the Allerton Avenue intersection.
- *Allerton Avenue* is a two-lane road with Class II buffered bicycle lanes connecting East Grand Avenue with Forbes Boulevard along the western edge of the Genentech Campus. The Project site is adjacent ot the northerly endpoint at Forbes Boulevard.

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. All transit services are located beyond a comfortable half-mile, ten-minute walking distance. The East of 101 Area therefore relies on supplementary shuttle services to connect employees with regional transit. 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 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 four miles northwest of the Project at Mission Road and McLellan Drive. 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 one mile west of the Project at 590 Dubuque Avenue, on the east side of US-101, immediately north of East Grand Avenue. Toward the end of 2020, Caltrain plans to open a relocated the South San Francisco Caltrain Station several hundred feet to the south near the 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 is currently served by 23 northbound and 23 southbound local or limited trains during a typical weekday.

Figure 2-1 Transit Facilities

- southbound weekday trains. The South San Francisco Caltrain Station has weekday service from 5:40 AM to 12:00 AM, with 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 only serves the western edge of the East of 101 employment area. The closest bus stops to the Project site are apprxomately one and a half miles to the west at the intersction of Airport Boulevard and Grand Avenue 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 Allerton Avenue and Carlton Court which is served by all Utah/Grand area shuttles. These routes connect with Caltrain, BART, and the WETA ferry terminal. While all Oyster Point area shuttle routes pass the Project site on Forbes Boulevard, they do not stop within walking distance of the site.

Table 2.1. East of 101 Area Commute.org Shuttle Service

Service Area	Regional Transit Connection	Peak Period Headway (minutes)	Total Daily Weekday Trips	
			AM (6:30-10:00)	PM (3:00-6:00)
Oyster Point	Caltrain	30-40	7	7
	Ferry Terminal	20-60	3	3
	BART	15-30	10	9
Utah/Grand	Caltrain	30-40	8	7
	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.

2.3 Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, trails, and pedestrian signals. In the Project vicinity, continuous sidewalks exist along the north side of Forbes Boulevard only except east of the Allerton Avenue intersection where continuous sidewalks exist on both sides of the roadway for approximately 900 feet. At the intersection of Forbes Boulevard and Allerton Avenue, an all-way "stop" controlled intersection immediately adjacent to the Project site, marked, high visibility "ladder" crosswalks are provided on two of the three intersection legs. Sidewalks exist on the east side of Allerton Avenue between Forbes Boulevard and Cabot Road, 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 Forbes Boulevard, allowing bicyclists and pedestrians traveling between the Ferry Terminal and Project Site to avoid circuitous and steeper routing via Gull Drive. Currently, there are gaps in the trail to the north of Brisbane, and just south of South San Francisco.

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 cross-flow 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 – Separtaed 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 connects to the South San Francisco Ferry Terminal but lacks dedicated bicycle connections to the Caltrain station and residential uses west of US-101. Existing and planned bicycle facilities in the Project vicinity, as designated by the South San Francisco Bicycle Master Plan (2011) and Active South City Plan (ongoing), are shown in **Figure 2-2,** and discussed below.

Figure 2-2 Bicycle Facilities

- *East Grand Avenue* has Class II bicycle lanes between Littlefield Avenue and Allerton Avenue and between Haskins Way and the South Campus entrance; Class II bike lanes are planned for the remainder of East Grand Avenue and Grand Avenue
- *Forbes Boulevard* has Class II buffered bicycle lanes between Allerton Avenue and DNA Way, but does not have bicycle lanes connecting to the Project site
- *Allerton Avenue* has Class II buffered bicycle lanes between Forbes Boulevard and East Grand Avenue
- *The San Francisco Bay Trail* (Bay Trail) is a Class I shared pedestrian, bicycle, and non-motorized vehicle pathway along the Oyster Point shoreline and Point San Bruno, part of a planned 400 mile regional trail system ecircling the San Francisco Bay shoreline.

Bicyclists would primarily access the Project site via Forbes Boulevard and Allerton Avenue. 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.

The 2011 City of South San Francisco Bicycle Master Plan identifies several bicycle improvements near the Project site, including completing bicycle lanes along East Grand Avenue and Forbes Boulevard and the addition of new Class I shared-use trails along abandoned railroad corridors. Near the Project site, rails-to-trails projects are currently planned for inactive railways paralleling Forbes Boulevard to the south and Eccles Avenue to the west, connecting to a proposed trail between East Grand Avenue and the new Caltrain station. The trail segment north of Forbes Boulevard adjacent the Project is not included on these plans due to its partially active rail use and lack of connectivity to the surrounding bicycle network.

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.

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), 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 Error! Reference source not found. 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 proposed 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);
- 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 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.

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 1st, 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 B**, Vehicle Miles Traveled Technical Overview. Analysis of greenhouse gas reduction goals performed by the California Air Resources Board (CARB) indicates that a reduction of at least 16.8 percent of light-duty vehicle VMT is necessary to reach statewide goals.[1] Light-duty VMT is appropriate for the Project because most Project trips are expected to be light duty vehicles.

[1] California Air Resources Board, *2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals*, January 2019. Available online at https://ww2.arb.ca.gov/resources/documents/carb-2017-scoping-plan-identified-vmt-reductions-and-relationship-state-climate

- A significant impact would occur should 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 11.8 HBW VMT per employee under existing conditions based on 16.8 percent below the existing regional average of 14.2 HBW VMT per employee as shown in **Table 3.1.**

Table 3.1 Home-Based Work (HBW) VMT Per Employee Threshold

Location	Total HBW VMT *(a)*	Total Employees *(b)*	HBW VMT per Employee *(a) / (b)*
Bay Area Region	60,994,917	4,285,001	14.2
		VMT Reduction Factor	(16.8%)
		HBW VMT Per Employee Threshold	**11.8**

Source: Fehr & Peers 2020; C/CAG-VTA Bi-County Transportation Demand Model, 2019.

3.1.2 Freeway Ramp Queuing

While SB743 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, 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 contribute to existing vehicle queues that exceed storage space for that movement.

3.1.3 Unsignalized Intersections

Just as with the freeway ramp queueing criteria, the need for a traffic signal at an unsignalized intersection is not solely based on traffic delay but must include safety considerations, spatial context, and engineering judgement. Since the potential addition of a traffic signal at an isolated intersection is not based entirely on traffic operations criteria and is unlikely to induce vehicle travel, and therefore increase VMT, a traffic signal warrant analysis was retained as a significance criteria.

- A significant impact would occur if the Project would increase total volumes passing through an intersection by two percent or more with all-way stop operation already at a baseline LOS E or F, or when a side street stop controlled approach is at a baseline LOS F. Side street stop criteria are applicable only for approaches with more than 25 trips during any peak traffic hour.

3.1.4 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.

The criteria of significance apply to all Project scenarios as measured against the corresponding No Project scenario.

Figure 3-1 Study Locations

3.2 Analysis Scenarios

The impacts of the proposed 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 proposed project is provided below. Project-specific impacts are described under Section 5, 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 conditions in 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 proposed project. Existing Plus Project conditions were compared to Existing conditions to determine potential immediate project impacts. As noted in the Project Description, major off-site transportation network improvements consist of a new Class I shared-use path that begins at the Project's northwestern edge and follows the disused railroad right-of-way approximately 1,400 feet, connecting with Forbes Boulevard north of Allerton Avenue.

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 Model.

3.2.4 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 proposed project would contribute to long-term cumulative transportation impacts.

3.3 VMT Analysis

Project-generated home-based work (HBW) vehicle miles traveled (VMT) per employee is calculated based on average home-based work 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. Based on this methodology, the project would generate 16 HBW VMT per employee under existing conditions. This total is above the regional average total of 14.2 HBW VMT per employee, and also above the VMT per employee threshold of 11.8 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 subject to a 35 percent non-drive alone mode share during peak periods under the current TDM ordinance, which represent an approximately nine percent reduction in non-drive alone mode share from baseline conditions (71%).[2] 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 (if not slightly higher than) regional averages. 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

Location	Total HBW VMT *(a)*	Total Employment *(b)*	HBW VMT per Employee *(a) / (b)*
East of 101 Area	572,219	35,831	16.0
Bay Area Region	60,994,917	4,285,001	14.2
		VMT Reduction Factor	(16.8%)
		VMT Per Employee Threshold	**11.8**

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. An analysis of the project's effect on VMT requires the use of sophisticated tools, such as a locally-calibrated and validated travel demand forecasting model. The C/CAG Travel Demand Model, which is used to analyze project-generated VMT per capita, is a regional

[2] 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).

travel demand forecasting model that has limited sensitivity to relatively small changes in land use and therefore is not appropriate for use in analyzing project effect on VMT for this Project.

Due to these limitations in available tools and the limited effect that a project of this size would have on total regional VMT, a quantitative analysis of the project's effect on VMT is not included in this DEIR. However, given the similarities in the proposed 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 provides a reasonable estimation of the environmental consequences associated with the project's effect on VMT.

A long-range cumulative VMT analysis was not performed since, as noted above, community, city, or regional scale sustainable land use and transportation policy changes are necessary to substantially reduce HBW VMT per employee. While land use changes are currently under consideration through Shape SSF, the General Plan update process, active City land use policy envisions continued single-use employment uses within the East of 101 area, and therefore VMT is unlikely to be substantially reduced from existing conditions.

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.

3.4 Trip Generation, Distribution, and Assignment

The amount of traffic added to the roadway system by the proposed 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 proposed 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 proposed project trips to specific street segments and intersection turning movements. The results are described below.

3.4.1.1 Project Trip Generation

Proposed Project traffic added to the surrounding roadway system was estimated using data collected in Fall 2019 from three sample office and research and development (R&D) campus sites in the East of 101 area. Local travel demand data was used instead of national averages because of the unique conditions in the East of 101 area, including peak 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.

Of the three sample sites, driveway count data from an approximately 435,000 square-foot office building at 395/400 Oyster Point Boulevard was selected to estimate Project travel demand. The site's land use, TDM

program, and proximity to first- and last-mile shuttles closely match Project characteristics. Specifically, the Project is required to achieve a 35% non-drive alone mode share during peak periods, which is similar to the sample site's 31%[3] non-drive alone mode share. The sample site's land use is predominately administrative office and the Project is intended for office, research and development (R&D) or mixed office and R&D occupancy. Compared to R&D, office uses typically have higher employee density, greater travel demand, and represent the maximum reasonable use at the Project site. The sample site driveway traffic data is presented in Error! Reference source not found..

The Project trip generation rate was derived from the sample site data and multiplied by the size of the proposed Project (gross square feet) to determine daily and weekday morning and evening peak hour vehicle trip generation volume, shown in **Table 3.3**. According to this trip generation analysis, the new 128,700 square foot office building would generate 721 new daily trips, 127 new AM peak hour trips (113 inbound and 14 outbound), and 135 new PM peak hour trips (19 inbound and 116 outbound). As noted previously, the Project site is currently vacant and therefore no trips were discounted from the total trip generation estimate.

Table 3.3 Project Trip Generation Rates and Estimates

Land Use	Size (KSF)	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Total	Rate	In	Out	Total	Rate	In	Out	Total
Office	128.7	5.6	721	0.99	113	14	127	1.05	19	116	135

Notes:
1. Rates based on 2019 driveway count data collected at 395-400 Oyster Point Boulevard and similar sites in the East of 101 area. Rates assume a non-drive alone mode share reduction of about 35 percent.

Potential effectiveness of the proposed TDM measures was evaluated using TDM+, a tool based on Quantifying Greenhouse Gas Mitigation Measures, a report for the California Air Pollution Control Officer's Association (CAPCOA) produced in 2010. Based on this assessment, the Project's TDM plan has the potential to meet the 35 percent non-drive alone target with aggressive marketing, transit subsidies, and provision of or participation in a first- and last-mile shuttle program. Existing employee mode share data for the East of 101 area show the non-drive alone mode share is about 29 percent for office employers. Accordingly, the project would have to reduce the non-drive alone mode share by approximately nine percent compared to baseline conditions.

3.4.1.2 Project Trip Distribution

The directions of approach and departure for the proposed project traffic were estimated based on the City of South San Francisco's Travel Demand Model, which has greater sensitivity to local travel patterns. **Figure 3-2,** shows the general trip distribution pattern for the proposed Project. Most of the Project traffic is split

[3] 395-400 Oyster Point Marina Plaza TDM Survey, 2017

between the north (33%) and south (49%) US-101 approaches to the East of 101 area. Locally, the greatest number of trips are estimated to occur between the west side of US-101 and the Project site (18%).

3.4.1.3 Project Trip Assignment

The proposed 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 3-3** shows the expected increases in peak hour turning movement volume at key vicinity intersections due to the proposed Project.

Project traffic would access the roadway network via a two-lane driveway along the Forbes Boulevard frontage, immediately to the west of Allerton Avenue and Forbes Boulevard. An existing landscape median along the Project frontage would be modified as part of the Project permit unrestricted inbound and outbound left turns at the site driveway. Most inbound vehicular traffic accesses the project site via Forbes Boulevard from the west and outbound traffic departs via Forbes Boulevard in the opposite direction. This route is the shortest and most direct connection between north and south US-101 access points and local destinations west of US-101.

Figure 3-2 Project Trip Distribution

Figure 3-3 Project Trip Assignment

3.5 Freeway Ramp Queuing Analysis

Two 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 and shown on **Figure 3-1**.

1. US-101 Southbound Off-Ramp at Oyster Point Boulevard
2. US-101 Northbound Off-Ramp at East Grand Avenue

Traffic counts were collected at the approaches and departures to the four freeway on- and 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.

Error! Reference source not found. presents weekday AM peak hour vehicle queues at the two 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 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.

Table 3.4 Existing Weekday AM Peak Hour 95th Percentile Queues

Approach Lanes	Storage Distance	Existing		Existing Plus Project	
		Volume	Queue Length	Volume	Queue Length
1. US-101 Southbound Off-Ramp at Oyster Point Boulevard					
Through	3,100	704	525	708	525
Right	350	319	**550**	345	**600**
2. US-101 Southbound Off-Ramp at East Grand Avenue					
Left	1,775	131	200	131	200
Right	1,775	639	1,025	678	1,100

Notes: Bold type indicates conditions where queue length exceeds storage capacity. Queues do not take into account downstream spillover from adjacent intersections. Storage distance and queues in feet per lane. Source: Fehr & Peers, 2020

Cumulative Plus Project traffic volumes are presented in **Appendix A** and the volume relevant to the freeway ramp queuing assessment is presented in Error! Reference source not found..

Table 3.5 Cumulative Weekday AM Peak Hour 95th Percentile Queues

Approach Lanes	Storage Distance	Cumulative		Cumulative Plus Project	
		Volume	Queue Length	Volume	Queue Length
1. US-101 Southbound Off-Ramp at Oyster Point Boulevard					
Through	3,100	1,809	1,550	1,813	1,550
Right	350	675	**1,200**	701	**1,250**
2. US-101 Southbound Off-Ramp at East Grand Avenue					
Left	1,775	216	325	216	325
Right	1,775	683	1,100	722	1,150

Notes: Bold type indicates conditions where queue length exceeds storage 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 Alternatives

Three potentially feasible Project alternatives were identified as part of the environmental review process and are described below:

1. *No Project*: Assumes no structure would be built on the Project site and existing improvements would remain. Additionally, the abandoned rail corridor to the north of the site would not be repurposed into a trail and greenway.
2. *Research and Development Building*: Demolition of existing site improvements and construction of a 128,737 square-foot research and development (R&D) building. The abandoned rail corridor would be repurposed as proposed in the Project alternative.
3. *Reduced Size office Building*: Demolition of existing site improvements and construction of an approximately 77,000 square-foot office building. The abandoned rail corridor would be repurposed as proposed win the Project alternative.

All alternatives would likely result in reduced vehicle trips, but home-based work vehicle miles traveled (HBW VMT) per employee would not change from the Project alternative. Primary variables affecting vehicle trip generation are building size and use and alternatives two and three lead to lower trip generation through either change in land use (Alternative 2, R&D use); or reduced size (Alternative 3, Reduced Size Office). However, HBW VMT per employee is a measure of the amount and distance of vehicle travel in a geographic area by an average employee. Since this is a per capita metric, the changes in Project size nor employment sub-uses would not affect VMT results.

4. Impacts and Mitigations

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: **Development of the proposed Project would generate per-employee vehicle miles traveled (VMT) greater than the City threshold. (*Significant; Significant and Unavoidable*)**

As documented in Section 4.4.2, Existing Plus Project Conditions , the proposed Project would generate approximately 16 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 16.8 percent below the regional average of 14.2 HBW VMT per employee. Therefore, the project would have a significant impact on VMT. A comparison between the Bay Area region and East of 101 per-employee VMT averages are presented in **Table 4.1**.

Table 4.1 VMT Impact Determination

Location	Total HBW VMT *(a)*	Total Employment *(b)*	HBW VMT per Employee *(a) / (b)*
Bay Area Region	60,994,917	4,285,001	14.2
East of 101 Area	572,219	35,831	16.0
		VMT Per Employee Threshold	**11.8**
		Project VMT Impact?	**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.

TRANS-1 As part of the proposed Project, the applicant shall design and fund the following off-site improvements to support the Project's first- and last-mile TDM strategies necessary to support auto trip reduction measures.

- Eastbound and westbound Class II buffered bicycle lanes along Forbes Boulevard between Allerton Avenue and Eccles Avenue, spanning approximately 2,000 linear feet. The improvement consists primarily of restriping the curbside vehicle travel lane in each direction to a Class II buffered bicycle lane, signage, and bicycle traffic signal detection upgrades at Eccles Avenue as required. The bicycle facility will close a gap between existing bicycle lanes to the east and a planned Class I shared-use pathway between Forbes Boulevard / Eccles Avenue and the South San Francisco Caltrain station. When implemented, the bicycle lanes will provide dedicated bicycle facilities between the Project site and two regional transit stations: the Downtown South San Francisco Caltrain Station and the South San Francisco Ferry Terminal, enabling first- and last-mile bicycle connections to regional transit.
- A marked crosswalk and necessary accessibility improvements per City standards across the west leg of the Allerton Avenue and Forbes Boulevard intersection, enabling direct pedestrian connectivity to the closest existing first- and last-mile shuttle stop at Allerton Avenue and Cabot Road.
- Accommodation for a potential future on-street shuttle stop along the Forbes Boulevard frontage. Provide a minimum 5-foot long by 8-foot wide (as measured perpendicular to the curb) sidewalk within the public right-of-way adjacent to the Project frontage, located approximately 50-feet downstream from the Forbes Boulevard and Allerton Avenue intersection. The existing curb alignment would not be substantially altered, and the final configuration should be reviewed by City staff. The Project shall coordinate with Commute.org and/or Genentech's gRide transportation program to determine the most appropriate on-street location for shuttle service (whether at this location on Forbes Boulevard or at another location within approximately ¼ mile of the Project site).

Significance after Mitigation: Implementation of Mitigation Measure TRANS-1 supports and enables the first- and last-mile non-auto commute strategies in the Project's TDM plan. However, this mitigation measure is unlikely to reduce the Project impact on VMT by 26 percent to reach a less-than-significant level. Therefore, this impact would be significant and unavoidable.

4.1.2 Freeway Ramp Queuing

Impact TRANS-2: **Development of the proposed Project would not add vehicle trips to existing freeway off-ramp vehicle queues that exceed storage capacity resulting in a potentially hazardous condition. (*Less than Significant*)**

As documented in Section 4.4.2, Existing Plus Project Conditions , Project vehicle trips that could interfere with the freeway mainline are concentrated at study locations #1, US-101 Southbound off-ramp at Oyster Point Boulevard, and #2, US-101 Northbound off-ramp at East Grand 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.

Mitigation Measures: None required

4.1.3 Unsignalized Intersections

Impact TRANS-3: **Development of the proposed Project would increase total vehicle volumes passing through an all-way stop controlled intersection operating at baseline LOS E or F by two percent or more or when a side-street stop controlled approach is at a baseline LOS F. Side street stop criteria are applicable only for approaches with more than 25 trips during any peak traffic hour.**

The Forbes Boulevard and Allerton Avenue intersection is the sole major stop-controlled intersection in the vicinity of the Project site and is expected to operate at LOS E or F only during cumulative no project conditions. However, Project traffic entering the intersection is less than two percent of total cumulative no project volume. Therefore, a traffic signal warrant analysis or further study was not performed.

Mitigation Measures: None required

4.2 Bicycle, Pedestrian, and Transit

Impact TRANS-4: **Development of the proposed Project would produce a detrimental impact to existing bicycle or pedestrian facilities, or conflict with adopted plans and programs (*Less than Significant with Mitigation*)**

Project site bicycle and pedestrian access is provided via a pathway that connects the main building entrance directly with Forbes Boulevard. Secondary access is provided via the proposed Class I shared-use bicycle and pedestrian trail as described in Section 1, which provides a strong non-auto linkage to the east. On-site connectivity is consistent with the City's multimodal site design objectives, but off-site improvements must be strengthened to meet the City's Pedestrian Master Plan access policies and General Plan complete street policies concerning reconstructed facilities, both of which are identified in Appendix B, Relevant Policies and Plans.

Specifically, the Project is disturbing existing sidewalk along the Forbes Boulevard frontage, including a portion that intersects the west leg of the Allerton Avenue and Forbes Boulevard intersection where a marked, accessible crosswalk is missing under existing conditions, likely since the ideal crosswalk alignment would conflict with an existing driveway along the Project site. This driveway is being removed as part of the Project, and the missing crosswalk shall be installed to provide full pedestrian connectivity at all legs of the intersection for consistency with City policy.

Mitigation Measures:

TRANS-4 As part of the proposed project, the applicant shall design and implement the Forbes Boulevard and Allerton Avenue crosswalk improvements described in mitigation measure **TRANS-1**.

Significance after mitigation: Implementation of Mitigation Measure TRANS-3 would upgrade a pedestrian facility disturbed by the Project to include a missing crosswalk at stop-controlled intersection, thereby providing connectivity consistent with the City's Pedestrian Master Plan goals and Complete Street policies

concerning altered facilities. This Mitigation Measure would reduce Project pedestrian impacts to less-than-significant levels.

Impact TRANS-5: Project development or project traffic would produce a detrimental impact to local transit or shuttle service *(Less than Significant with Mitigation)*

As a measure of vehicle congestion, level of service is a reasonable proxy to evaluate the Project's effect on transit operations. The existing no project traffic operations analysis presented in **Appendix A** show several major intersections in the East of 101 area near the Project site operate at levels of service below the City's General Plan standard of LOS D. The two intersections that operate below the City's LOS standard are traversed by first- and last-mile public Commute.org shuttles that serve the Project site but Project vehicle trips are not anticipated to cause any intersection to change from acceptable to unacceptable LOS. Under cumulative no project conditions, most intersections operate at unacceptable LOS but the addition of Project vehicle trips are not anticipated to cause any intersection to change from acceptable to unacceptable LOS. Therefore, the Project's impacts to local transit or shuttle service are less-than-significant.

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 vehicle 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, it 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[4]
- *California Air Resources Board* (CARB) *2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals*, California Air Resources Board, January 2019[5]
- *Local Development – Intergovernmental Review Program Interim Guidance, Implementing Caltrans Strategic Management Plan 2015-2020 Consistent with SB 743*, Caltrans, November 9, 2016[6]

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 approximately 16.8 percent lower than existing, and overall per-capita vehicle travel would need to be

[4] http://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf
[5] https://ww2.arb.ca.gov/sites/default/files/2019-01/2017_sp_vmt_reductions_jan19.pdf
[6] https://dot.ca.gov/programs/transportation-planning/office-of-smart-mobility-climate-change/sb-743

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 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 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 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[7] 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 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.

[7] CAPCOA (2010) Quantifying Greenhouse Gas Mitigation Measures, p. 55, available at http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

Appendix B: Relevant Plans and 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, I-380 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 Proposed 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 Proposed 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, the Project sponsors are pursing the FAR bonus program and are subject to a 35% non-drive alone mode share target and the more rigorous monitoring and enforcement mechanisms described above.

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 that also outlines a process for obtaining C/CAG approval.

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 except at intersections within ¼ mile of rail stations or ferry terminals. 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 preformed 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 6th Edition methodology.

Table C.1 Signalized Intersection LOS Criteria

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10 and ≤ 20
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20 and ≤ 35
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volume-to-capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35 and ≤ 55
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 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 of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no traffic delays.	≤ 10
B	Short traffic delays.	> 10 and ≤ 15
C	Average traffic delays.	> 15 and ≤ 25
D	Long traffic delays.	> 25 and ≤ 35
E	Very long traffic delays.	> 35 and ≤ 50
F	Extreme traffic delays with intersection capacity exceeded.	> 50

Source: Transportation Research Board, 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, 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 Proposed Project. The study intersections are listed below and shown on **Figure C-1** and listed below.

1. Forbes Boulevard / Allerton Avenue
2. Forbes Boulevard / Eccles Avenue
3. Forbes Boulevard / E Grand Avenue
4. Gateway Boulevard / E Grand Avenue
5. Grand Avenue / E Grand Avenue
6. Grand Avenue / Dubuque Avenue
7. Gateway Boulevard / S Airport Boulevard
8. Gateway Boulevard / Oyster Point Boulevard
9. S Airport Boulevard / Airport Boulevard / Produce Avenue

Existing Conditions

The existing conditions section include the existing no project and existing plus project scenarios. **Figure C-2**, 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 nine study intersections.

Figure C-1 Study Intersection Locations

Figure C-2 Existing Traffic Volume

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 estimates presented previously were used as the basis for assigning Project-generated vehicle trips to the local transportation network and nine study intersections. **Figure C-3**, Project Trip Assignment, presents vehicle trip assignment at the nine study intersections and **Figure C-4**, 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

Intersection		Traffic Control	Peak Hour	Existing Conditions		Existing Plus Project	
				Average Delay	LOS	Average Delay	LOS
1	Forbes Boulevard / Allerton Avenue	AWSC	AM	12.4	B	12.6	B
			PM	21.1	C	21.6	C
2	Forbes Boulevard / Eccles Avenue	Signal	AM	11.2	B	10.9	B
			PM	25.8	C	25.9	C
3	Forbes Boulevard / E Grand Avenue	Signal	AM	34.5	C	34.4	C
			PM	**65.9**	**E**	**65.7**	**E**
4	Gateway Boulevard / E Grand Avenue	Signal	AM	48	D	51	D
			PM	44.5	D	44.5	D
5	Grand Avenue / E Grand Avenue	Signal	AM	17.2	B	21.1	C
			PM	10.8	B	10.8	B
6	Grand Avenue / Dubuque Avenue	Signal	AM	6.1	A	6.0	A
			PM	42.2	D	42.2	D
7	Gateway Boulevard / S. Airport Boulevard	Signal	AM	44.1	D	43.9	D
			PM	**>80**	**F**	**>80**	**F**
8	Gateway Boulevard / Oyster Point Boulevard	Signal	AM	**>80**	**F**	**>80**	**F**
			PM	53.1	D	54.1	D
9	S. Airport Boulevard / Airport Boulevard / Produce Avenue	Signal	AM	36.9	D	37	D
			PM	42.8	D	43.6	D

Notes: **Bold** indicates unacceptable LOS E or F. Delay reported as seconds per vehicle. LOS based on the methodology in the Highway Capacity Manual 6th Edition. Intersections 2, 6, and 8 were analyzed based on HCM 2000. Signalized and all-way stop control (AWSC) 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 Project Trip Assignment

Figure C-4 Existing Plus Project Traffic Volume

All intersections operate under LOS D or better during AM and PM peak hours in both scenarios except for intersections #7 Gateway Boulevard / S Airport Boulevard and #8 Gateway Boulevard / Oyster Point Boulevard. Intersection #7 operates at LOS F during the PM peak hour under existing and existing plus project conditions. Intersection #8, Gateway Boulevard / Oyster Point Boulevard and 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 95th 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 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

US-101 Northbound Freeway On-Ramp Location		Lanes	Storage Length	Existing Conditions		Existing Plus Project	
				Volume	Queue Length	Volume	Queue Length
1	Oyster Point Boulevard	2 + 1 HOV	500	1,384	**>500**	1,414	**>500**
2	Produce Avenue	2	1500	1,806	200	1,843	250

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-5**, 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-6**, 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 nine study intersections.

Table C.5 Peak Hour Intersection Levels of Service: Cumulative Conditions Scenarios

Intersection		Traffic Control	Peak Hour	Cumulative Conditions		Cumulative Plus Project	
				Average Delay	LOS	Average Delay	LOS
1	Forbes Boulevard / Allerton Avenue	AWSC	AM	**>50**	**F**	**>50**	**F**
			PM	**>50**	**F**	**>50**	**F**
2	Forbes Boulevard / Eccles Avenue	Signal	AM	11.8	B	11.6	B
			PM	28.7	C	29	C
3	Forbes Boulevard / E Grand Avenue	Signal	AM	**>80**	**F**	**>80**	**F**
			PM	**>80**	**F**	**>80**	**F**
4	Gateway Boulevard / E Grand Avenue	Signal	AM	**>80**	**F**	**>80**	**F**
			PM	**>80**	**F**	**>80**	**F**
5	Grand Avenue / E Grand Avenue	Signal	AM	18.7	B	31.5	C
			PM	**>80**	**F**	**>80**	**F**
6	Grand Avenue / Dubuque Avenue	Signal	AM	7.3	A	7.2	A
			PM	**>80**	**F**	**>80**	**F**
7	Gateway Boulevard / S. Airport Boulevard	Signal	AM	48.2	D	48.4	D
			PM	**>80**	**F**	**>80**	**F**
8	Gateway Boulevard / Oyster Point Boulevard	Signal	AM	**>80**	**F**	**>80**	**F**
			PM	**>80**	**F**	**>80**	**F**
9	S. Airport Boulevard / Airport Boulevard / Produce Avenue	Signal	AM	50.2	D	50.4	D
			PM	**>80**	**F**	**>80**	**F**

Notes: **Bold** indicates LOS E or F. Delay reported as seconds per vehicle. LOS is based on the methodology in the Highway Capacity Manual 6th Edition. Intersections 2, 6, and 8 were analyzed based on HCM 2000. Signalized and all-way stop control (AWSC) 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.

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Figure C-5 Cumulative Traffic Volume

Figure C-6 Cumulative Plus Project Traffic Volume

Freeway On-Ramp Queuing

Table C.6 shows estimated 95th 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 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 On-Ramp Location		Lanes	Storage Length	Cumulative Conditions		Cumulative Plus Project	
				Volume	Queue Length	Volume	Queue Length
1	Oyster Point Boulevard	2 + 1 HOV	500	2,756	**>500**	2,788	**>500**
2	Produce Avenue	2	1500	3,254	800	3,291	1,150

Notes: Bold type indicates conditions where queue length exceeds storage capacity. Storage distance and queues in feet per lane.
Source: Fehr & Peers, 2020