ATTACHMENT D

TRAFFIC OPERATIONS AND VEHICLE MILES TRAVELED

FEHR PEERS

Memorandum

Date: December 19, 2019

To: Yuri Suzuki, NBBJ

From: Jarrett Mullen and Bob Grandy, Fehr & Peers

Subject: Kilroy Oyster Point Phase 2-4 Informational VMT Assessment

SF19-1027

This memorandum presents Fehr & Peers' informational vehicle miles travelled (VMT) assessment for the Kilroy Oyster Point Phase 2-4 development (Project) in the City of South San Francisco, CA. The Project is in the East of 101 employment area and includes approximately 2.3 million square feet of office and research and development (R&D) space in ten buildings on 35 acres.

This informational assessment was prepared to accompany Project entitlement applications that are tiering from the 2011 Oyster Point Specific Plan Environmental Impact Report (EIR). Accordingly, a full CEQA VMT assessment and related impact determinations are not included in this memorandum, but the technical methodology follows December 2018 technical guidance from the Governor's Office of Planning and Research (OPR) and presents a high-level Project VMT estimate based on the best available analysis tools. The Project's effect on VMT was not analyzed.

Fehr & Peers compared regional and local home-based work trip VMT per employee using base year (2015) data from the City County Association of Governments of San Mateo County (C/CAG) travel demand forecasting model. The local data were obtained from a transportation analysis zone (TAZ) that includes the Project site in the East of 101 Area.

Key Findings include:

- **Project VMT Per Employee:** 16.1 VMT is the estimated per employee, home-based work VMT for the Oyster Point Area and is representative of Project conditions.
- **Regional Comparison:** The nine county Bay Area average VMT per employee is 14.2 VMT. The Governor's Office of Planning and Research guidance recommends office land development projects generate 15 percent less VMT than the regional average.
- **Supplemental EIR Applicability:** Should Project entitlement occur after July 1, 2020, additional VMT analysis is likely required as part of a supplemental EIR.

Regulatory and Policy Background

With the 2006 adoption of Assembly Bill 32 (AB32), the Global Warming Solutions Act, the California State Legislature identified anthropogenic climate change as growing problem that must be addressed. The law requires statewide greenhouse gas (GHG) emissions reductions to 1990 levels by 2020, a reduction of approximately 15 percent below emissions expected under a business as usual scenario. The AB32 Scoping Plan identified transportation sector is the largest source (37%) of GHG emissions in California, most of which comes from passenger vehicles[1].

Recognizing the relationship between transportation and GHG emissions, the legislature sought to align California Environmental Quality Act (CEQA) analysis practices with statewide GHG reduction policy. Senate Bill 743 (SB 743) was passed in 2013 which required changes to the transportation impact analysis Guidelines implementing the California Environmental Quality Act (CEQA Guidelines). Historically, project transportation impacts were measured using level of service (LOS), a vehicle congestion metric, which SB743 identified as counter to reducing GHG emissions from vehicle travel. Road widening, suppressed transit-oriented development, and ultimately higher transportation GHG emissions were deemed outcomes of a LOS-based transportation assessment practices.

Vehicle miles traveled (VMT) was identified by the California Natural Resources Agency as the most appropriate metric to evaluate a project's transportation impacts under CEQA. In the context of CEQA evaluations of land use projects, VMT refers to the amount and distance of auto travel attributed to a project. With the changes in the CEQA guidelines approved in December 2018, July 1, 2020 is the statewide date when LOS and other measures of congestion may not be used by lead agencies for environmental analysis.

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VMT Impact Threshold

Cities, counties, and other lead agencies are in the process of updating their transportation impact thresholds and methodologies, including the City of South San Francisco. The City is presently coordinating the necessary updates with *Shape SSF,* the 2040 General Plan update process. Since updated City VMT policies are under development, Fehr & Peers is referring to the December 2018 Governor's Office of Planning and Research *Technical Advisory on Evaluating Transportation Impacts in CEQA* (Technical Advisory) to conduct this informational assessment

[1] Climate Change Scoping Plan, 2008; and, ca50million.ca.gov/transportation; 37% of statewide GHG emissions are estimated to originate directly from transportation. When accounting for industrial and tailpipe emissions, transportation accounts for nearly half of the State's greenhouse gas emissions.

which recommends that office projects exceeding a level of 15 percent below existing regional VMT per employee may indicate a significant transportation impact.

Project Background

The Project is in the Oyster Point Specific Plan area in the City of South San Francisco's East of 101 employment area. Site improvements include approximately 2.3 million square feet of office and research and development (R&D) space in ten buildings along the Oyster Point Boulevard corridor. Approximately 8,000 to 10,000 employees are estimated to occupy the site under full buildout conditions based on data from the Project Sponsor. The site plan is shown in **Figure 1.**

While the Project is currently under entitlement review, key Project characteristics such as land use and travel demand were analyzed programmatically in 2011 as part of the Oyster Point Specific Plan Environmental Impact Report (EIR). It is understood that a supplemental EIR is not currently under consideration for the Project.

Should Project approval occur after July 1, 2020 the Project may be subject to expanded environmental review to fully assess the Project's potential VMT impacts. Since this assessment was prepared for informational purposes, a high-level analysis is presented. The Project Sponsor and affiliates may wish to consult with legal counsel to determine what, if any, supplementary analysis is required should approval occur after July 1.

Methodology

The California Environmental Quality Act generally defers to lead agencies on the choice of methodology to analyze impacts. Since the City of South San Francisco is currently developing VMT thresholds of significance and analysis methodologies, Fehr & Peers referred to the December 2018 Governor's Office of Planning and Research *Technical Advisory on Evaluating Transportation Impacts in CEQA* (Technical Advisory), which includes a series of applicable recommendations that Fehr & Peers followed when conducting the analysis.

Travel Demand Model Selection

As a measure of the amount and distance of vehicle travel, VMT analysis for land use projects requires a method and tool that can estimate vehicle travel among geographic areas. Two travel demand forecasting models are capable of estimating VMT in the Project area: The Metropolitan Transportation Commission (MTC) model and the C/CAG model. The MTC model is tour-based and the C/CAG model is trip-based. The C/CAG model was used for this analysis since it has greater land use and transportation network detail in South San Francisco.

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Figure 1

Project Site Plan

Travel Demand Model Analysis

To complete the trip-based Project VMT analysis, Fehr & Peers estimated local and regional VMT per employee by obtaining home-based work trip lengths and employee population data from the C/CAG travel demand forecasting model. The Project's per-employee VMT was estimated based on home-based work trip lengths and employee population data associated with a transportation analysis zone (TAZ) in the Oyster Point area. This approach is illustrated in **Figure 2**.

It should be noted that this data is representative of the travel existing transportation characteristics in the area and does not account for the Project's effect on travel behavior but is a reasonable proxy of travel under Project conditions. The size and use of the Project would likely affect regional vehicle travel if anticipated land use and employee population parameters are added to the C/CAG model. However, the C/CAG model's key land use inputs must be updated, calibrated, and validated to conduct this analysis. This level of effort would be suitable for an environmental assessment but the Project's estimated per-employee VMT would likely exceed the OPR-recommended threshold due to the land use and transportation characteristics of the Project setting.

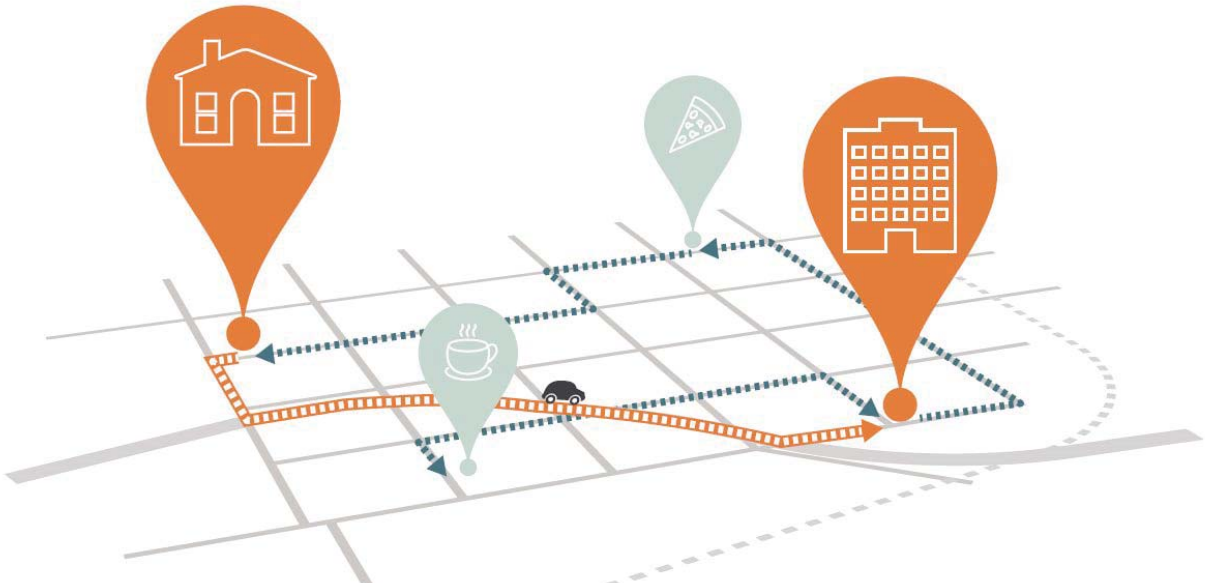


Figure 2: *Drivers typically visit multiple destinations during the day. This analysis focused on* ***home-based work trips,*** *which is a reasonable proxy to estimate Project VMT. The orange line is a typical home-based work trip segment*

Analysis & Findings

Results from the home-based work VMT analysis are presented in **Table 1.** Estimated Oyster Point area home-based per-employee trip lengths are 16.1 VMT which is higher than 14.2 VMT, the regional average. The estimate generally aligns with the transportation and land use characteristics of the Project site. Suburban, car-dependent employment centers typically have higher VMT due to limited regional transit access, lower density, and less diverse land uses. While the Oyster Point and East of 101 Area have shuttle and Ferry service, they are currently uncompetitive with auto travel for most trip ends.

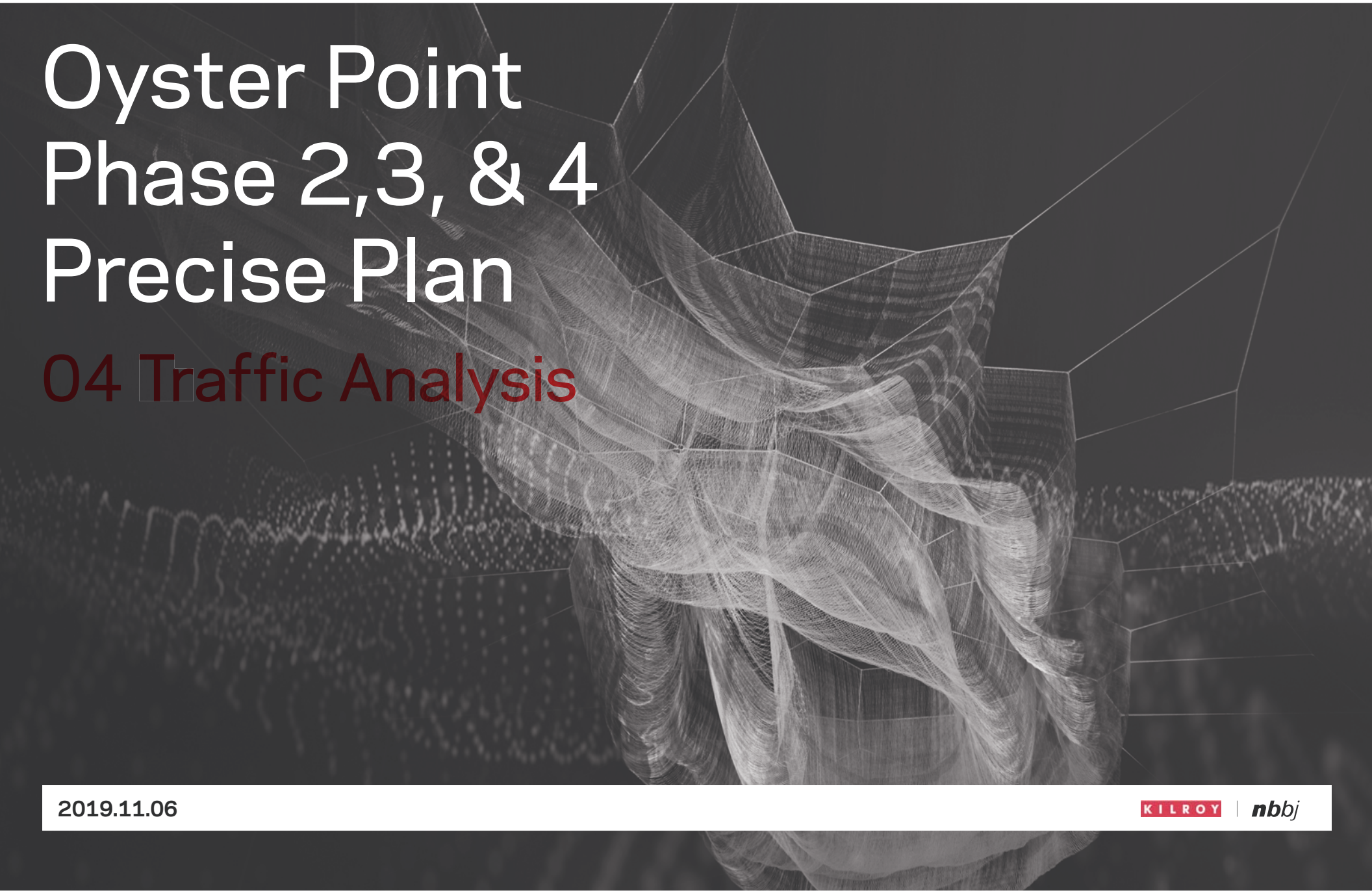
Table 1: Estimated Weekday Daily Per-Employee VMT[1] Base Year: 2015

	Regional	Existing No Project	Existing Plus Project
Home-Based Work VMT (A)	60,734,355[2]	110,726	*Requires Additional Modeling*
Employee Population (B)	4,269,979	6,881	
Per Employee VMT (A/B = C)	14.2	16.1	
Comparison to OPR Recommended Impact Threshold[3]			
		VMT Per-Employee Threshold	12.1 (Project Exceeds)

Notes:

1. The data are based on year 2015 estimates from the C/CAG travel demand forecasting model.
2. The C/CAG model truncates VMT estimates at regional boundaries which is a discouraged practice for environmental review but is presented as a planning-level comparison.
3. The City of South San Francisco are developing but have not adopted VMT thresholds of significance. This threshold reflects 15 percent below the regional average, the threshold of significance recommended for office projects in the Governor's Office of Planning and Research *Technical Advisory on Evaluating Transportation Impacts in CEQA*. This comparison is presented for information and additional analysis is necessary for impact determinations under CEQA.

As noted previously, office projects with estimated per-employee VMT exceeding a level of 15 percent below existing regional VMT per-employee may indicate a significant transportation impact. In this planning-level analysis, VMT per-employee within the Project's TAZ is greater than 12.1 VMT and may have a significant impact if analyzed in greater detail as part of an environment assessment. The Governor's OPR Technical Advisory describes a range of potential mitigation measures for land use projects exceeding VMT thresholds, including: improving access to transit, goods, and services; incorporate housing; price and/or limit parking supply; improve bicycle and pedestrian networks; and, implement or provide access to a commute reduction program.



Oyster Point Phase 2,3, & 4 Precise Plan

04 Traffic Analysis

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04 Traffic Report

MEMORANDUM

Date: July 23, 2019

To: Yuri Suzuki, NBBJ

From: Geoff Rubendall and Jarrett Mullen, Fehr & Peers

Subject: Kilroy Oyster Point Phase 2-4 Traffic Operations Review

SF19-1027

This memorandum summarizes Fehr & Peers' traffic operations analysis of intersections proposed to provide access for the Kilroy Oyster Point development project (Project), located in the Oyster Point Specific Plan area in the City of South San Francisco, CA. This memorandum is not intended to be used for environmental review purposes. Instead, this document addresses Fehr & Peers' efforts related to the Project's traffic operations along roadways internal to the site. Additionally, a summary of the access and circulation review of parking facilities, bikeways, and transit facilities are included. Phase 1 of the Project has been approved and is currently under construction. This memo focuses on the subsequent phases 2, 3, and 4.

Land Use & Trip Generation Assumptions

Approved in 2011, the Oyster Point Specific Plan's (OPSP) land use program includes a mix of office, research & development (R&D), hotel, retail and open space. Since approval of the specific plan, a proposed development in 2017 included a housing component, but the proposal did not advance beyond the initial planning stage. The Project represents a return to the original commercial and recreation-oriented uses of the 2011 OPSP. **Table 1** summarizes the land use assumptions of the Project, which collectively encompasses Phase 1D, 2, 3, and 4 from the OPSP's land use subareas.

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Table 1: Land Use Assumptions

Land Use	Units	Size	
		2011 Specific Plan Land Use Program	2019 Land Use Program[1]
Office / R&D	KSF	2,300	2,256[2]
Hotel	Rooms	350	0
Retail	KSF	40	0

Sources: Oyster Point Specific Plan & Kilroy Realty Corporation
Notes:
1. Includes Phase 2-4 and the Phase 1D site which is presently under construction. Phase 1D was not analyzed as part of this study.
2. Phase 2-4 includes 47,500 square feet of amenity space that is intended to primarily serve office tenants and visitors.

As shown in **Table 1**, the Project sponsor's proposed land use program closely aligns with the land development size and uses proposed in the OPSP. Approximately 40,000 square feet of retail space was proposed in the OPSP, which is not formally included in the current proposal. Instead, "amenity" spaces are proposed within each subarea that offer services oriented toward office tenants and visitors such as fitness and food service facilities. For the purpose of this report, the amenity spaces effectively serve internal trips and are not typically stand-alone destinations.

Fehr & Peers completed a trip generation analysis to compare the trip generation characteristics of the 2011 Specific Plan and 2019 Proposed Program. **Table 2** presents the trip generation comparison.

Table 2: Trip Generation Comparison

Scenario	AM Peak Hour	PM Peak Hour
A. Phase 1 – Under Construction[1]	417	398
B. Phase 2-4 – 2019 Proposed Project[2]	1,222	1,266
C. 2011 Oyster Point Specific Plan – All Phases[1]	1,873	2,127
Delta A+B-C:	**-234**	**-463**

Notes:
1. Trip generation forecasts obtained from the Oyster Point Specific Plan Environmental Impact Report.
2. Project trip generation estimates were prepared based on national standard trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*. Trip generation estimates were adjusted to account for to transportation demand management (TDM) measures required by City of South San Francisco's zoning ordinance and consistency with the 2011 OPSP.

04 Traffic Report

Traffic Analysis

Assumptions

Fehr & Peers analyzed traffic conditions under two scenarios: Existing Plus Project and Cumulative Plus Project. Under both scenarios, trip distribution--where travelers are headed-- was based on data from the OPSP EIR. Trip assignment--the routes travelers take to reach destinations-- was based on proposed parking garage locations, access points, and discussions with the project team. Roadway geometry data inputs, such as lane configuration, cross-sections, intersection locations, and intersection traffic control, was obtained from the OPSP, Phase 1D roadway improvements, and modifications based on discussion with the Project team.

In the Existing Plus Project scenario, Project trips were added to existing baseline conditions from OPSP. . The results are intended to illustrate near-term traffic conditions with full Project build-out. The cumulative scenario adds Project trips to year 2035 traffic volume projections obtained from the OPSP Environmental Impact Report and are intended to represent conditions with traffic from future non-Project growth.

Analysis Methodology

Using the land use, trip generation, and trip distribution assumptions discussed above, Fehr & Peers analyzed weekday AM and PM peak hour traffic conditions using microsimulation Synchro and SimTraffic software for both scenarios. The traffic simulation accounts for delays and queues under congested conditions, which characterize current peak-period traffic conditions along Oyster Point Boulevard. However, the analysis does not account for delays or queues related to internal roadway and driveway (e.g. garage) operations. However, Fehr & Peers qualitatively assessed garage access points where adjacent to external roadways, and findings are presented in the following section.

Intersection operations are measured using "level of service" (LOS). LOS is a qualitative description of traffic flow from a driver's perspective based on factors such as delay, speed, and travel time. Six levels of service are defined ranging from LOS A (free-flow uncongested conditions) to LOS F (congested, stop-and-go conditions). LOS E represents operations "at capacity," whereas LOS F represents over capacity. A summary of the intersection delay and LOS is shown for the AM and PM peak hours in **Table 3.** Study intersection locations, traffic volumes, and intersections are shown in **Figure 1** and **Figure 2.**

Table 3: AM & PM Peak Hour Intersection LOS / Delay

Intersection	Control[1]	Peak Hour	Delay[2, 3] / LOS	
			Existing Plus Project	Cumulative Plus Project
1. Oyster Point Blvd / Gull Dr / Phase 2 Driveway	Signal	AM PM	22.6 / C **>80 / F**	30.4 / C **>80 / F**
2. Oyster Point Blvd / Marina Blvd	Signal	AM PM	15.9 / B 45.4 / D	17.3 / B 44.4 / D
3. Oyster Point Blvd / Phase 2 Driveway	SSSC	AM PM	2.8 / A **>80 / F**	2.9 / A **>80 / F**
4. Oyster Point Blvd / Ph3-4 Garage Access A	Signal	AM PM	6.4 / A **>80 / F**	5.5 / A **75.6 / E**
5. Oyster Point Blvd / Ph3-4 Garage Access B	SSSC	AM PM	2.4 / A **>80 / F**	13.4 / B **>80 / F**
6. Oyster Point Blvd / Ph3-4 Garage Access A	SSSC	AM PM	4.3 / A **>80 / F**	13.7 / B **> 80 / F**

Notes:
1. SSSC = Side street stop controlled intersection
2. Delay expressed as seconds per vehicle. Side street stop controlled intersection report the delay and LOS for the intersection approach with the worst delay. Signalized intersection report the average intersection delay and corresponding LOS.
3. Delay reported in seconds.

Source: Fehr & Peers, 2019

As shown, the existing plus project and cumulative plus project operate similarly during the AM and PM peak hour. All study intersections except #2, Oyster Point Boulevard / Marina Boulevard operate at unacceptable LOS F in the PM peak hour. Intersection delay and LOS within the Project site are likely affected by downstream congestion and capacity constraints on westbound Oyster Point Boulevard, which are consistent with the OPSP EIR findings and analysis from the City of South San Francisco's Draft *Mobility 20/20 Plan*.

The *Mobility 20/20* Plan focuses on the East of 101 planning area, which includes the Project site, and notes that internal street congestion "primarily occurs during the PM peak period approaching the US-101 metering ramps, especially along Oyster Point Boulevard." Increasing capacity along the Oyster Point Boulevard would necessitate additional through lanes, which may be constrained by right-of-way and effectiveness would remain limited by mainline congestion on U.S. Highway 101.

04 Traffic Report

Gull Drive Access

A key difference between the Project access configuration and the OPSP conceptual circulation network is the Phase 2 parking facility access is provided at the Oyster Point Boulevard / Gull Drive intersection. The OPSP and the 2017 proposal concentrated all site access points along Oyster Point Boulevard north of the Marina Boulevard / Oyster Point Boulevard intersection. Including site access at the Gull intersection provides an alternative route to enter and exit the site, which allows more vehicles to exit and enter the site.

Intersection Traffic Control

Intersection traffic control was evaluated at intersections #4 through #6 which are along a roadway segment that will be reconstructed as part of the Project and provide primary vehicular access to the Phase 3 and 4 parking garage. A traffic signal is proposed at intersection #4, while #5 and #6 are proposed as side-street stop-controlled intersections. Fehr & Peers conducted peak-hour signal warrants at all intersections and while intersection #4 does not meet the warrant based on volumes alone, a traffic signal is recommended due to the high anticipated pedestrian volumes, east-west bikeway crossing[1].

Intersections #5 and #6 do not satisfy traffic signal warrants and it is assumed the garage driveway approaches to the intersection will be stop controlled. Intersection #6 includes a marked, uncontrolled crosswalk on the north leg of the intersection which is the primary pedestrian link between the garage and Phase 4 buildings. The crosswalk includes a median refuge island to enhance pedestrian visibility and increase motorist yielding behavior. Rectangular rapid flashing beacons (RRFB's) with standard pedestrian warning signage are recommended at this crosswalk.

Access & Circulation Review

The following is a summary of the major tasks, findings, and recommendations Fehr & Peers provided to the Project team throughout the Project's schematic design phase.

[1] Under Existing Plus Project conditions, the estimated traffic volumes are between 90 to 100 percent of the volumes necessary to meet the peak-hour signal warrant. Any substantial redevelopment to the north, outside of the Project area, would likely increase approach volumes, thus likely meeting the peak-hour signal warrant

Bicycle & Pedestrian Circulation

The Oyster Point Boulevard / Phase 3+4 Garage Access A intersection is a key vehicular, pedestrian, and bicycle connection. The intersection is anticipated to be a major vehicular link to the Phase 3 and 4 garage and pedestrian crossing for motorists to access the buildings on the west side of Oyster Point Boulevard and their parked vehicles. A San Francisco Bay Trail spur crosses Oyster Point Boulevard at this intersection and is an important east-west off-street bicycle corridor that connects the Project site to the South San Francisco Ferry Terminal and permits through cyclists to bypass an alternate circuitous route.

Based on review of the OPSP circulation goals and feedback from the Bay Conservation Development Commission (BCDC) received via Project team discussions, Fehr & Peers recommended a protected intersection design which was incorporated at the schematic design level. A protected intersection physically separates bicyclists from motor and pedestrian traffic on all intersection approaches and the design intent is to enhance safety for all modes and reduce bicyclist stress. Traffic signal phasing may also include protected bicycle phases separated from motor vehicle movements which would require further evaluation as part of traffic signal design prepared for the construction design stage.

The San Francisco Bay Trail will be reconstructed along the western edge of the Project site and the east-west connector mentioned above will be widened. As landscape, civil, and lighting plans are developed, Fehr & Peers recommends any reconstructed portion of the San Francisco Bay Trail be designed per the *San Francisco Bay Trail Design Guidelines and Toolkit*, and Caltrans design standards for Class I multi-use trails, where appropriate.

Pedestrian facilities including sidewalks and crosswalks are proposed between buildings, along and across public roadways serving the Project site.

Transit Facilities & Network Configuration

The OPSP encourages site design that is conducive to alternative modes, including transit. Except for the South San Francisco Ferry Terminal, the Project site is not within walking distance of regional transit service, such as Caltrain and BART. Access to these services are provided by feeder shuttles operated by Commute.org. Currently, three commute.org shuttle routes provide service along and to the northern end of Oyster Point Boulevard and connect the Project site with the South San Francisco BART and Caltrain stations and the South San Francisco Ferry terminal. During the weekday AM and PM peak period, each shuttle route operates on approximately 30-minute

04 Traffic Report

headways in the peak direction and are timed to connect with arriving or departing ferries and Caltrain service. Service is limited to weekday commute periods and directions.

The Project proposes new on-street shuttle stops which may be used by commute.org shuttles or other providers which are generally more efficient for through-running transit service with multiple stops on a line. All Project bus stops are configured with pull-out lanes integrated with the roadway section. Note that the eastbound stop adjacent to the Phase 1 development was approved and under construction at the time of this analysis and it is not configured in the same way as the proposed bus stops in Phase 2, 3, and 4.

Additional Considerations

As noted in the analysis section, Project access and mobility in the weekday PM peak period are constrained by downstream congestion and roadway capacity within the East of 101 area and U.S. Highway 101. With key roadways operating at capacity, the City of South San Francisco's Draft *Mobility 20/20* plan includes a range of multimodal improvement strategies to maintain efficient operations, enhance capacity, reduce vehicle miles traveled (VMT), and reduce drive alone mode share.

Roadway capacity enhancements are proposed, including transit-only lanes along Oyster Point Boulevard between Eccles and Gateway Boulevard, which would reduce travel time for passengers connecting with BART and Caltrain. Shuttle route alignment optimizations are also proposed to provide fast and efficient connectivity with the renovated South San Francisco Caltrain Station, which by 2022 is anticipated to have peak-period train service every 15 minutes in both directions.

The City of South San Francisco are actively planning and designing traffic signal coordination and optimization upgrades along key corridors within the East of 101 area. The traffic signal hardware and programming upgrades will allow for dynamic, demand-responsive coordination that typically yields travel time reliability improvements, although congested conditions will likely remain.

Key Findings

The Project trip generation forecast is lower than the trip generation forecast from the OPSP EIR, indicating that the Project size and use are consistent with the transportation characteristics of the land use program analyzed in the EIR. However, the traffic volume projections include a reduction for Transportation Demand Management (TDM) programs, which will need to be initiated and overseen by the Project sponsor or affiliate.

Despite trip reductions from a comprehensive TDM program, under Project buildout, weekday PM peak hour traffic conditions in the outbound direction will likely be congested and drivers will experience delays. Much of the congestion is related to downstream capacity limits on Oyster Point Boulevard and U.S. Highway 101 as documented in the OPSP EIR.