FEHR & PEERS

1919 O'Farrell Street, San Mateo

Transportation Impact Assessment

April 12, 2021

Prepared for the City of San Mateo

SF20-1129

Contents

1919 O'Farrell TIA Executive Summary

This transportation impact assessment (TIA) reviews transportation conditions at and adjacent to 1919 O'Farrell Street in the City of San Mateo. The proposed Project will not result in CEQA impacts on VMT, bicycle, pedestrian, or transit circulation, or hazards and emergency access. The proposed project would not cause the study intersection to exceed the level of service standard as specified in the City's Circulation Element of the 2030 General Plan, i.e. the acceptable level of service standards that were in place on August 4, 2020, at the time of the Senate Bill 330 Application.[1] The Project presents no adverse circulation issues and meets the code for design.

1919 O'Farrell
» 4 stories
» 49 multifamily apartments
» 64 parking spaces
**Image is a current representation of the project*

CEQA IMPACTS

» No significant VMT impact due to proximity to high quality transit (within a 1/2 mile of Hayward Park Caltrain Station)

Study Intersection
» Less than 1 second of additional delay during commute hours added by the project
» Acceptable traffic operations for all scenarios

O'Farrell Street

West 20th Avenue

ADDITIONAL TRANSPORTATION ANALYSIS

» **9** new AM peak hour and **12** new PM peak hour vehicle trips compared to existing land uses
» Driveway site distance and parking is compliant with code
» No vehicle queuing expected
» Study intersection does not warrant a signal
No adverse effects to vehicle circulation or Level of Service created by the project

» Project will generate new riders on Caltrain and SamTrans
No adverse effects to transit created by the project

» Minimal impact on neighborhood traffic
» No new hazards or impact to emergency access

» Pedestrians access the project site via the main staircase and ramps
» Sidewalks in good condition and meet ADA standards
No adverse effects to pedestrian circulation created by the project

54 long-term bicycle parking spaces on-site
4 short-term bicycle parking spaces on-site
No adverse effects to bicycle circulation created by the project

1. The developer submitted a Senate Bill 330 Application on August 4, 2020 that freezes codes and policies in effect of its submitted date.

Introduction

This transportation impact assessment (TIA) reviews transportation conditions at and adjacent to 1919 O'Farrell Street in the City of San Mateo. Conditions are evaluated for the current site without the proposed project, for plus project near-term conditions, and for cumulative 2040 conditions with and without the proposed project. The topics presented herein are based on the City of San Mateo's *Transportation Impact Analysis (TIA) Guidelines* (July 2020) and are intended to disclose the transportation related CEQA impacts and local transportation effects of the project. These topics include an assessment of vehicle level of service, vehicle miles traveled, site access and circulation, driveway site distance and vehicle queuing, parking, hazards and emergency vehicle access, and neighborhood traffic. Although the new TIA Guidelines were referenced to frame this report, the developer submitted a Senate Bill 330 Application on August 4, 2020 that freezes codes and policies in effect of its submitted date. At the time of application, the City had adopted the State's Office of Planning and Research (OPR) Updates to the CEQA Guidelines as the interim TIA Guidelines for VMT analysis. Those interim guidelines are followed in this report.

Methodology

The study area for this Project includes O'Farrell Street and West 20th Avenue in the vicinity of O'Farrell Street. The intersection of O'Farrell Street and West 20th Avenue is the sole study intersection[1]. Transportation conditions were evaluated for the weekday peak periods of 7:00-9:00 AM and 4:00-6:00 PM in a manner consistent with the interim TIA Guidelines at the time[2]. Due to COVID-19, Streetlight Data was used in lieu of in-person vehicle counts.

Based on recent changes to the California Environmental Quality Act (CEQA) guidelines with the implementation of SB 743 and guidance from the OPR, VMT is recommended as the appropriate measure of transportation impacts under CEQA. LOS and other similar vehicle delay or capacity metrics can no longer serve as transportation impact metrics for CEQA analysis. As stated in the interim TIA Guidelines, the City of San Mateo shifted to using VMT for CEQA impact evaluation

[1] Due to the small number of new trips the project is expected to generate during the peak hours, only the closest intersection at the end of the block was selected for operations analysis. The project driveway was selected for a qualitative review.

[2] The developer submitted a Senate Bill 330 Application on August 4, 2020 that freezes codes and policies in effect of its submitted date. At the time of application, the City had adopted the State's Office of Planning and Research (OPR) Updates to the CEQA Guidelines as the interim TIA Guidelines for VMT analysis.

but continues to evaluate LOS analysis for land use development projects through the non-CEQA local transportation analysis.

1919 O'Farrell Street - Project Description

The 1919 O'Farrell Street Project (herein described as the Project) proposes to construct a 4-story, 49-unit multifamily apartment community with subterranean parking. The Project site, as seen in Figure 1, is located at 1919 O'Farrell Street in the City of San Mateo, near San Mateo City Hall. Apartment amenities will include bike storage, a community room, private balconies, and a courtyard.

The Project is located on a 0.71-acre parcel with an existing 3,976 square foot building composed of four units. Two units are vacant and the other two are occupied by dentist offices. The Project proposes to demolish the existing building and construct a 55,541 square foot multifamily apartment community. An underground parking garage will be located beneath the site with 64 vehicle parking spaces. The garage will be accessed via O'Farrell Street.

Existing Transportation Conditions

Transportation topics are discussed in the following order: roadway network, pedestrian facilities, bicycle facilities, transit service, vehicle volumes and lane configurations, intersection level of service, and parking conditions.

Existing Roadway Network

As shown in Figure 1, the Project Site is located at the cul-de-sac terminus of O'Farrell Street. O'Farrell Street is one-block in length and intersects with West 20th Avenue. O'Farrell Street is the only entry and exit point to the site. El Camino Real and Alameda de las Pulgas are the two nearest regional access routes, both of which provide connection to State Route 92.

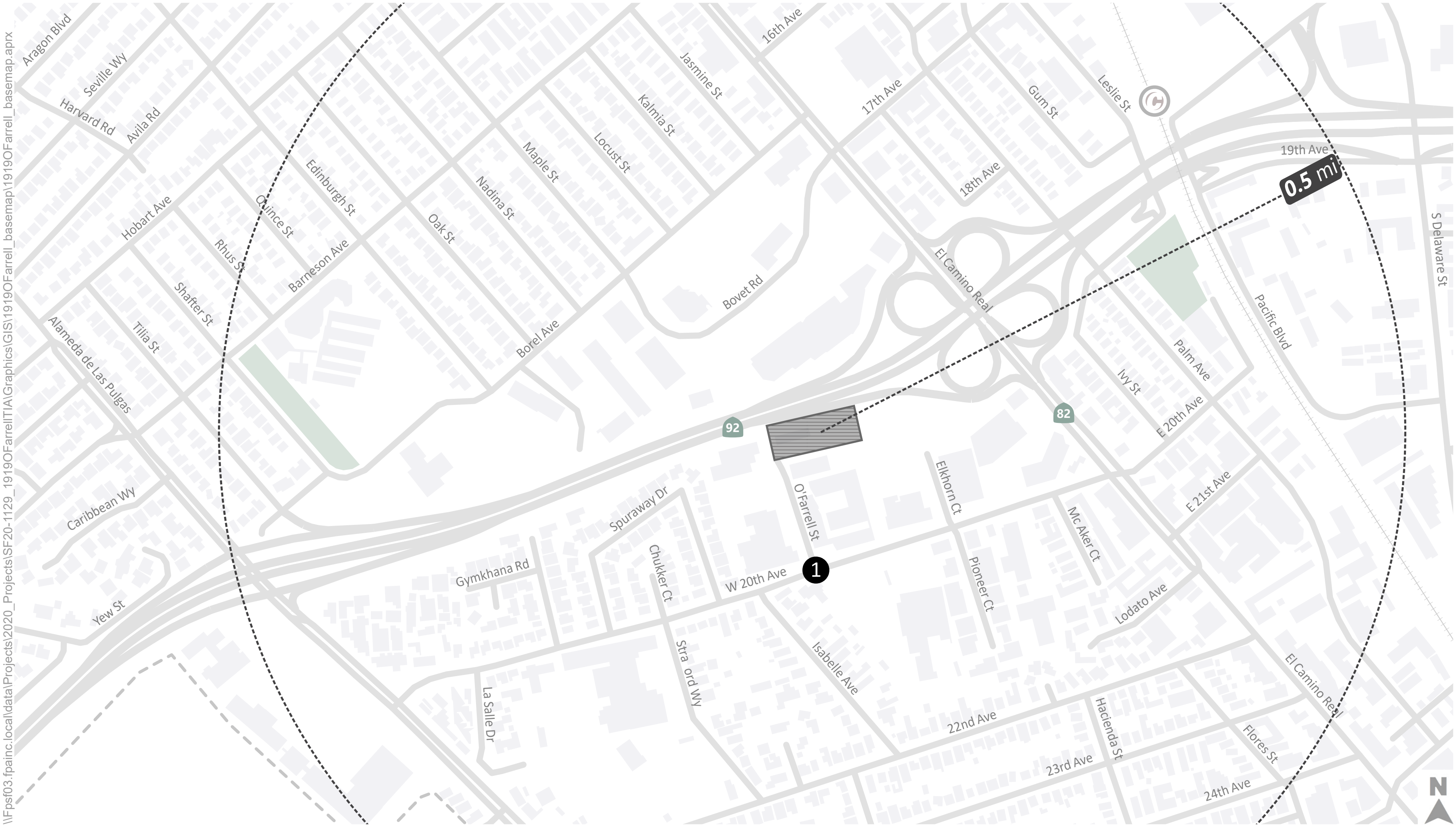
O'Farrell Street is a two-way north-south street with one travel lane in each direction and on-street parking and sidewalks on each side of the street. The roadway is approximately 35 feet wide and each sidewalk is approximately six feet wide. O'Farrell Street intersects West 20th Avenue to the south of the Project Site, with side-street stop control for O'Farrell Street.

West 20th Avenue is a two-way east-west collector street with one travel lane in each direction near the Project Site. Sidewalks are provided on both sides of the street and two-hour parking is permitted between Isabelle Avenue and La Salle Drive between 8 AM and 6 PM Monday through Friday. Closer to El Camino Real, West 20th Avenue becomes a four-lane road with two travels lanes in each direction and no on-street parking. The roadway is approximately 35 feet wide and each sidewalk is approximately six feet wide. Where West 20th Avenue intersects with O'Farrell Street, West 20th Avenue is not stop-controlled.

El Camino Real (State Route 82) is a two-way north-south street with three travel lanes in each direction and left-turn pockets at most intersections. The roadway has on-street parking and sidewalks on each side of the street. The roadway is approximately 95 feet wide and each sidewalk is approximately seven feet wide. El Camino Real meets West 20th Avenue east of the Project Site at a signalized intersection. El Camino Real connects to State Route 92 to the north of the Project Site, which connects travelers to I-280 and US-101.

Alameda de las Pulgas is a north-south street with two travel lanes in each direction. The roadway has on-street parking and sidewalks on each side of the street. The roadway is approximately 65 feet wide and each sidewalk is approximately four feet wide. Alameda de las Pulgas meets West 20th Avenue west of the Project Site at a signalized intersection. Alameda de las Pulgas also connects to State Route 92 to the north of the Project Site, which connects travelers to I-280 and US-101.

SR 92 is a four-to-six-lane east-west freeway extending from Half Moon Bay in west San Mateo County to Hayward in Alameda County. Project access to SR 92 is available via a full interchange at El Camino Real and at on/off ramps along Alameda de las Pulgas; both access points are approximately a half-mile from the Site.



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Project Site
Study Intersection
Unincorporated San Mateo County

Figure 1
Project Site

Existing Pedestrian Facilities

Sidewalks are provided on all approaches to the Project Site on O'Farrell Street and West 20th Avenue. Sidewalks are generally in good condition, with curb ramps at all intersections, and are approximately five to seven feet wide within the vicinity of the Project Site. The sidewalk narrows at the turnaround in front of the Project Site to approximately four and a half to five feet wide.

The intersection of O'Farrell Street and West 20th Avenue is a one-way stop-controlled intersection with only a marked east-west crosswalk. The crosswalk is faded in places. The nearest marked north-south crosswalk across West 20th Avenue from the Project site is at the intersection of West 20th Avenue and Isabelle Avenue, approximately 250 feet west of O'Farrell Street. There are no marked north-south crosswalks across West 20th Avenue between El Camino Real and Isabelle Avenue, which is approximately 1,500 feet.

Sidewalks on West 20th Avenue are approximately six feet wide and are generally in good condition. The West 20th Avenue and Chukker Court/Stratford Way intersection is two-way stop-controlled and, as a school zone crossing has marked yellow, high visibility zebra-striped crosswalks at three of the intersection approaches.

West 20th Avenue towards El Camino Real
Source: Fehr & Peers, 2020

Faded crosswalk O'Farrell and West 20th Avenue
Source: Fehr & Peers, 2020

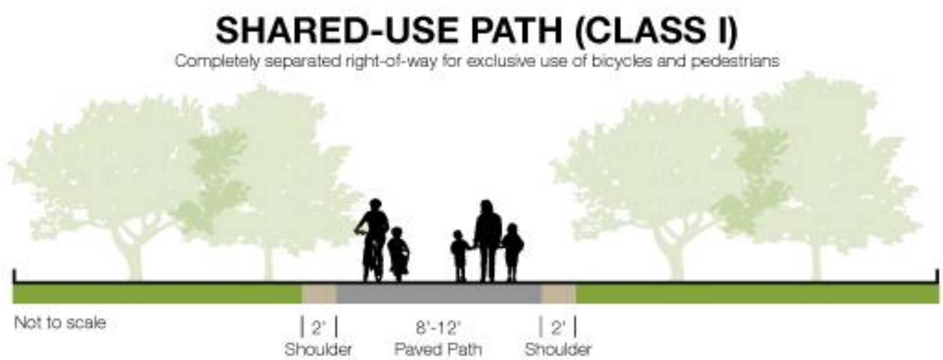
As pedestrians approach the intersection of West 20th Avenue and El Camino Real, the sidewalks widen from approximately six feet to seven feet but the northern sidewalk is cluttered with trees and poles that take up much of the available sidewalk space, as shown in the above photo. El

Camino Real is a signalized intersection with pedestrian push buttons and a crossing distance of approximately 95 feet in the east-west direction.

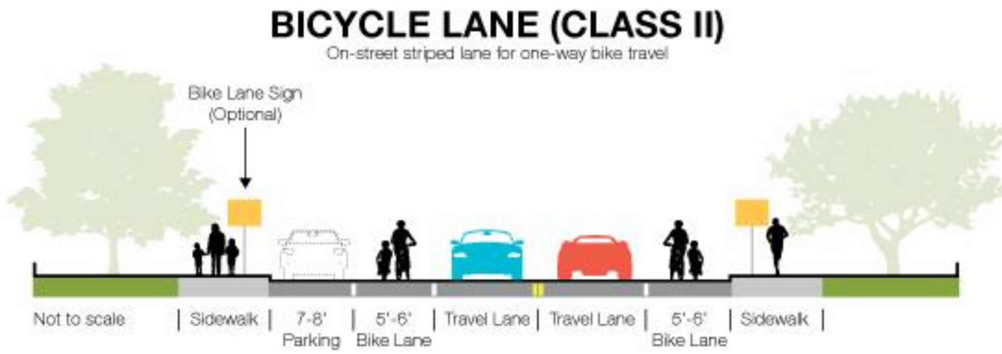
Existing Bicycle Facilities

Bikeway planning and design in California typically relies on guidelines and design standards established by California Department of Transportation (Caltrans) in the *Highway Design Manual* (Chapter 1000: Bikeway Planning and Design). The Caltrans guidelines cover four primary types of bikeway facilities: Class I, Class II, Class III, and Class IV. These facilities types are described below.

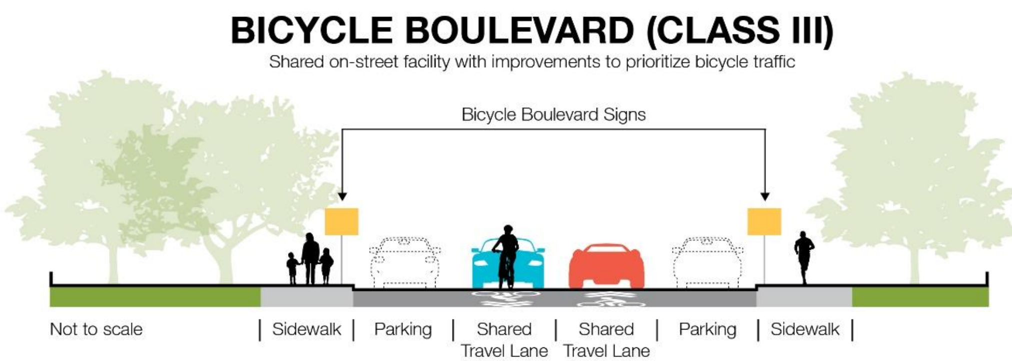
- *Class I Bikeway (Bike Path)* provides a completely separate right-of-way, is designated for the exclusive use of bicycles and pedestrians and minimizes vehicle and pedestrian cross-flow. In general, bike paths serve corridors that are not served by existing streets and highways, or where sufficient right-of-way exists for such facilities to be constructed.



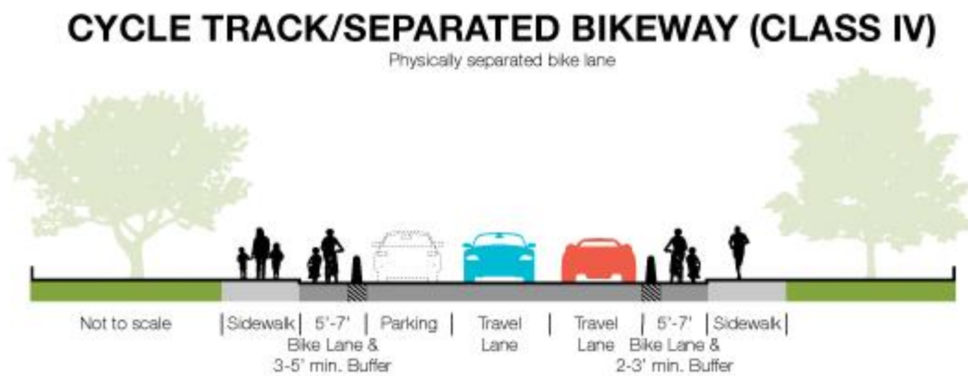
Class II Bikeways (Bike Lanes) are lanes for bicyclists generally adjacent to the outer vehicle travel lanes. These lanes have special lane markings, pavement legends, and signage. Bicycle lanes are generally five feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted. Note that when grade separation or buffers are constructed between the bicycle and vehicle lanes, these facilities are classified as Class IV Separate Bikeways.



- *<u>Class III Bikeway (Bicycle Routes/Bicycle Boulevards)</u>* are designated by signs or pavement markings for shared use with pedestrians or motor vehicles but have no separated bicycle right-of-way or lane striping. Bicycle routes serve either to a) provide continuity to other bicycle facilities, or b) designate preferred routes through high demand corridors. Bicycle routes are implemented on low-speed (less than 25 mph) and low-volume (less than 3,000 vehicles/day) streets. The San Mateo Bicycle Master Plan also designates a special subset of Bicycle Routes which include traffic calming treatments as Bicycle Boulevards. There are only bicycle boulevards proposed near the Project site.



- *<u>Class IV Bikeway</u>*, also known as "cycle tracks" or "protected bike lanes," provide a right-of-way designated exclusively for bicycle travel within a roadway and which are protected from other vehicle traffic with devices, including, but not limited to, grade separation, flexible posts, inflexible physical barriers, or parked cars.



Current bicycle facilities near the Project Site include Class III bike routes on Palm Avenue and Alameda de Las Pulgas and a short Class II bike lane on El Camino Real under the SR-92 overpass. However, the City of San Mateo has proposed a few nearby Class I bike paths, Class II bike lanes, and Class III bike boulevards within the San Mateo Bicycle Master Plan updated in 2020.

As shown in Figure 2, a Class I shared path has been proposed to connect Bovet Road to O'Farrell Street under State Route 92. From O'Farrell Street to West 20th Avenue, the proposed facility is a Class III bicycle boulevard that would connect on the western edge of the Project Site. The landing points for the bridge are proposed and further feasibility studies would need to be conducted. A Class II bike lane is proposed on West 20th Avenue between El Camino Real and Alameda de Las Pulgas.

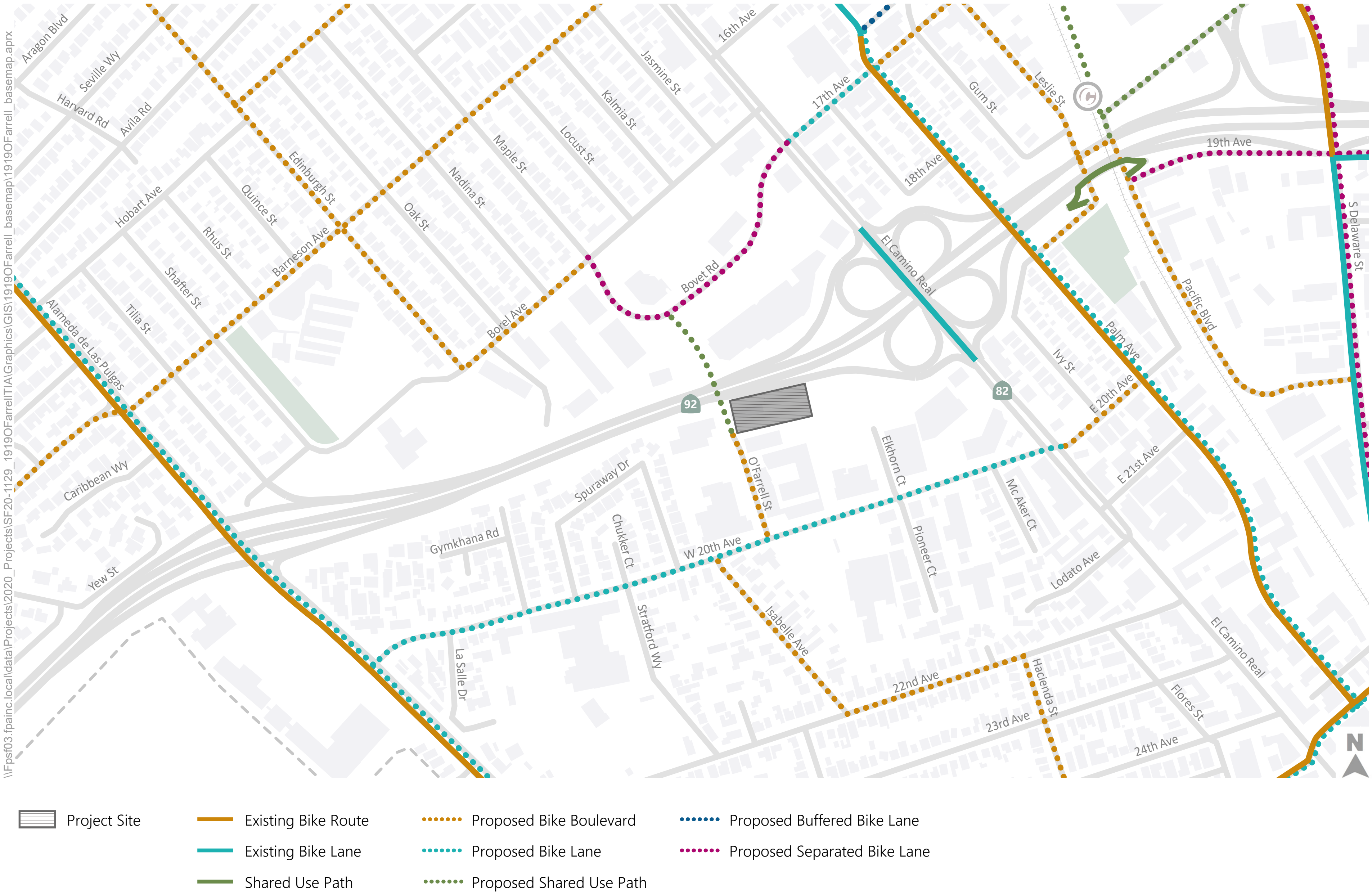


Figure 2

Existing & Proposed Bicycle Facilities

Existing Transit Service

Table 1 presents the existing transit service providers and routes that provide service near the Project Site. SamTrans is the primary regional and local transit provider within San Mateo County, serving all rail stations within the County and major transit transfer points for Santa Clara, Alameda, and San Francisco counties. Many service operators are running reduced schedules due to COVID-19. The schedule information below reflects pre-COVID-19 timetables, which we anticipate will resume once emergency health orders are lifted.

Table 1 Existing Transit Service

Route	Weekday Headway	Weekend Headway	Hours of Operation	Closest Stop(s) to Project Site	Key Destinations Served by Route
Samtrans 295	120	-	Weekday only	Alameda de las Pulgas and West 20th Avenue	San Mateo and Hillsdale Caltrain Stations; Redwood City Transit Center
Samtrans 250	60	60	All Day	Alameda de las Pulgas and West 20th Avenue	San Mateo and Hillsdale Caltrain Stations; College of San Mateo
Samtrans 294	60	60	All Day	Alameda de las Pulgas and West 20th Avenue	Hillsdale Caltrain Station, San Mateo Medical Center, Half Moon Bay
Samtrans 397	60	60	Early AM hours	El Camino Real and West 20th Avenue	Palo Alto Transit Center, Downtown San Francisco, San Francisco Airport, all Caltrain stations in San Mateo

Samtrans ECR	15-20	30	All day	El Camino Real and West 20th Avenue	Multiple BART stations, all Caltrain stations in the city of San Mateo, Palo Alto Transit Center
Caltrain	30-60	90	All day	Hayward Park Station, San Mateo Station	San Francisco, San Jose
Commute.org San Mateo-Campus Drive	60	60	AM and PM peak	West 20th Avenue and O'Farrell Street	Belmont Caltrain Station, Hillsdale Caltrain Station, San Mateo Medical Center, Campus Drive area

Note: Samtrans ECR Rapid route runs with 15-minute frequency on El Camino Real with the nearest stop at El Camino Real and 17th Avenue though at the time of this report, this route was suspended

The nearest Caltrain rail station is Hayward Park, approximately a 15 to 20-minute walk or five-minute drive from the Project Site. The San Mateo Caltrain station is a 40-minute walk or 12-minute drive north of the Project Site and the Hillsdale Caltrain Station is 30-minute walk or seven-minute drive south of the Project Site.

The Commute.org shuttle is funded on a two-year cycle by the SMCTA-C/CAG Call for Projects process. Current funding is set to expire in July 2022. An update to the Call for Projects process is presently under study alongside the Reimagine SamTrans bus network design and Caltrain service changes associated with electrification. Consequently, the future of the Campus Drive shuttle is uncertain beyond July 2022.

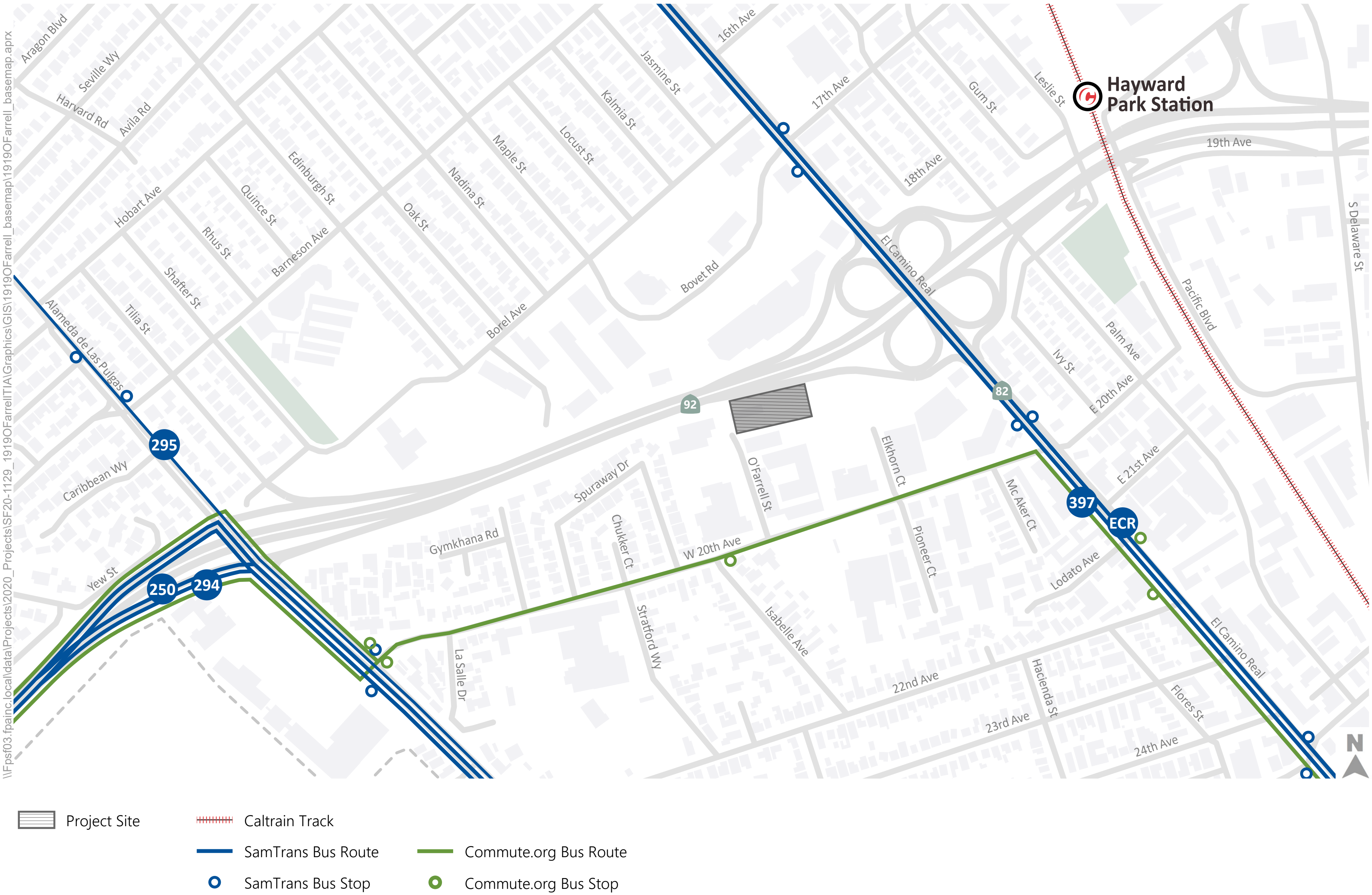
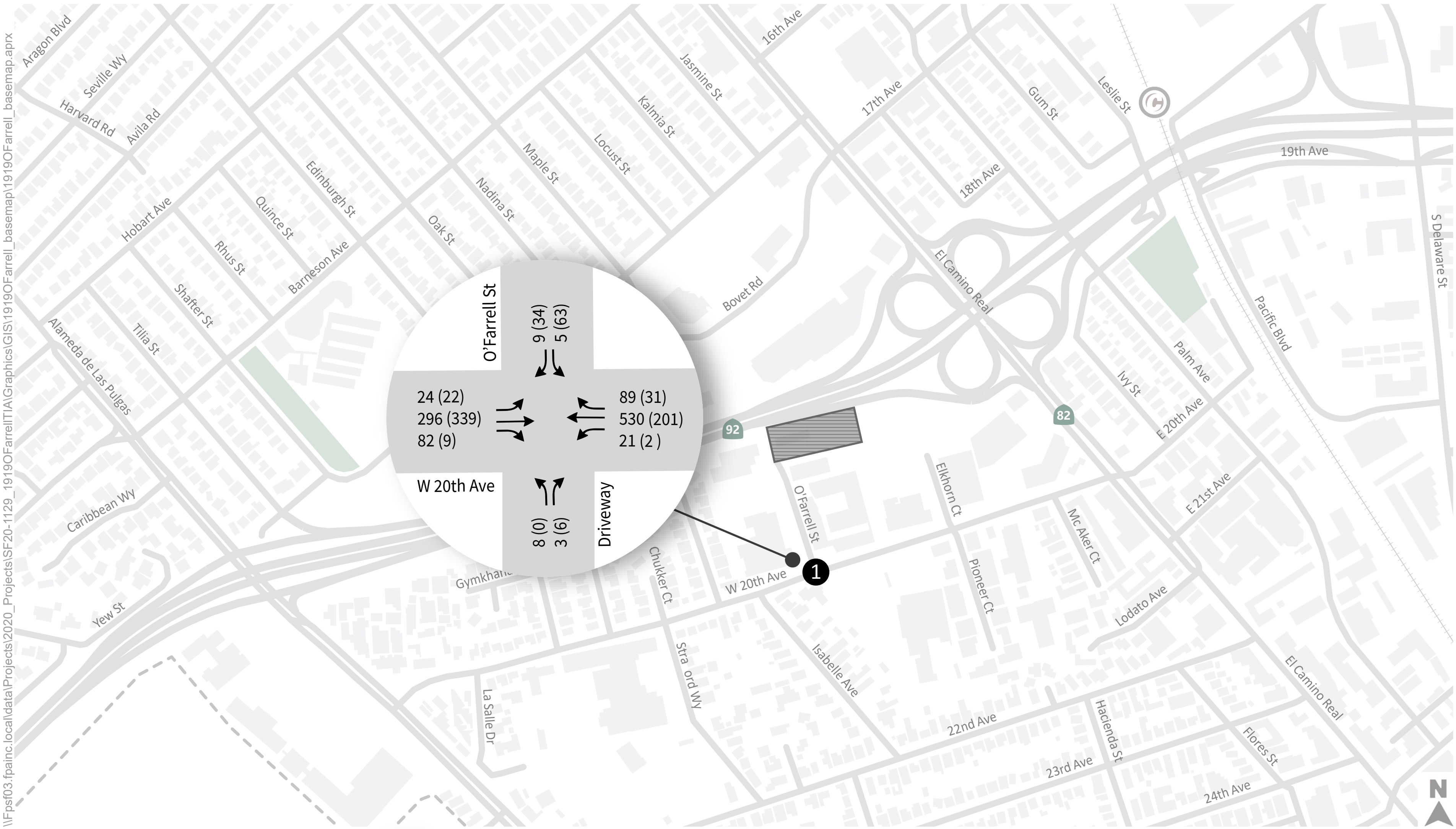


Figure 3
Existing Transit Service

Existing Vehicle Volumes and Lane Configurations

Pre-COVID-19 vehicle volumes were obtained from Streetlight Data, a big data provider that uses smartphone location to measure activity on the street. An aggregated average of historic volumes at the intersection of O'Farrell Street and West 20th Avenue were collected from October 1, 2019 to November 22, 2019 for both the AM peak period (7:00-9:00 AM) and PM peak period (4:00-6:00 PM). The existing lane configuration and traffic volumes for this intersection is shown in **Figure 4.** Additional information on the Streetlight Data is found in Appendix A and raw Streetlight Data in Appendix B.



Project Site

Study Intersection

Unincorporated San Mateo County

AM (PM)
vehicles/hour
Peak Hour Intersection Turning- Movement Counts

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Figure 4

Existing Vehicle Volumes

Existing Intersection Level of Service

Only the intersection of O'Farrell Street and West 20th Avenue was identified for study as part of this TIA. As of August 4, 2020, when the developer submitted its Senate Bill 330 application, the City of San Mateo did not have a LOS standard for unsignalized intersections as specified in the 2030 General Plan, thus, this analysis was conducted in accordance with the new TIA Guidelines for informational purposes only.

The San Mateo General Plan through the TIA Guidelines, requires the City to *maintain a Level of Service no worse than LOS E for unsignalized intersections*. *Adverse traffic operations are to be noted if an unsignalized intersection operating at acceptable LOS is triggered to operate at unacceptable levels of service (from E or better to F) or increases the average delay for an unsignalized intersection that is already operating at unacceptable LOS by 4 or more seconds*.

In order to evaluate these policies, the City uses the metric Level of Service ("LOS"), which is a qualitative description of driver comfort and convenience. Typical factors that affect motorized vehicle LOS include speed, travel time, traffic interruptions, and freedom to maneuver. Typical LOS criteria are defined in **Table 2**, below.

Table 2. Unsignalized Intersection LOS Criteria

		Average Control Delay (seconds per vehicle)
Description	LOS	Unsignalized Intersections
Represents free flow. Individual users are virtually unaffected by others in the traffic stream.	A	≤ 10
Stable flow, but the presence of other users in the traffic stream begins to be noticeable.	B	> 10 to 15
Stable flow, but the operation of individual users becomes significantly affected by interactions with others in the traffic stream.	C	> 15 to 25
Represents high-density, but stable flow.	D	> 25 to 35
Represents operating conditions at or near the capacity level.	E	> 35 to 50
Represents forced or breakdown flow.	F	> 50

Source: Highway Capacity Manual 6th Edition, Transportation Research Board of the National Academies of Science, 2017.

Transportation studies typically evaluate whether unsignalized intersections are functioning adequately and whether signalization is warranted using the peak-hour volume signal warrant described in the California MUTCD. At unsignalized two-way stop-controlled intersections, LOS is defined by the intersection approach that operates the "worst" rather than overall, average intersection LOS, which is the standard for signalized and all-way stop-controlled intersections. **Table 3** below presents existing LOS and intersection delay in seconds for the study intersection. The study intersection performs at LOS C under existing conditions in both the AM and PM peak periods. See Appendix C for detailed LOS results.

Table 3. Existing LOS and Delay Results

Intersection	Peak Period	Existing	
		Delay	LOS
O'Farrell Street / West 20th Avenue	AM	22.8 (NB)	C
	PM	15.0 (SB)	C

Notes:
1. The study intersection is Side Street Stop Controlled. For unsignalized intersections, LOS is based on the worst approach. Delay reported as seconds per vehicle.
Source: Fehr & Peers, 2020

Existing Parking Conditions

On-street parking on roadway segments adjacent to the Project Site consists of unmetered parking. On the west side of O'Farrell Street, parking is limited to four hours between 8:00 AM and 6:00 PM Monday through Saturday. On the east side of O'Farrell Street, parking is limited to two hours between 8:00 AM and 6:00 PM Monday through Saturday. On West 20th Avenue, parking is limited to two hours between 8:00 AM and 6:00 PM with two spaces with 20-minute limits in front of City Hall. Some blocks on West 20th Avenue are regulated Monday through Saturday and some are Monday through Friday. The majority of residential streets west of O'Farrell are part of the residential parking permit program, meaning permitted vehicles may park on the street for longer than the 2-hour parking restriction. O'Farrell is not part of the permit program, therefore, future residents of the Project are not eligible to receive a parking permit. The adjacent City Hall parking garage is open to the public from 5PM-8AM Monday through Friday and all day on weekends. During a weekday field visit between 8:00 AM and 9:00 AM, on-street parking was approximately 85 percent occupied on O'Farrell Street.

Existing Plus Project Conditions

The Project proposes a 49-unit new apartment project with four stories of residential and one story of parking accessed via O'Farrell Street. This section presents the traffic conditions with the Project, including Vehicle Miles Traveled and LOS, while site access and circulation issues and other related topics are evaluated within the Additional Transportation Analysis sections.

Project Trip Generation and Distribution

Trip Generation

Trip generation rates were determined using the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition*. The ITE rate for "Multifamily Housing (Mid-Rise)" was used to determine project trip generation and the ITE rate for "Medical Office - Dental" was used to determine the existing trip generation for the existing dentist office. As shown in **Table 4** below, the trips generated by the existing uses to be removed were subtracted from the project trips generated.

Table 4 Project Vehicle Trip Generation

Land Use	Units	ITE Code	Vehicle Trips						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Existing Medical-Dental Office Building[1]	1.988 ksf	720	67	4	1	5	2	5	7
Proposed Multifamily Housing Mid-Rise	49 units	221	223	5	9	14	11	8	19
Net New Project Trips			**156**	**1**	**8**	**9**	**9**	**3**	**12**

Notes:

1. Total existing building size is 3.976 ksf but at the time of application submittal only half of the total ksf was occupied by the Dental office, thus half of the total ksf was evaluated for trip generation.

Sources: Fehr & Peers; ITE *Trip Generation Manual,* 10th Edition. Calculated using the ITE rate for peak hour of adjacent street traffic.

Trip Distribution

Trips generated by the Project were distributed through the study intersection of O'Farrell Street and West 20th Avenue based on the existing travel patterns on the surrounding roadway system and the locations of complementary land uses. The proposed residential use would typically generate outbound trips in the morning to employment areas and inbound trips in the evening from employment areas. During the AM peak period, 11 percent of Project trips are estimated to enter the site and 89 percent are estimated to exit the site. During the PM peak period, 75 percent of Project trips are estimated to enter the site and 25 percent exit the site.

The peak-hour trips generated by the existing and proposed uses were assigned to the roadway network based on the directions of approach and departure, the roadway network connections, the location of freeway on/off ramps, and trip distribution assignments used in the Concar Passages Mixed-Use Development[3] analysis located one-mile from the Project site. A 60/40 split was applied for the trip distribution at the study intersection with 60 percent of trips traveling on West 20th Avenue to/from El Camino Real and 40 percent of trips traveling on West 20th Avenue to/from Alameda de las Pulgas. The trips generated by the existing uses to be removed were subtracted from the roadway network prior to assigning project trips. Figure 5 shows the net project trip assignment and project trips at the study intersection.

[3] Hexagon Transportation Consultants, Inc., *Concar Passage Mixed-Use Development Draft Transportation Impact Analysis*, February 10, 2020, p. 39.

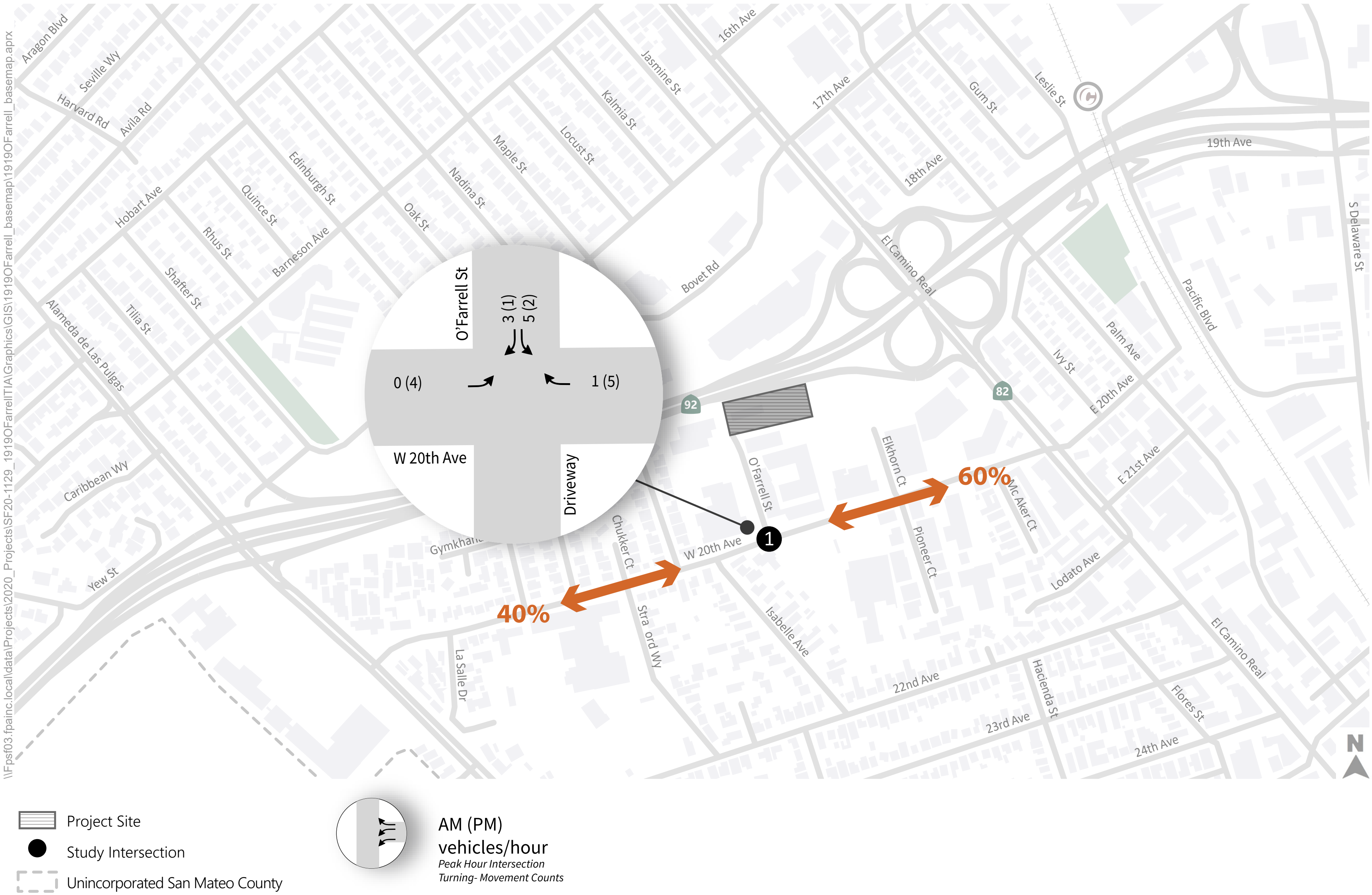

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Figure 5

Trip Distribution and Project Trips

Plus Project VMT

The purpose of this section is to introduce vehicle miles traveled (VMT) and evaluate whether the Project fulfills the screening criteria presented in the TIA Guidelines. VMT is a measurement of the amount and distance that a person drives, accounting for the number of passengers within a vehicle. Many interdependent factors affect the amount and distance a person might drive. In particular, the type of built environment affects how many places a person can access within a given distance, time, and cost, using different ways of travel (e.g., private vehicle, public transit, bicycling, walking, etc.). Typically, low-density development located at great distances from other land uses and in areas with few alternatives to the private vehicle provides less access than a location with high density, mix of land uses, and numerous ways of travel. Therefore, low-density development typically generates more VMT per capita compared to a similarly sized development located in urban areas. In general, higher VMT areas are associated with more air pollution, including greenhouse gas emissions, and energy usage than lower VMT areas. VMT is calculated by multiplying the number of trips generated by a project by the total distance of each of those trips.

VMT Screening

Although OPR provides recommendations for adopting new VMT analysis guidelines, lead agencies, such as the City of San Mateo, have the final say in designing their methodology to assess VMT and determine a relevant threshold. Lead agencies must prove that their selected analysis methodology aligns with SB 743's goals to promote infill development, reduce greenhouse gases, and reduce VMT. Per the interim OPR guidelines in effect at the time of this application, a project can be exempt from a VMT analysis if the project is located within a half mile of a high-quality transit area. The Project is located within a half mile of the Hayward Park Caltrain Station (see Figure 1), which the City designates as a high-quality transit service as defined by OPR guidelines. In addition to being located within a half mile of a Caltrain station, the project must have a floor area ratio of more than 0.75, include no more than the minimum parking required by the City of San Mateo, be consistent with the Metropolitan Transportation Commissions' (MTC) Sustainable Communities Strategy (SCS), and cannot replace affordable residential units. The Project has a floor area ratio of 1.79, is consistent with MTC's SCS, and replaces an existing use of a dentist office. The project is eligible to use parking minimums associated with the State Density Bonus and as a result proposes to provide less parking than required by the Municipal code. The Project provides 64 parking spaces, which does not exceed the minimum parking of 92 parking spaces as required by City of San Mateo's Municipal Code. Therefore, this Project would have a less than significant VMT impact due to its proximity to high-quality transit.

Plus Project Vehicle Volumes and Level of Service

Plus project trips were added to the existing volumes to create existing plus project volumes, shown in Figure 6. **Table 5** below presents existing plus project LOS and intersection delay in seconds for the study intersection. The study intersection continues to perform at LOS C under existing plus project conditions in both the AM and PM peak periods. Project trips result in very minor increases to delay.

Table 5. Plus Project LOS and Delay Results

Intersection	Peak Period	Existing		Existing Plus Project	
		Delay	LOS	Delay	LOS
O'Farrell Street / West 20th Avenue	AM	22.8 (NB)	C	23.0 (NB)	C
	PM	15.0 (SB)	C	15.3 (SB)	C

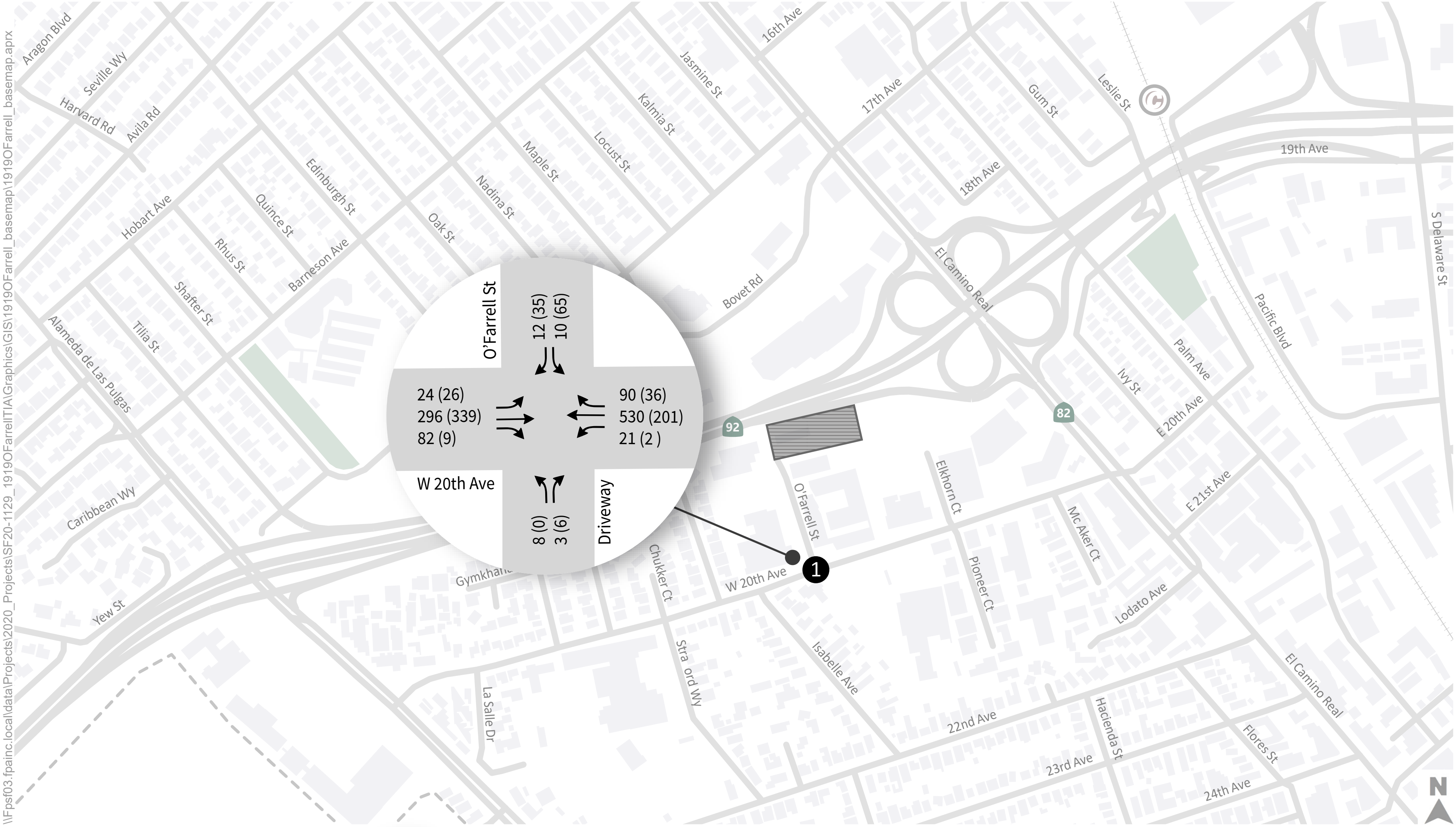
Notes:
1. The study intersection is Side Street Stop Controlled. For unsignalized intersections, LOS is based on the worst approach. Delay reported as seconds per vehicle.
Source: Fehr & Peers, 2020

The San Mateo TIA Guidelines[4] indicates that "unsignalized intersections should maintain a Level of Service no worse than LOS E." For unsignalized study intersections, an adverse traffic operations issue is identified if the addition of the traffic generated from the proposed project results in any one of the following:

- Triggers an intersection operating at acceptable LOS to operate at unacceptable levels of service (from E or better to F).
- Increases the average delay for an unsignalized study intersection that is already operating at unacceptable LOS by 4.0 seconds or more.

As the Project-generated traffic will not trigger either of these thresholds, the Project will not cause adverse traffic impacts.

[4] The developer submitted a Senate Bill 330 Application on August 4, 2020 that freezes codes and policies in effect of its submitted date. At the time of application, the City had adopted the State's Office of Planning and Research (OPR) Updates to the CEQA Guidelines as the interim TIA Guidelines for VMT analysis.



Project Site

Study Intersection

Unincorporated San Mateo County

AM (PM)
vehicles/hour
Peak Hour Intersection
Turning- Movement Counts

Figure 6

Existing Plus Project Vehicle Volumes

Cumulative Conditions

Cumulative Roadway Network and Traffic Volumes

Cumulative scenarios were analyzed for 2040, 20 years in the future based on the San Mateo TIA Guidelines[5]. Based on input from the City of San Mateo, there are no major roadway changes or development projects planned near the proposed project site that would affect traffic volumes on O'Farrell Street or West 20th Avenue. To account for Citywide growth and general changes in travel patterns over the course of 20 years, a simple growth rate was applied to through volumes on West 20th Avenue. A growth rate of one percent per year was applied to existing PM peak hour volumes and one and a half percent per year for AM peak hour volumes[6]. Since O'Farrell Street and the driveway to the Elks Lodge are minor streets and would not provide new connections for Citywide growth, only eastbound and westbound through volumes on West 20th Avenue were increased in the cumulative scenarios.

Cumulative Intersection Level of Service

Table 6 below presents cumulative (2040) and cumulative (2040) plus project LOS and intersection delay in seconds for the study intersection. The study intersection performs at acceptable LOS C in the PM peak period and at acceptable LOS D in the AM peak period under cumulative conditions. As the Project-generated traffic will not trigger either of the thresholds discussed in the TIA Guidelines, the Project will not cause adverse traffic impacts in cumulative conditions.

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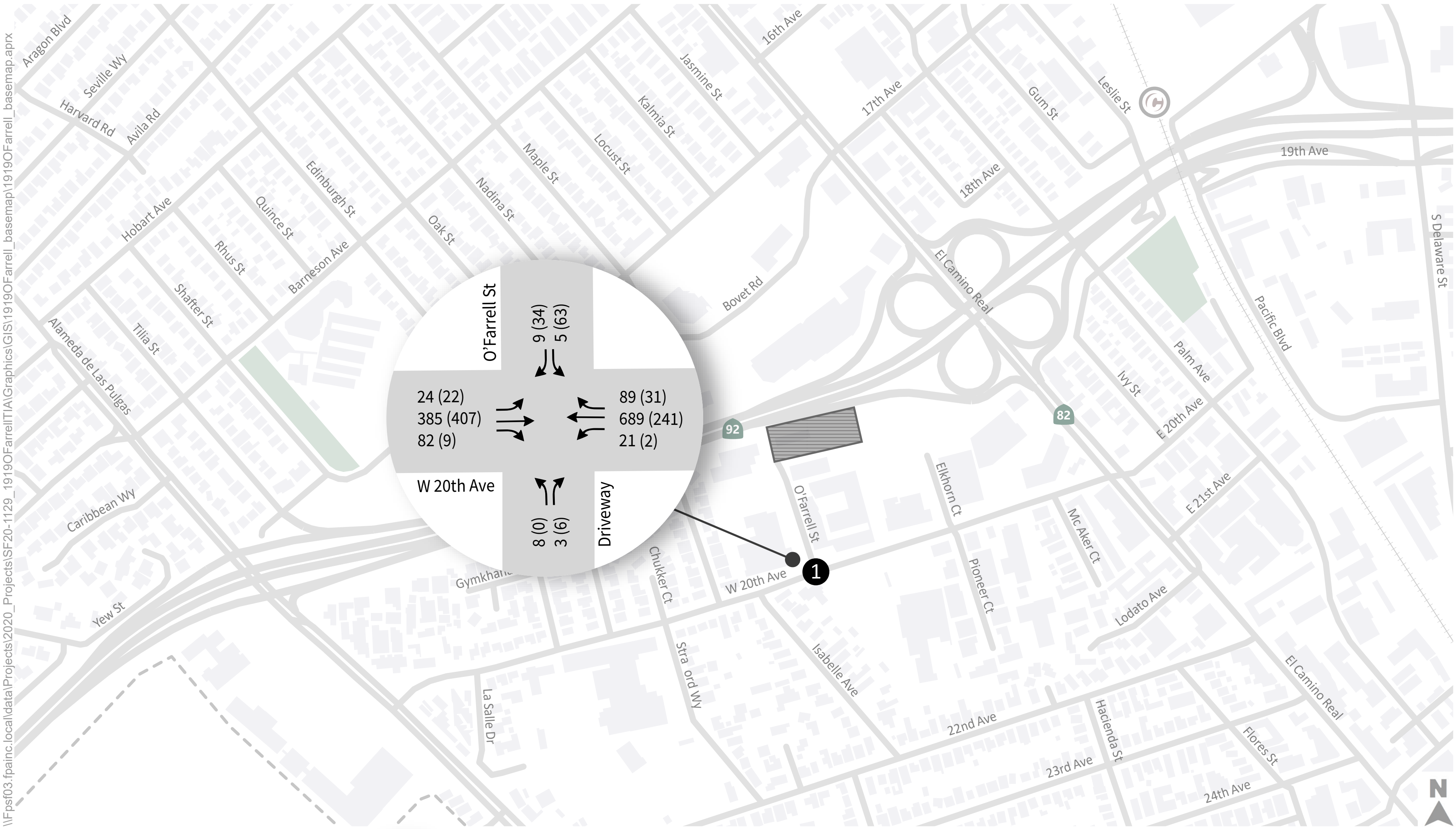
[5] The developer submitted a Senate Bill 330 Application on August 4, 2020 that freezes codes and policies in effect of its submitted date. At the time of application, the City had adopted the State's Office of Planning and Research (OPR) Updates to the CEQA Guidelines as the interim TIA Guidelines for VMT analysis.

[6] Growth rates were developed based on the change in volumes on the adjacent major streets (El Camino Real and Alameda de las Pulgas) between the 2015 and 2040 C/CAG model scenarios.

Table 6: Cumulative Level of Service

Intersection	Peak Period	Existing		Existing Plus Project		Cumulative (2040)		Cumulative Plus Project (2040)	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
O'Farrell Street / West 20th Avenue	AM	22.8	C (NB)	23.0	C (NB)	33.1	D (NB)	33.5	D (NB)
	PM	15.0	C (SB)	15.3	C (SB)	17.3	C (SB)	17.7	C (SB)

Notes:
1. The study intersection is Side Street Stop Controlled. For unsignalized intersections, LOS is based on the worst approach. Delay reported as seconds per vehicle.
Source: Fehr & Peers, 2020



Project Site

Study Intersection

Unincorporated San Mateo County

AM (PM)
vehicles/hour
Peak Hour Intersection
Turning- Movement Counts

Figure 7

Cumulative (2040) Vehicle Volumes

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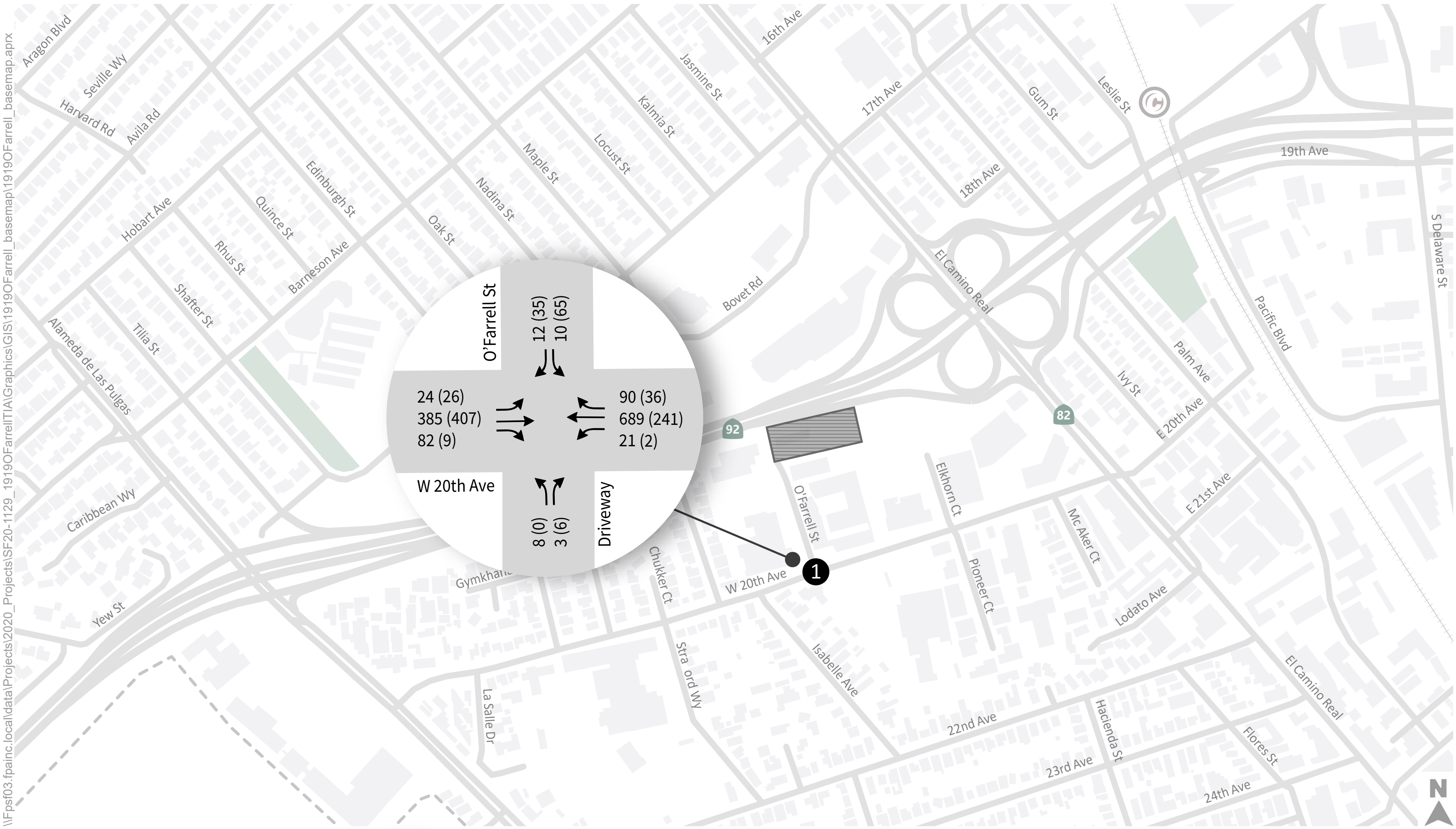


Project Site

Study Intersection

Unincorporated San Mateo County

AM (PM)
vehicles/hour
Peak Hour Intersection Turning- Movement Counts

Figure 8

Cumulative (2040) Plus Project Vehicle Volumes

Additional Transportation Analysis

This section presents an analysis of other transportation issues associated with the Project site, including:

- Impacts to vehicle, pedestrian & bicycle site access and circulation
- Driveway site distance and vehicle queuing
- Parking
- Hazards and emergency vehicle access
- Neighborhood traffic

The analyses in this section are in accordance with the City of San Mateo's General Plan Circulation Element outlined in the TIA guidelines that requires a non-CEQA local transportation analysis for land use projects that may have an effect on the local street system. The analysis in this section is based on professional judgment in accordance with the standards and methods employed by the traffic engineering community.

Although operational issues are not considered CEQA impacts, they do describe traffic conditions that are relevant to describing the project environment.

Vehicle Site Access and Circulation

The Project will replace an existing driveway on O'Farrell Street and does not propose any geometric design changes to the surrounding roadway network. As shown in Figure 9, the Project driveway is 24 feet wide and meets the City of San Mateo standards to provide adequate vehicle access to the Project.[7] The Project will add approximately 9 vehicle trips during the AM peak hour and approximately 12 trips during the PM peak hour. These trips will enter the Project site at the driveway on O'Farrell Street, and as demonstrated in the LOS analysis presented above, these trips will not have a substantial effect on existing or proposed roadway facilities. Garbage facilities will also be accessed from the curb on O'Farrell Street and would not require access to the garage (see Figure 9).

Pedestrian & Bicycle Site Access and Circulation

The existing network of sidewalks and crosswalks in the immediate vicinity of the Project site has good connectivity and provides pedestrians with continuous facilities to various points of interest in the study area, including the Hayward Park Caltrain Station, nearby bus stops on West 20th

[7] Since the Project has more than four units, San Mateo Public Works considers this Project as nonresidential and 24' driveway width is required under SMMC 27.64.025(3)

Avenue, Alameda de las Pulgas and El Camino Real. Pedestrian access to the Project's building would be provided to existing sidewalks on O'Farrell Street via a central staircase and ramp adjacent to the Project driveway. Sidewalks along O'Farrell Street and West 20th Avenue are generally in good condition and meet ADA standards for the minimum required passable walkway of four feet, although sidewalks along West 20th Avenue close to El Camino Real become narrow with the placement of trees and utility poles.

The Project proposes 58 bicycle parking spaces, four short-term spaces (bicycle racks) and 54 long-term spaces (lockers). As shown in the site plan in Figure 9, short-term bicycle racks are proposed to be placed at street level near the main pedestrian entrance outside the public right-of-way. The long-term parking would be located in the garage and on the first floor near the main entrance. Bicyclists would access the bike parking in the garage through the vehicle driveway or by walking their bike up the stairs or ramp to the first level storage room. There are no other proposed bicycle facility changes, thus the Project would not disrupt existing bicycle facilities in the City.

A Class I shared path has been proposed to connect Bovet Road to O'Farrell Street under State Route 92 as part of the City of San Mateo's Bicycle Master Plan. While further study is still required to confirm bridge landings, this proposed shared path would be directly adjacent to the proposed Project, providing an additional bicycle and pedestrian connection to the residential neighborhood and commercial amenities on the north side of State Route 92. This Project, if built in the future, would substantially improve accessibility for people walking and bicycling and would reduce the need for driving trips for Project residents to the retail, school, and other amenities north of State Route 92. The proposed Project does not present a conflict with this project and would therefore not adversely affect existing or proposed pedestrian and bicycle facilities.

Transit Access and Circulation

Neither public transit conditions nor public transit access are expected to change with the Project. The Project would generate a small number of peak hour transit trips, likely associated with commutes, which could be accommodated by existing nearby transit routes and services including SamTrans and Caltrain. Transit users would access existing transit service via West 20th Avenue to El Camino Real or Alameda de Las Pulgas. The proposed Project does not present a conflict to existing or proposed transit facilities and due to the small size of the project, the number of new transit trips would have a negligible effect transit capacity.

Driveway Sight Distance

Due to the location of the driveway at the end of a cul-de-sac with clear sight lines to O'Farrell Street and a lack of on-street parking or other obstructions adjacent to the driveway, the Project's proposed driveway will have an adequate sight distance.

Vehicle Queuing

There is adequate space within the parking garage to account for any outbound vehicle queuing at the Project driveway. During the PM peak hour there will be 11 total inbound vehicles generated by the Project, which represents a vehicle trip every five to six minutes. Given the low volumes added by the Project site and the lack of a gate or other control that would cause vehicles to wait at the driveway entrance, vehicle queues would not form during typical peak conditions.

Parking Conditions

The Project proposes one underground parking garage that would be accessed on O'Farrell Street. The Project proposes a total of 64 vehicle parking spaces, which represents a parking ratio of approximately 1.3 vehicles per residential unit. Although the Municipal Code requires 1.5-2 units per multi-family dwelling unit, the State Density Bonus permits a reduced parking ratio of 0.5 spaces/bedroom because the Project is within a half mile of public transit, requiring the Project to have 34 spaces. The applicant is voluntarily providing 30 parking spaces over the Density Bonus requirement but still fewer than required by the Municipal Code. Three of the spaces are proposed as ADA accessible. Given the location within a high-quality transit area, the proposed parking supply will be adequate for the Project and parking conditions on surrounding streets are not expected to change.

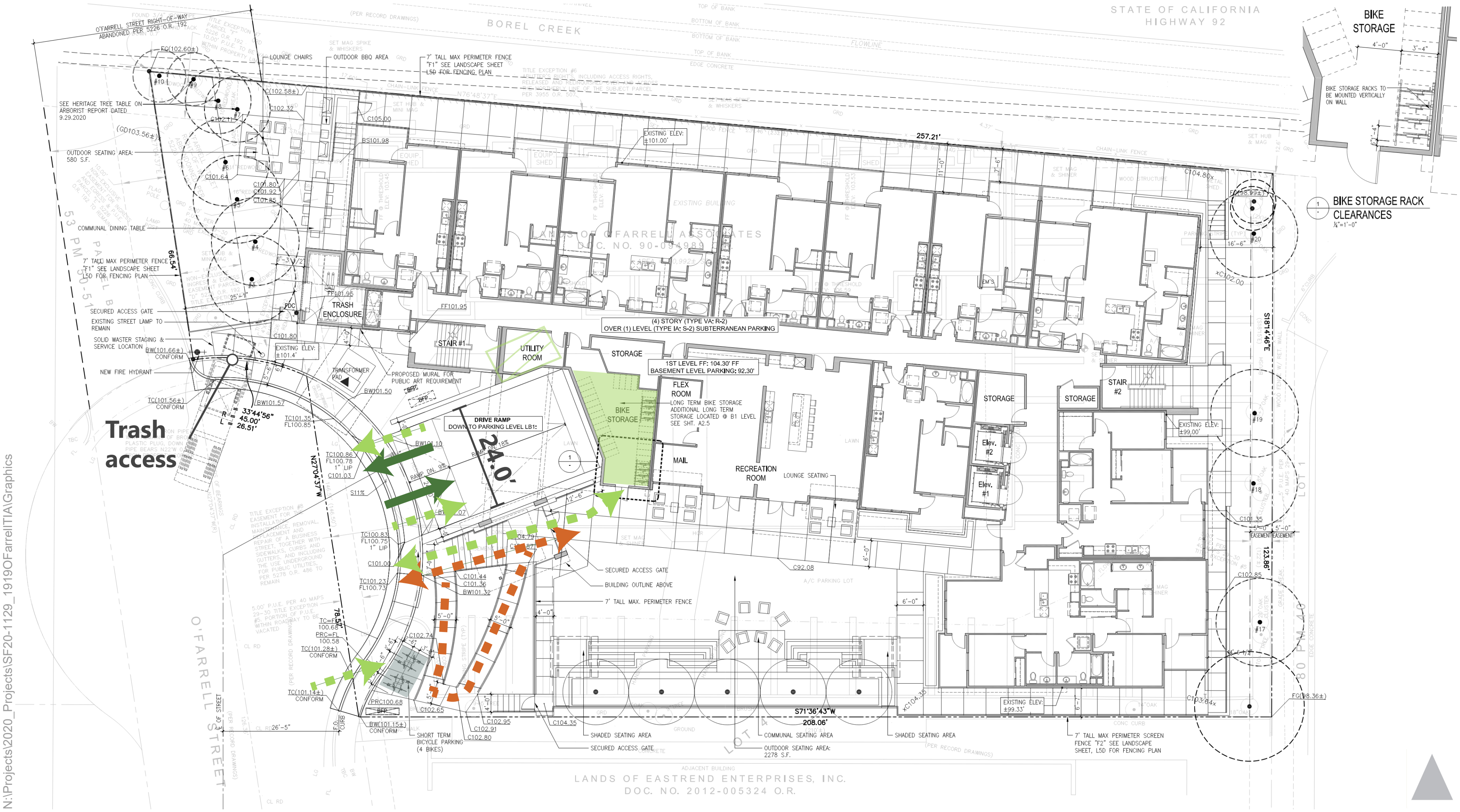
A total of three short-term and 54 long-term bicycle parking spaces are required. The proposed Project will fulfill these requirements by providing four short-term and 54 long-term bicycle parking spaces.

Hazards and Emergency Vehicle Access

Several factors determine whether a project has sufficient access for emergency vehicles, including the number of access points, width of access points, and width of internal roadways. The Project would not change emergency vehicle access to the site as emergency vehicles would access the Project from the existing access point on O'Farrell Street. The O'Farrell Street driveway would be 24 feet wide, providing enough space for emergency vehicles to enter the driveway, if needed. The Project does not propose altering the existing roadway network and does not propose new vehicular roadways that would create hazards or impede emergency vehicle access.

Neighborhood Traffic

The most direct path for project-generated vehicles to access the Project site is via West 20th Avenue to El Camino Real or Alameda de las Pulgas and there are not any neighborhood streets that provide direct and convenient connections to key destinations. The cumulative and cumulative plus project small increase in vehicle volumes does not warrant a signal at the study intersection. Due to the relatively low number of new Project-generated vehicles (less than 15 in the AM and PM peak hours, or one every four minutes) and the lack of nearby neighborhood streets that connect directly to destinations, this Project will have a minimal effect on nearby neighborhood streets. See Appendix D for the detailed signal warrant analysis.



Vehicle Access	Short Term Bike Parking
Pedestrian Access	Long Term Bike Parking
Bicycle Access	Long Term Bike Parking within Parking Garage (not pictured)

N:\Projects\2020_Projects\SF20-1129_1919OFarrellTIA\Graphics

Figure 9

Site Circulation and Access

Conclusion

The proposed project would not cause the study intersection to exceed the level of service standard as specified in the City's Circulation Element of the 2030 General Plan, i.e. the acceptable level of service standards that were in place on August 4, 2020, at the time of the Senate Bill 330 Application.[8] The proposed Project will not result in CEQA impacts on VMT, bicycle, pedestrian, or transit circulation, or hazards and emergency access. VMT is screened out because of the Project's proximity to high-quality transit. The Project presents no adverse LOS effects or site circulation issues. The Project does not include features that would disrupt these facilities nor generate a substantial number of people that would worsen or create a new impact. The Project meets the City's design standards.

[8] The developer submitted a Senate Bill 330 Application on August 4, 2020 that freezes codes and policies in effect of its submitted date. At the time of application, the City had adopted the State's Office of Planning and Research (OPR) Updates to the CEQA Guidelines as the interim TIA Guidelines for VMT analysis.

FEHR & PEERS

Appendix A Streetlight Memo

Memorandum

Date: December 28, 2020

To: Somer Smith, City of San Mateo

From: Ashley Hong and Taylor McAdam, Fehr & Peers

Subject: 1919 O'Farrell Street Streetlight Methodology

SF20-1129

Purpose

As presented in the 1919 O'Farrell Street Transportation Impact Analysis Scope of Work, Fehr & Peers collected data at one study intersection, O'Farrell Street and W 20th Avenue. Due to changes in travel behavior and transportation resulting from the COVID-19 pandemic, the standard approach of collecting new traffic counts was not an option. Based on meetings with the San Mateo City staff, Fehr & Peers' proposed using StreetLight Data's turning movement volume estimates as an alternative source of pre-COVID count data. This memo describes some considerations for using StreetLight Data and briefly summarizes the results.

StreetLight Data Considerations

There are two primary concerns many jurisdictions have with using StreetLight or other big data providers – data privacy and data biases. StreetLight Data attempts to address both concerns at several points in the data processing workflow. All mobile device location data provided to StreetLight has been de-identified (personally identifiable information removed) by data suppliers. StreetLight runs the data through several rounds of processing to take raw device traces and produce individual trips that follow roadways. Quality assurance tests ensure that traces with erratic or unlikely behavior are filtered out of the final data set, and that the data are appropriately normalized to the population. To improve accuracy of the mobile data, StreetLight adds "contextual" data sets such as road networks, information like speed limits and directionality, land use data, parcel data, and census data.

When users such as Fehr & Peers query StreetLight's dataset, trips are aggregated and averaged over one or more months. In the case of estimating intersection turning movement counts, StreetLight aggregates trips traveling from each intersection leg to every other leg. Figure 1 diagrams the Streetlight intersection turning movement query.

Figure 1: StreetLight Intersection Turning Movement Query – O'Farrell Street and W 20th Avenue

Source: StreetLight Data, 2020

StreetLight's turning movement estimates are presented as vehicle turning movement volumes through the intersection, and starting or ending locations of these trips are not captured. Additionally, a query that returns too few trips (raising concerns of both statistical validity and privacy) is flagged for review before being delivered to users. Fehr & Peers' independent validation of StreetLight's intersection turning movement volume estimates[1] found that

1 More information about the validation methodology for StreetLight data can be found in the white paper here: https://www.fehrandpeers.com/transformative-data-collection-solution/, May 2020.

StreetLight estimates are a reasonable replacement for traditional traffic counts. In 88 percent of locations tested, manual counts fell within the unadjusted StreetLight estimates confidence intervals. This validation effort found two biases in StreetLight's raw vehicle estimates that can be corrected with adjustments: (1) estimates for through movements are typically higher than for left and right turns and (2) estimates are higher in areas with higher device concentration (typically more urban contexts with higher pedestrian, bicycle, or transit use).

StreetLight Data Methodology

After discussion about the overestimate of through movements produced by the StreetLight Volume estimates, StreetLight staff recommended filtering out trips with a circuity greater than 2.0 to correct this overestimate. Circuity occurs when StreetLight's trip algorithm assigns the same vehicle through the intersection more than once in a short period of time, counting the same vehicle as more than one trip. This is most common at freeway interchanges, or at intersections near destinations such as gas stations, drive-throughs, or with high pass-by rates. Filtering the percentage of trips with a circuity greater than 2.0 is key to reducing the instances of locations where StreetLight volume estimates are higher than counts. This method was used on StreetLight data collected for this project.

Additional Assumptions

An average Tuesday through Thursday aggregated volume for the dates between September 2, 2019 and November 22, 2019, excluding October 31, 2019 (Halloween) to avoid holiday discrepancies, were analyzed. Data on weekdays Tuesday-Thursday were used to reflect average traffic patterns. The sample size included 5,000 device counts and approximately 23,000 trips.

StreetLight volumes for the AM peak hour (7AM-8AM) were compared with volumes from the same time window collected in 2017 and provided by the City. The east-bound volumes on W 20th Avenue were approximately 100 vehicles lower in StreetLight counts than they were in Spring 2017 and west-bound volumes on W 20th Avenue were approximately 100 vehicles higher in the Streetlight counts than they were in Spring 2017. This difference in volumes may be partially due to changes in the land uses or travel patterns in the intervening years. More likely, however, the difference can be attributed to normal variation in traffic patterns. The Streetlight volumes represent a more accurate approximation of recent traffic conditions on W 20th Avenue by accounting for variation over many months and weeks rather than a single day's counts. StreetLight Volumes for the PM peak hour (5PM-6PM) were not compared to historic counts since counts collected in 2017 captured afternoon school peak period rather than PM peak period.

Appendix B Streetlight Data

Average of Adjusted Volumes	Intersection Approach			
Time of Day	**Driveway_Sleg**	**OFarrell_Nleg**	**W20th_Eleg**	**W20th_WLeg**
00: All Day (12am-12am)	148.38225	620.1964545	2056.14825	1545.630667
01: 12am (12am-1am)		2.66675	9.875	6.38875
02: 1am (1am-2am)	2	5.4	5.75	3
03: 2am (2am-3am)			3.166666667	2
04: 3am (3am-4am)		1	2.375	2.611
05: 4am (4am-5am)			4.833333333	4.36
06: 5am (5am-6am)		3.25	13.125	10.36016667
07: 6am (6am-7am)	4.75	7.938714286	42.43090909	34.57744444
08: 7am (7am-8am)	66.423	55.632125	294.1893636	194.9360909
09: 8am (8am-9am)	10.28571429	54.24144444	129.5608182	95.0865
10: 9am (9am-10am)	14.125	64.235	103.0168182	63.82433333
11: 10am (10am-11am)	9.25	42.59344444	114.0953333	61.04736364
12: 11am (11am-12noon)	9.5	58.21366667	97.75666667	75.52545455
13: 12pm (12noon-1pm)	12	55.02877778	143.9716	89.298
14: 1pm (1pm-2pm)	10.66666667	63.19088889	140.3640909	85.48325
15: 2pm (2pm-3pm)	11	62.54955556	251.6385556	169.5110909
16: 3pm (3pm-4pm)	12.98888889	63.22577778	183.341	142.747
17: 4pm (4pm-5pm)	9.571428571	51.34622222	198.8581	150.6760909
18: 5pm (5pm-6pm)	15.692	61.87854545	187.8418182	161.0469091
19: 6pm (6pm-7pm)	18.625	34.865	165.0968182	132.804
20: 7pm (7pm-8pm)	11	27.12966667	102.6508182	66.75808333
21: 8pm (8pm-9pm)	9.677625	30.68588889	88.22222222	57.8866
22: 9pm (9pm-10pm)	4	15.460375	45.54372727	32.2962
23: 10pm (10pm-11pm)	4	7.342857143	26.23911111	15.746
24: 11pm (11pm-12am)		4.9375	11.5	6.236888889

FEHR PEERS

Appendix C Synchro LOS Reports

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	296	82	21	530	89	8	0	3	5	0	9
Future Vol, veh/h	24	296	82	21	530	89	8	0	3	5	0	9
Conflicting Peds, #/hr	5	0	5	5	0	5	10	0	10	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	322	89	23	576	97	9	0	3	5	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	678	0	0	416	0	0	1110	1148	382	1106	-	640
Stage 1	-	-	-	-	-	-	424	424	-	676	-	-
Stage 2	-	-	-	-	-	-	686	724	-	430	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	914	-	-	1143	-	-	187	199	665	188	0	475
Stage 1	-	-	-	-	-	-	608	587	-	443	0	-
Stage 2	-	-	-	-	-	-	438	430	-	603	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	910	-	-	1138	-	-	171	183	656	175	-	468
Mov Cap-2 Maneuver	-	-	-	-	-	-	171	183	-	175	-	-
Stage 1	-	-	-	-	-	-	582	562	-	424	-	-
Stage 2	-	-	-	-	-	-	411	414	-	572	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.3	22.8	17.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	214	910	-	-	1138	-	-	175	468
HCM Lane V/C Ratio	0.056	0.029	-	-	0.02	-	-	0.031	0.021
HCM Control Delay (s)	22.8	9.1	0	-	8.2	0	-	26.2	12.9
HCM Lane LOS	C	A	A	-	A	A	-	D	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.1	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	339	9	2	201	31	0	0	6	63	0	34
Future Vol, veh/h	22	339	9	2	201	31	0	0	6	63	0	34
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	368	10	2	218	34	0	0	7	68	0	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	257	0	0	383	0	0	694	687	388	679	-	250
Stage 1	-	-	-	-	-	-	426	426	-	244	-	-
Stage 2	-	-	-	-	-	-	268	261	-	435	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	1308	-	-	1175	-	-	357	370	660	366	0	789
Stage 1	-	-	-	-	-	-	606	586	-	760	0	-
Stage 2	-	-	-	-	-	-	738	692	-	600	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1302	-	-	1169	-	-	329	357	651	350	-	778
Mov Cap-2 Maneuver	-	-	-	-	-	-	329	357	-	350	-	-
Stage 1	-	-	-	-	-	-	589	570	-	739	-	-
Stage 2	-	-	-	-	-	-	695	687	-	575	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	10.6	15
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	651	1302	-	-	1169	-	-	350	778
HCM Lane V/C Ratio	0.01	0.018	-	-	0.002	-	-	0.196	0.048
HCM Control Delay (s)	10.6	7.8	0	-	8.1	0	-	17.8	9.9
HCM Lane LOS	B	A	A	-	A	A	-	C	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.7	0.1

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	296	82	21	530	90	8	0	3	10	0	12
Future Vol, veh/h	24	296	82	21	530	90	8	0	3	10	0	12
Conflicting Peds, #/hr	5	0	5	5	0	5	10	0	10	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	322	89	23	576	98	9	0	3	11	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	679	0	0	416	0	0	1112	1149	382	1106	-	640
Stage 1	-	-	-	-	-	-	424	424	-	676	-	-
Stage 2	-	-	-	-	-	-	688	725	-	430	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	913	-	-	1143	-	-	186	198	665	188	0	475
Stage 1	-	-	-	-	-	-	608	587	-	443	0	-
Stage 2	-	-	-	-	-	-	436	430	-	603	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	909	-	-	1138	-	-	169	182	656	175	-	468
Mov Cap-2 Maneuver	-	-	-	-	-	-	169	182	-	175	-	-
Stage 1	-	-	-	-	-	-	582	562	-	424	-	-
Stage 2	-	-	-	-	-	-	406	414	-	572	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.3	23	19.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	212	909	-	-	1138	-	-	175	468
HCM Lane V/C Ratio	0.056	0.029	-	-	0.02	-	-	0.062	0.028
HCM Control Delay (s)	23	9.1	0	-	8.2	0	-	26.9	12.9
HCM Lane LOS	C	A	A	-	A	A	-	D	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.1	-	-	0.2	0.1

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	26	339	9	2	201	36	0	0	6	65	0	35
Future Vol, veh/h	26	339	9	2	201	36	0	0	6	65	0	35
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	368	10	2	218	39	0	0	7	71	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	262	0	0	383	0	0	705	700	388	690	-	253
Stage 1	-	-	-	-	-	-	434	434	-	247	-	-
Stage 2	-	-	-	-	-	-	271	266	-	443	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	1302	-	-	1175	-	-	351	363	660	359	0	786
Stage 1	-	-	-	-	-	-	600	581	-	757	0	-
Stage 2	-	-	-	-	-	-	735	689	-	594	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1296	-	-	1169	-	-	322	349	651	342	-	775
Mov Cap-2 Maneuver	-	-	-	-	-	-	322	349	-	342	-	-
Stage 1	-	-	-	-	-	-	581	562	-	733	-	-
Stage 2	-	-	-	-	-	-	691	684	-	567	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	10.6	15.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	651	1296	-	-	1169	-	-	342	775
HCM Lane V/C Ratio	0.01	0.022	-	-	0.002	-	-	0.207	0.049
HCM Control Delay (s)	10.6	7.8	0	-	8.1	0	-	18.2	9.9
HCM Lane LOS	B	A	A	-	A	A	-	C	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.8	0.2

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	385	82	21	689	89	8	0	3	5	0	9
Future Vol, veh/h	24	385	82	21	689	89	8	0	3	5	0	9
Conflicting Peds, #/hr	5	0	5	5	0	5	10	0	10	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	418	89	23	749	97	9	0	3	5	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	851	0	0	512	0	0	1379	1417	478	1375	-	813
Stage 1	-	-	-	-	-	-	520	520	-	849	-	-
Stage 2	-	-	-	-	-	-	859	897	-	526	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	788	-	-	1053	-	-	122	137	587	123	0	378
Stage 1	-	-	-	-	-	-	539	532	-	356	0	-
Stage 2	-	-	-	-	-	-	351	358	-	535	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	784	-	-	1048	-	-	109	124	579	113	-	373
Mov Cap-2 Maneuver	-	-	-	-	-	-	109	124	-	113	-	-
Stage 1	-	-	-	-	-	-	511	504	-	337	-	-
Stage 2	-	-	-	-	-	-	324	341	-	502	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.2	33.1	23.3
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	140	784	-	-	1048	-	-	113	373
HCM Lane V/C Ratio	0.085	0.033	-	-	0.022	-	-	0.048	0.026
HCM Control Delay (s)	33.1	9.8	0	-	8.5	0	-	38.5	14.9
HCM Lane LOS	D	A	A	-	A	A	-	E	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	407	9	2	241	31	0	0	6	63	0	34
Future Vol, veh/h	22	407	9	2	241	31	0	0	6	63	0	34
Conflicting Peds, #/hr	5	0	5	5	0	5	10	0	10	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	442	10	2	262	34	0	0	7	68	0	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	301	0	0	457	0	0	812	805	462	797	-	294
Stage 1	-	-	-	-	-	-	500	500	-	288	-	-
Stage 2	-	-	-	-	-	-	312	305	-	509	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	1260	-	-	1104	-	-	298	316	600	305	0	745
Stage 1	-	-	-	-	-	-	553	543	-	720	0	-
Stage 2	-	-	-	-	-	-	699	662	-	547	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1254	-	-	1099	-	-	273	304	591	291	-	734
Mov Cap-2 Maneuver	-	-	-	-	-	-	273	304	-	291	-	-
Stage 1	-	-	-	-	-	-	536	526	-	698	-	-
Stage 2	-	-	-	-	-	-	656	657	-	522	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.1	11.2	17.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	591	1254	-	-	1099	-	-	291	734
HCM Lane V/C Ratio	0.011	0.019	-	-	0.002	-	-	0.235	0.05
HCM Control Delay (s)	11.2	7.9	0	-	8.3	0	-	21.1	10.2
HCM Lane LOS	B	A	A	-	A	A	-	C	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.9	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	385	82	21	689	90	8	0	3	10	0	12
Future Vol, veh/h	24	385	82	21	689	90	8	0	3	10	0	12
Conflicting Peds, #/hr	5	0	5	5	0	5	10	0	10	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	418	89	23	749	98	9	0	3	11	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	852	0	0	512	0	0	1381	1418	478	1375	-	813
Stage 1	-	-	-	-	-	-	520	520	-	849	-	-
Stage 2	-	-	-	-	-	-	861	898	-	526	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	787	-	-	1053	-	-	121	137	587	123	0	378
Stage 1	-	-	-	-	-	-	539	532	-	356	0	-
Stage 2	-	-	-	-	-	-	350	358	-	535	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	783	-	-	1048	-	-	107	124	579	113	-	373
Mov Cap-2 Maneuver	-	-	-	-	-	-	107	124	-	113	-	-
Stage 1	-	-	-	-	-	-	511	504	-	337	-	-
Stage 2	-	-	-	-	-	-	320	341	-	502	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.2	33.5	26.5
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	138	783	-	-	1048	-	-	113	373
HCM Lane V/C Ratio	0.087	0.033	-	-	0.022	-	-	0.096	0.035
HCM Control Delay (s)	33.5	9.8	0	-	8.5	0	-	40.2	15
HCM Lane LOS	D	A	A	-	A	A	-	E	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.3	0.1

Intersection												
Int Delay, s/veh	2.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	26	407	9	2	241	36	0	0	6	65	0	35
Future Vol, veh/h	26	407	9	2	241	36	0	0	6	65	0	35
Conflicting Peds, #/hr	5	0	5	5	0	5	10	0	10	10	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	140	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	442	10	2	262	39	0	0	7	71	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	306	0	0	457	0	0	823	818	462	808	-	297
Stage 1	-	-	-	-	-	-	508	508	-	291	-	-
Stage 2	-	-	-	-	-	-	315	310	-	517	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	-	3.318
Pot Cap-1 Maneuver	1255	-	-	1104	-	-	292	311	600	299	0	742
Stage 1	-	-	-	-	-	-	547	539	-	717	0	-
Stage 2	-	-	-	-	-	-	696	659	-	541	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1249	-	-	1099	-	-	266	298	591	284	-	731
Mov Cap-2 Maneuver	-	-	-	-	-	-	266	298	-	284	-	-
Stage 1	-	-	-	-	-	-	528	520	-	692	-	-
Stage 2	-	-	-	-	-	-	652	654	-	514	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.1			11.2			17.7		
HCM LOS							B			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	591	1249	-	-	1099	-	-	284	731
HCM Lane V/C Ratio	0.011	0.023	-	-	0.002	-	-	0.249	0.052
HCM Control Delay (s)	11.2	7.9	0	-	8.3	0	-	21.8	10.2
HCM Lane LOS	B	A	A	-	A	A	-	C	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	1	0.2

Appendix D Signal Warrants

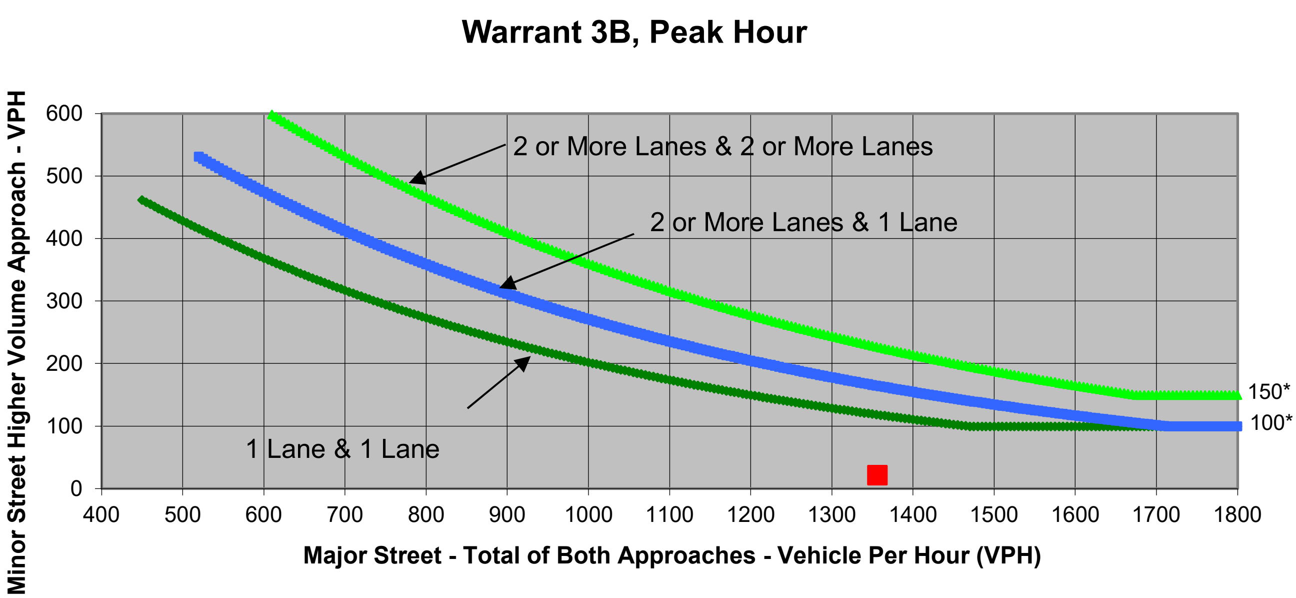
Major Street	W 20th Ave	Project	1919 O'Farrell
Minor Street	O'Farrell St	Scenario	2040 Plus Project
		Peak Hour	AM

Turn Movement Volumes

	NB	SB	EB	WB
Left	8	10	31	27
Through			385	689
Right	3	12	107	117
Total	11	22	523	833

Major Street Direction

	North/South
X	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street W 20th Ave	Minor Street O'Farrell St	Warrant Met
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**1,356**	**22**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

FEHR PEERS

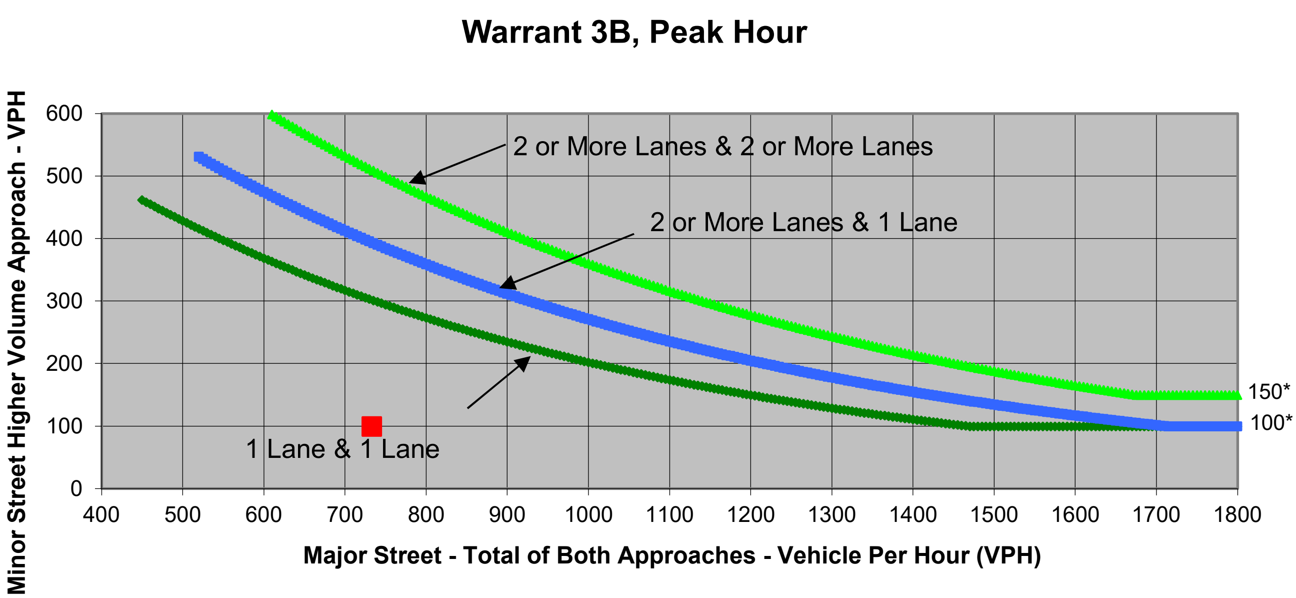
			Project	1919 O'Farrell
Major Street	W 20th Ave		Scenario	2040 Plus Project
Minor Street	O'Farrell St		Peak Hour	PM

Turn Movement Volumes

	NB	SB	EB	WB
Left		65	30	2
Through			407	241
Right	6	35	11	42
Total	6	100	448	285

Major Street Direction

	North/South
X	East/West



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

	Major Street	Minor Street	Warrant Met
	W 20th Ave	O'Farrell St	
Number of Approach Lanes	**1**	**1**	**NO**
Traffic Volume (VPH) *	**733**	**100**	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.