This section describes the existing transportation systems in the city, characterizes different modes of transportation, discusses the adopted transportation plan and policies pertinent to traffic and circulation in the area, and discusses the effects on transportation associated with the Stratford School at Partridge Avenue (project). Mitigation measures to reduce or eliminate project impacts identified as significant are included where feasible and necessary. Discussion is also provided when mitigation measures are determined to be infeasible.

The analysis was prepared by Fehr & Peers and presents results of the Transportation Impact Analysis (TIA) conducted for the proposed Stratford School to be located at 1500 Partridge Avenue in the Birdland neighborhood of Sunnyvale. The analysis was conducted to evaluate project impacts on the surrounding transportation system and to identify measures to mitigate any significant impacts. The TIA was prepared following guidelines from the City of Sunnyvale and the Santa Clara Valley Transportation Authority (VTA), the congestion management agency for Santa Clara County. **Appendix I** includes the full TIA and its appendices. This section refers the reader to TIA chapters, figures, tables, and appendices for more detailed discussion. Baseline conditions are based on current building conditions. The buildings are currently vacant.

A summary of impact conclusions is provided below.

Impact Number	Impact Topic	Impact Significance
3.14.1	Conflict with an Applicable Plan, Ordinance, or Policy	Less than significant with mitigation incorporated
3.14.1	Conflict with an Applicable Congestion Management Program	Less than significant
3.14.2	Air Traffic Pattern Impacts Under Existing plus Project Conditions	No impact
3.14.3	Increased Hazards Due to a Design Feature	Less than significant
3.14.4	Emergency Access Impacts Under Existing plus Project Conditions	Less than significant
3.14.5	Conflict with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities	Less than significant with mitigation incorporated
3.14.6	Background Intersection Impacts	Less than significant
3.14.7	Cumulative Bicycle, Pedestrian, and Transit Impacts	Less than cumulatively considerable
3.14.8	Cumulative Impacts on Emergency Access and Road Hazards	Less than cumulatively considerable
3.14.9	Cumulative Impacts at Intersection 3 – Wolfe Road/Elizabeth Way	Less than cumulatively considerable
3.14.10	Cumulative Impacts at Intersection 11 – Lawrence Expressway/Benton Street AM	Cumulatively considerable and significant and unavoidable
3.14.11	Cumulative Impacts at Intersection 11 – Lawrence Expressway/Benton Street PM	Less than cumulatively considerable
3.14.12	Cumulative Impacts at Intersection 15 – Homestead Road/Swallow Drive	Less than cumulatively considerable
3.14.13	Cumulative Impacts at Intersection 16 – Lawrence Expressway/Homestead Road	Less than cumulatively considerable

3.14.1 EXISTING SETTING

The circulation system serving Sunnyvale consists of roadways, bicycle and pedestrian facilities, the public transit system, and railroad facilities. Travel characteristics, major transportation facilities, and existing travel conditions in the project area are described below.

EXISTING ROADWAY NETWORK

Sunnyvale is traversed by a number of key regional and local transportation facilities. This extensive transportation network provides circulation and mobility that allow local and regional connectivity. Roadways with the highest average daily traffic (ADT) volumes are those that provide north–south and east–west connections across regional facilities (US 101, Interstate 280 [I-280], State Route [SR] 85, and SR 237) and railroads, or serve as parallel routes to regional roadways. The overall condition of the local street system, as well as the standards to which the improvements were originally constructed, varies by location.

Local streets are designed for high accessibility (access to adjacent properties) and low mobility (throughput of traffic movement). Conversely, freeways are designed for low accessibility, with limited connections to other facilities provided by grade-separated interchanges, and high mobility. Sunnyvale's street network comprises freeways, expressways, major and minor arterial streets, commercial/industrial collectors, residential collectors, local streets, interchanges, freeway connectors, and rail lines. The City of Sunnyvale's main vehicular roadway types are freeways, expressways, arterial streets, and local streets.

Freeways are facilities designed solely for traffic movement, providing no access to abutting properties, and designed to separate all conflicting traffic movements through the use of grade-separated interchanges. Expressways are facilities designed primarily for traffic movement and provide limited access to abutting properties. These facilities generally include median areas dividing traffic directions, some intersecting streets allowing only right turn access, some grade-separated interchanges, and some signalized intersections allowing full access. Expressways are maintained and operated by the Santa Clara County Roads and Airports Department. While the City coordinates with the County regarding expressway operations and improvements, the County controls access to adjacent parcels and the operation of traffic signals on each of these facilities.

Arterial streets are roadways that accommodate major movements of traffic not served by freeways or multi-lane highways. They are designed mainly for the movement of through traffic; the provision of access to abutting properties is a secondary function. On-street parking and loading may be restricted or prohibited to improve the capacity for moving traffic. The number of lanes on this type of facility depends on its function, its location, and the volume of traffic it is expected to handle; however, arterials are generally planned to have four or more travel lanes (two or more in each direction) and/or serve traffic at speeds greater than 30 mph.

Collector streets are facilities that serve internal traffic movements in a specific area or neighborhood and provide connections to the arterial street system. Sunnyvale includes both commercial/industrial collectors and residential collectors. Collectors typically do not serve through trips but can provide access to abutting properties.

Local streets serve access to immediately adjacent properties. These low-speed streets may be subdivided into classes according to the type of land served, such as residential or industrial, or the slope of the roadway. All public streets in Sunnyvale that are not designated as expressways, including major arterials, minor arterials, or collectors, are considered local streets. The vast majority of streets in the city are local streets.

Four major regional roadways provide access to the project site: El Camino Real/SR 82 (Congestion Management Program [CMP] corridor), Lawrence Expressway (CMP corridor), Wolfe Road, and Homestead Road. Descriptions of the roadways are presented below. **Figure 3.14-1** shows the locations of these facilities in relation to the project site.

- *Interstate 280 (freeway)* is located immediately south of the project site and provides regional freeway access between the cities of San Francisco and San Jose. I-280 is a north–south freeway with three mixed-flow lanes and one high occupancy vehicle (HOV) lane in each direction adjacent to the project site. HOV lanes, also known as diamond or carpool lanes, restrict use to vehicles with two or more persons (carpool, vanpool, and buses) or motorcycles during the morning (5:00–9:00 AM) and evening (3:00–7:00 PM) commute periods. Near the project site, I-280 has an ADT volume of approximately 158,000 vehicles. I-280 provides access to the project site via Lawrence Expressway and Wolfe Road.

- *Lawrence Expressway (expressway)* is a limited-access north–south facility operated by Santa Clara County that travels between SR 237 near Moffett Field in the north and Saratoga Avenue/Quito Road at the border between San Jose and Saratoga to the south. North of I-280, Lawrence Expressway is an eight-lane facility with the right-most lane in each direction restricted to HOVs during the commute hours.[1] Lawrence Expressway provides access to the project site via Lochinvar Avenue, Benton Street, and Lillick Drive. Near the project site, the ADT on Lawrence Expressway is approximately 62,000 vehicles.

- *El Camino Real (arterial)* is a six-lane, east–west roadway that bisects the city diagonally and connects Sunnyvale to Mountain View and Santa Clara. El Camino Real provides local access to the project site via Halford Avenue, Poplar Avenue, and Norman Drive. Near the project site, the ADT on El Camino Real is approximately 44,000 vehicles.

- *Wolfe Road (arterial)* is a four- to six-lane north–south roadway that that extends north of Sunnyvale to south of Saratoga. It provides access to the project site via Elizabeth Way, Marion Way, Inverness Way, and Homestead Road and has an ADT of approximately 35,000 vehicles.

- *Homestead Road (collector)* is a four-lane, east–west Arterial that extends from Foothill Expressway in the west to Santa Clara. Homestead Road runs south of the project site and has an ADT of approximately 23,000 vehicles. It provides access to the project site via Nightingale Avenue, Peacock Avenue, Quail Avenue, and Swallow Drive.

Key neighborhood school access streets include the following:

- *Dunford Way (local)* is a two-lane, east–west Collector street that extends across the Birdland neighborhood. To the west, Dunford Way transitions into Marion Way. To the east, Dunford Way links to Benton Street. Dunford Way provides access to several schools in the area, including Laurelwood Elementary School, Peterson Middle School, Appleseed Montessori School, Appleseed International School, Silicon Valley Academy, and New Concept Chinese School. The proposed project and Raynor Park are located

[1] For analysis purposes, the VTA CMP network accounts for the presence of HOV lanes on Lawrence Expressway by adjusting the lane geometries to three northbound lanes and three southbound lanes and applying a volume adjustment factor (0.85 during the AM peak period; 0.82 (southbound) and 0.77 (northbound) during the PM peak period). This traffic analysis is consistent with the CMP and includes these adjustments.

along Partridge Avenue. Drop-off and pick-up activity would enter the proposed project site via Dunford Way.

- *Partridge Avenue (local)* is a two-lane, north–south local street. To the south, Partridge Avenue connects to Glenbar Avenue. The proposed project and Raynor Park are located along Partridge Avenue. A second driveway for the proposed project is accessed via Partridge Avenue. Drop-off and pick-up activity would exit onto Partridge Avenue.

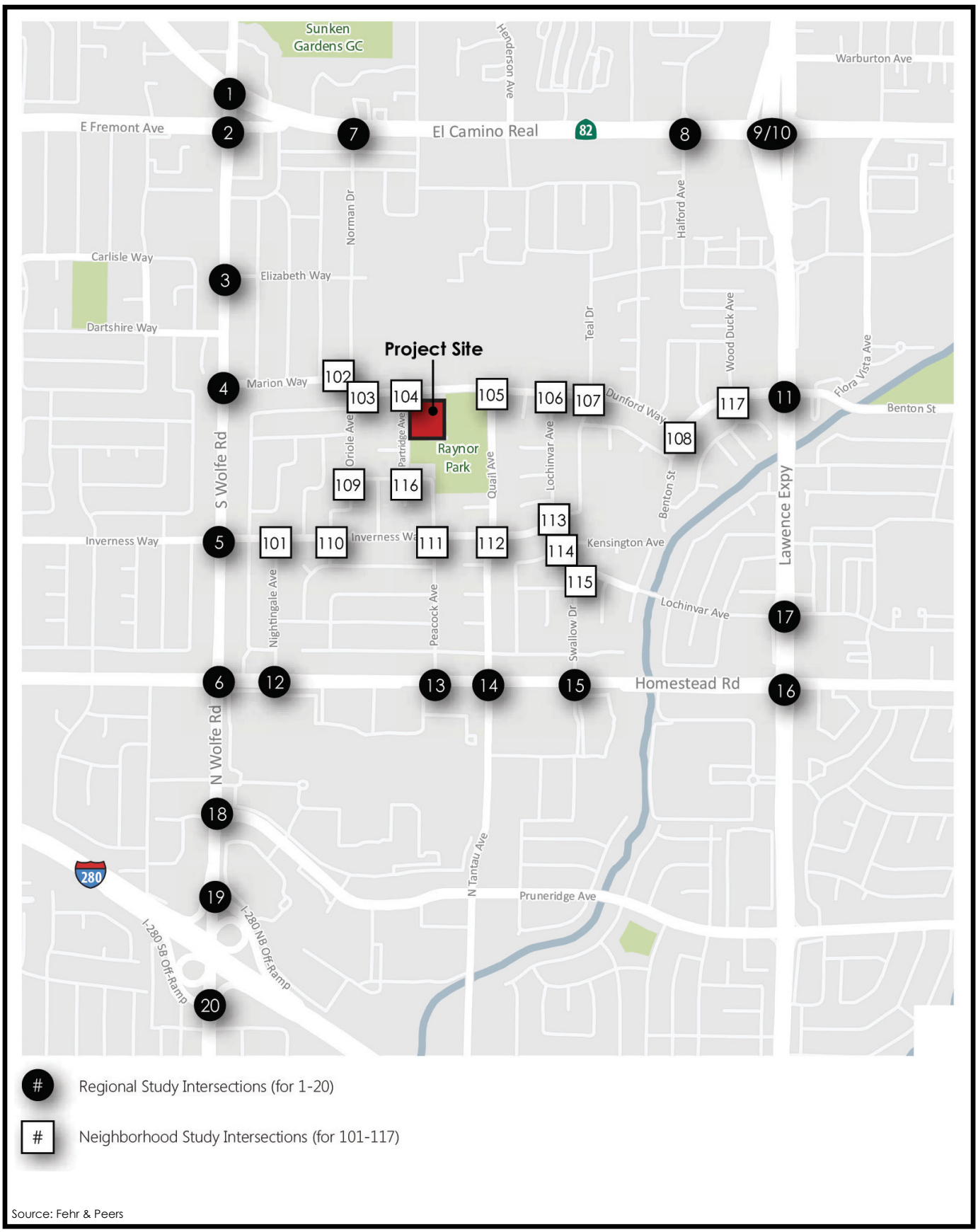
- *Inverness Way (local)* is a two-lane, east–west Collector street that extends across the Birdland neighborhood. To the east, it turns into Teal Drive.

- *Teal Drive (local)* is a two-lane, north–south local street. It provides access to Laurelwood Elementary School.

- *Quail Avenue (local)* is a two-lane, north–south Collector street that extends across the Birdland neighborhood. To the south, it connects to Tantau Avenue, a primary point of access for the Apple Campus 2.

Other notable neighborhood streets under study include Oriole Avenue, Lochinvar Avenue, Nightingale Avenue, Norman Drive, Elizabeth Way, Peacock Avenue, and Swallow Drive.

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center Figures



Source: Fehr & Peers

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Figure 3.14-1

Project Location and Study Intersections

PMC

PEDESTRIAN FACILITIES

Pedestrian facilities improve safety for pedestrians and can also encourage the use of active modes of transportation. These facilities include sidewalks, paths, pedestrian bridges, crosswalks, and pedestrian signals with crosswalks at signalized intersections to accommodate pedestrian circulation. In California, it is legal for pedestrians to cross any street, except at unmarked locations between immediately adjacent signalized crossings or where crossing is expressly prohibited. Marked crossings reinforce the location and legitimacy of a crossing. In pedestrian-friendly cities, crossing locations are treated as essential links in the pedestrian network.

Pedestrian activity is higher in the downtown area, where development densities are higher and walking distances between complementary land uses are shorter. Sunnyvale has been developed with large land areas containing similar uses, such as industrial areas, residential areas of single-family homes, etc. Most residential areas are more than one-half mile (a 10-minute walk) away from commercial centers. The neighborhood street pattern, especially in the southern part of the city, is marked by wide and high vehicle volume arterial streets at 1-mile intervals, which create long walking distances for pedestrians. Wide arterial streets, such as El Camino Real, Mathilda Avenue, Wolfe Road, and Sunnyvale-Saratoga Road, act as barriers to pedestrian movement. Additional pedestrian barriers include expressways that lack sidewalks and have long distances between signalized intersections, the Caltrain train tracks, and freeways.

The majority of city streets have pedestrian sidewalks on either one or both sides of the street. Signals are currently equipped with pedestrian signals and push buttons. Other pedestrian facilities such as signing and pavement marking, speed radar signs, flashing beacons, and in-road warning lights are also provided throughout the city, with special emphasis on school areas.

Adjacent to the project site, sidewalks are provided on both sides of El Camino Real, Wolfe Road, and Homestead Road; no sidewalks are present on Lawrence Expressway. Major roadway intersections adjacent to the site include enhanced pedestrian crossings consisting of marked crosswalks and pedestrian countdown signals at signalized intersections. The roadways immediately surrounding the site (Dunford Way, Partridge Avenue, and Oriole Avenue) include sidewalks on both sides of the street. Marked crosswalks are present near the project site at the intersections of Dunford Way/Quail Avenue, Dunford Way/Lochinvar Avenue, Dunford Way/Teal Drive, and Inverness Way/Quail Avenue. Several of the local intersections immediately adjacent to the site are uncontrolled (i.e., do not have clearly defined right-of-way through yield or stop signs), such as Partridge Avenue/Glenbar Avenue, Oriole Avenue/Glenbar Avenue, and Dunford Way/Lochinvar Avenue.

The intersections of Dunford Way/Oriole Avenue/Marion Way and Marion Way/Norman Drive represent areas of concern for pedestrian circulation. West of Oriole Drive, Marion Way lacks sidewalks, as does Norman Drive. This neighborhood was once under the jurisdiction of the County; as part of the annexation agreement, the City agreed to not install sidewalks upon annexation to maintain a rural setting. A secondary pedestrian access to Peterson Middle School just east of the Dunford Way/Oriole Avenue/Marion Way intersection is used by parents/guardians to drop off and pick up students on Dunford Way. There are no marked crosswalks on Dunford Way at this secondary drop-off/pick-up location. The City of Sunnyvale is planning pedestrian improvements in these areas, discussed in Section 6.3.1 of the Transportation Impact Analysis (**Appendix I**) and outlined below in subsection 3.14.3.

BICYCLE FACILITIES

Bikeway planning and design in California typically relies on guidelines and design standards established by the California Department of Transportation (Caltrans) (2015) in the *Highway Design Manual* (Chapter 1000: Bikeway Planning and Design). The manual describes three distinct types of bikeway facilities, as listed below.

- *Class I Bikeways (Bike Paths)* provide a completely separate right-of-way and are designated for the exclusive use of bicycles and pedestrians with vehicle and pedestrian cross-flow minimized. In general, bike paths serve corridors not served by streets and highways or where sufficient right-of-way exists to allow such facilities to be constructed away from the influence of parallel streets and vehicle conflicts.

- *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 5 feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted.

- *Class III Bikeways (Bike Routes)* are designated by signs or pavement markings for shared use with pedestrians or motor vehicles, but have no separated bike right-of-way or lane striping. Bike routes serve either to provide continuity to other bicycle facilities or to designate preferred routes through high demand corridors.

The VTA's (2007) Bicycle Technical Guidelines recommend that Caltrans standards regarding bicycle facility dimensions be used as a minimum and provide supplemental information and guidance on when and how to better accommodate the many types of bicyclists.

Sunnyvale currently has 83.8 miles of bikeways. The bikeways include Class I (bike paths), Class II (on-street bike lanes), and Class III (signed on-street bike routes) bicycle facilities. The city's bicycle network is a comprehensive system that serves Sunnyvale neighborhoods and provides connections to adjacent communities, including Santa Clara, Mountain View, Los Altos, and Cupertino. It should be noted that Santa Clara County allows bicycles on all expressways and has been gradually upgrading signals on the expressways to accommodate bicycle detection. As an alternative to high-volume and high-speed arterials and expressways, the City is considering a grid of neighborhood/intracity guided bicycle routes that will provide alternative routes to city destinations using neighborhood streets that serve low vehicular traffic volumes. Many signalized intersections in Sunnyvale are equipped with bicycle detection/loops to better serve bicycle demand.

Class II bicycle lanes are provided along the following roadways in the project area:

- Wolfe Road (from El Camino Real to Stevens Creek Boulevard)
- Homestead Road (from North Foothill Boulevard to the city of Santa Clara)
- Fremont Avenue (from Miramonte Avenue to Wolfe Road)

Bicycling is also permitted on the striped shoulder of Lawrence Expressway, though vehicle speeds can be high and the City advises caution when riding along this roadway. The City of Sunnyvale characterizes the Lawrence Expressway as an advanced facility due to the high volumes and speeds of vehicles.

The City designates several bike routes near the proposed project. These routes are not signed but are classified as a Class III bicycle routes. The following roadways are included and are shown in **Figure 3.14-2**:

- Marion Way/Dunford Way (between Wolfe Road and Thunderbird Avenue)
- Inverness Way (from Bittern Drive to Lochinvar Avenue)
- Tantau Avenue/Quail Avenue (from Homestead Road to Dunford Way)
- Lochinvar Avenue (from Dunford Way to the Lawrence Expressway)

There are no Class I bicycle/pedestrian trails in the project area.

The VTA has adopted the Santa Clara Countywide Bicycle Plan. The plan guides the development of major bicycling facilities by identifying cross-county bicycle corridors and other projects of countywide or intercity significance. Several of these routes travel through the project area, including Route 4 on El Camino Real, Route 7 on Homestead Road, and Route 9 on Wolfe Road.

EXISTING TRANSIT SERVICE

The project site is located near several transit routes, including bus and light rail service operated by the VTA and passenger rail service operated by Caltrain as shown in **Figure 3.14-3** and summarized in **Table 3.14-1**. The table includes the origins and destinations, operating hours, and headways. A description of transit services is provided below.

VTA Bus Service

The VTA operates bus service in the area. Local buses include bus Routes 22, 26, and 81, while express service includes Routes 522 and 328. A summary of each route is provided below.

- Route 22 – Local service from the Palo Alto Transit Center to the Eastridge Transit Center via El Camino Real. This route is parallel to express route 522. Near the project site, Route 22 stops at the El Camino Real/Poplar Avenue intersection.

- Route 26 – Local service from the Sunnyvale/Lockheed Martin Transit Center to the Eastridge Transit Center. This route offers north–south service on Wolfe Road in the project area. Near the project site, Route 26 stops at the Wolfe Road/Marion Way intersection.

- Route 81 – Local east–west service from San Jose State University to Vallco. This route traverses Homestead Road and Tantau Avenue in the project area. Near the project site, Route 81 stops at the Homestead Road/Tantau Avenue intersection.

- Route 522 – Express service from the Palo Alto Transit Center to the Eastridge Transit Center via El Camino Real. Near the project site, Route 522 stops at the intersections of El Camino Real/Wolfe Road and El Camino Real/Lawrence Expressway.

- Route 328 – Limited service from Almaden Expressway and Via Valiente to Lockheed Martin/Moffett Park. This route traverses Lawrence Expressway in the project area and provides four trips per day: two northbound in the AM peak period and two southbound in the PM peak period. Near the project site, Route 328 stops at the intersections of Lawrence Expressway/Wolfe Road and Lawrence Expressway/El Camino Real.

VTA Light Rail Service

The VTA also operates approximately 40 miles of light rail service in Santa Clara County. The system includes three light rail lines: Alum Rock-Santa Teresa, Mountain View-Winchester, and Ohlone/Chynoweth-Almaden. Stops are located between 0.25 and 1.5 miles apart, and service is provided via one- to three-car trains. Bicycles are permitted on all light rail vehicles at any time of day to facilitate multimodal travel. Connections to Caltrain passenger rail service are provided at the Mountain View Caltrain station and the Diridon station in downtown San Jose.

The Mountain View-Winchester Line (Route 902) operates between the downtown Mountain View station and the Winchester station in Campbell, passing through downtown San Jose. It is approximately 22 miles long and serves 37 stations, with 6 in or near Sunnyvale. Route 902 is accessible from the project site via VTA Route 26, transferring at Crossman station. This line operates approximately 19 hours a day on weekdays and 18 hours a day on weekend days. Weekday service operates on 15-minute headways during the peak commute hours and 30-minute headways the rest of the day, except late evenings when headways are 60 minutes. Weekend and holiday service operates on 30-minute headways during most of the day, except in the early mornings and late evenings when headways are 60 minutes.

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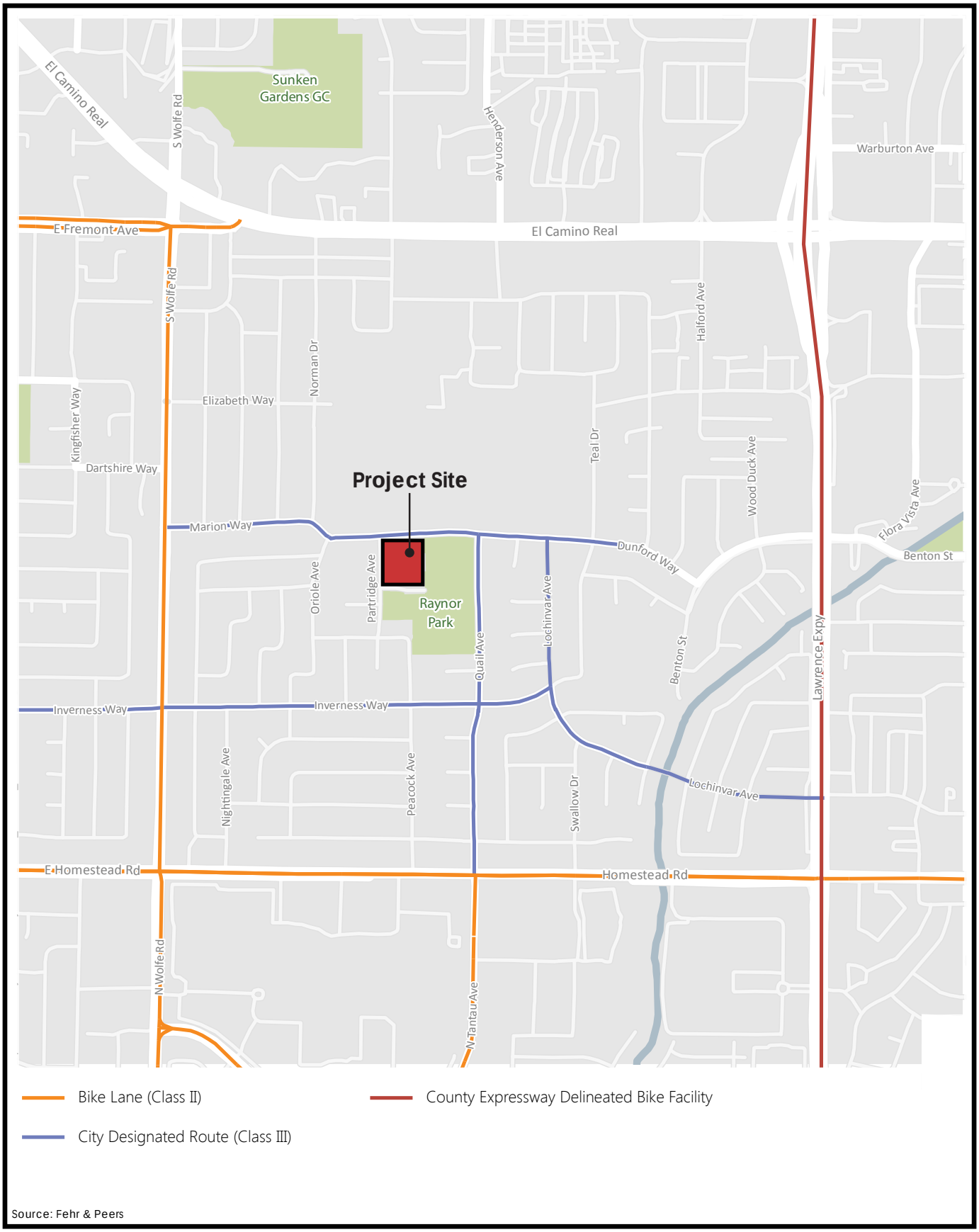

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Figure 3.14-2
Existing Bicycle Network

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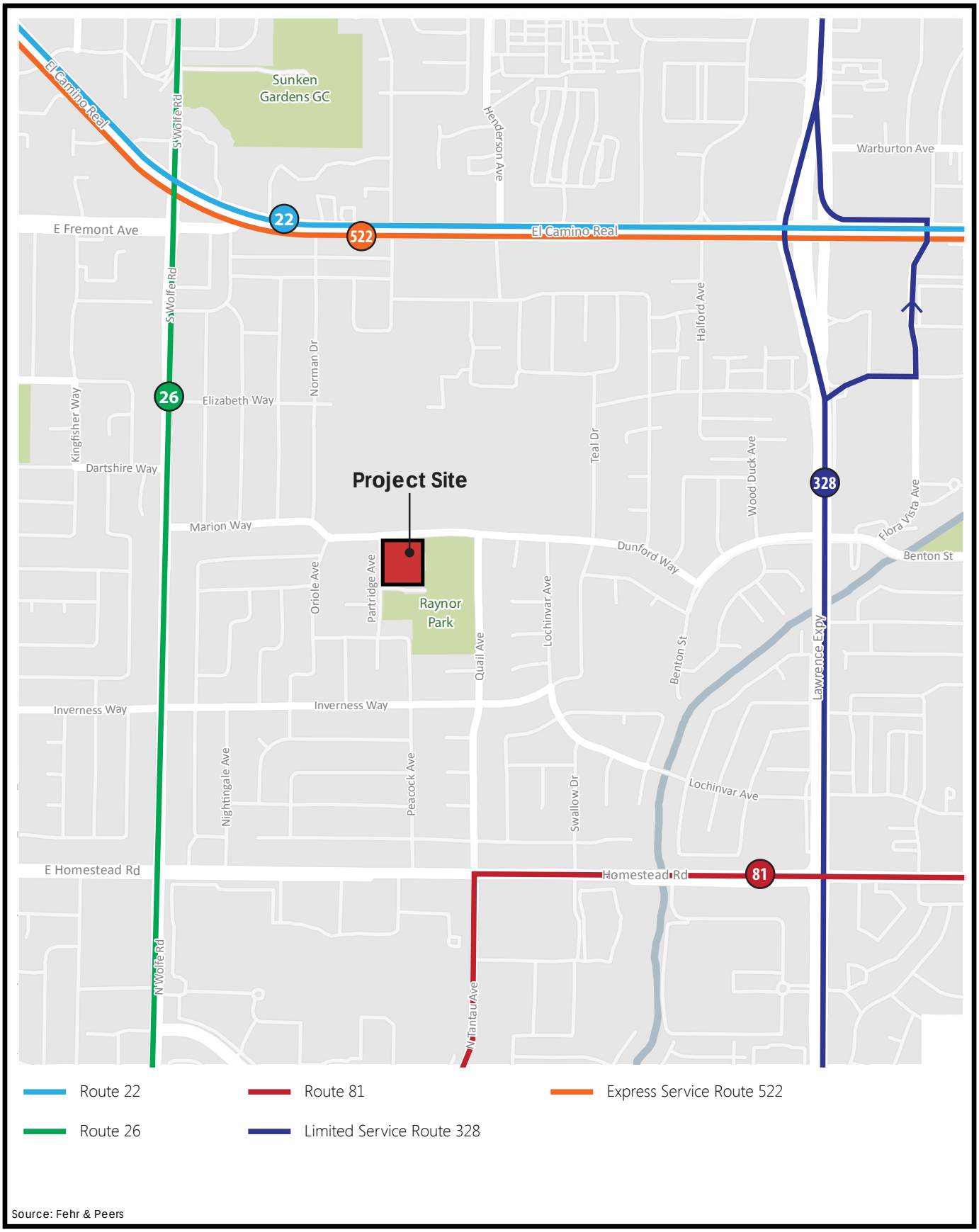

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Figure 3.14-3
Existing Transit Service

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Caltrain Service

Caltrain operates 50 miles of commuter rail between San Francisco and San Jose and operates limited commute service trains that serve Gilroy during weekday commute periods. Sunnyvale has Caltrain stations in downtown on Evelyn Avenue (Sunnyvale station) and near Lawrence Expressway (Lawrence station).

On weekdays, Caltrain operates approximately 86 trains per day of local, limited-stop, and Baby Bullet express services in both directions. Some Baby Bullet and limited-stop trains stop at the Sunnyvale station. Some limited-stop trains stop at the Lawrence station. Both stations are served by all local and limited trains. Travel time between San Jose and San Francisco is approximately 90 minutes for local services and 70 minutes for limited-stop services. Caltrain's Baby Bullet trains travel between San Francisco and San Jose in 59 minutes. Caltrain offers 22 weekday commute-hour bullet trains, of which 6 stop at the Sunnyvale station. Caltrain operates 32 trains on Saturdays and 28 trains on Sundays with local stops only. There are two Baby Bullet trains on weekends, both of which stop at the Sunnyvale station. These trains operate in both directions between San Francisco and San Jose's Diridon station.

Three Caltrain stations are located near the project site: Sunnyvale, Lawrence, and Santa Clara. The Sunnyvale station is accessible from the project site via driving or VTA Route 26 to Fair Oaks Avenue/Evelyn Avenue and a 0.7-mile walk. The Lawrence station is accessible from the project site via driving or VTA Route 328 (during its limited peak-hour service) to Lawrence Expressway/Kifer Road. The Santa Clara station is accessible from the project site via driving or VTA Routes 22, 522, or 81 to the Santa Clara Transit Center. Parking is also provided at all Caltrain stations.

TABLE 3.14-1
EXISTING TRANSIT SERVICE

Route	From	To	Weekdays		Weekends	
			Operating Hours[1]	Peak Headway[2] (minutes)	Operating Hours[1]	Headway (minutes)[2]
VTA Route 22	Palo Alto Transit Center	Eastridge Transit Center	12:00 AM–11:55 PM	15	12:00 AM–11:55 PM	15–60
VTA Route 26	Sunnyvale/Lockheed Martin Transit Center	Eastridge Transit Center	5:35 AM–11:10 PM	30	6:30 AM–10:15 PM	30–60
VTA Route *81	San Jose State University	Vallco	6:15 AM – 9:05 PM	30	9:30 AM–4:50 PM Saturday (no service on Sunday)	60
VTA Route 328	South San Jose Almaden Expressway and Via Valiente	Lockheed Martin/Moffett Park	6:00 AM–8:40 AM 4:55 PM–7:15 PM	AM: 2 NB trips PM: 2 SB trips	No service	—
VTA Route 522	Palo Alto Transit Center	Eastridge Transit Center	5:15 AM–11:30 PM	15	7:50 AM–11:10 PM Saturday 8:50 AM–7:30 PM Sunday	15–30
Caltrain	San Jose Diridon (Gilroy)	San Francisco	4:30 AM–1:30 AM	30	7:00 AM–1:40 PM Saturday 8:00 AM –10:55 PM Sunday	60

Source: VTA 2015; Caltrain 2015
Notes:
1. *Operating hours rounded to the nearest 5-minute interval.*
2. *Headways are defined as the time interval between two transit vehicles traveling in the same direction over the same route. Caltrain headways are measured from the Lawrence station.*

EXISTING INTERSECTION VOLUMES AND LANE CONFIGURATIONS

The existing operations of the study intersections were evaluated for the highest one-hour volume during the weekday morning and evening peak periods. In general, AM and PM peak-hour intersection turning movement counts were conducted between May 2014 and April 2015 (counts prior to April 2015 were provided by the City of Sunnyvale). For intersections 18-20, rebalanced 2011 counts were utilized from the Apple II Campus TIA; these counts are higher than 2015 counts due to the construction impacts of the Apple II Campus. An additional traffic count for the Benton Street/Wood Duck Avenue intersection (#117) was conducted during September 2015 and rebalanced with adjacent study intersection data from April 2015 to reflect conditions when schools are in session. Copies of new traffic counts are included in Appendix A. Figure 5 **of the TIA** presents the existing AM and PM peak-hour turning movement volumes, lane configurations, and traffic control devices at the study intersections . **Figure 3.14-4a** and **b** (presents the existing AM and PM peak-hour turning movement volumes, lane configurations, and traffic control devices at the study intersections.

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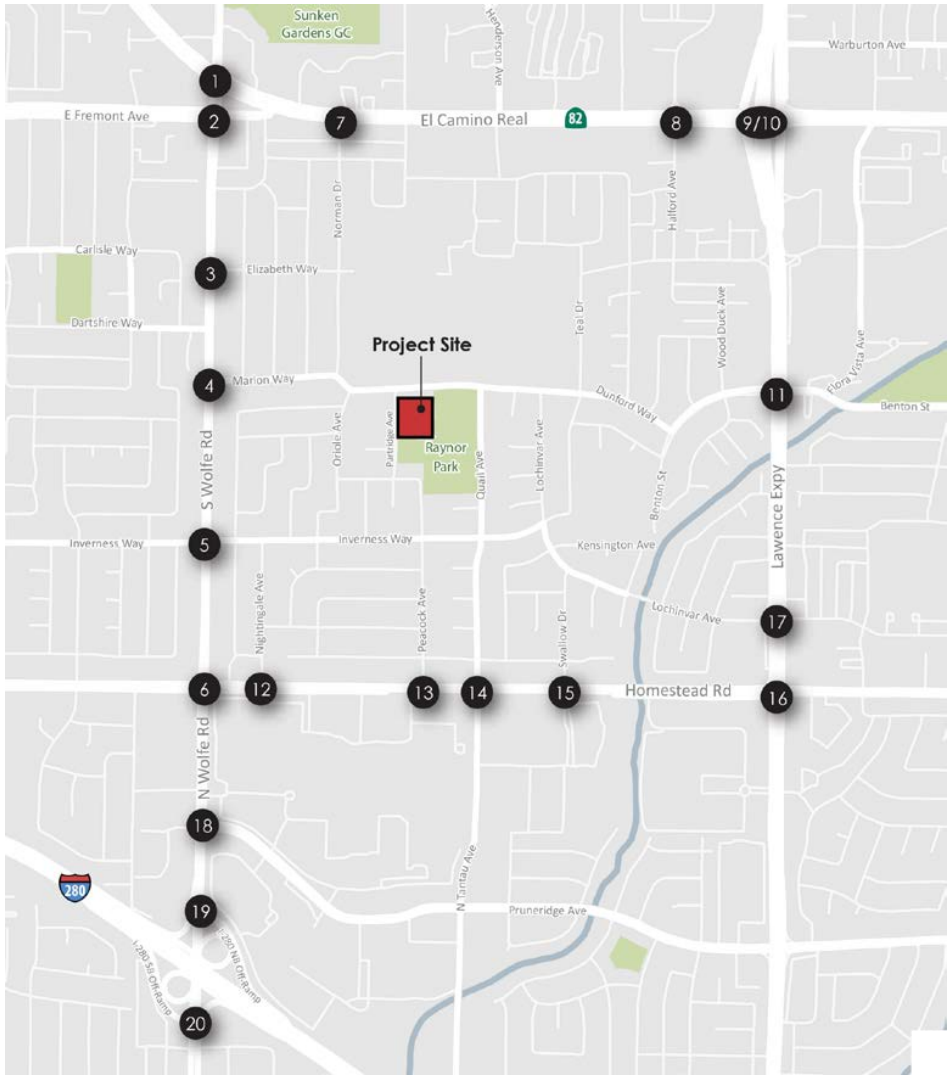

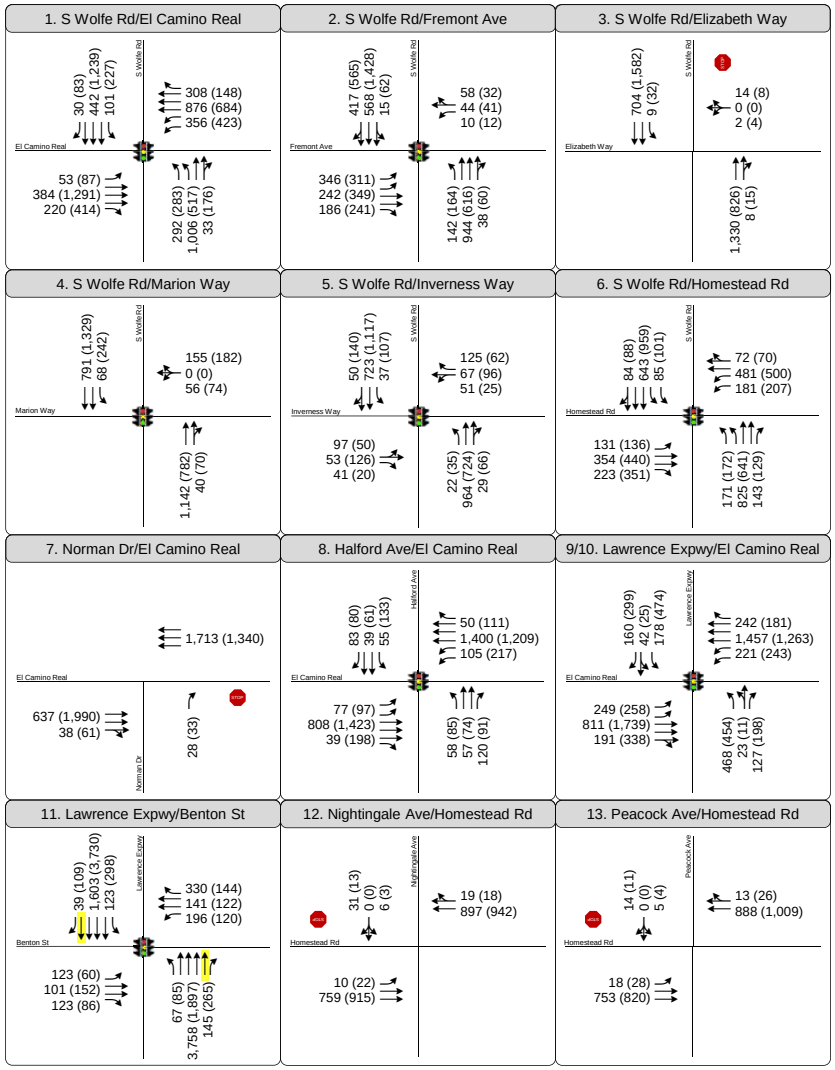

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Figure 3.14-4a

Existing Peak Hour Traffic Volumes

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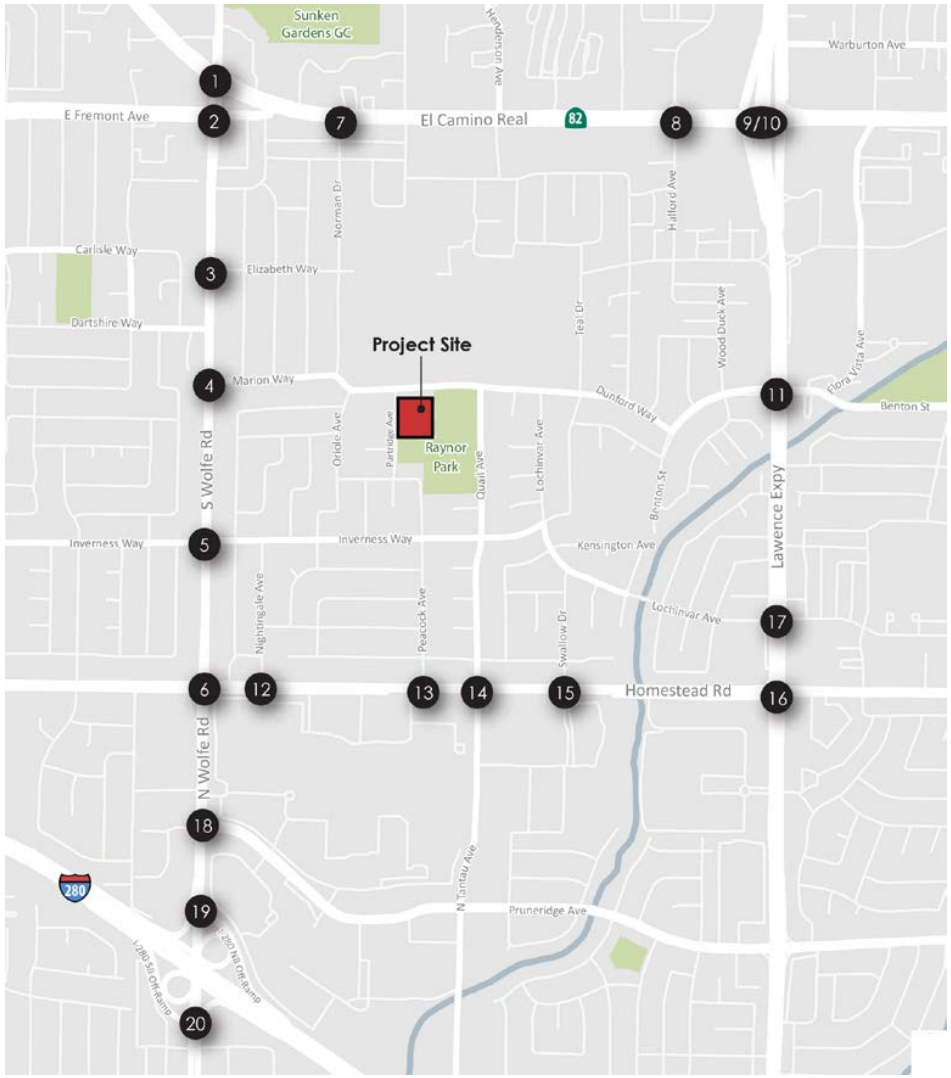

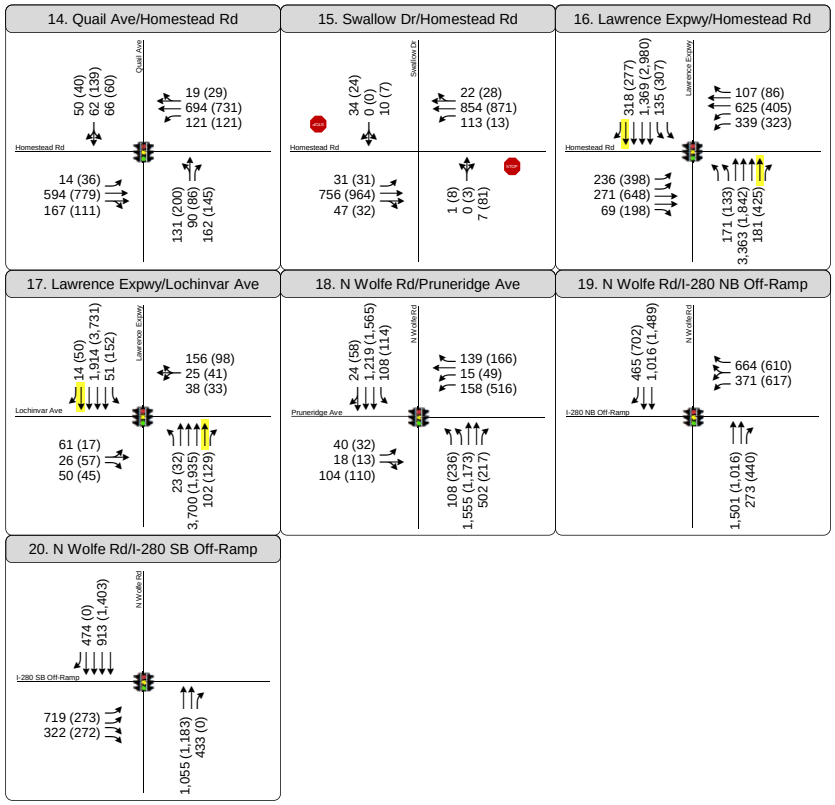

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Figure 3.14-4b

Existing Peak Hour Traffic Volumes

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EXISTING INTERSECTION LEVELS OF SERVICE

Existing intersection lane configurations, signal timings, and peak-hour turning movement volumes were used to calculate the levels of service for the key intersections during each peak hour. The results of the level of service (LOS) analysis using the TRAFFIX software program for existing conditions are presented in **Table 3.14-2**. TIA Appendix B contains the corresponding calculation sheets. The results indicate that all study intersections operate at acceptable service levels (LOS D or better for City intersections and LOS E or better for regionally significant and CMP intersections) during the AM and PM peak hours.

TABLE 3.14-2
EXISTING INTERSECTION LEVELS OF SERVICE

Intersection		Count Date	Intersection Control[1]	Peak Hour[2]	Existing Conditions	
					Delay[3]	LOS[4]
1	El Camino Real/ Wolfe Road (CMP)*	May 2014	Signal	AM PM	52.6 36.7	D- D+
2	Fremont Avenue/ Wolfe Road	May 2014	Signal	AM PM	32.2 32.2	C- C-
3	Wolfe Road/ Elizabeth Way	April 2015	SSSC	AM PM	19.0 24.6	C C
4	Wolfe Road/ Marion Way	May 2014	Signal	AM PM	11.4 13.0	B+ B
5	Wolfe Road/ Inverness Way	May 2014	Signal	AM PM	12.2 14.1	B B
6	Wolfe Road/ Homestead Road	May 2014	Signal	AM PM	30.9 31.9	C C
7	El Camino Real/ Norman Drive*	April 2015	SSSC	AM PM	9.8 15.1	A C
8	El Camino Real/ Halford Avenue*	May 2014	Signal	AM PM	16.8 21.3	B C+
9/10	El Camino Real/ Lawrence Expressway* (CMP)	May 2014	Signal	AM PM	27.4 31.5	C C
11	Lawrence Expressway/ Benton Street*	May 2014	Signal	AM PM	38.3 30.4	D+ C
12	Homestead Road/ Nightingale Avenue	April 2015	SSSC	AM PM	13.2 13.5	B B
13	Homestead Road/ Peacock Avenue	April 2015	SSSC	AM PM	13.6 14.7	B B
14	Homestead Road/ Quail Avenue	April 2015	Signal	AM PM	32.4 36.4	C- D+
15	Homestead Road/ Swallow Drive	April 2015	SSSC	AM PM	25.7 23.9	D C

Intersection		Count Date	Intersection Control[1]	Peak Hour[2]	Existing Conditions	
					Delay[3]	LOS[4]
16	Lawrence Expressway/ Homestead Road* (CMP)	April 2015	Signal	AM PM	51.7 52.1	D- D-
17	Lawrence Expressway/ Lochinvar Avenue*	April 2015	Signal	AM PM	18.6 18.8	B- B-
18	Wolfe Road/ Pruneridge Avenue	May 2011	Signal	AM PM	19.5 32.9	B- C-
19	Wolfe Road/ NB I-280 Off-Ramp	May 2011	Signal	AM PM	12.7 13.3	B B
20	Wolfe Road/ SB I-280 Off-Ramp	May 2011	Signal	AM PM	10.5 6.3	B+ A

Source: Fehr & Peers 2015
Notes:
** Regionally significant intersection*
1. Signal = Signalized Intersection; SSSC = Side-Street Stop Controlled Intersection.
2. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM).
3. Whole intersection weighted average control delay expressed in seconds per vehicle for signalized intersections. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
4. LOS = Level of Service calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.
** Regionally significant and CMP intersection have a LOS E threshold; all other intersections have a LOS D threshold.*

FIELD OBSERVATIONS

Field observations of the study intersections were conducted during the morning and evening peak hours in May 2015. In most cases, the intersections were observed to operate at the calculated levels of service for each peak hour. A summary of field observations for regional intersections is provided below.

- *El Camino Real/Wolfe Road (#1)* – In the AM peak hour, at the El Camino Real/Wolfe Road intersection, the heaviest movements are the westbound through and left-turn movements. This intersection is very closely spaced to the intersection of El Camino Real/Fremont Avenue, resulting in the full segment being used. Intersection timing is offset from Fremont Avenue/Wolfe Road, allowing queues to clear after one cycle.

- *Fremont Avenue/Wolfe Road (#2)* – This intersection is very closely spaced with the El Camino Real/Wolfe Road intersection. The heaviest volumes observed at this intersection were the northbound through and northbound left-turn movements. All queuing at this intersection is due to northbound left-turn movement. Northbound queues on Wolfe Road can extend past Elizabeth Way.

- *Wolfe Road/Inverness Way (#5)* – In the PM peak hour, this intersection experiences long queues in either direction, sometimes reaching adjacent intersections at Homestead Road and Marion Way.

- *Homestead Road/Wolfe Road (#6)* – In the AM and PM peak hours, this intersection operates with slight delays. Queues are generally cleared after one cycle. Ongoing construction of Apple Campus 2 has affected the intersection's lane markings and signage, but the lane geometry remains unchanged.

- *El Camino Real/Halford Avenue (#8)* – In the AM peak hour, westbound left turn queues on El Camino Real can be long as a result of trips to several area schools, notably Peterson Middle School and Laurelwood Elementary School.

- *El Camino Real/Lawrence Expressway (#9/#10)* – The two intersections at Lawrence Expressway (northbound ramps and southbound ramps) are closely spaced and operate as a single intersection in the CMP.

- *Lawrence Expressway/Benton Street (#11)* – This intersection experiences some delays in the AM and PM peak hours, particularly in the northbound through and westbound left turn directions. Queues are generally cleared after one cycle.

- *Homestead Road/Lawrence Expressway (#16)* – This intersection experiences some delays in the AM and PM peak hours, particularly in the northbound direction. Queues are generally cleared after one cycle.

- *Wolfe Road/Pruneridge Avenue (#18)* – The eastern leg of Pruneridge Avenue is closed due to Apple Campus 2 construction. Upon reopening, Pruneridge Avenue will provide local access only to Apple Campus 2 and adjacent land uses.

EXISTING FREEWAY SEGMENT LEVELS OF SERVICE

According to the VTA's (2014) *Transportation Impact Analysis Guidelines*, a freeway segment analysis should be included if the project meets one of the following requirements:

1. The proposed development project is expected to add traffic equal to at least 1 percent of a freeway segment's capacity.

2. The proposed development project is adjacent to one of the freeway segment's access or egress points.

3. Based on engineering judgment, lead agency staff determines that the freeway segment should be included in the analysis.

The project meets the first two criteria. A freeway segment analysis was conducted for the proposed project.

Table 3.14-3 contains lists of the existing freeway segment levels of service for the mixed-flow and HOV lanes based on the segment densities reported in the VTA's 2012 CMP Monitoring and Conformance Report, which is the most recent report available as of April 2015. For mixed-flow lanes, freeway segment capacities are defined as 2,200 vehicles per hour per lane for four-lane freeway segments and 2,300 vehicles per hour per lane for six-lane freeway segments. HOV lane capacities are defined between 1,800 to 1,900 vehicles per hour per lane.

The following freeway segments operate unacceptably (LOS F):

- Northbound I-280 between De Anza Boulevard and Wolfe Road during the AM peak period (mixed and HOV)

- Northbound I-280 between Wolfe Road and Lawrence Expressway during the AM peak period (mixed only)

- Northbound I-280 between Lawrence Expressway and Saratoga Avenue during the AM peak period (mixed only)
- Southbound I-280 between Lawrence Expressway and Saratoga Avenue during the PM peak period (mixed only)

TABLE 3.14-3
EXISTING FREEWAY SEGMENT LEVELS OF SERVICE

Freeway Segment	Direction	Peak Hour[1]	Lanes		Density[2]		LOS[3]	
			Mixed	HOV	Mixed	HOV	Mixed	HOV
I-280, Between De Anza Boulevard and Wolfe Road	NB	AM	3	1	**69**	**60**	**F**	**F**
		PM	3	1	30	12	D	B
	SB	AM	3	1	23	14	C	B
		PM	3	1	53	30	E	D
I-280, Between Wolfe Road and Lawrence Expressway	NB	AM	3	1	**90**	**49**	**F**	E
		PM	3	1	27	12	D	B
	SB	AM	3	1	26	12	C	B
		PM	3	1	42	19	D	C
I-280, Between Lawrence Expressway and Saratoga Avenue	NB	AM	3	1	**92**	**57**	**F**	E
		PM	3	1	27	9	D	A
	SB	AM	3	1	36	12	C	B
		PM	3	1	**62**	**37**	**F**	D

Source: VTA 2012
Notes:
1. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM)
2. Measured in passenger cars per mile per lane
3. LOS = level of service
N/A = Not applicable. Freeway segment does not have HOV lanes.
***Bold** font indicates unacceptable operations based on VTA's LOS E standard.*

PUBLIC SAFETY CONSIDERATIONS

Efficient operation of city streets helps to reduce response times for emergency responders, including Sunnyvale Police and Fire Department personnel as well as private ambulance services.

The design of primary response routes needs to reasonably accommodate emergency vehicles while still reducing speeds for traffic in general by minimizing unnecessarily long curb radii at intersections or maintaining extra-wide street sections. To that end, the City requires the Sunnyvale Department of Public Safety to approve plans that include the installation of any traffic calming measures.

AVIATION

No airports or other general use aviation facilities are located in Sunnyvale. Nearby aviation facilities include Moffett Federal Airfield and San Jose International Airport.

Moffett Federal Airfield, formally known as the Moffett Field Naval Air Station, is located in the City of Sunnyvale's sphere of influence. The United States Navy turned the airfield into the NASA/Ames Research Center in July 1994. Aviation uses of the airfield are limited to federal and federally hosted operations, including Google's initiative to pay for landing rights as a hosted operation.

San Jose International Airport is located approximately 6 miles east of Sunnyvale. The airport provides commercial air carrier and air cargo services, as well as general aviation. The Airport Improvement Program's goals (formally known as the Airport Master Plan) are to provide a world-class facility with state-of-the-art passenger amenities and a technologically advanced security system in a cost-efficient manner.

The project site is not located within the land use plans, height restriction areas, or flight paths of San Jose International Airport or Moffett Federal Airfield.

FREIGHT TRANSPORTATION

Sunnyvale's freight movement consists primarily of intercity trucking on freeways. The City maintains designated truck routes for trucks over three tons in weight, which is consistent with the California Vehicle Code. The City requires permits and collects fees for oversized loads in accordance with state law.

While rail freight has declined over the years with the decline of heavy industry, several businesses on the eastern side of the city still use this mode. The Union Pacific Railroad operates freight trains daily to serve Sunnyvale industry, using trackage rights on the Caltrain line. Rail freight services may continue to decline as rail commuter services along the San Francisco-San Jose rail line take precedence.

3.14.2 REGULATORY FRAMEWORK

For the purposes of this discussion, a jurisdiction is a level of government (city, county, state, or federal) or regulatory authority (local, regional, state, or federal) responsible for some or all aspects of the planning, implementation, operations, and maintenance of transportation facilities and services in a defined area. The City of Sunnyvale has jurisdiction over all city streets and City-operated traffic signals. The neighboring cities of Mountain View, Cupertino, and Santa Clara have jurisdiction over local roadways within their respective jurisdictional boundaries. Caltrans has jurisdiction over state facilities, including I-280 and SR 82 (El Camino Real). Caltrans also has jurisdiction over on- and off-ramp intersections with local streets. The County of Santa Clara has jurisdiction over streets in unincorporated areas and all of the county expressways. Transit agencies operating within the city limits are the Santa Clara Valley Transportation Authority and Caltrain. Several regional, state, and federal agencies have jurisdiction over transportation planning and implementation of circulation improvements in Sunnyvale.

FEDERAL

Americans with Disabilities Act of 1990

Titles I, II, III, and V of the Americans with Disabilities Act have been codified in Title 42 of the United States Code, beginning at Section 12101. Title III prohibits discrimination on the basis of disability in places of public accommodation (businesses and nonprofit agencies that serve the public) and commercial facilities (other businesses). The regulation includes Appendix A to Part 36 (Standards for Accessible Design) establishing minimum standards for ensuring accessibility

when designing and constructing a new facility or altering an existing facility. ADA regulations were updated and published in 2011 and amend the 1991 Title II regulation (state and local governments), 28 Code of Federal Regulations (CFR) Part 35, and the 1991 Title III regulation (public accommodations), 28 CFR Part 36.

Examples of key guidelines include detectable warnings for pedestrians entering traffic where there is no curb, a clear zone of 48 inches for the pedestrian travelway, and a vibration-free zone for pedestrians.

Federal Highway Administration

The Federal Highway Administration (FHWA) is a major agency of the US Department of Transportation. In partnership with state and local agencies, the FHWA carries out federal highway programs to meet the nation's transportation needs. The FHWA administers and oversees federal highway programs to ensure that federal funds are used efficiently.

STATE

California Department of Transportation

Caltrans has authority over the state highway system, including freeways, interchanges, and arterial state routes. Caltrans approves the planning, design, and construction of improvements for all state-controlled facilities, including State Route (SR) 82, SR 85, US 101, SR 237, and I-280, and the associated interchanges for these facilities located in Sunnyvale. The department's requirements are described in Caltrans (2001) *Guide for the Preparation of Traffic Impact Studies*, which covers the information needed for Caltrans to review the impacts on state highway facilities, including freeway segments.

Statewide Transportation Improvement Program

The California Transportation Commission administers transportation programming, the public decision-making process that sets priorities and funds projects envisioned in long-range transportation plans. It commits expected revenues over a multiyear period to transportation projects. The State Transportation Improvement Program (STIP) is a multiyear capital improvement program of transportation projects on and off the state highway system, funded with revenues from the State Highway Account and other funding sources. Caltrans manages the operation of state highways, including SR 82, SR 85, US 101, I-280, and SR 237 through Sunnyvale.

Complete Streets (AB 1358)

Assembly Bill (AB) 1358, also known as the California Complete Streets Act of 2008, requires cities and counties to include complete streets policies in their general plans. These policies address the safe accommodation of all users, including bicyclists, pedestrians, motorists, public transit vehicles and riders, children, the elderly, and the disabled. These policies can apply to new streets as well as to the redesign of corridors such as streets in the project area.

REGIONAL

Metropolitan Transportation Commission

The Metropolitan Transportation Commission (MTC) is the Bay Area's regional transportation planning agency and federally designated metropolitan planning organization (MPO). MTC is responsible for preparing the Regional Transportation Plan (RTP), a comprehensive blueprint for the development of mass transit, highway, airport, seaport, railroad, bicycle, and pedestrian facilities. The RTP is a 20-year plan that is updated every three years to reflect new planning priorities and changing projections of future growth and travel demand. The long-range plan must be based on a realistic forecast of future revenues, and the transportation projects taken as a whole must help improve regional air quality. MTC also screens requests from local agencies for state and federal grants for transportation projects to determine compatibility with the RTP.

On April 22, 2009, the Metropolitan Transportation Commission (MTC) adopted the Transportation 2035 Plan for the San Francisco Bay Area, which specifies how some $218 billion in anticipated federal, state, and local transportation funds will be spent in the nine-county Bay Area during the next 25 years.

MTC, in collaboration with the Association of Bay Area Government, is in the process of updating Plan Bay Area 2013. Plan Bay Area 2040 is a state-mandated, integrated long-range transportation, land use, and housing plan that is meant to provide integrated housing and transportation choices and reduce transportation-related pollution in the nine-county San Francisco Bay Area.

Santa Clara Valley Transportation Authority

The VTA serves two roles in Santa Clara County: as primary transit operator and as the congestion management agency (CMA). In its role as transit operator, the VTA is responsible for the development, operation, and maintenance of the bus and light rail system in the county. The VTA operates over 70 bus lines and three light rail lines, in addition to shuttle and paratransit service. It also provides transit service to major regional destinations and transfer centers in adjoining counties.

During the Valley Transportation Plan 2035 update, the VTA published the Community Design & Transportation Program (August 2003), which "provides design guidelines, planning tools, and policy guidance for coordinating transportation and land use in projects across the county." This report identifies future growth areas including Sunnyvale, the El Camino corridor, and the station areas adjacent to the light rail and Caltrain stations.

The VTA is in the process of updating its Long Range Transportation Plan. The update will include an updated list of projects included in the plan, such as transit, local streets, highway, and bike and pedestrian mobility projects. The final list will be included in Plan Bay Area, the Regional Transportation Plan, through the Metropolitan Transportation Commission.

Congestion Management Program

As the county's congestion management agency (CMA), the VTA is responsible for managing the county's blueprint to reduce congestion and improve air quality. The VTA is authorized to set state and federal funding priorities for transportation improvements affecting the Santa Clara County Congestion Management Program (CMP) transportation system. CMP-designated transportation system components in Sunnyvale include a regional roadway network, a transit

network, and a bicycle network. The CMP roadway network in Sunnyvale includes all state highways, county expressways, and some principal arterials and intersections, while the transit network includes rail service and selected bus service. The bicycle network focuses on cross-county bicycle corridors. The long-range countywide transportation plan and the means by which projects compete for funding and prioritization are documented in the Valley Transportation Plan 2040 (Adopted October 2014).

The Santa Clara Valley Transportation Authority oversees the Santa Clara County Congestion Management Program. The relevant state legislation requires that all urbanized counties in California prepare a CMP in order to obtain each county's share of gas tax revenues. The CMP legislation requires that each CMP contain the following five mandatory elements: (1) a system definition and traffic level of service standard element; (2) a transit service and standards element; (3) a trip reduction and transportation demand management element; (4) a land use impact analysis program element; and (5) a capital improvement element. The Santa Clara County CMP includes the five mandated elements and three additional elements, including a countywide transportation model and database element, an annual monitoring and conformance element, and a deficiency plan element. Preparation of a deficiency plan is required by cities for CMP facilities that operate at unacceptable levels based on the CMP's standard. The purpose of a deficiency plan is to improve system-wide traffic flow and air quality. The VTA Deficiency Plan Requirements document was simplified and updated in 2010 to focus on providing instructions on developing deficiency plans, to reflect current practices, policies, and procedures that were not yet established when the existing document was developed, and to be consistent with the recently updated VTA Transportation Impact Analysis (TIA) Guidelines.

The VTA also requires local jurisdictions to analyze impacts of new developments or land use policy changes on CMP facilities if they are expected to generate 100 or more new peak-hour trips. The VTA developed the Transportation Impact Analysis Guidelines (updated October 2014) that were adopted by all cities and the County to provide local jurisdictions with a uniform program for evaluating the transportation impacts of land use decisions on the designated CMP system.

Transit

The VTA's Short Range Transit Plan is a federally mandated planning document that describes the plans, programs, and goals of the VTA's transit service. The plan has a 10-year planning horizon and is updated annually. It focuses on the characteristics and capital needs of the existing system and on committed (funded) expansion plans. The current plan proposes eight goals to maintain financial stability, improve mobility and access, integrate transportation and land use, enhance customer focus, increase employee ownership, build ridership on transit system, improve relationships throughout the county, and deliver a capital program.

Santa Clara County

Streets in unincorporated areas, as well as all county expressways (including Central Expressway and Lawrence Expressway in Sunnyvale), are under the auspices of the Santa Clara County Roads and Airports Department. Department staff are responsible for maintaining and operating all of the expressways and all of the streets on County property.

The Santa Clara County Countywide Trails Master Plan was approved by the Santa Clara County Board of Supervisors in 1995. The goal of the plan is to direct the County's trail implementation efforts well into the twenty-first century with a balanced regard for the public good and individual desires for privacy. The plan implements the vision to provide a contiguous trail network that connects cities to one another, connects cities to the county's regional open

space resources, connects county parks to other county parks, and connects the northern and southern urbanized regions of the county. The plan identifies regional trail routes, subregional trail routes, connector trail routes, and historic trails.

The VTA's (2008) Santa Clara Countywide Bicycle Plan synthesizes other local and county plans into a comprehensive 20-year cross-county bicycle corridor network and expenditure plan and was adopted in August 2008. The plan guides the development of major bicycling facilities by identifying cross-county bicycle corridors and other projects of countywide or intercity significance. The plan complements the member agencies' bicycle plans, which focus on improvements at the local level, and incorporates other regional bike projects including the Bay Trail and the Bay Area Ridge Trail.

Caltrain/Peninsula Corridor Joint Powers Board

Caltrain is owned by the Peninsula Corridor Joint Powers Board, operated under contract with Amtrak, and managed under contract with the San Mateo County Transit District (SamTrans). Caltrain operates 50 miles of commuter rail between San Francisco and San Jose and operates limited commute service trains that serve Gilroy during weekday commute periods. There are two Caltrain stations in Sunnyvale: the Lawrence station located under Lawrence Expressway between Kifer Road and Reed Avenue and Monroe Street, and the Sunnyvale station, on West Evelyn Avenue. The Sunnyvale station is located approximately 3.5 miles north of the project area.

Planned short-range improvements to Caltrain focus on a strategy called the State of Good Repair, which provides a systematic approach to optimize the current system's condition and performance. The planned improvements include upgrading signaling and communications systems, replacing old bridges, enhancing approach speeds and the flexibility at the San Francisco terminus, and eliminating all of the remaining hold-out stations. Planned long-range improvements to Caltrain include electrification of the entire line to improve operating efficiency. .

LOCAL

City of Sunnyvale General Plan

The City of Sunnyvale General Plan consolidated 22 separate General Plan chapters and sub-chapters in 2011, many of which were adopted at varying times. The plan identifies key transportation assets and issues for the city. Sunnyvale has a central location in Silicon Valley, with good highway and train access; however, it also has limited public transportation options. To support its future vision to be an "attractive, safe, environmentally sensitive community which takes pride in the diversity of its people, the innovation of its businesses and the responsiveness of its government," the City aims to provide greater transportation options and encourage new development in nodes along major transportation corridors and transit hubs. The City's long-range goal is to provide and maintain a balanced multimodal transportation system that provides choice, convenience, and efficiency for the movement of people and goods. Specifically, the goal acknowledges the dominance of the private automobile but also recognizes the important role and benefits of other modes. The City of Sunnyvale is currently undertaking an effort to update its Land Use and Transportation Element. The General Plan Land Use and Transportation Element includes the following transportation goal and accompanying policies (2011 Consolidated General Plan numbering):

Goal LT-5 Attain a transportation system that is effective, safe, pleasant, and convenient.

Policy LT-5.1 Achieve an operating LOS of D or better on the citywide roadways and intersections as defined by the functional classification street system.[2]

Policy LT-5.2 Integrate the use of land and the transportation system.

Policy LT-5.3 Optimize the City traffic signal system performance.

Policy LT-5.4 Maintain roadways and traffic control devices in good operating condition.

Policy LT-5.5 Support a variety of transportation modes.

Policy LT-5.6 Minimize expansion of the current roadway system, while maximizing opportunities for alternative transportation systems and related programs.

Policy LT-5.7 Pursue local, state, and federal transportation funding sources to finance city transportation capital improvement projects consistent with city priorities.

Policy LT-5.8 Provide a safe and comfortable system of pedestrian and bicycle pathways.

City of Sunnyvale Bicycle Plan

The City of Sunnyvale published its Bicycle Plan in 2006, which focuses on the goals, policies, and action statements that will guide bicycling improvements through the next decade. The plan includes the following statement of purpose: "Sunnyvale shall encourage the use of bicycles for transportation and recreation, to minimize air pollution, reduce energy consumption and traffic congestion, and to improve the health and fitness of citizens of all ages" (Sunnyvale 2006, p. 67).

The plan includes three objectives:

- Enhance Sunnyvale's livability by supporting bicycling through planning, engineering, education, encouragement, and enforcement.
- Ensure that a bicyclist of average ability can travel safely on all Sunnyvale streets and can reach any Sunnyvale destination by a reasonably direct route.
- Support bicycling as a travel mode on an equal basis with motorized mobility options.

The Bicycle Plan describes the four bikeway classifications in the city: a bicycle lane, a shared roadway, a shared-use path, and a trail (unpaved). The bike network is primarily on arterial and collector streets that serve as the most direct routes to the city's destinations and workplaces. A proposed Capital Improvement Program is highlighted in the plan, which includes bicycle projects listed by cost and priority.

[2] From Policy C1.3 and Figure 2.19 of 1997 LUTE. City of Sunnyvale LOS D standard for local streets and LOS E standard for streets on regionally significant roadways (also CMP facilities), including Caribbean Drive, Mathilda Avenue, Sunnyvale-Saratoga Road, El Camino Real, Central Expressway, and Lawrence Expressway and CMP facilities.

City of Sunnyvale Citywide Deficiency Plan

In compliance with the VTA, the City of Sunnyvale maintains a Citywide Deficiency Plan (CDP; 2005) to address existing and anticipated deficiencies in the level of service of Congestion Management Program (CMP) intersections in the city. The objective of the CDP is to set forth a comprehensive citywide solution of offsetting improvements to level of service deficiencies at CMP facilities for which no localized mitigation is feasible. The CDP includes a list of transportation improvements to mitigate identified deficiencies. Improvements include intersection and roadway improvements, as well as pedestrian, bicycle, and transit infrastructure improvements to facilitate multimodal access throughout the city. There are no planned improvements near the project site in the CDP.

Citywide Evacuation Plan

In the event of a fire, geologic, or other hazardous occurrence, the City's Emergency Plan provides comprehensive, detailed instructions and procedures regarding the responsibilities of City personnel and coordination with other agencies to ensure the safety of Sunnyvale citizens.

3.14.3 IMPACTS AND MITIGATION MEASURES

This subsection identifies potential impacts that would be associated with the proposed project and describes potential mitigation measures to eliminate or reduce the magnitude of significant impacts.

STUDY SCENARIOS

The operations of the 20 regional study intersections were evaluated during the weekday morning (AM) and weekday evening (PM) peak hours for the following scenarios as presented in Chapters 2, 3, 4, and 5 of the TIA:

Scenario 1: *Existing Conditions* – Existing volumes obtained from counts.

Scenario 2: *Existing plus Project Conditions* – Scenario 1 volumes plus traffic generated by the proposed project.

Scenario 3: *Background No Project Conditions* – Existing volumes plus traffic from "approved but not yet built" and "not occupied" developments in the area.

Scenario 4: *Background plus Project Conditions* – Scenario 3 volumes plus traffic generated by the proposed project.

Scenario 5: *Cumulative No Project Conditions* – Background No Project volumes (Scenario 3) including pending developments in the area plus a five-year ambient growth factor.

Scenario 6: *Cumulative plus Project Conditions* – Scenario 5 volumes plus traffic generated by the proposed project.

The 17 school access intersections internal to the Birdland neighborhood were evaluated only during the AM (7:00–9:00 AM), afternoon (2:00–4:00 PM), and PM (4:00–6:00 PM) peak periods under Existing plus Project Conditions as presented in Chapter 6 of the TIA and discussed below in Impact 3.14.1.

Freeway segments were analyzed following the VTA guidelines under the Existing and Existing plus Project scenarios.

STANDARDS OF SIGNIFICANCE

This subsection provides first the general California Environmental Quality Act (CEQA) criteria of significance and then more specific significance criteria against which the proposed project was evaluated. According to the CEQA Guidelines, project implementation would have a significant impact if any of the following would result:

1) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

2) Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures or other standards established by the county congestion management agency for designated roads or highways.

3) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.

4) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

5) Result in inadequate emergency access.

6) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

The following level of service standards and impact criteria were applied to the intersection and freeway analysis and were developed in accordance with state, regional, and City regulations.

Intersection Impact Criteria

Signalized Intersections

Signalized intersection operations and impacts are evaluated based on the appropriate jurisdiction's level of service standards (i.e., minimum threshold for acceptable operations). The level of service standard for City of Sunnyvale intersections is LOS D except for City intersections that are designated regionally significant. Regionally significant roadways within the study area include El Camino Real and Lawrence Expressway. Additionally the Wolfe Road/El Camino Real (#1), El Camino Real/Lawrence Expressway (#9/10), and Homestead Road/Lawrence Expressway (#16) intersections are designated CMP intersections. The threshold for both regionally significant roadway intersections and CMP intersections is LOS E. The City of

Cupertino's level of service standard for the study intersections analyzed is LOS D. Cupertino also applies its own LOS D standard to CMP intersections, which in this study include the Wolfe Road intersections at the I-280 northbound and southbound ramps. Traffic impacts on City of Sunnyvale, Cupertino, and CMP intersections would occur when the addition of traffic associated with implementation of the project causes:

- Intersection operations to deteriorate from an acceptable level (LOS D or better for City of Sunnyvale and Cupertino intersections and LOS E or better for regionally significant roadways and CMP intersections) under No Project conditions to an unacceptable level (LOS E or LOS F for City of Sunnyvale and Cupertino intersections and LOS F for regionally significant roadways and CMP intersections) under the corresponding plus Project condition.

- Exacerbation of unacceptable No Project operations (LOS E or LOS F for City of Sunnyvale and Cupertino intersections and LOS F for regionally significant roadways and CMP intersections) by increasing the average critical delay by more than 4 seconds and increasing the critical volume-to-capacity (V/C) ratio by 0.01 or more.

The exception to this threshold is when the addition of project traffic reduces the amount of average control delay for critical movements; i.e., the change in average control delay for critical movements is negative. In this case, the threshold is when the project increases the critical V/C value by 0.01 or more.

Unsignalized Intersections

Levels of service analysis at unsignalized intersections are generally used to determine the need for modification in the type of intersection control (i.e., all-way stop or signalization). As part of this evaluation, traffic volumes, delays, and traffic signal warrants were evaluated to determine whether the existing intersection control is appropriate.

The City of Sunnyvale does not have an officially adopted significance criteria for unsignalized intersections (none of the unsignalized study intersections are City of Cupertino or CMP intersections). Based on previous studies, significant impacts are defined to occur when the addition of project traffic causes the average intersection delay for all-way stop-controlled intersections or the worst movement/approach for side-street stop-controlled intersections to degrade to unacceptable levels (LOS E or LOS F for City of Sunnyvale intersections and LOS F for regionally significant roadways) and the intersection satisfies the California Manual on Uniform Traffic Control Devices (MUTCD) peak-hour volume signal warrant.

Freeway Impact Criteria

The level of service standard for CMP freeway segments is LOS E. Traffic impacts on a CMP freeway segment occur when the addition of project traffic causes:

- Freeway segment operations to deteriorate from an acceptable level (LOS E or better) under existing conditions to an unacceptable level (LOS F)

- An increase in traffic of more than 1 percent of the capacity of a segment that operates at LOS F under existing conditions

Pedestrian and Bicycle Impact Criteria

Pedestrian and bicycle impacts are considered significant if the proposed project would potentially disrupt existing pedestrian and bicycle facilities, eliminate existing pedestrian and/or bicycle facilities, interfere with planned pedestrian and bicycle facilities, increase conflicts between drivers, pedestrians, and/or bicyclists, or create inconsistencies or conflicts with adopted pedestrian and bicycle system plans, guidelines, policies, or standards. These impacts are discussed in TIA Chapter 6 **(Appendix I)**.

Transit Impact Criteria

Transit impacts are considered significant if the proposed project conflicts with existing or planned transit facilities, generates potential transit trips in excess of available capacity, increases transit delay, or does not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops. These impacts are discussed in TIA Chapter 7 **(Appendix I).**

METHODOLOGY

The following is a summary of the methods and assumptions used to conduct the impact analysis for the project. Roadway and freeway lane configurations, daily traffic counts, public transit routes and facility locations, and bicycle and pedestrian facilities were collected.

This analysis is focused on potential level of service impacts that would occur from increased travel demand associated with intensification of land use under the proposed project.

Level of Service

The operations of roadway facilities are described with the term *level of service*. Level of service (LOS) is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to maneuver. Traffic operations are traditionally measured using a qualitative measure called level of service. LOS is a general measure of traffic operating conditions whereby a letter, from A (the best) to F (the worst), is assigned. These levels of service represent the perspective of drivers and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver.

Table 3.14-4 describes the characteristics of each level of service designation for motor vehicle traffic. For purposes of this Draft EIR, roadway segment LOS was analyzed per the procedures in the *Highway Capacity Manual* (Transportation Research Board 2000).

TABLE 3.14-4
QUALITATIVE DESCRIPTION OF LEVEL OF SERVICE

Level of Service	Driver's Perception
A/B	Levels of service A/B are characterized by light congestion. Motorists are generally able to maintain desired speeds on two- and four-lane roads and make lane changes on four-lane roads. Motorists are still able to pass through traffic-controlled intersections in one green phase. Stop-controlled approach motorists begin to notice absence of available gaps.
C	LOS C represents moderate traffic congestion. Average vehicle speeds continue to be near the motorist's desired speed for two- and four-lane roads. Lane change maneuvers on four-lane roads increase to maintain desired speed. Turning traffic and slow vehicles begin to have an adverse impact on traffic flows. Occasionally, motorists do not clear the intersection on the first green phase.
D	LOS D is characterized by congestion with average vehicle speeds decreasing below the motorist's desired level for two- and four-lane roads. Lane change maneuvers on four-lane roads are difficult to make and adversely affect traffic flow like turning traffic and slow vehicles. Multiple cars must wait through more than one green phase at a traffic signal. Stop-controlled approach motorists experience queuing due to a reduction in available gaps.
E	LOS E is the lowest grade possible without stop-and-go operations. Driving speeds are substantially reduced, brief periods of stop-and-go conditions can occur on two- and four-lane roads, and lane changes are minimal. At signalized intersections, long vehicle queues can form waiting to be served by the signal's green phase. Insufficient gaps on the major streets cause extensive queuing on the stop-controlled approaches.
F	LOS F represents stop-and-go conditions for two- and four-lane roads. Traffic flow is constrained and lane changes minimal. Drivers at signalized intersections may wait several green phases prior to being served. Motorists on stop-controlled approaches experience insufficient gaps of suitable size to cross safely through a major traffic stream.

Source: Transportation Research Board 2000

Signalized Intersections

The method described in Chapter 16 of the 2000 *Highway Capacity Manual* (HCM) was used to prepare the level of service calculation for the study intersections. This level of service method, which is approved by the City of Sunnyvale, the City of Cupertino, and the VTA, analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections is calculated using TRAFFIX analysis software and is correlated to a level of service designation as shown in **Table 3.14-5**.

TABLE 3.14-5
SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS
USING AVERAGE CONTROL VEHICULAR DELAY

Level of Service	Description	Average Control Delay per Vehicle (seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B+	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 12.0
B		12.1 to 18.0
B-		18.1 to 20.0
C+	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 23.0
C		23.1 to 32.0
C-		32.1 to 35.0
D+	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 39.0
D		39.1 to 51.0
D-		51.1 to 55.0
E+	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	55.1 to 60.0
E		60.1 to 75.0
E-		75.1 to 80.0
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80.0

Source: VTA 2014, 2003; Transportation Research Board 2000

Unsignalized Intersections

The unsignalized intersections were evaluated using the method contained in Chapter 17 of the 2000 HCM. Levels of service ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. At two-way or side-street-controlled intersections, the average control delay is calculated for each stopped movement, not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. **Table 3.14-6** summarizes the relationship between delay and level of service for unsignalized intersections. Additionally, the City of Sunnyvale applies the 2014 California Manual on Uniform Traffic Control Devices (MUTCD) peak-hour volume signal warrant to evaluate operations at unsignalized intersections.

TABLE 3.14-6
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS
USING AVERAGE CONTROL VEHICULAR DELAY

Level of Service	Description	Average Control Delay per Vehicle (seconds)
A	Little or no delay	≤10.0
B	Short traffic delay	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded	> 50.0

Sources: VTA 2014, 2003; Transportation Research Board 2000

Freeway Segments

Freeway segments were analyzed following the VTA guidelines under the Existing and Existing plus Project scenarios. Freeway segments are evaluated using the VTA's analysis procedure, which is based on the density of the traffic flow using methods described in the 2000 HCM. Density is expressed in passenger cars per mile per lane. The Congestion Management Program ranges of densities for each freeway segment level of service are shown in **Table 3.14-7.**

TABLE 3.14-7
FREEWAY SEGMENT LEVEL OF SERVICE DEFINITIONS

Level of Service	Density (passenger cars per mile per lane)
A	≤11
B	11.1 to 18.0
C	18.1 to 26.0
D	26.1 to 46.0
E	46.1 to 58.0
F	>58.0

Sources: VTA 2014, 2003; Transportation Research Board 2000

Project Traffic Estimates

The amount of traffic added to the roadway system by the proposed project is estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of traffic added to the roadway network. The second estimates the direction of travel to and from the project site. The new trips are assigned to specific street segments and intersection turning movements during the third step. The results of the process for the proposed project are described in the following paragraphs.

Project Trip Generation

Stratford-specific trip generation rates were developed by collecting 48-hour driveway counts at two existing Stratford schools. These use-specific rates more accurately represent the trip generation characteristics of the proposed school, since Institute of Transportation Engineers (ITE) rates are generalized based on private schools surveyed in the 1990s and 2000s in Florida, Maryland, Texas, Pennsylvania, and Oregon.

Two similar Stratford schools in Santa Clara County were selected to develop the Stratford-specific trip generation rates. Two-day (48-hour) driveway counts were conducted in April/May 2015 for the AM, afternoon, and PM peak hours at De Anza Elementary School in Sunnyvale (576 students, kindergarten through 5th grade) and San Jose Middle School in San Jose (172 students, 6th through 8th grades). The total trips in and out were divided by the total students to develop a Stratford-specific trip generation rate per student.

The driveway counts captured typical school activities, including pick-up/drop-off, staff parking, and loading. Counts at De Anza Elementary School also included on-street parking and pick-up/drop-off activities. To verify results, additional counts were conducted at San Jose Middle School. In both cases, the use of school parking lots by Little League practices may have increased the PM peak-hour count totals, thus representing slightly higher trips rates for the PM peak hour.

To utilize a conservative approach, the highest observed trip generation rate for each school was assumed for the proposed project. This rate was derived from De Anza Elementary School, which contained a higher average rate than San Jose Middle School and has similar characteristics in school size. It is worth noting that the Stratford-specific generation rates (AM: 1.14 trips per student; afternoon: 0.52 trips per student; PM: 0.71 trips per student) are higher than the standard rates from the ITE (AM: 0.9 trips per student; PM: 0.6 trips per student), thus providing a more conservative analysis.

Existing plus Project Intersection Levels of Service

Intersection levels of service were calculated with the new traffic added by the proposed project to evaluate the operating conditions of the intersections and identify potential impacts to the roadway system. The results of the intersection level of service calculations for Existing plus Project Conditions are presented in **Table 3.14-8**. TIA Appendix B contains the corresponding calculation sheets. The results for Existing Conditions are included for comparison purpose, along with the projected increases in critical delay and critical volume-to-capacity (V/C) ratios. Critical delay represents the delay associated with the critical movements of the intersection, or the movements that require the most "green time" and have the greatest effect on overall intersection operations. The changes in critical delay and critical V/C ratio between Existing Conditions and Existing plus Project Conditions are used to identify significant impacts.

TABLE 3.14-1
EXISTING AND EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection		Intersection Control[1]	Peak Hour[2]	Existing Conditions		Existing plus Project Conditions				
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Δ in Crit. V/C[5]	Δ in Crit. Delay[6]	Signal Warrant Met?[7]
1	El Camino Real/ Wolfe Road (CMP)*	Signal	AM PM	52.6 36.7	D- D+	53.1 37.2	D- D+	0.021 0.025	0.5 1.6	N/A
2	Fremont Avenue/ Wolfe Road	Signal	AM PM	32.2 32.2	C- C-	32.1 32.6	C- C-	0.005 0.014	0.2 0.7	N/A
3	Wolfe Road/ Elizabeth Way	SSSC	AM PM	19.0 24.6	C C	18.1 19.8	C C	N/A N/A	N/A N/A	No
4	Wolfe Road/ Marion Way	Signal	AM PM	11.4 13.0	B+ B	14.3 14.1	B B	0.076 0.050	3.5 1.4	N/A
5	Wolfe Road/ Inverness Way	Signal	AM PM	12.2 14.1	B B	12.6 14.3	B B	0.020 0.000	0.3 0.0	N/A
6	Wolfe Road/ Homestead Road	Signal	AM PM	30.9 31.9	C C	30.8 31.9	C C	0.013 0.007	0.0 0.0	N/A
7	El Camino Real/ Norman Drive*	SSSC	AM PM	9.8 15.1	A C	9.9 15.2	A C	N/A N/A	N/A N/A	No
8	El Camino Real/ Halford Avenue*	Signal	AM PM	16.8 21.3	B C+	16.9 21.4	B C+	0.000 0.003	0.0 0.3	N/A
9/ 10	El Camino Real/ Lawrence Exwy* (CMP)	Signal	AM PM	27.4 31.5	C C	27.5 31.6	C C	0.004 0.002	0.0 0.1	N/A
11	Lawrence Expressway/ Benton Street*	Signal	AM PM	38.3 30.4	D+ C	42.0 32.1	D C-	0.025 0.014	4.5 2.1	N/A
12	Homestead Road/ Nightingale Avenue	SSSC	AM PM	13.2 13.5	B B	13.2 13.2	B B	N/A N/A	N/A N/A	No
13	Homestead Road/ Peacock Avenue	SSSC	AM PM	13.6 14.7	B B	15.5 16.7	C C	N/A N/A	N/A N/A	No
14	Homestead Road/ Quail Avenue	Signal	AM PM	32.4 36.4	C- D+	32.9 36.8	C- D+	0.016 0.011	0.6 0.5	N/A
15	Homestead Road/ Swallow Drive	SSSC	AM PM	25.7 23.9	D C	26.5 24.3	D C	N/A N/A	N/A N/A	No
16	Lawrence Expressway/ Homestead Rd* (CMP)	Signal	AM PM	51.7 52.1	D- D-	52.9 52.6	D- D-	0.008 0.005	2.6 0.7	N/A
17	Lawrence Expressway/ Lochinvar Avenue*	Signal	AM PM	18.6 18.8	B- B-	18.8 19.0	B- B-	0.002 0.004	0.1 0.2	N/A
18	Wolfe Road/ Pruneridge Avenue	Signal	AM PM	19.5 32.9	B- C-	19.4 32.7	B- C-	0.018 0.013	0.0 0.0	N/A
19	Wolfe Road/ NB I-280 Off-Ramp	Signal	AM PM	12.7 13.3	B B	13.0 13.4	B B	0.020 0.003	0.4 0.1	N/A
20	Wolfe Road/ SB I-280 Off-Ramp	Signal	AM PM	10.5 6.3	B+ A	10.7 6.6	B+ A	0.017 0.012	0.3 0.4	N/A

Notes:

* Regionally significant intersection
1. Signal = Signalized Intersection; SSSC = Side-Street Stop Controlled Intersection.
2. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM).
3. Whole intersection weighted average control delay expressed in seconds per vehicle for signalized intersections and all-way stop controlled intersections. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
4. LOS = Level of Service calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the *2000 HCM*.
5. Change in critical volume-to-capacity ratio (V/C) between Existing and Project Conditions.
6. Change in critical movement delay between Existing and Project Conditions.
7. Signal warrant based on CA MUTCD Warrant 3, Peak Hour Volume (Urban Area).

N/A = Not Applicable
* Regionally significant intersection with LOS E threshold
Source: Fehr & Peers, September 2015.

Future Year Analysis

Background Conditions

Traffic volumes for Background No Project Conditions comprise existing volumes plus traffic generated by approved but not yet built and not occupied development in the area to account for local growth in the study area. Background plus Project Conditions are defined as Background No Project Conditions plus traffic generated by the proposed project.

Vehicle trips from approved but not yet built and not occupied development projects in the study area were added. Staff from the City of Sunnyvale, City of Cupertino, and City of Santa Clara provided a list of approved but not yet built and not occupied development projects. Projects larger than 20 residential units or 10,000 square feet of office/commercial space were considered. Trip generation estimates from approved and not occupied projects that would add traffic to the study intersections were obtained from their respective traffic reports or estimated based on trip generation rates published in the ITE's *Trip Generation* (9th Edition). The trips for each of the background projects were then assigned to the roadway network based on population and employment data, existing and estimated future travel patterns, and recent transportation impact analyses completed in the area.

TIA Appendix F contains a full list of approved and not occupied projects; major developments near the project area included in the background volumes include numerous projects in Sunnyvale, Santa Clara, and Cupertino (including the Apple Campus 2). The trips for each of the background projects were added to the existing volumes discussed above to represent Background Conditions, as shown in **Figures 3.14-5a** and **b**.

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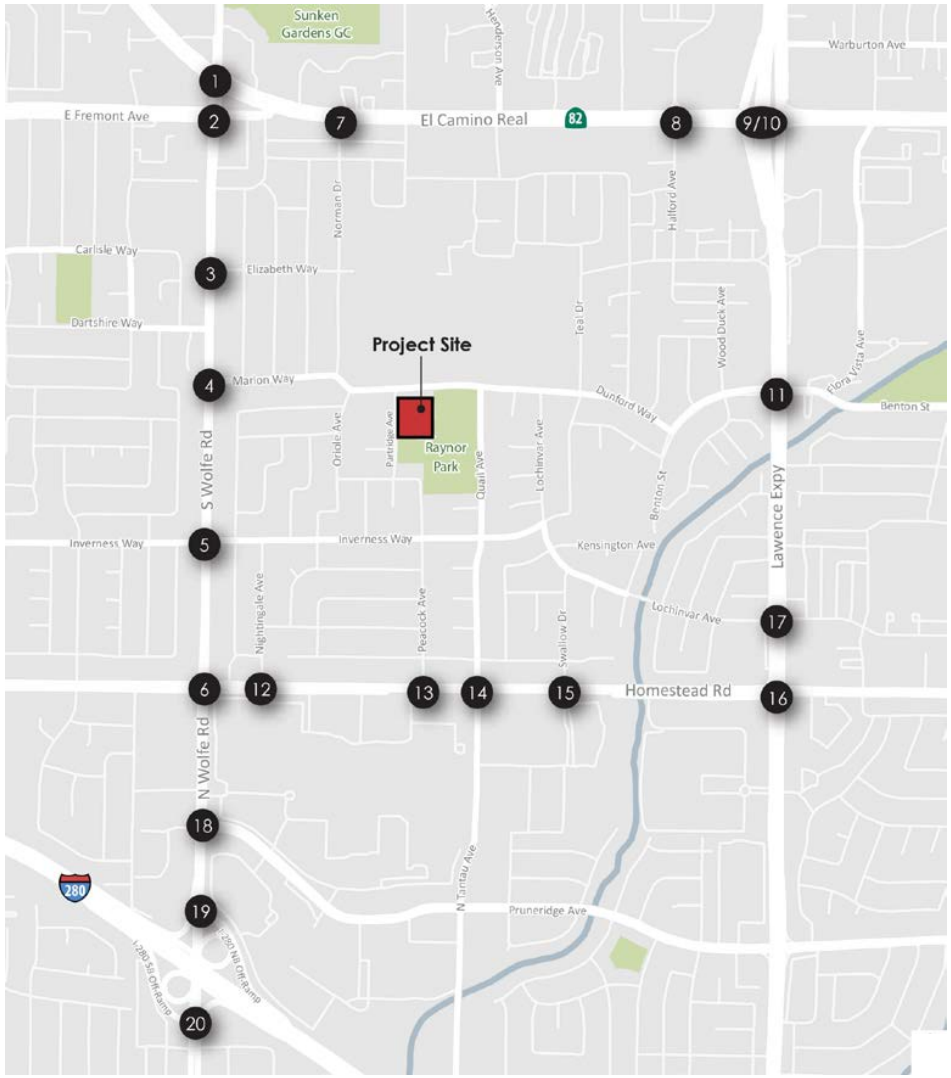

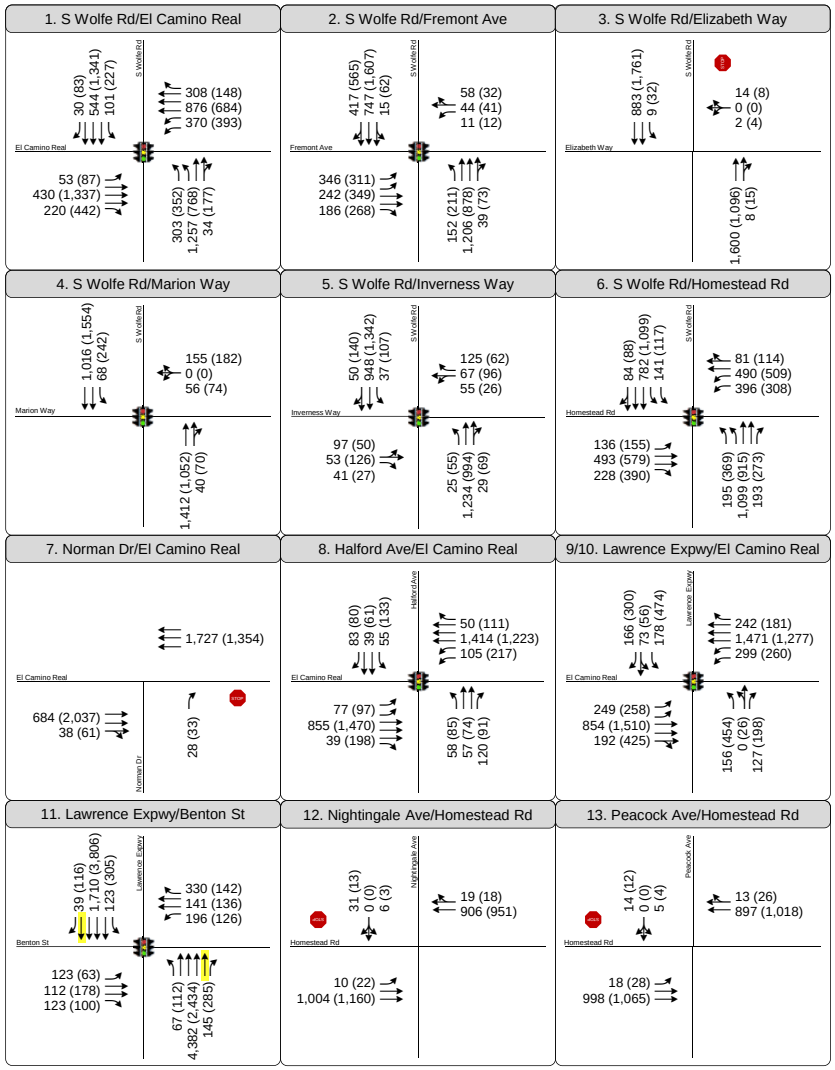

Source: Fehr & Peers

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Figure 3.14-5a

Background No Project Peak Hour Traffic Volumes

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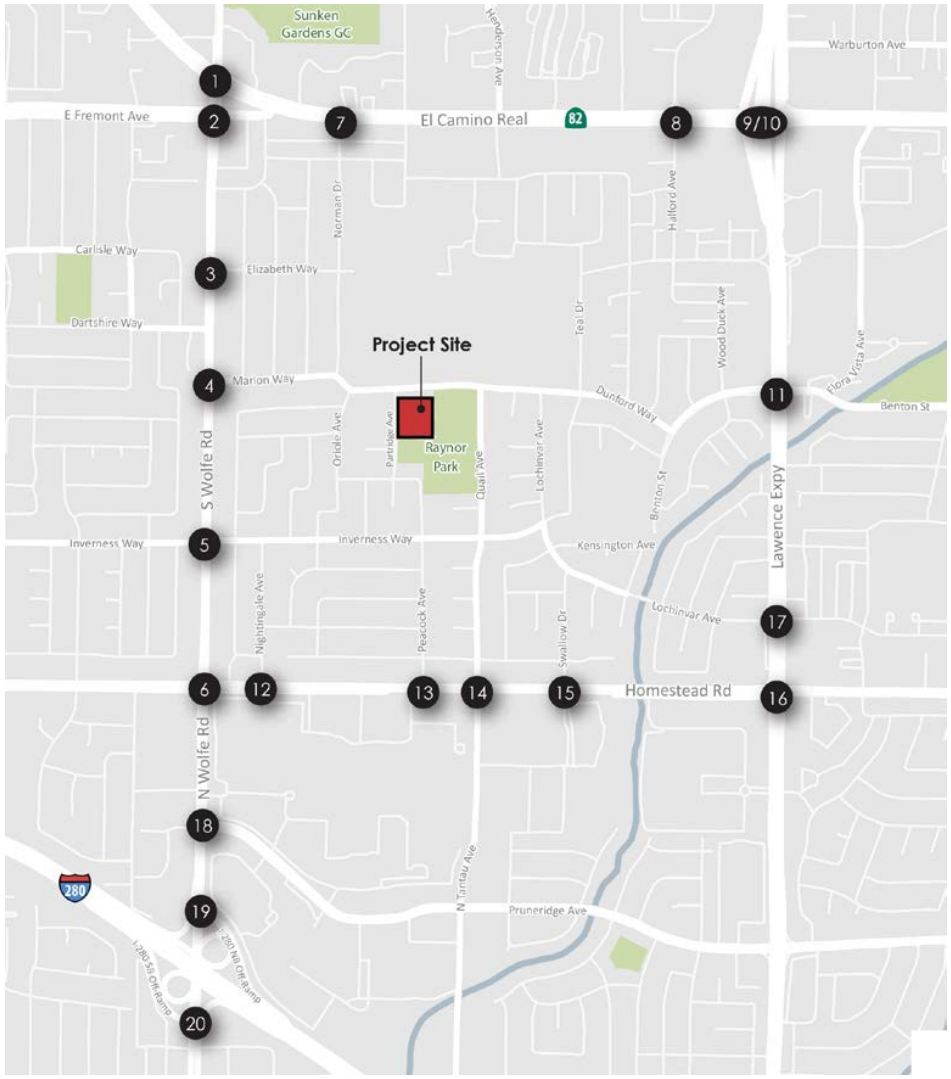

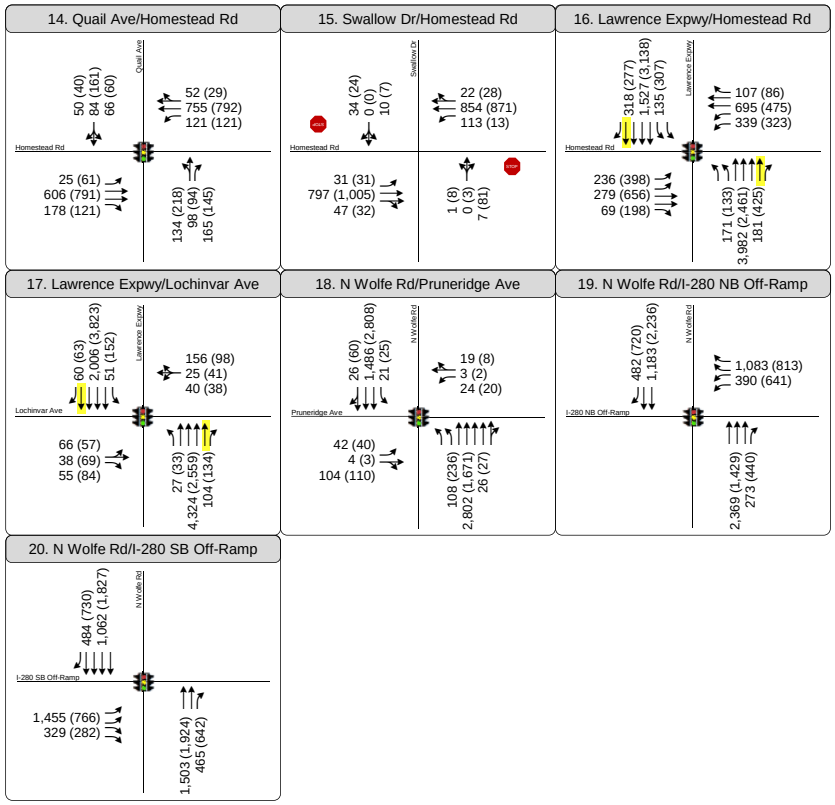

Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume

Stop Sign | HOV Lane | # Major Study Intersection

Source: Fehr & Peers

Not to scale

N

Figure 3.14-5b

Background No Project Peak Hour Traffic Volumes

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Several changes in roadway geometry were identified for the background scenario as a part of project-level improvements for the Apple Campus 2 project currently under construction:

- At the intersection of Homestead Road and Quail Avenue/Tantau Avenue (#14), an eastbound right turn lane will be added at the southeast corner of Wolfe Road/Homestead Road.

- At the intersection of Wolfe Road and Pruneridge Avenue (#18), three northbound through lanes and one southbound through lane will be added to Wolfe Road. Circulation on Pruneridge Avenue will be restricted to local access only for land uses not associated with the Apple Campus 2 (the Apple Campus 2 entrance will be located at a new intersection to the north). As a result, Pruneridge Avenue will be narrowed to one westbound left turn lane, one westbound through-right lane, and one eastbound through lane east of the intersection. To reflect these changes in access and circulation, volumes on Pruneridge Avenue during the Background and Cumulative scenarios have been reduced accordingly.

- At the intersection of Wolfe Road and the northbound I-280 off-ramp (#19), two changes will occur. An additional westbound off-ramp lane will be added, resulting in two left turn lanes and two right turn lanes (the intersection presently contains one right turn lane, one left turn lane, and one shared right/left turn lane). An additional northbound through lane will be added, resulting in three through lanes (currently includes two lanes).

Apart from these, no other approved and funded transportation network improvements have been identified. The existing roadway network was assumed for the remaining intersections in the background analysis.

Cumulative

Apart from the background transportation improvements identified above, no additional approved and funded transportation network improvements were assumed to be constructed prior to the cumulative horizon year of 2020. Therefore, the background roadway network was used for the cumulative analysis.

Land Use Changes

Future land use data is instrumental in estimating daily and peak-hour trip generation and subsequently future traffic demand. Year 2020 land use estimates are based on input from City of Sunnyvale and VTA land use projections. For all other areas outside Sunnyvale, future year land use data comes from the VTA model, which incorporates Association of Bay Area Governments (ABAG) 2007 projections.

Planned Bicycle Improvements

The City of Sunnyvale has a Bicycle Plan that provides for a comprehensive bikeway and trail system. The following are the City's major projects based on a ranked score:

- Bike lane proposed for El Camino from city limit to city limit

- Bike lane proposed for Fair Oaks between Crossman and Weddell

- Narrow outside bike bane proposed for Tasman between Lawrence and the city limit

- Bike lane proposed for Tasman between Fair Oaks and the city limit
- Wide outside lane proposed for Java between Mathilda and Crossman

IMPACTS AND MITIGATION MEASURES

Conflict with an Applicable Plan, Ordinance, or Policy (Standard of Significance 1) or with an Applicable Congestion Management Program (Standard of Significance 2)

Impact 3.14.1 Based on project site circulation patterns and potential conflicts, the project would have a **less than significant impact with mitigation incorporated** on applicable plans, ordinances, or policies establishing measures of effectiveness for the performance of the circulation system, including other modes of transportation like transit, bicycling, and walking. Since the level of service calculations indicate that all study intersections operate at acceptable service levels based on the City of Sunnyvale's and the VTA's criteria, the project would have a **less than significant** impact at all study intersections under the Existing plus Project scenario and thus would not conflict with applicable congestion management programs.

Project Construction

Project construction would take approximately 5 months. Construction techniques would include grading, repaving, revegetation, and any other activities associated with building improvements. During construction, streets would not be closed and materials would be hauled in and out of the project area using city streets. The project would generate an estimated 52 daily round trips for material hauling and deliveries (materials brought to the site or hauled off-site) over the construction period. This would be a small addition to existing traffic and would be short in duration.

Project construction would require the use of off-road equipment, such as haul trucks and small bulldozers, as well as graders and pavers, and all construction traffic would take place on City of Sunnyvale–approved routes. Further, project construction would require up to 182 crew workers, depending on the timing and potential overlap of various construction activities. All crew members would park in designated areas in the project area and are not anticipated to all be working at the same time. Crew members would be encouraged to carpool to the project site; the number would vary at different times of construction. Because construction traffic would take place on City-approved routes and it would be short in duration and temporary, construction would have a **less than significant** impact on circulation systems in the project area.

Project Operation

Vehicle Miles Traveled Under Existing plus Project Conditions

The distribution of the project's traffic onto the roadway system was based on a map of the anticipated students' home locations provided by the applicant, locations of employment areas, prevailing travel patterns, and recent transportation impact analyses completed in the area. Input from City of Sunnyvale staff was used to refine the trip distribution patterns. The trip distribution pattern is shown in **Figure 3.14-6**.

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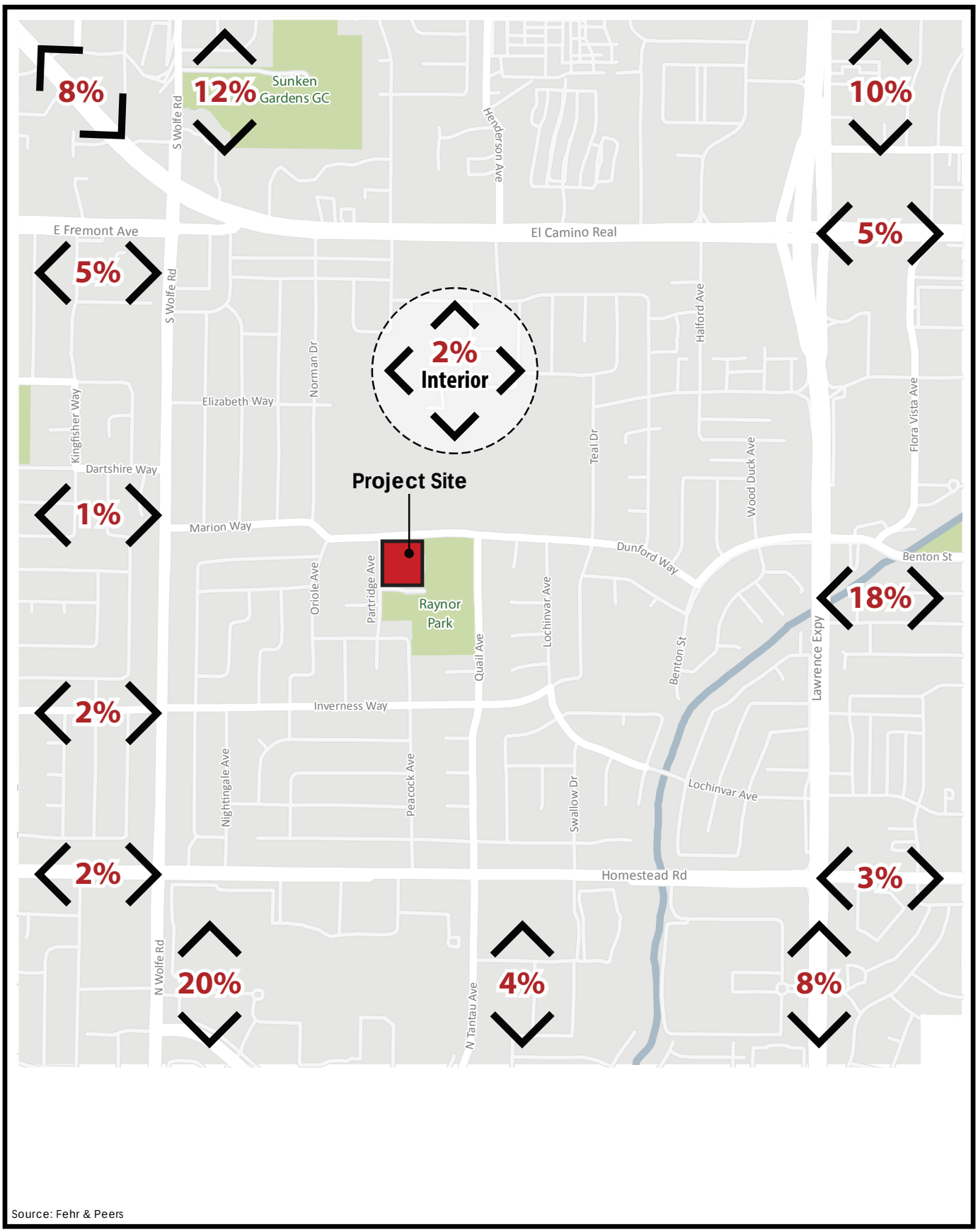

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Figure 3.14-6

Project Trip Distribution

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Project trips were assigned to the roadway network based on the trip distribution patterns discussed above. **Figure 3.14-7a** and **b** shows the AM and PM peak-hour project trips assigned to each turning movement at the study intersections. The trip assignment was added to the existing volumes to establish volumes under Existing plus Project Conditions, as shown on **Figure 3.14-8a** and **b**.

TABLE 3.14-9
TRIP GENERATION ESTIMATES

Land Use	ITE Code	Size	Units[4]	AM Peak Hour				Afternoon Peak Hour				PM Peak Hour			
				Rate[5]	In	Out	Total	Rate[5]	In	Out	Total	Rate[5]	In	Out	Total
Proposed Land Use															
Stratford Middle School[6]		520	Students	1.14	312	281	593	0.52	135	136	271	0.71	195	173	368
Baseline Trip Generation					**312**	**281**	**593**		**135**	**136**	**271**		**195**	**173**	**368**

Source: Fehr & Peers, September 2015.
Notes:
1. ksf = 1,000 square feet
2. Rate = trips per 1,000 square feet or per student

Based on Stratford-specific trip generation rates developed from existing Stratford schools.

Impacts to Existing plus Project Freeway Segment Levels of Service

Freeway segments of Interstate 280 were analyzed during the AM and PM peak hours by calculating the amount of project traffic projected to be added to these freeway segments. To be conservative, 80 percent of trips traveling to/from Wolfe Road and Lawrence Expressway south of Homestead Road were assumed to use I-280, and no project trips were assigned to HOV lanes.

Table 3.14-10 presents the estimated number of trips added to the freeway segments under Existing plus Project Conditions and the estimated densities and service levels.

TABLE 3.14-10
EXISTING PLUS PROJECT FREEWAY SEGMENT LEVELS OF SERVICE

I-280 Freeway Segment	Direction	Peak Hour[1]	Capacity (vph)[2]	Existing Conditions		Existing plus Project Conditions			
				Density[3]	LOS[4]	Trips[5]	Density	LOS	% Impact[6]
Between De Anza Boulevard and Wolfe Road	NB	AM	6,900	**69**	**F**	48	**69**	**F**	0.70%
		PM		30	D	27	30	D	0.39%
	SB	AM	6,900	23	C	38	23	C	0.55%
		PM		53	**E**	26	53	E	0.38%
Between Wolfe Road and Lawrence Expressway	NB	AM	6,900	**90**	**F**	12	**90**	**F**	0.17%
		PM		27	D	8	27	D	0.12%
	SB	AM	6,900	26	C	9	26	C	0.13%
		PM		42	D	9	42	D	0.13%
Between Lawrence Expressway and Saratoga Avenue	NB	AM	6,900	**92**	**F**	22	**92**	**F**	0.26%
		PM		27	D	12	27	D	0.17%
	SB	AM	6,900	36	C	22	36	C	0.26%
		PM		**62**	**F**	12	**62**	**F**	0.17%

Notes:
1. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM).
2. vph = vehicles per hour
3. Measured in passenger cars per mile per lane
4. LOS = Level of Service
5. Project trips added to individual freeway segments
6. Percent impact on mixed flow lanes determined by dividing the number of Project trips by the freeway segment's capacity.

Bold font indicates unacceptable operations based on VTA's LOS E Standard.
Source: *2012 Monitoring and Conformance Report*, VTA, September 2015.

As shown in **Table 3.14-10**, the proposed project would not add trips greater than 1 percent of the freeway segment capacity to the freeway study segments during the AM and PM peak hours. Therefore, based on the VTA's impact criteria, the project would have a **less than significant** impact on the identified freeway study segments under Existing plus Project Conditions and no mitigation measures would be required.

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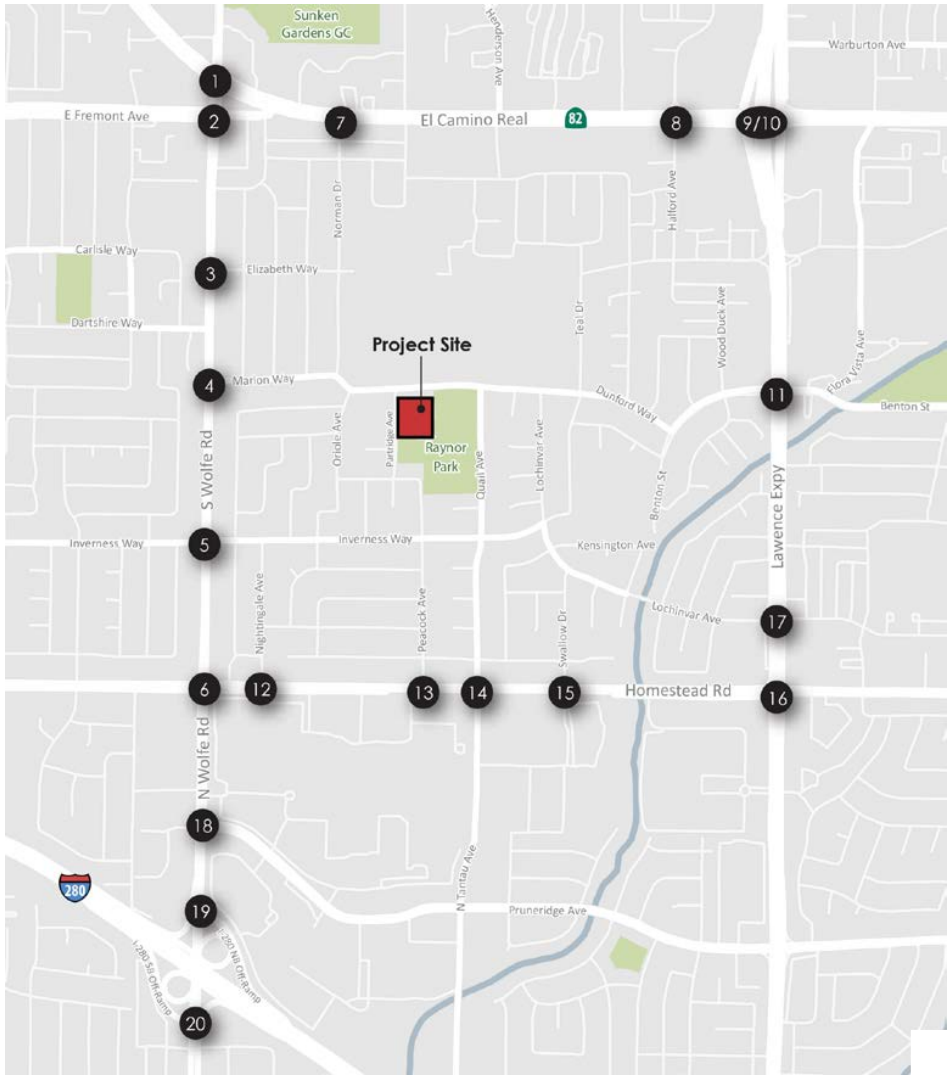

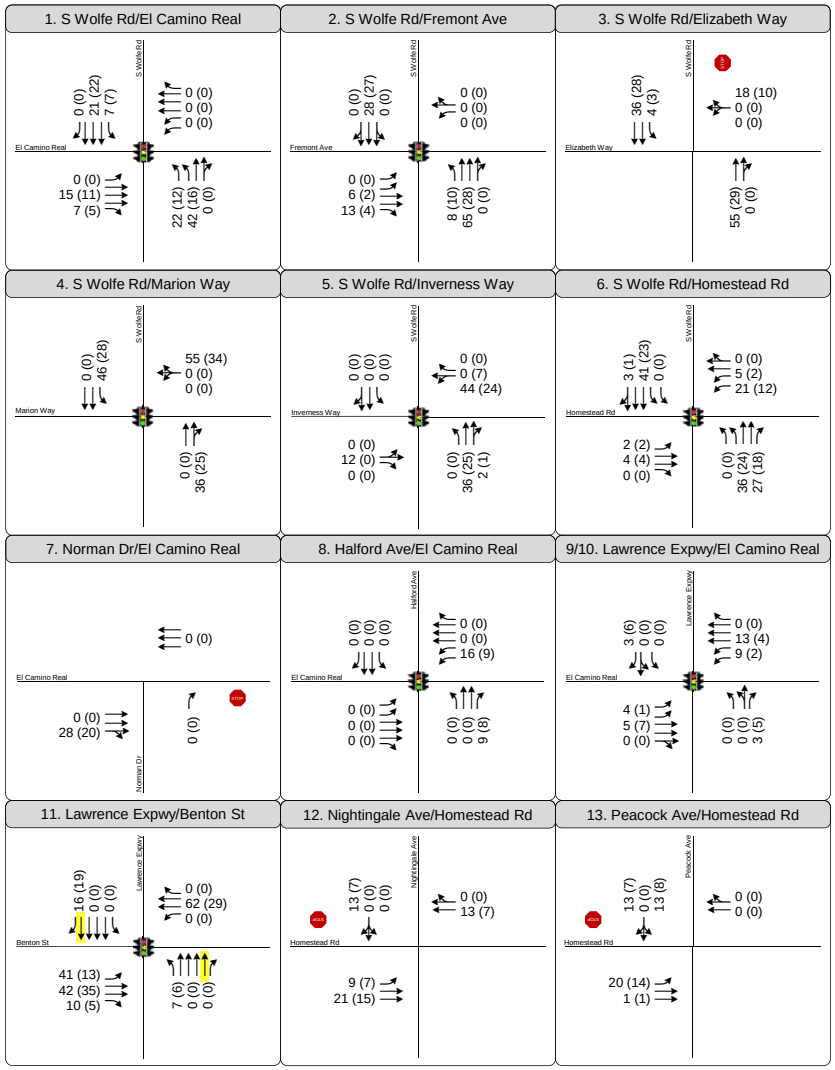

Source: Fehr & Peers

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Figure 3.14-7a

Project Trip Assignment

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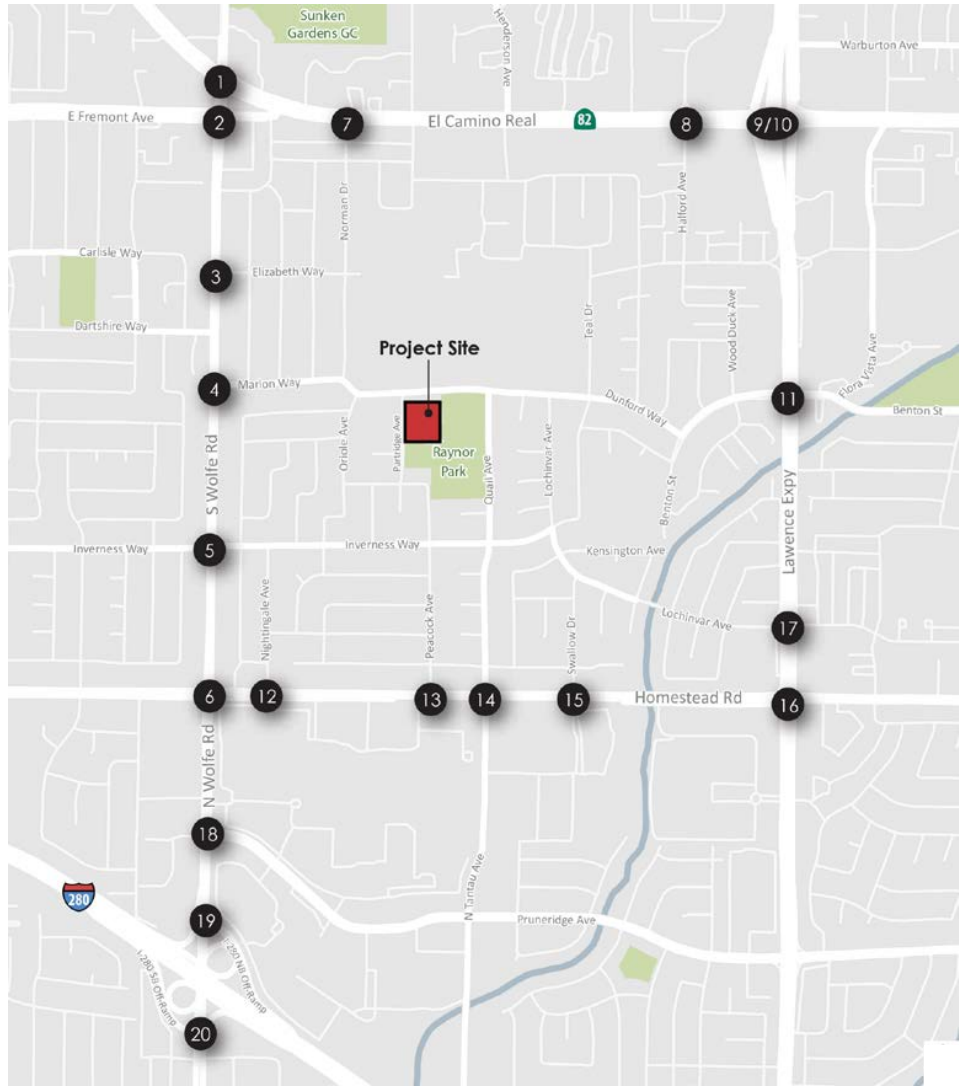

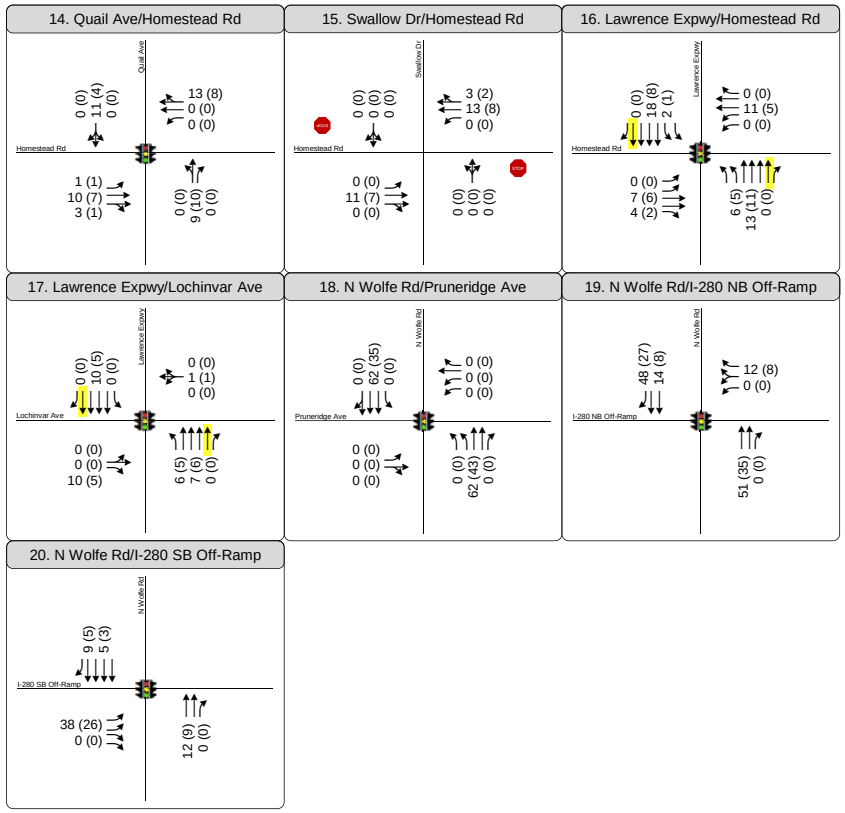

Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume
Stop Sign | HOV Lane | # Major Study Intersection

Source: Fehr & Peers

Not to scale

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Figure 3.14-7b
Project Trip Assignment

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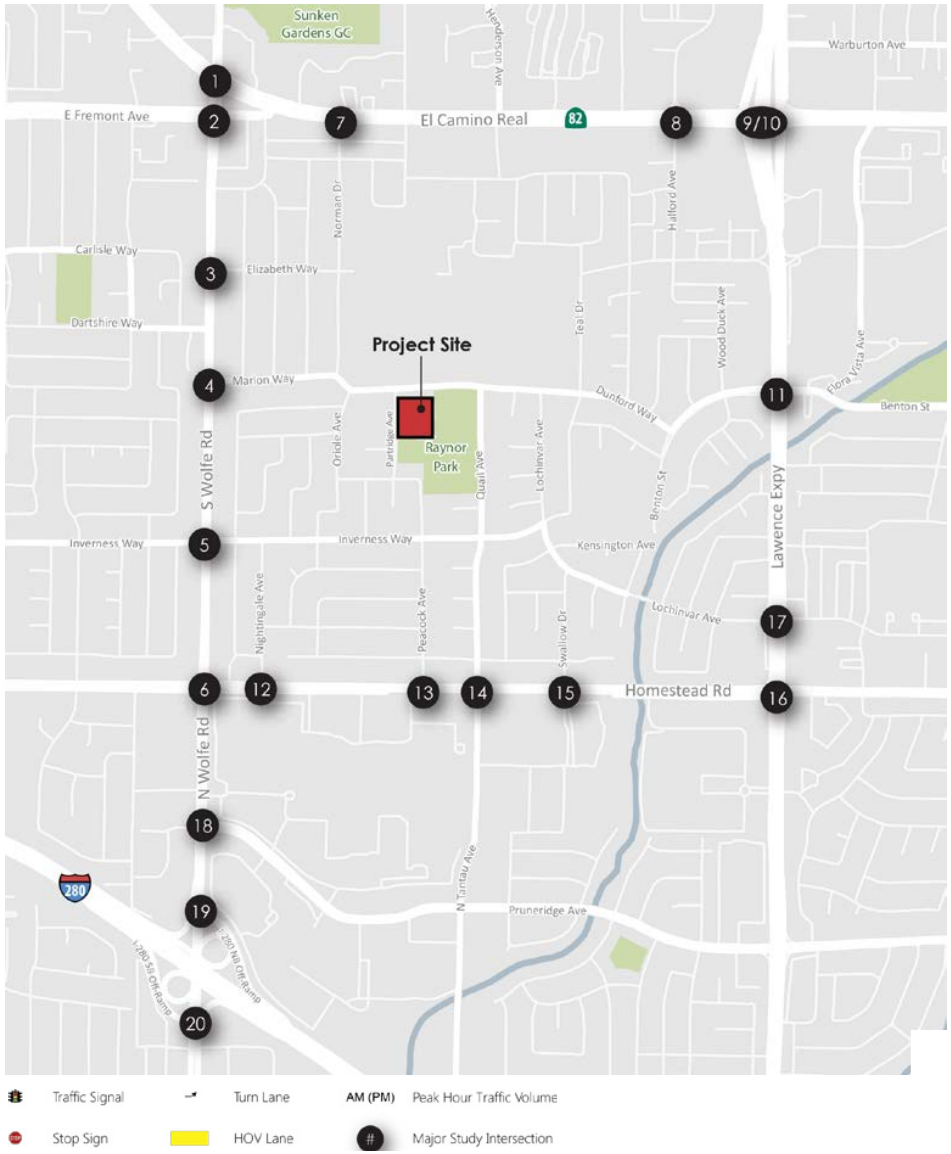

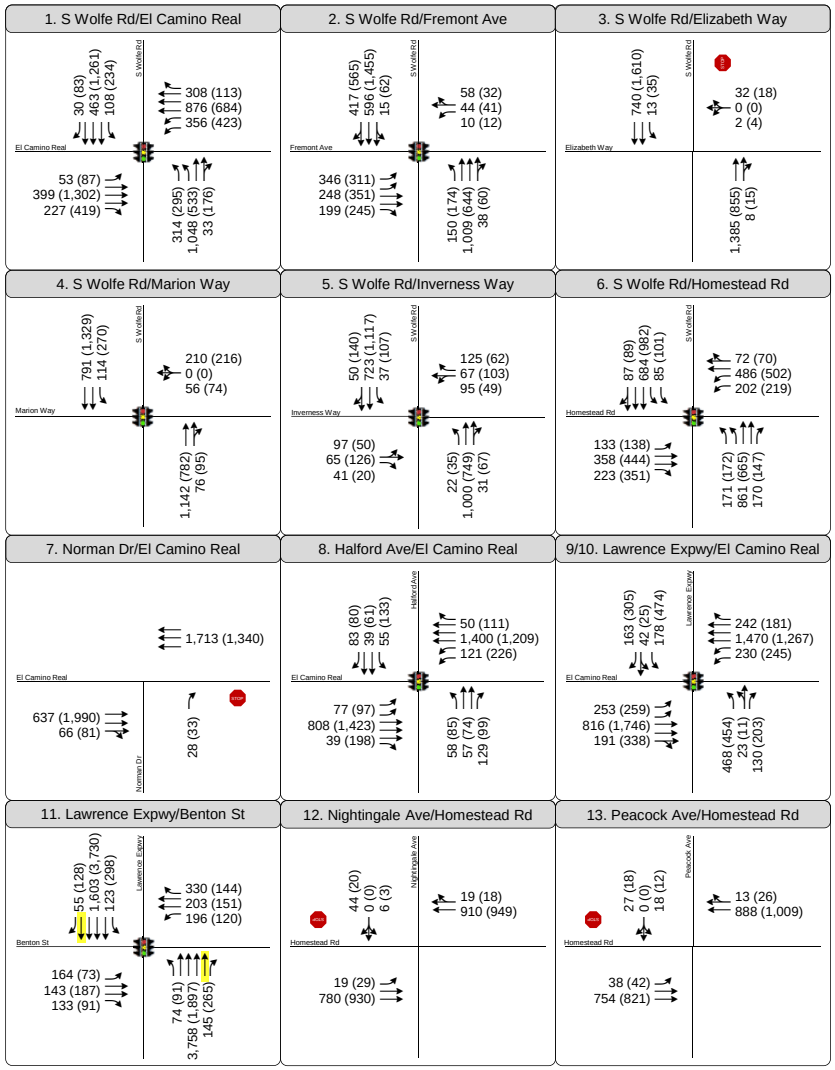

Source: Fehr & Peers

Not to scale

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Figure 3.14-8a

Existing Plus Project Peak Hour Traffic Volumes

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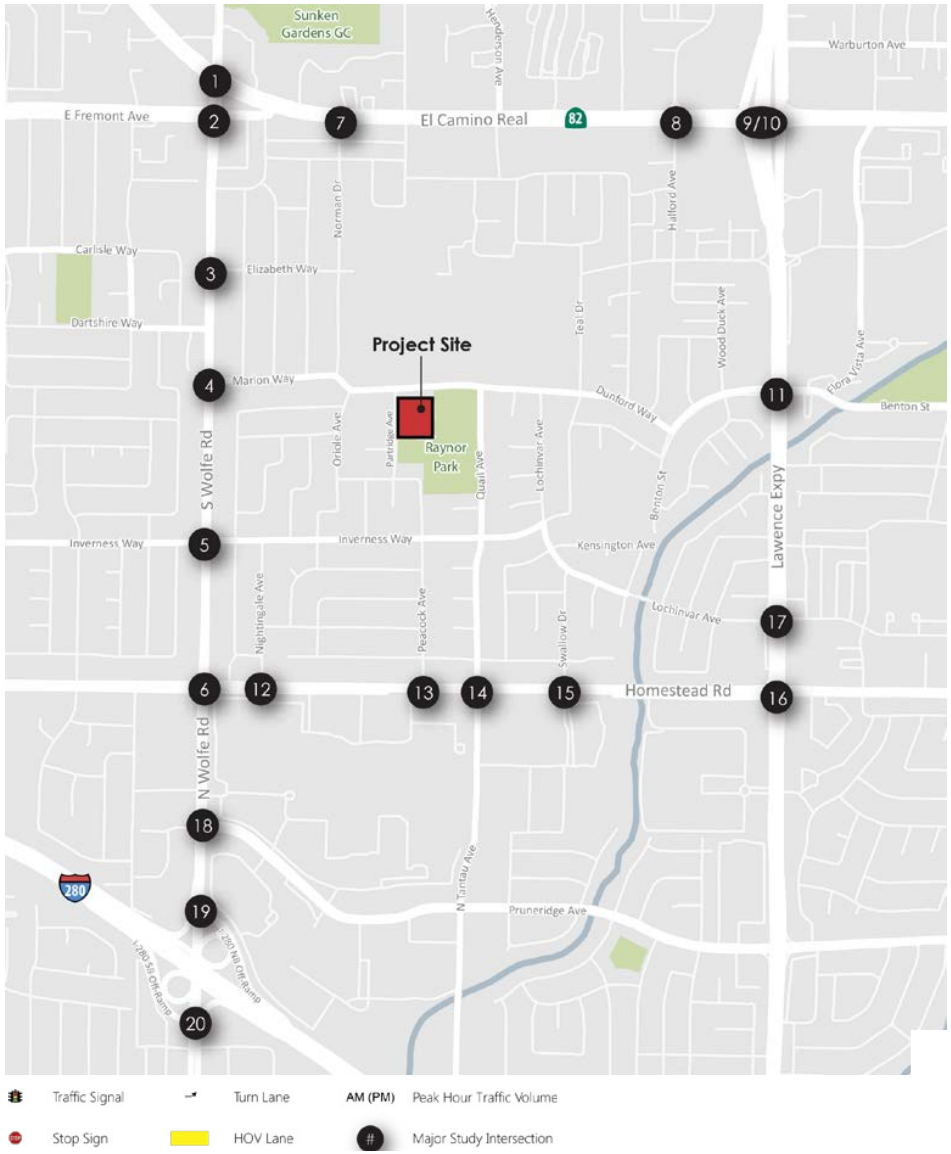

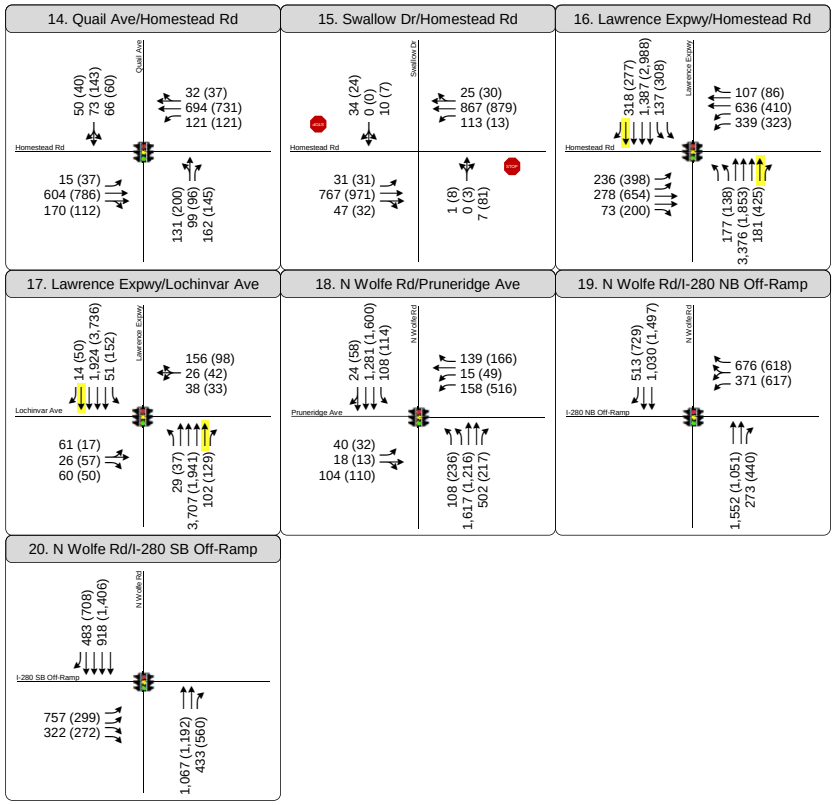

Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume

Stop Sign | HOV Lane | # Major Study Intersection

Source: Fehr & Peers

Not to scale

N

Figure 3.14-8b

Existing Plus Project Peak Hour Traffic Volumes

PMC

Impacts to Intersections Under Existing plus Project Conditions

Peak-Hour Signal Warrant Analysis

The 2014 California MUTCD contains a number of guidelines, called warrants, to determine whether the installation of a traffic signal at a particular location is appropriate. The peak-hour volume signal warrant, one of eight warrants, was evaluated for the unsignalized intersections with LOS D of worse under Existing and Existing plus Project Conditions.[3] The results indicate that no intersections satisfy peak-hour volume signal warrants under Existing plus Project Conditions during the AM and PM peak hours and are shown in **Table 3.14-11**. TIA Appendix C contains the peak-hour signal warrants.

TABLE 3.14-11
EXISTING AND EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection		Intersection Control[1]	Peak Hour[2]	Existing Conditions		Existing plus Project Conditions				
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Δ in Crit. V/C[5]	Δ in Crit. Delay[6]	Signal Warrant Met?[7]
1	El Camino Real/ Wolfe Road (CMP)*	Signal	AM PM	52.6 36.7	D- D+	53.1 37.2	D- D+	0.021 0.025	0.5 1.6	N/A
2	Fremont Avenue/ Wolfe Road	Signal	AM PM	32.2 32.2	C- C-	32.1 32.6	C- C-	0.005 0.014	0.2 0.7	N/A
3	Wolfe Road/ Elizabeth Way	SSSC	AM PM	19.0 24.6	C C	18.1 19.8	C C	N/A N/A	N/A N/A	No
4	Wolfe Road/ Marion Way	Signal	AM PM	11.4 13.0	B+ B	14.3 14.1	B B	0.076 0.050	3.5 1.4	N/A
5	Wolfe Road/ Inverness Way	Signal	AM PM	12.2 14.1	B B	12.6 14.3	B B	0.020 0.000	0.3 0.0	N/A
6	Wolfe Road/ Homestead Road	Signal	AM PM	30.9 31.9	C C	30.8 31.9	C C	0.013 0.007	0.0 0.0	N/A
7	El Camino Real/ Norman Drive*	SSSC	AM PM	9.8 15.1	A C	9.9 15.2	A C	N/A N/A	N/A N/A	No
8	El Camino Real/ Halford Avenue*	Signal	AM PM	16.8 21.3	B C+	16.9 21.4	B C+	0.000 0.003	0.0 0.3	N/A
9/ 10	El Camino Real/ Lawrence Exwy* (CMP)	Signal	AM PM	27.4 31.5	C C	27.5 31.6	C C	0.004 0.002	0.0 0.1	N/A
11	Lawrence Expressway/ Benton Street*	Signal	AM PM	38.3 30.4	D+ C	42.0 32.1	D C-	0.025 0.014	4.5 2.1	N/A
12	Homestead Road/ Nightingale Avenue	SSSC	AM PM	13.2 13.5	B B	13.2 13.2	B B	N/A N/A	N/A N/A	No

[3] The peak-hour signal warrant analysis should not serve as the only basis for deciding whether and when to install a traffic signal. To reach such a decision, the full set of warrants should be investigated based on a thorough study of traffic and roadway conditions by an experienced engineer. The decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. The responsible state or local agency should undertake regular monitoring of actual traffic conditions and accident data and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

	Intersection	Intersection Control[1]	Peak Hour[2]	Existing Conditions		Existing plus Project Conditions				
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Δ in Crit. V/C[5]	Δ in Crit. Delay[6]	Signal Warrant Met?[7]
13	Homestead Road/ Peacock Avenue	SSSC	AM PM	13.6 14.7	B B	15.5 16.7	C C	N/A N/A	N/A N/A	No
14	Homestead Road/ Quail Avenue	Signal	AM PM	32.4 36.4	C- D+	32.9 36.8	C- D+	0.016 0.011	0.6 0.5	N/A
15	Homestead Road/ Swallow Drive	SSSC	AM PM	25.7 23.9	D C	26.5 24.3	D C	N/A N/A	N/A N/A	No
16	Lawrence Expressway/ Homestead Rd* (CMP)	Signal	AM PM	51.7 52.1	D- D-	52.9 52.6	D- D-	0.008 0.005	2.6 0.7	N/A
17	Lawrence Expressway/ Lochinvar Avenue*	Signal	AM PM	18.6 18.8	B- B-	18.8 19.0	B- B-	0.002 0.004	0.1 0.2	N/A
18	Wolfe Road/ Pruneridge Avenue	Signal	AM PM	19.5 32.9	B- C-	19.4 32.7	B- C-	0.018 0.013	0.0 0.0	N/A
19	Wolfe Road/ NB I-280 Off-Ramp	Signal	AM PM	12.7 13.3	B B	13.0 13.4	B B	0.020 0.003	0.4 0.1	N/A
20	Wolfe Road/ SB I-280 Off-Ramp	Signal	AM PM	10.5 6.3	B+ A	10.7 6.6	B+ A	0.017 0.012	0.3 0.4	N/A

Source: Fehr & Peers 2015
Notes:
** Regionally significant intersection with LOS E threshold*
8. Signal = signalized intersection; SSSC = side-street stop-controlled intersection
9. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM)
10. Whole intersection weighted average control delay expressed in seconds per vehicle for signalized intersections and all-way stop-controlled intersections. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
11. LOS = Level of service calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.
12. Change in critical volume-to-capacity ratio (V/C) between Existing and Project Conditions.
13. Change in critical movement delay between Existing and Project Conditions.
14. Signal warrant based on California MUTCD Warrant 3, Peak Hour Volume (Urban Area).
N/A = Not Applicable

Some of the study intersections, such as Wolfe Road/Elizabeth Way (#3) and El Camino Real/Lawrence Expressway (#9), show a reduction in average delay with the addition of project traffic, which is counterintuitive. The average delay values in the table are weighted averages. Weighted average delays will be reduced when traffic is added to a movement with a low delay, such as the through movements in the non-peak direction. Conversely, relatively small volume increases to movements with high delays can substantially increase the weighted average delay. Since the level of service calculations indicate that all study intersections would operate at acceptable service levels based on the City of Sunnyvale's and the VTA's criteria, the project would have a **less than significant impact** at all study intersections under the Existing plus Project scenario and no mitigation measures would be required.

Neighborhood Intersection Analysis

The school access study intersections were evaluated during the AM peak period (7:00–9:00 AM), afternoon school peak period (2:00–4:00 PM), and evening peak period (4:00–6:00 PM) under Existing and Existing plus Project Conditions. Background or Cumulative conditions were not evaluated as part of the neighborhood intersection analysis, since there were no other approved or pending projects in the neighborhood that would add traffic to these intersections. Additionally, any increases in traffic volumes from larger developments outside of the neighborhood would likely be nominal and not change the conclusions of the analysis.

Neighborhood Intersection Volumes

The neighborhood study intersections were evaluated for the highest 1-hour volume during the weekday morning, afternoon, and evening peak periods. AM, afternoon, and PM peak-hour intersection turning movement counts were conducted during April 2015 and May 2015. Copies of new traffic counts are included in TIA Appendix A. **Figure 3.14-9a** and **b** presents the existing AM, afternoon, and PM peak-hour turning movement volumes, lane configurations, and traffic control devices at the study intersections.

Project trips were assigned to the roadway network based on the trip distribution patterns discussed in TIA Chapter 3.1.2 and above. **Figure 3.14-10a** and **b** shows the AM, afternoon, and PM peak-hour project trips assigned to each turning movement at the study intersections. The trip assignment was added to the existing volumes to establish volumes under Existing plus Project Conditions, as shown in **Figure 3.14-11a** and **b**.

Table 3.14-12a presents the delay and level of service results for the study intersections under Existing and Existing plus Project Conditions. TIA Appendix B contains the corresponding calculation sheets.

TABLE 3.14-12
EXISTING AND EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection		Intersection Control[1]	Peak Hour[2]	Existing Conditions		Existing plus Project Conditions	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
101	Inverness Way/ Nightingale Avenue	SSSC	AM Afternoon PM	9.9 9.6 12.3	A A B	10.1 9.7 12.4	B A B
102	Norman Drive/ Marion Way	AWSC	AM Afternoon PM	8.5 7.7 10.2	A A B	9.8 8.1 11.5	A A B
103	Dunford Way/ Marion Way/Oriole Avenue	Yield	AM Afternoon PM	10.9 9.9 12.7	B A B	12.3 10.4 13.7	B B B
104	Dunford Way/ Partridge Avenue	SSSC	AM Afternoon	10.7 10.1 13.3	B B B	16.4 10.8 17.0	C B C

Intersection		Intersection Control[1]	Peak Hour[2]	Existing Conditions		Existing plus Project Conditions	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
			PM				
105	Dunford Way/ Quail Avenue	SSSC	AM Afternoon PM	11.6 10.0 17.0	B A C	16.1 11.0 27.9	C B D
106	Dunford Way/ Lochinvar Avenue	None	AM Afternoon PM	13.4 10.6 21.3	B B C	17.8 11.4 30.3	C B D
107	Dunford Way/ Teal Drive	AWSC	AM Afternoon PM	12.8 8.5 12.7	B A B	23.7 9.1 16.3	C A C
108	Dunford Way/ Benton Street	AWSC	AM Afternoon PM	8.5 7.7 9.3	A A A	10.2 8.1 10.4	B A B
109	Oriole Avenue/ Glenbar Avenue	None	AM Afternoon PM	8.4 8.6 8.5	A A A	9.4 9.0 9.1	A A A
110	Inverness Way/ Oriole Avenue	SSSC	AM Afternoon PM	10.7 10.2 11.4	B B B	11.6 10.6 11.8	B B B
111	Inverness Way/ Peacock Avenue	AWSC	AM Afternoon PM	8.1 7.5 9.1	A A A	8.4 7.6 9.3	A A A
112	Inverness Way/ Quail Avenue	AWSC	AM Afternoon PM	8.9 7.9 11.2	A A B	9.2 8.0 11.6	A A B
113	Inverness Way/ Lochinvar Avenue	AWSC	AM Afternoon PM	9.3 7.7 8.7	A A A	9.6 7.7 8.7	A A A
114	Lochinvar Avenue/ Kerry Avenue	None	AM Afternoon PM	11.0 9.9 10.6	B A B	11.3 10.0 10.7	B A B

Intersection		Intersection Control[1]	Peak Hour[2]	Existing Conditions		Existing plus Project Conditions	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
115	Lochinvar Avenue/ Swallow Drive	AWSC	AM Afternoon PM	8.0 7.3 8.0	A A A	8.1 7.4 8.0	A A A
116	Partridge Avenue/ Glenbar Avenue	None	AM Afternoon PM	9.0 8.7 8.8	A A A	9.4 8.9 8.8	A A A
117	Benton Street/ Wood Duck Avenue	AWSC	AM Afternoon PM	9.6 8.2 9.8	A A A	10.8 8.6 10.5	B A B

Source: Fehr & Peers 2015
Notes:
1. *SSSC = side-street stop-controlled intersection; AWSC = all-way stop-controlled intersection*
2. *AM = morning peak hour (between 7:00 and 9:00 AM), Afternoon = afternoon peak hour (between 2:00 and 4:00 PM), PM = evening peak hour (between 4:00 and 6:00 PM).*
3. *Whole intersection weighted average control delay expressed in seconds per vehicle for all-way stop controlled intersections. Total control delay for the worst movement is presented for side-street stop-controlled intersections.*
4. *LOS = Level of service calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.*

Based on the criteria, the project would have a **less than significant impact** on level of service at all study intersections under the Existing plus Project scenario and no mitigation measures would be required. No signal warrants would be met for neighborhood intersections.

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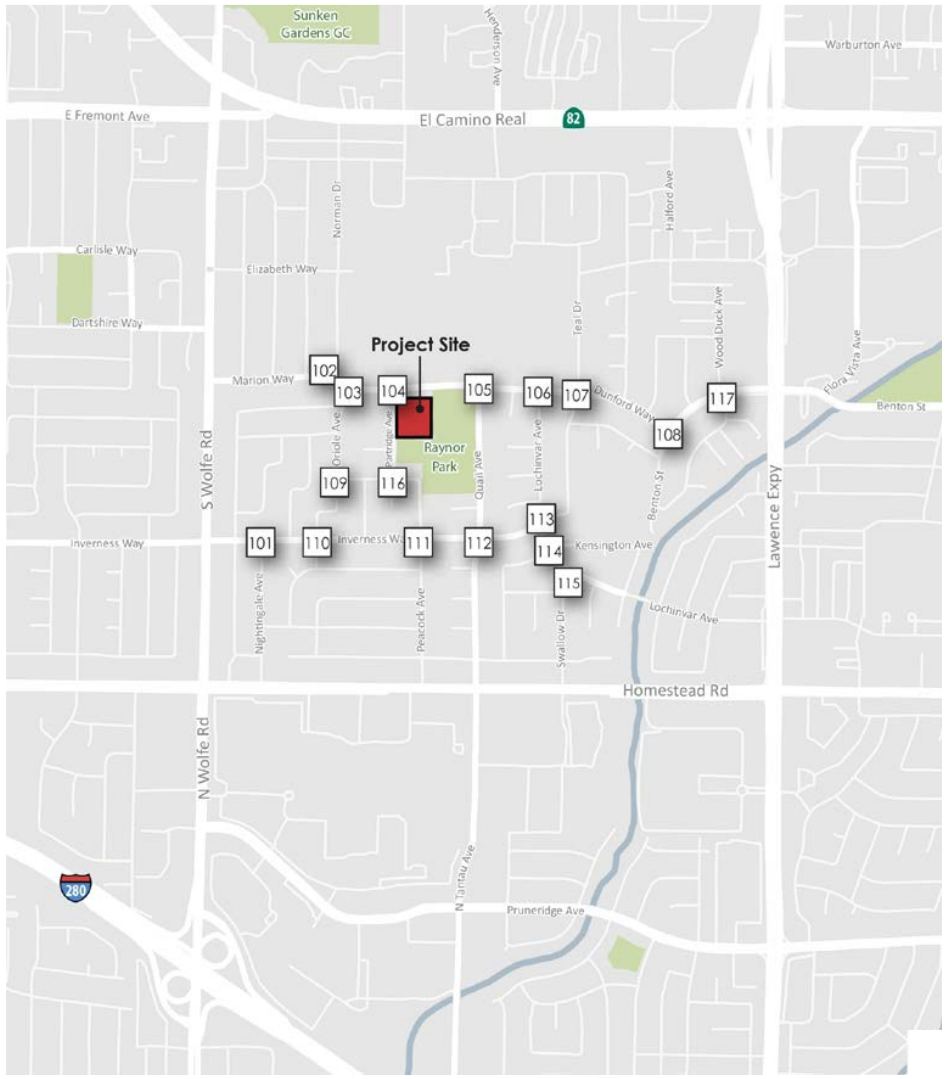
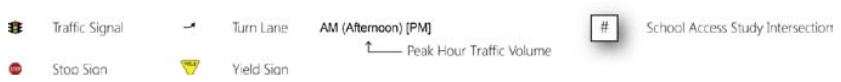
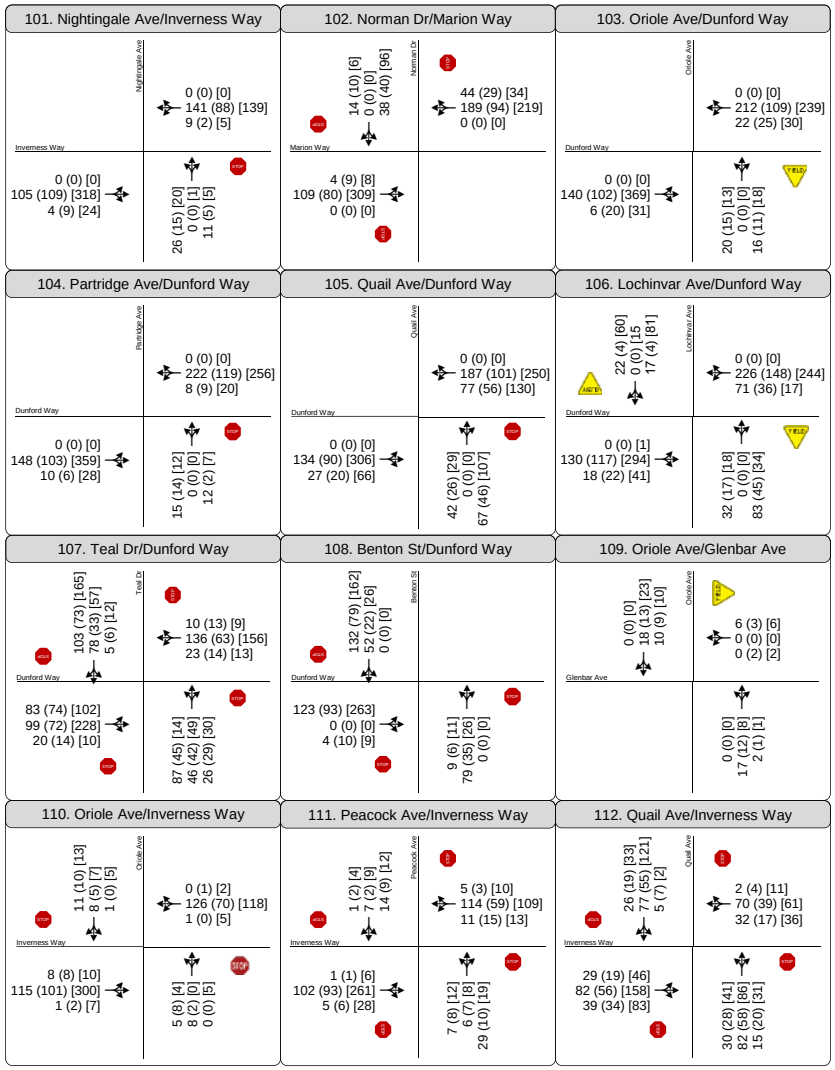






Source: Fehr & Peers

Not to scale

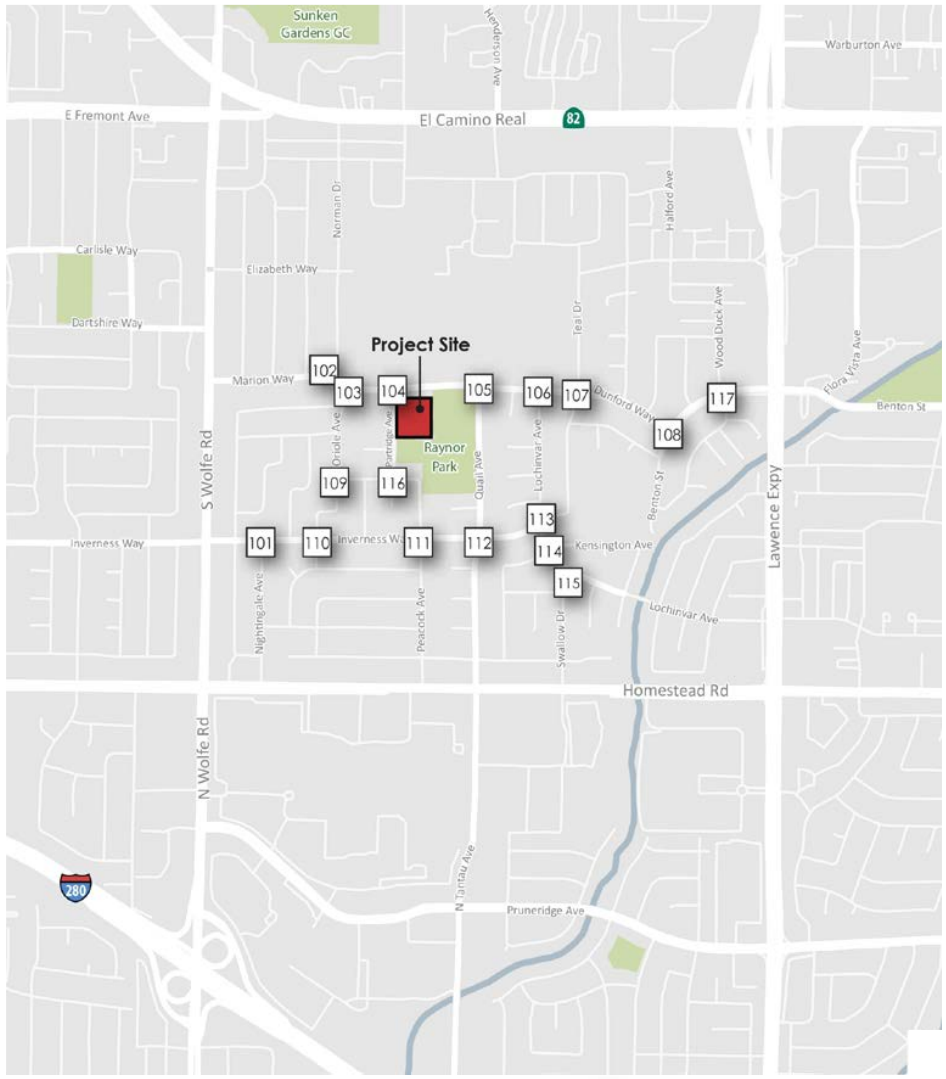
N

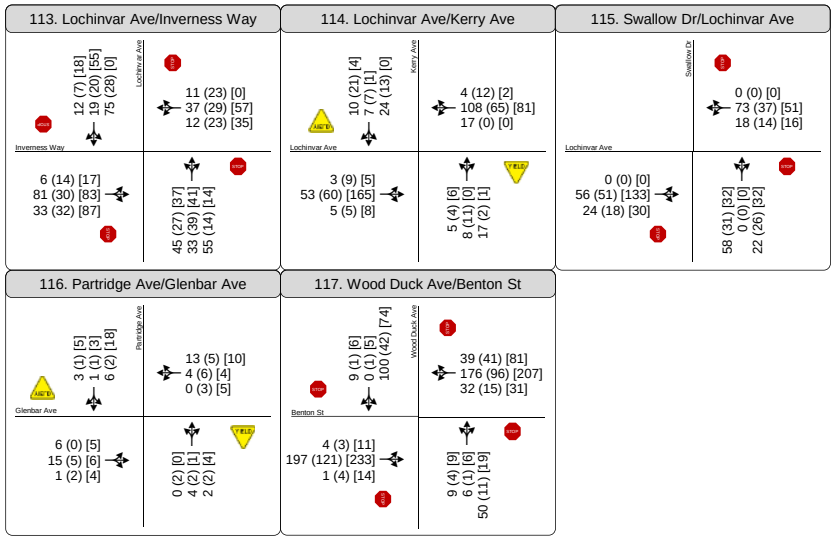
Figure 3.14-9a

Existing Neighborhood Volumes

PMC

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center Figures





Traffic Signal | Turn Lane | AM (Afternoon) [PM] | Peak Hour Traffic Volume | School Access Study Intersection

Stop Sign | Yield Sign

Source: Fehr & Peers

Not to scale

N

Figure 3.14-9b

Existing Neighborhood Volumes

PMC

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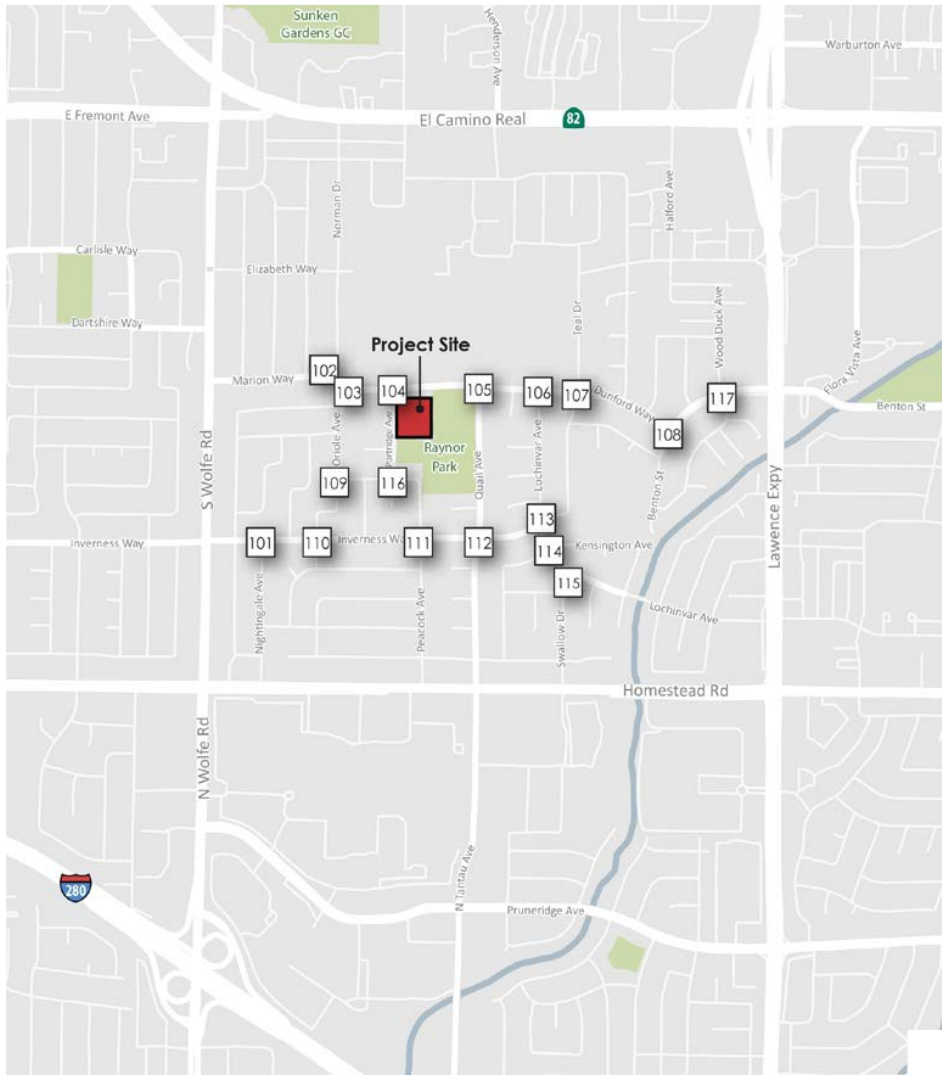

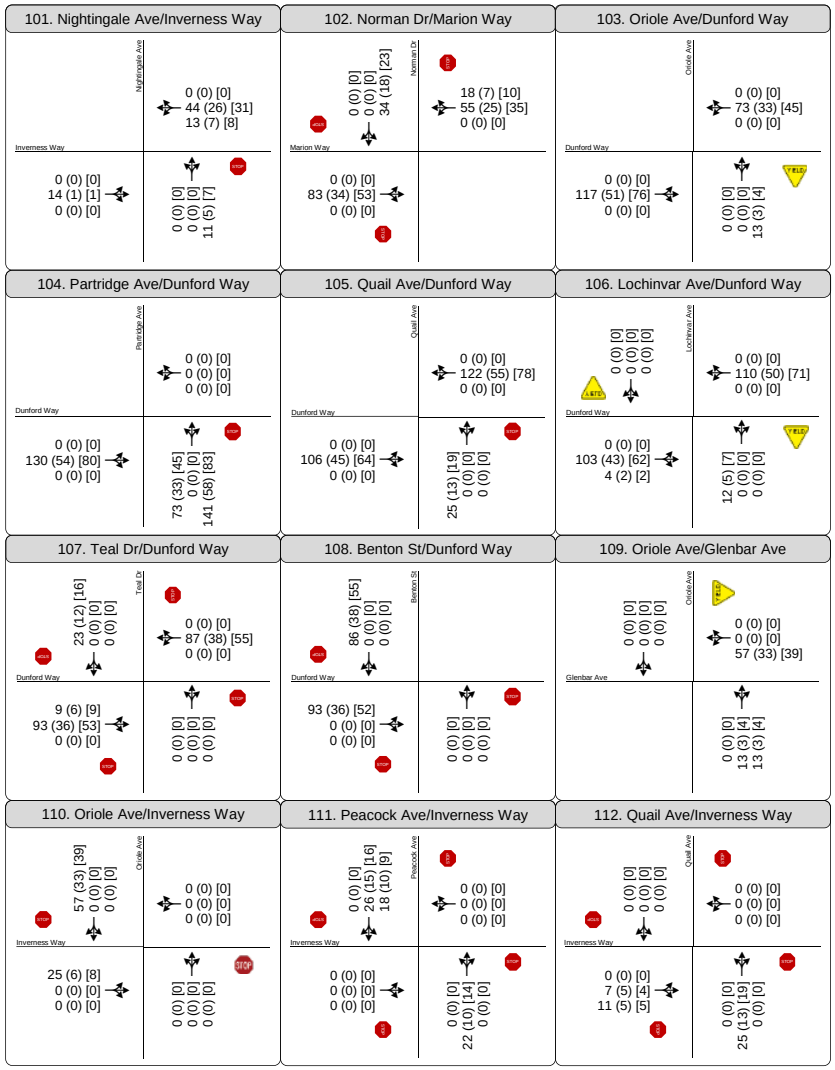

Source: Fehr & Peers

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Figure 3.14-10a

Neighborhood Project Trip Assignment

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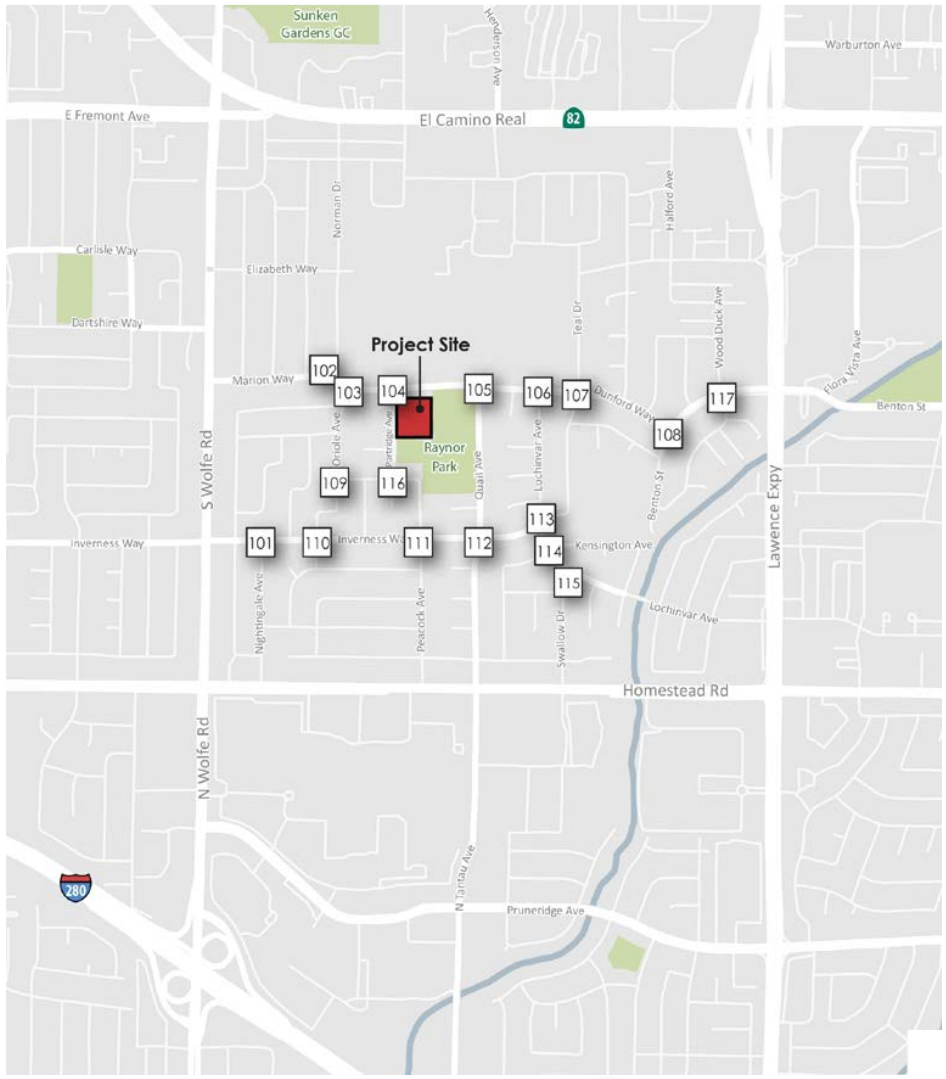

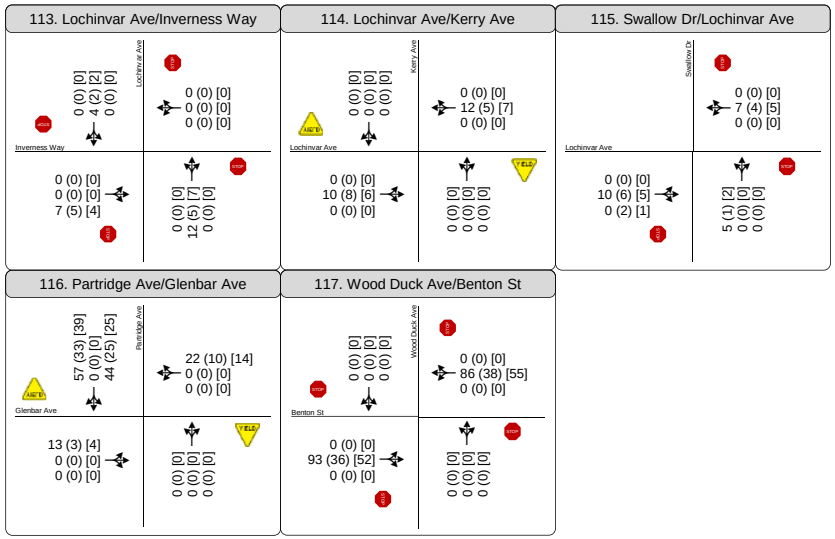

Source: Fehr & Peers

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Figure 3.14-10b

Neighborhood Project Trip Assignment

PMC®

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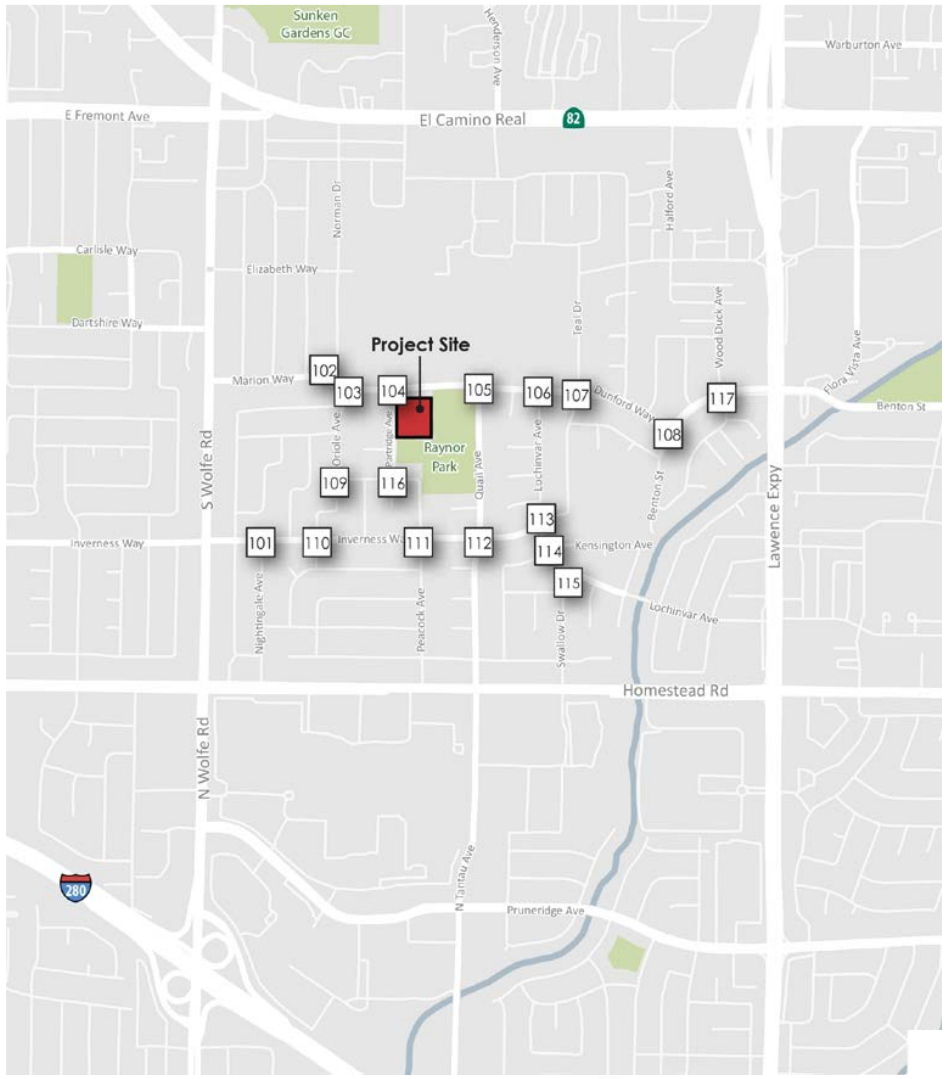

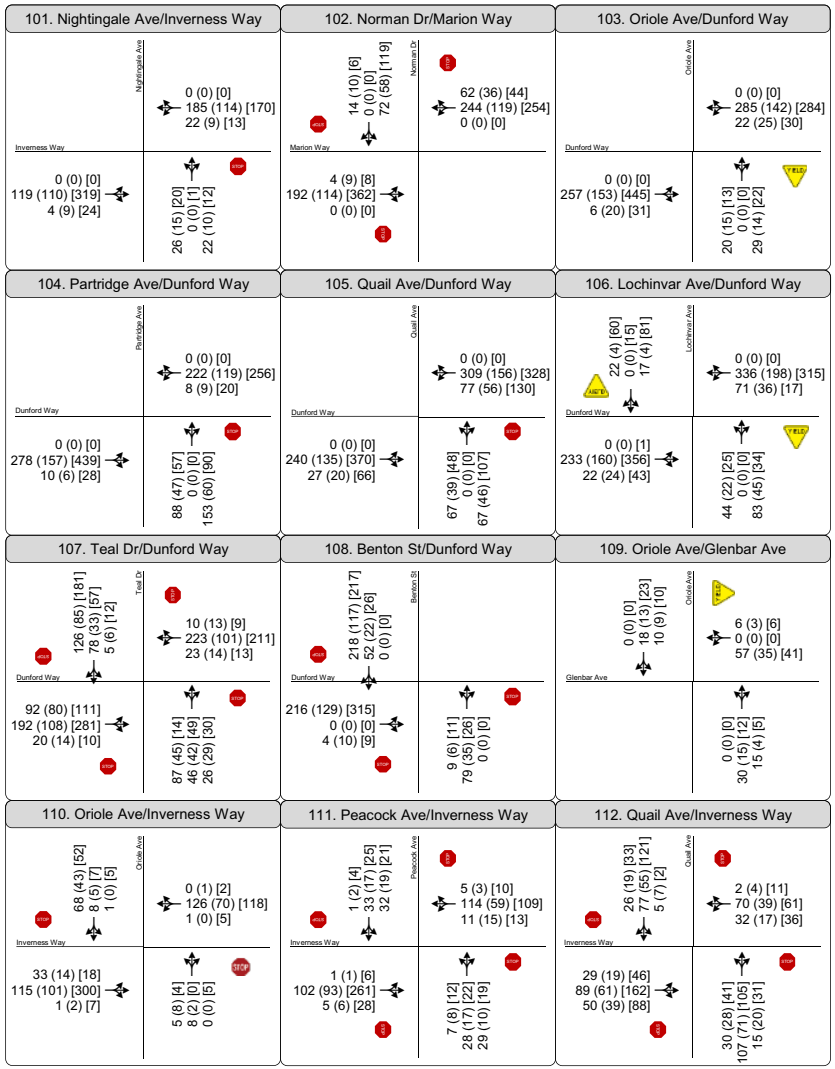

Source: Fehr & Peers

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Figure 3.14-11a

Existing Plus Project Neighborhood Volumes

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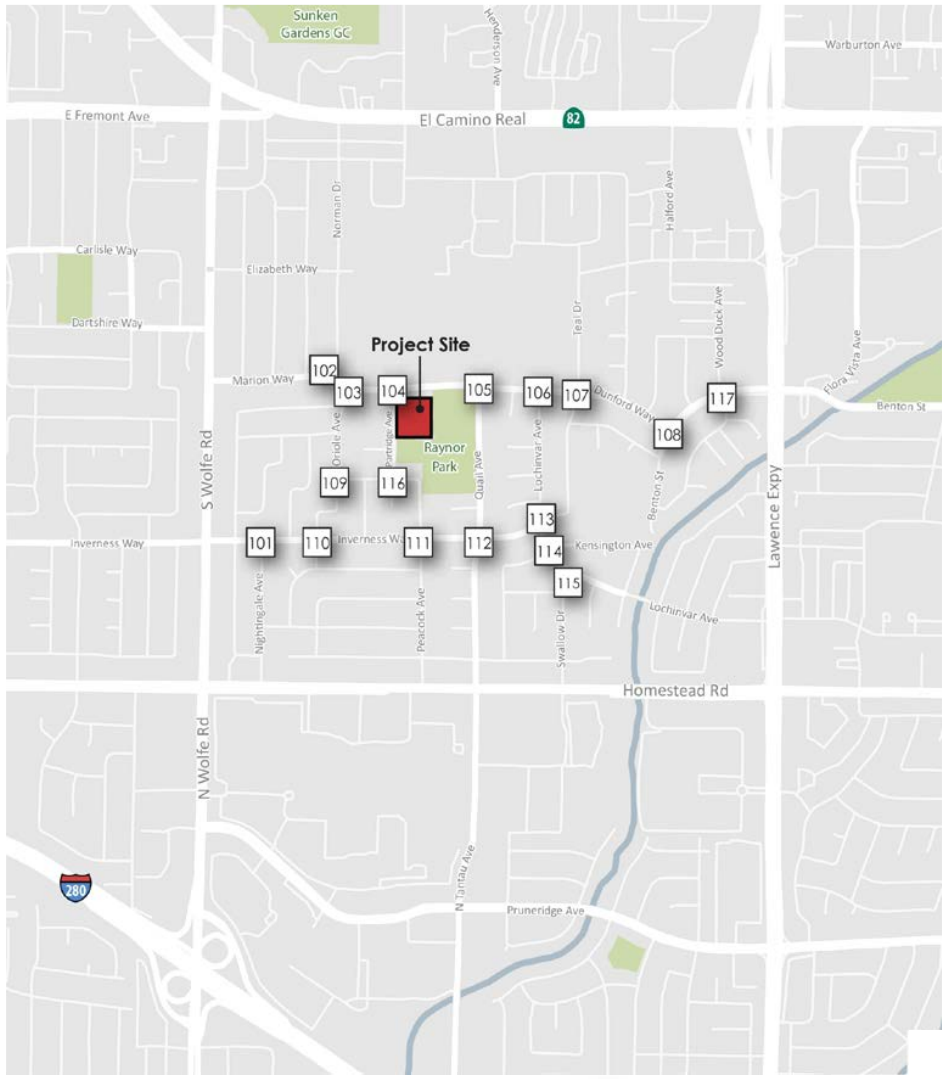
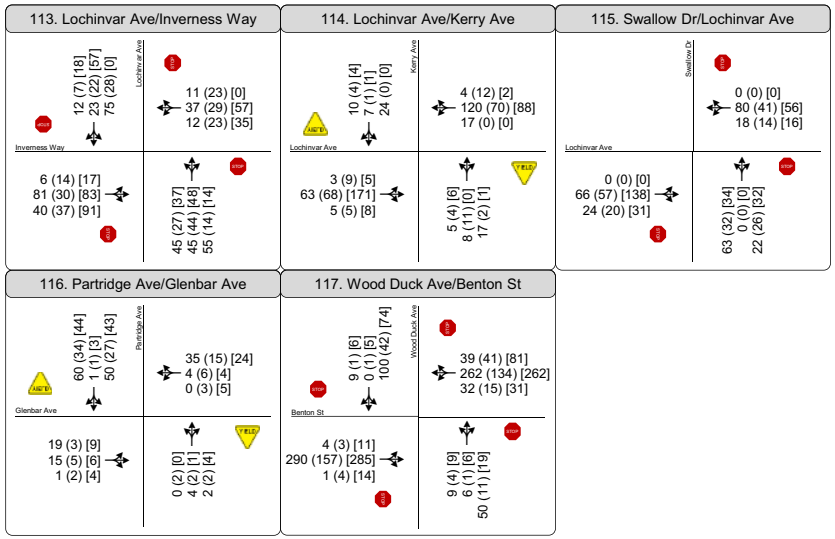




Traffic Signal
Stop Sign
Turn Lane
Yield Sign
AM (Afternoon) [PM]
Peak Hour Traffic Volume
School Access Study Intersection

Source: Fehr & Peers

Not to scale

N

Figure 3.14-11b

Existing Plus Project Neighborhood Volumes

PMC

On-Site Vehicle Access and Circulation

Fehr & Peers reviewed the site plan provided by the project applicant. The site plan shows the location of the project driveways and the internal circulation system for auto, pedestrian, and bicycle traffic.

Vehicle access to the proposed project would be provided via the three existing driveways and one new drive aisle:

- Two existing driveways (one for entering vehicles, one for exiting vehicles) are located on Dunford Way. They would provide access to eight staff parking spaces and access to the drop-off/pick-up loop along the eastern border of the site.

- One existing driveway (a two-way driveway) is located on Partridge Avenue. It provides access to the main parking lot and serves as an exit point for the drop-off/pick-up loop. A new one-way, two-lane, 24-foot drive aisle along the east side of the project site would provide circulation for the drop-off and pick-up activity via a loop entering on Dunford Way and exiting on Partridge Avenue. Up to 80 queued cars could be accommodated in the drop-off/pick-up loop from Dunford Way to the end of the student pick-up/drop-off zone along the southwest of the project site, which should be sufficient to accommodate queuing related to passenger loading during peak periods.

Pedestrian access would be provided via several gated access points, including the main entrance from Partridge Avenue, the drop-off/pick-up zone in the south parking lot, and the north parking lot at Dunford Way. The proposed project includes a bicycle parking facility in the northwest area of the site, adjacent to the multipurpose room, which would be accessible via pathways from Dunford Avenue and Partridge Avenue.

South Parking Lot

In the south parking lot, vehicle conflicts would likely occur in the drive aisle between the two south parking lots (i.e., the eastern and western lots). Specifically, conflicts would arise during drop-off/pick-up times where one-way traffic from the drop-off/pick-up loop in the eastern lot transitions to the western lot that has two-way circulation. Vehicles traveling against the flow from the western lot into the eastern lot or those backing out of the western lot would likely cause delays to cars exiting the drop-off/pick-up loop. This impact would be **significant**. To reduce the conflict point in the drive aisle between the two southern parking lots and to improve the efficiently of the drop-off/pick-up loop, mitigation measure **MM 3.14.1a** would be required.

Partridge Driveway

Sight lines from the recessed driveway exiting onto Partridge Avenue would be partially obstructed by trees and parked vehicles. Additionally, pedestrians would have an indirect travel path across the driveway, as they would be required to walk to the driveway from Partridge Avenue before crossing the driveway. Pedestrians would be likely to cross diagonally across the driveway, which could limit their visibility to vehicles accessing the driveway. Additionally, the driveway currently does not include a marked crosswalk or any pedestrian-related signage. This impact would be **significant**. To improve pedestrian circulation and visibility at the Partridge Avenue driveway, mitigation measure **MM 3.14.1b** would be required.

Drop-Off/Pick-Up Activities

Without monitoring and enforcement, drop-off/pick-up activity would likely occur along the angled parking along the property on Partridge Avenue, along Dunford Way, and in the northern parking lot along the short parking loop (exiting back onto Dunford Way and avoiding the longer on-site drop-off/pick-up queue).

The existing parking supply exceeds City parking requirements and should be sufficient under the middle school only scenario to accommodate parking needs. If the school accommodates a mix of ages, like preschool, parking would need to be adjusted and some parking may occur on local streets if not otherwise discouraged. This impact would be **significant**, and mitigation measure **MM 3.14.1c** would be required.

Because it is hard to predict how students, parents, staff, and others would behave during pick-up, drop-off, and other times, conflicts between these users could continue to be a **significant** impact. Therefore, mitigation measure **MM 3.14.1d** would be required to provide adaptive management of the on- and off-site traffic conditions.

Mitigation Measures

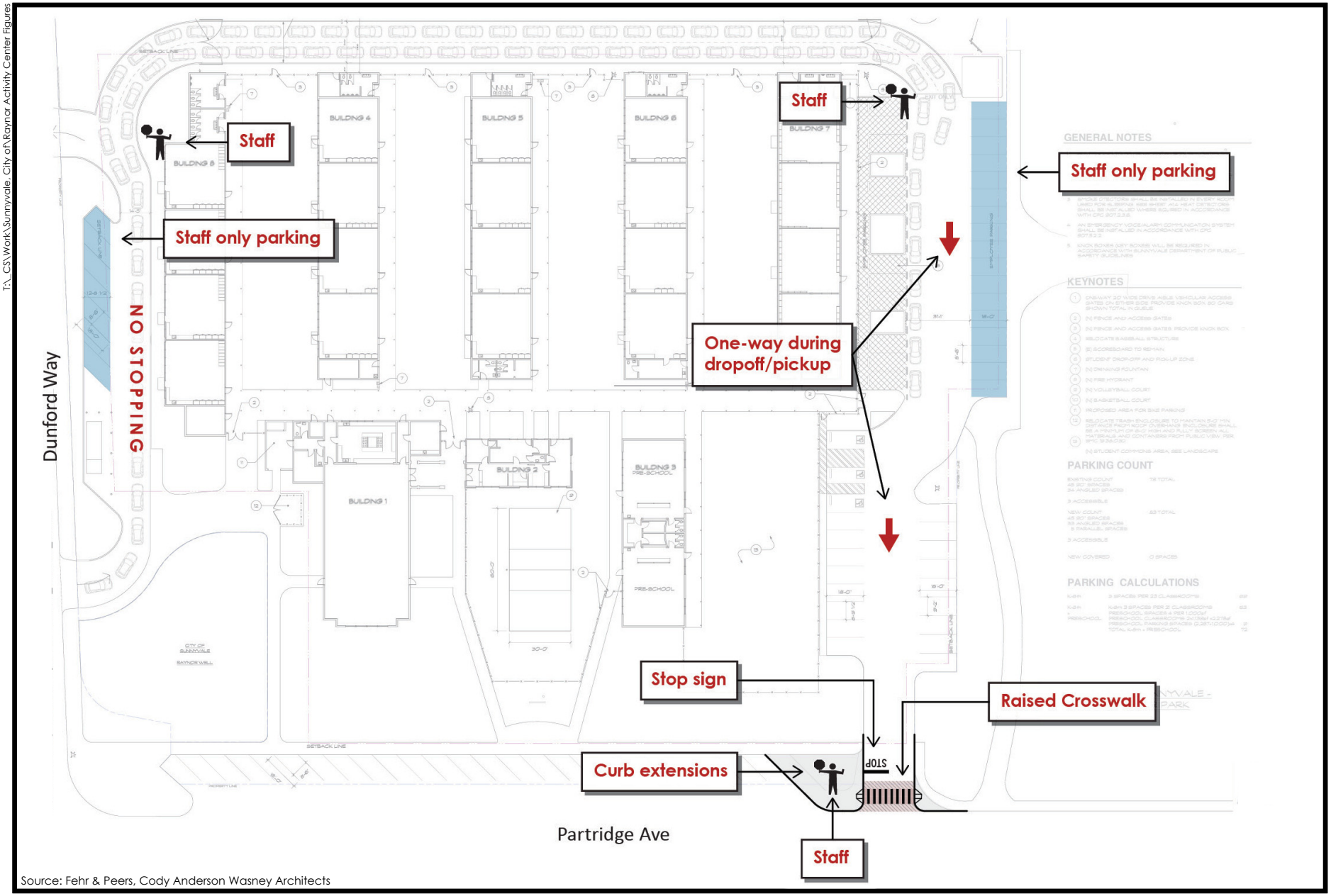
MM 3.14.1a To reduce the conflict point in the drive aisle between the two southern parking lots and to improve the efficiently of the drop-off/pick-up loop, the project applicant shall restrict project site access at the Partridge Avenue driveway to only allow outbound travel during drop-off/pick-up times. The applicant shall place a sign indicating no left or right turns into the parking lot from Partridge Avenue during the specified drop-off and pick-up times on the school property and the public right-of-way to enforce the one-way operation of the driveway.

MM 3.14.1b To improve pedestrian circulation and visibility at the Partridge Avenue driveway, the project applicant shall construct a curb extension at the northern end of the driveway as shown on **Figure 3.14-12a**. Additionally, the project applicant shall install an ADA-compliant raised crosswalk across the driveway to facilitate a continuous and direct extension of the sidewalk. The driveway exit shall include a stop sign and stop bar to clearly delineate the right-of-way.

MM 3.14.1c The project applicant shall implement the following enforcement strategies:

- Provide at least three staff stationed throughout the project site to facilitate drop-off/pick-up procedures: one along the northern parking lot; one adjacent to the drop-off/pick-up area, and one at the Partridge Avenue driveway.
- Install a "no stopping/passenger loading" sign along the northern parking lot.
- Restrict passenger loading on Dunford Way and Partridge Avenue during peak drop-off and pick-up times.
- Discourage parking in the neighborhood through communication with parents and students.

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center Figures



Source: Fehr & Peers, Cody Anderson Wasney Architects

Not to scale

N

Figure 3.14-12a

Proposed Site Plan Recommendations

PMC

- Encourage carpooling, walking, and biking to school, to the extent feasible.

MM 3.14.1d The project applicant shall continually monitor circulation around the immediate area and work with the City and community to identify and resolve issues as appropriate and reasonable. Additionally, the project applicant shall continue to actively communicate with parents about drop-off/pick-up procedures.

Implementation of mitigation measures **MM 3.14.1a** through **MM 3.14.1d** would improve the on-site circulation system in the project area. With these measures, these impacts would be reduced to **less than significant**.

Air Traffic Pattern Impacts Under Existing plus Project Conditions (Standard of Significance 3)

Impact 3.14.2 Project implementation would not conflict with or require changes to current air traffic patterns. **No impact** would occur.

Under Existing plus Project Conditions, project implementation would not result in substantial safety risks due to changes in air traffic. Due to the nature and scope of the project, its implementation would not have the potential to result in a change in air traffic patterns at any airport in the area. Therefore, the project would have **no impact**.

Mitigation Measures

None required.

Increased Hazards Due to a Design Feature (Standard of Significance 4)

Impact 3.14.3 Project implementation would not substantially increase hazards due to a design feature. This impact would be **less than significant**.

Under Existing plus Project Conditions, the proposed project would not result in any new design features or incompatible uses. Although work crews would use existing public roads to transport equipment during construction, they would follow all traffic laws, would not require special permission from local governments, and would not require use of warning or chase vehicles. Further, all trucks transporting construction material to and from the work site would use designated truck routes in Sunnyvale. The proposed project would increase bicycle and pedestrian uses in an area that could pose safety hazards. Such impacts are discussed below in Standard of Significance 6. The project includes mitigation measures to improve existing unsafe conditions for this group of users. The proposed project would not require the permanent alteration of any roadways or generate vehicle uses incompatible with the existing roadways; therefore it would have a **less than significant** impact on road hazards.

Mitigation Measures

None required.

Emergency Access Impacts Under Existing plus Project Conditions (Standard of Significance 5)

Impact 3.14.4 Project implementation may conflict with emergency response times due to increased traffic congestion on roadways. This would be a **less than significant** impact.

According to Policy SN-3.1 of the 2011 Consolidated General Plan (Sunnyvale 2011), the City strives to provide rapid and timely response to all emergency service calls (previously Law Enforcement Policy 4.1A.1). Emergency access would not be impacted by the proposed project. No streets or intersections would be closed during construction. As discussed above, the project would increase delays but not in a manner that would warrant signals for neighborhood intersections. Further, impacts at regional intersections were found to be less than significant. As such, although it would increase traffic, the project would not conflict with emergency response times in a substantial manner. This impact would be **less than significant**.

Mitigation Measures

None required.

Conflict with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities (Standard of Significance 6)

Impact 3.14.5 Project implementation would increase motor vehicle traffic and congestion on roadways used by transit, bicyclists, and pedestrians. The project would increase biking and pedestrian usage in the project area and could decrease the safety of existing facilities for users due to an increase in the volume of motor vehicles. The project could lead to delays in transit times. The project would not lead to a substantial decrease in performance or safety of such facilities and would not conflict with adopted policies or plans. This impact would be **less than significant with mitigation incorporated**.

Transit Operational Impacts Under Existing plus Project Conditions

Transit vehicles operating in the project vicinity could incur additional delay due to increased auto congestion. The four primary corridors around the project site are El Camino Real, Lawrence Expressway, Wolfe Road, and Homestead Road/Tantau Avenue. The TIA used through movement delays along the primary corridors from the detailed calculation sheets presented in TIA Appendix B to determine the potential added transit vehicle delay. The difference between the No Project and Plus Project values is the added transit vehicle delay. The results, as well as the transit routes along each corridor, are shown in **Table 3.14-13**.

TABLE 3.14-13
ADDITIONAL TRANSIT VEHICLE DELAY BY CORRIDOR

Corridor	Peak Hour	Projected Additional Delay (sec)						Affected Transit Routes
		Existing plus Project		Background plus Project		Cumulative plus Project		
		NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	
El Camino Real (Wolfe Road to Lawrence Expressway)	AM PM	0.6 0.6	0.9 0.3	0.6 0.6	0.6 0.3	1.0 0.6	1.2 0.3	22 / 522
Lawrence Expressway (El Camino Real to Homestead Road)	AM PM	7.0 0.4	3.5 1.4	12.9 0.4	3.1 1.3	16.6 0.4	3.5 6.9	328
Wolfe Road (El Camino Real to Homestead Road)	AM PM	3.8 2.6	3.3 3.2	6.3 7.7	9.8 9.2	18.0 5.8	10.1 13.1	26
Homestead Road (Homestead Road to Tantau Avenue to Lawrence Expressway)	AM PM	2.5 2.2	1.0 0.3	3.9 5.7	1.9 0.4	14.1 8.7	2.3 2.0	81

Source: Fehr & Peers 2015

Overall, transit vehicles are projected to incur at most 15 seconds of delay along the study corridors. Considering that the study corridors for which the added transit delay was calculated generally are about 1 mile long, the added delay does not represent a substantial change in travel times. Further, there are no significance thresholds for an increase in transit delay identified in the VTA's latest Transportation Impact Analysis Guidelines (dated October 2014).

Transit Access

Transit impacts are considered significant if the proposed project would conflict with existing or planned transit facilities, would generate potential transit trips in excess of available capacity, or would not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops. Based on these criteria, the project would have a **less than significant** impact on transit service and would require no mitigation measures.

Bicycle Facility Impacts Under Existing plus Project Conditions

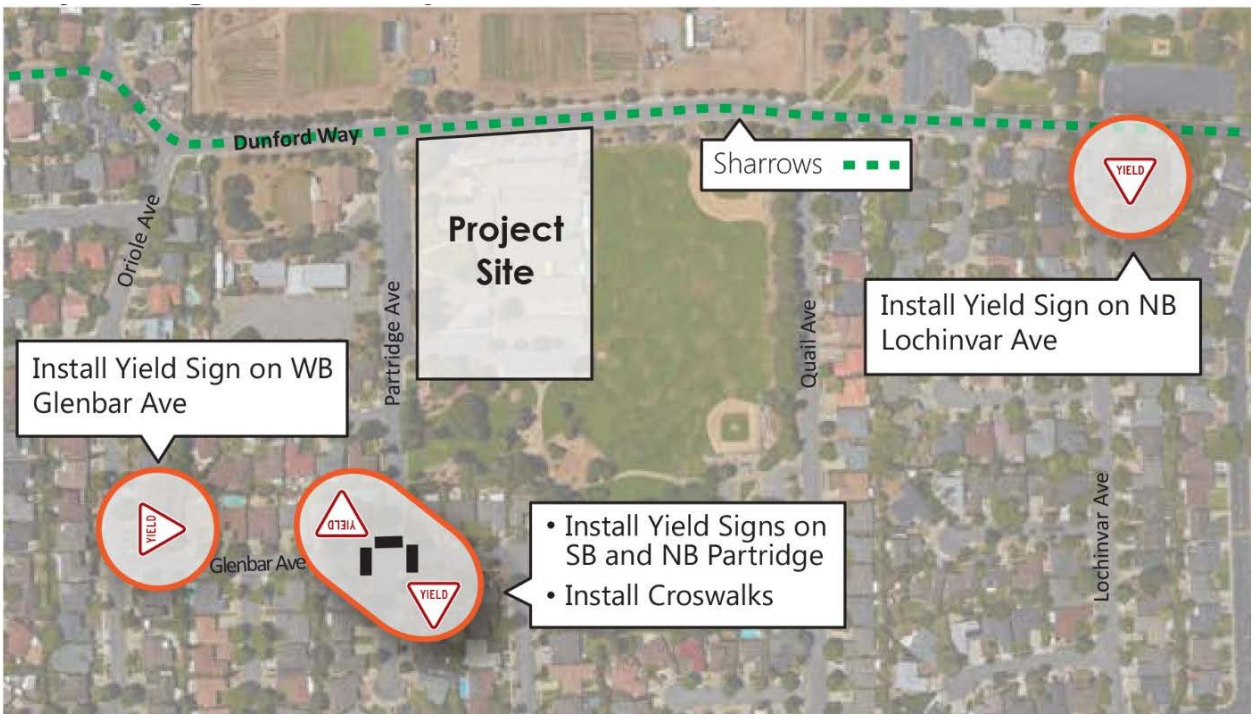
Several neighborhood streets are designated Class III bike routes and provide an adequate bicycle network to access the school via bicycle (Marion Way/Dunford Way, Quail Avenue, Inverness Way, and Lochvinar Avenue). However, these facilities are generally not marked or signed. The speeds and volumes on the local roads without bicycle facilities or designations are low so that most people biking can share the roadway with vehicle traffic, although children biking to school may not always feel comfortable and use sidewalks instead. Wolfe Road and Homestead Road provide the closest marked bicycle facilities (Class II) to the site. Based on neighborhood observations and feedback received during public outreach, the intersections near the project site currently pose a safety hazard to bicyclists due to low visibility. As such, under Existing plus Project Conditions, project implementation would increase the number of

bicyclists and could add bicyclists to locations with unsafe conditions. Therefore, project impacts would be **significant** and mitigation measure **MM 3.14.5a** would be required.

Mitigation Measures

MM 3.14.5a The project applicant shall install sharrows on Dunford Way between Wolfe Road and the eastern city limits to clearly delineate Dunford Avenue as a bike route and increase driver awareness of possible bicyclists on the road (shown in **Figure 3.14-12b**).

FIGURE 3.14-12B PROJECT NEIGHBORHOOD IMPROVEMENTS



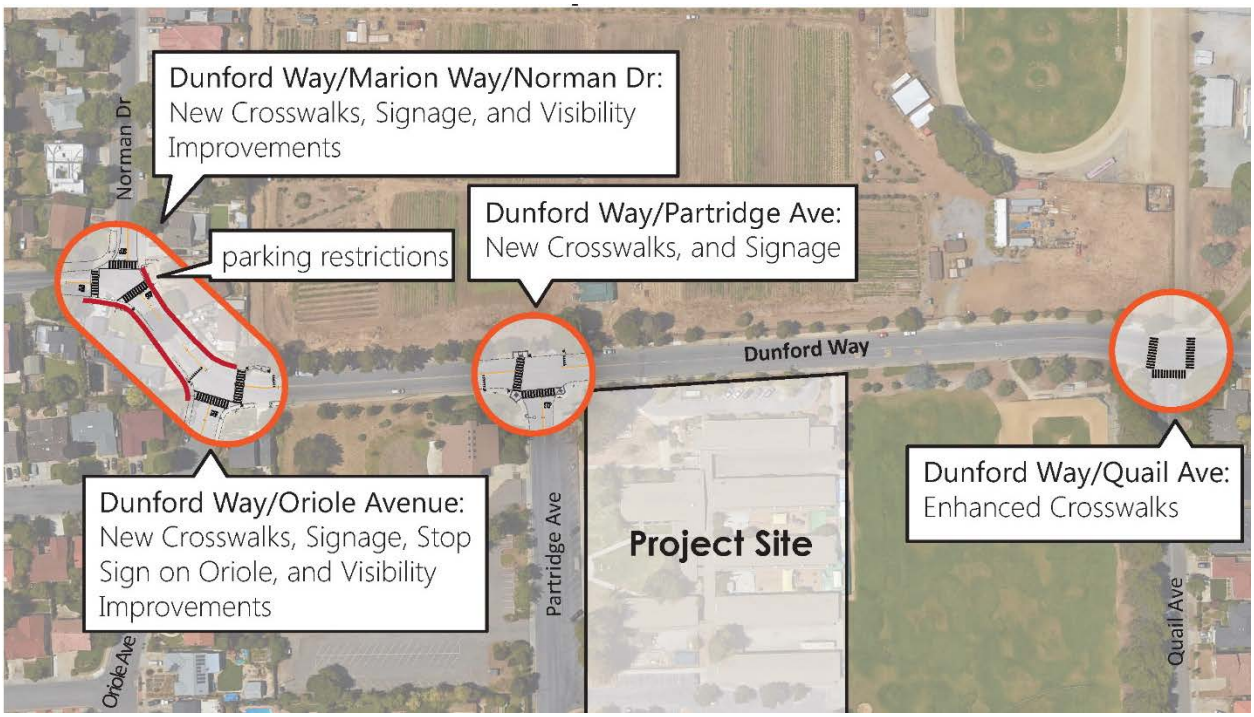
Pedestrian Facility Impacts Under Existing plus Project Conditions

The Birdland neighborhood presently experiences high pedestrian volumes during peak periods before and after school. Surrounding the site, high pedestrian volumes were observed along Dunford Avenue accessing area schools, notably Laurelwood Elementary School and Peterson Middle School. The heaviest concentrations of pedestrian activity are at the intersections of Dunford Way/Teal Drive and Teal Drive/Inverness Way/Lochinvar Avenue; crossing guards are present at these intersections during drop-off and pick-up before and after school. The intersections of Dunford Way/Quail Avenue and Dunford Way/Oriole Avenue also experience considerable pedestrian volumes relating to school and park activities.

To improve pedestrian safety and circulation, the City of Sunnyvale is in the process of implementing several Safe Routes to Schools improvements along Dunford Way. These improvements include crosswalks and signage at the intersections of Marion Way/Norman Drive, Oriole Avenue/Dunford Way, Partridge Avenue/Dunford Way, and Lochinvar Avenue/Dunford Way. As a part of these improvements, the yield sign on Oriole Avenue at Dunford Way will be replaced with a stop sign, and parking will be restricted on Dunford between Oriole Avenue and

Norman Drive to provide a pedestrian walkway. These improvements are expected to provide a traffic calming effect in the neighborhood and address several key pedestrian circulation issues. Proposed Safe Routes to Schools Improvements are shown in **Figure 3.14-13**.

FIGURE 3.14-13 PLANNED SAFE ROUTES TO SCHOOLS IMPROVEMENTS



Although planned improvements would make for a safer pedestrian environment, key issues would remain related to pedestrian circulation safety, as follows:

- Lack of crosswalks at the intersection of Partridge Avenue/Glenbar Avenue just south of the project site
- Wide streets and large curb radii on most local streets, facilitating higher vehicle speeds and longer pedestrian crossing distances
- Lack of sidewalks on Dunford Way/Marion Way west of Oriole Avenue, and on Norman Drive and Elizabeth Way
- Heavy volumes of pedestrians at the intersections of Teal Drive/Dunford Way, Teal Drive/Inverness Way/Lochinvar Avenue, and Dunford Way/Quail Avenue

The proposed project would lead to a slight increase in traffic volumes on several neighborhood streets, which would increase conflicts between vehicles and pedestrians. Some of these concerns are addressed as a part of the Safe Routes to Schools improvements on Dunford Way, but others are not. All but the first of the issues outlined above are existing deficiencies that cannot be addressed by the project. The project would also increase the number of pedestrians in the project area through the addition of middle school–age children.

As such, under Existing plus Project Conditions, project implementation would increase the number of pedestrians and could add pedestrians to locations with unsafe conditions. Therefore, project impacts would be **significant** and mitigation measure **MM 3.14.5b** would be required.

Mitigation Measures

MM 3.14.5b The project applicant shall fund the City's engineering study to determine the need for the installation of crosswalks and yield signs as shown in **Figure 3.14-13**. If the engineering study finds that crosswalks and yield signs are warranted, the applicant shall fund the installation of crosswalks and yield signgs. Additionally, the applicant shall fund the installation of advance school warning signs in both directions along Dunford Way and Partridge Avenue along the school's frontage. The signs will be SW 24-1 (CA) signs as defined by the California Manual on Uniform Traffic Control Devices (MUTCD).

3.14.4 BACKGROUND SETTING, IMPACTS, AND MITIGATION MEASURES

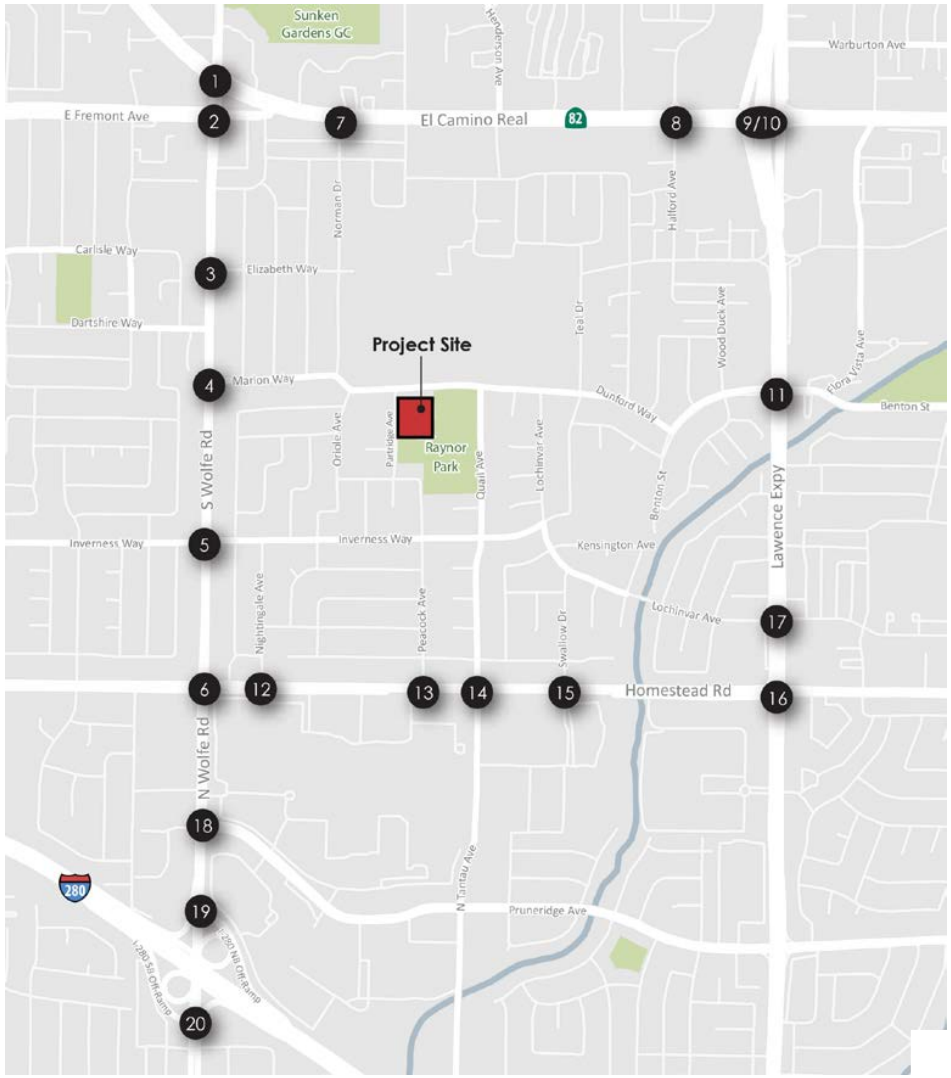
Background plus Project Traffic Volumes

Trips generated from the proposed project (**Figure 3.14-7a**) were added to the Background traffic Projections to develop traffic volumes for Background plus Project Conditions. The resulting volumes are shown on **Figure 3.14-14a** and **b**.

Background Intersection Levels of Service

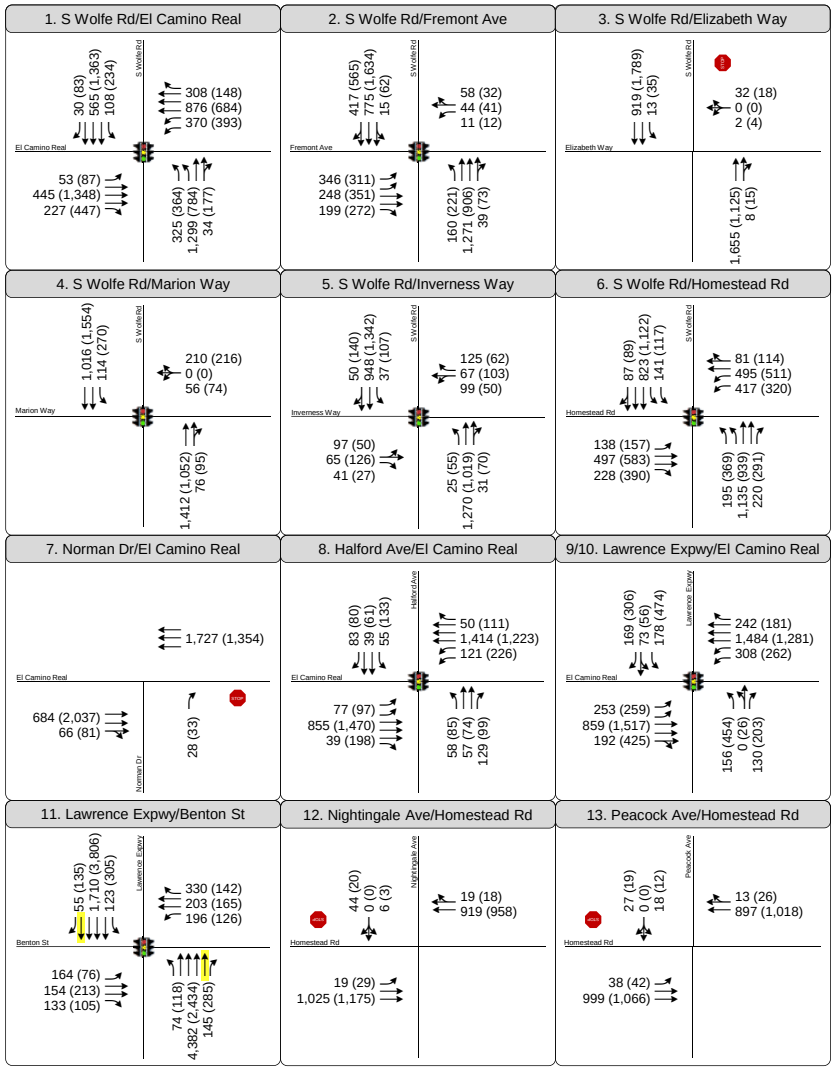
Table 3.14-14 presents the delay and level of service calculation results for the study intersections under Background No Project and Background plus Project Conditions. TIA Appendix B contains the corresponding calculation sheets. TIA Appendix C contains the peak-hour signal warrants.

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center Figures



Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume

Stop Sign | HOV Lane | # Major Study Intersection



Source: Fehr & Peers

Not to scale

N

Figure 3.14-14a

Background Plus Project Peak Hour Traffic Volumes

PMC

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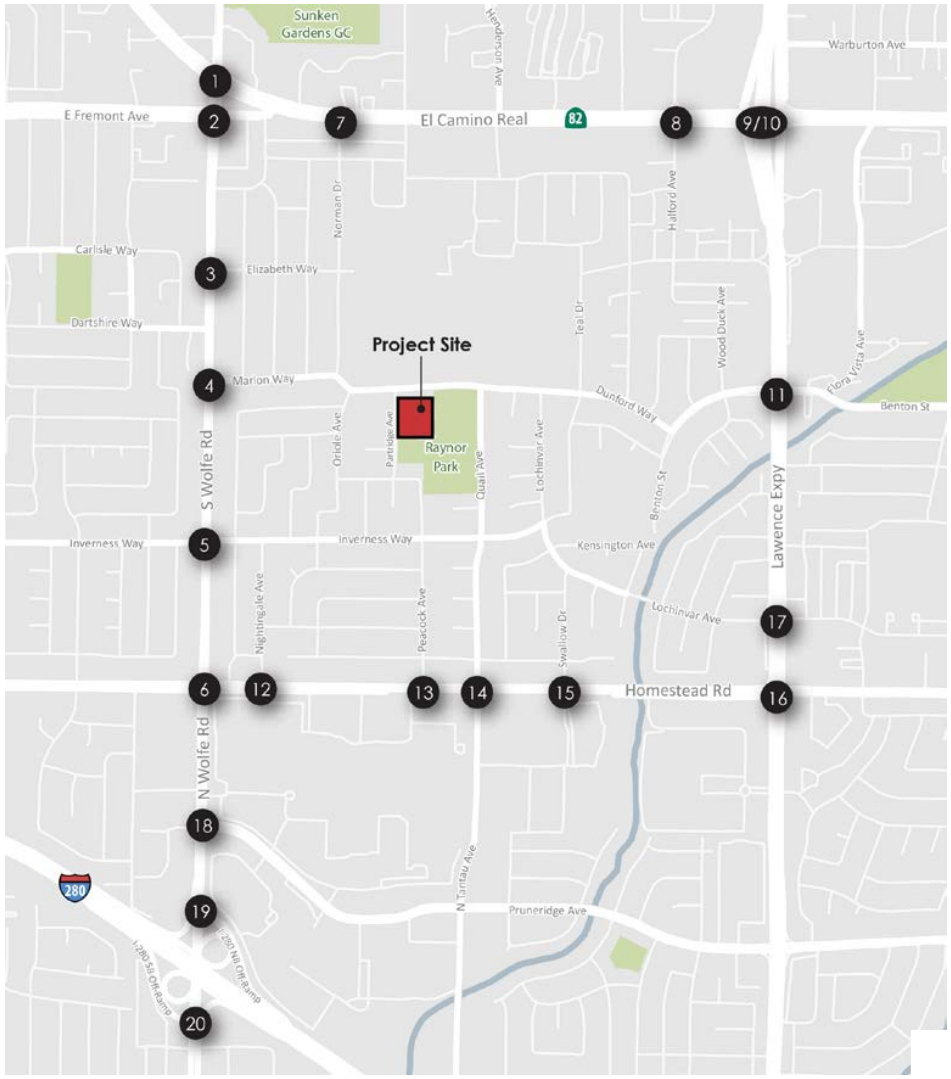
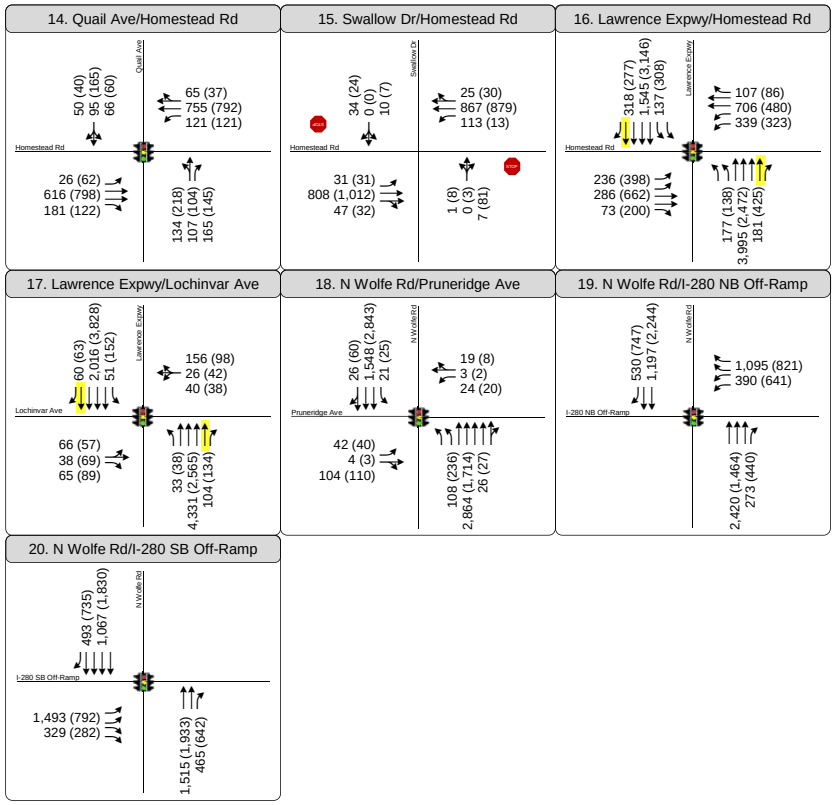




Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume

Stop Sign | HOV Lane | # Major Study Intersection

Source: Fehr & Peers

Not to scale

N

Figure 3.14-14b

Background Plus Project Peak Hour Traffic Volumes

PMC®

TABLE 2
BACKGROUND AND BACKGROUND PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection		Intersection Control[1]	Peak Hour[2]	Background Conditions		Background plus Project Conditions				
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Δ in Crit. V/C[5]	Δ in Crit. Delay[6]	Signal Warrant Met?[7]
1	El Camino Real/ Wolfe Road (CMP)*	Signal	AM PM	45.8 39.5	D D	46.3 40.2	D D	0.021 0.013	0.8 1.5	N/A
2	Fremont Avenue/ Wolfe Road	Signal	AM PM	31.5 33.3	C C-	31.5 33.8	C C-	0.005 0.014	0.3 0.8	N/A
3	Wolfe Road/ Elizabeth Way	SSSC	AM PM	25.7 **38.5**	D **E**	23.5 29.3	C D	N/A N/A	N/A N/A	No
4	Wolfe Road/ Marion Way	Signal	AM PM	11.0 13.1	B+ B	13.3 14.6	B B	0.061 0.034	2.9 1.4	N/A
5	Wolfe Road/ Inverness Way	Signal	AM PM	12.1 8.4	B A	12.5 8.7	B A	0.016 0.000	0.3 0.0	N/A
6	Wolfe Road/ Homestead Road	Signal	AM PM	40.5 36.6	D D+	40.6 36.9	D D+	0.019 0.009	0.4 0.3	N/A
7	El Camino Real/ Norman Drive*	SSSC	AM PM	9.9 15.3	A C	10.0 15.5	B C	N/A N/A	N/A N/A	No
8	El Camino Real/ Halford Avenue*	Signal	AM PM	16.7 21.1	B C+	16.8 21.3	B C+	0.000 0.003	0.0 0.3	N/A
9/ 10	El Camino Real/ Lawrence Expressway* (CMP)	Signal	AM PM	22.2 32.2	C+ C-	22.2 32.3	C+ C-	0.004 0.002	0.0 0.1	N/A
11	Lawrence Expressway/ Benton Street*	Signal	AM PM	45.2 32.9	D C-	51.4 34.6	D- C-	0.025 0.014	8.8 2.2	N/A
12	Homestead Road/ Nightingale Avenue	SSSC	AM PM	13.5 13.8	B B	13.5 13.5	B B	N/A N/A	N/A N/A	No
13	Homestead Road/ Peacock Avenue	SSSC	AM PM	13.9 15.0	B B	16.2 17.2	C C	N/A N/A	N/A N/A	No
14	Homestead Road/ Quail Avenue	Signal	AM PM	32.4 38.3	C- D+	33.0 38.7	C- D+	0.017 0.011	0.7 0.4	N/A
15	Homestead Road/ Swallow Drive	SSSC	AM PM	26.5 24.6	D C	27.1 25.0	D C	N/A N/A	N/A N/A	No

Intersection		Intersection Control[1]	Peak Hour[2]	Background Conditions		Background plus Project Conditions				
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Δ in Crit. V/C[5]	Δ in Crit. Delay[6]	Signal Warrant Met?[7]
16	Lawrence Expressway/ Homestead Road* (CMP)	Signal	AM PM	59.7 53.9	E+ D-	61.1 54.4	E D-	0.008 0.005	2.8 0.7	N/A
17	Lawrence Expressway/ Lochinvar Avenue*	Signal	AM PM	19.7 19.5	B- B-	19.9 19.7	B- B-	0.002 0.004	0.1 0.2	N/A
18	Wolfe Road/ Pruneridge Avenue	Signal	AM PM	11.3 20.6	B+ C+	11.1 20.7	B+ C+	0.012 0.007	-0.3 0.2	N/A
19	Wolfe Road/ NB I-280 Off-Ramp	Signal	AM PM	27.4 27.6	C C	27.8 27.9	C C	0.014 0.005	0.6 0.6	N/A
20	Wolfe Road/ SB I-280 Off-Ramp	Signal	AM PM	31.3 19.5	C B-	32.6 20.0	C- C+	0.016 0.011	1.7 0.7	N/A

Source: Fehr & Peers 2015

Notes:

* Regionally significant intersection

1. Signal = Signalized Intersection; SSSC = Side-Street Stop Controlled Intersection.
2. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM)
3. Whole intersection weighted average control delay expressed in seconds per vehicle for signalized intersections. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
4. LOS = Level of Service calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the *2000 HCM*.
5. Change in critical volume-to-capacity ratio (V/C) between Background and Project Conditions.
6. Change in critical movement delay between Background and Project Conditions.
7. Signal warrant based on CA MUTCD Warrant 3, Peak Hour Volume (Urban Area).

* Regionally significant intersection with LOS E threshold.

N/A = Not applicable

Bold font indicates unacceptable operations based on the appropriate jurisdiction's LOS standards.

Source: Fehr & Peers, September 2015.

As under Existing Conditions, some of the study intersections (such as Wolfe Road/Elizabeth Way (#3) show a reduction in average delay with the addition of project traffic, which is counterintuitive. The average delay values in the table are weighted averages. Weighted average delays will be reduced when traffic is added to a movement with a low delay, such as the through movements in the non-peak direction. Conversely, relatively small volume increases to movements with high delays can substantially increase the weighted average delay.

Background Intersection Impacts and Mitigation Measures

Impact 3.14.6 The project has a **less than significant impact** at all study intersections under the Background plus Project scenario and no mitigation measures are required.

This subsection evaluates the intersection level of service results presented in **Table 3.14-14** against City of Sunnyvale and VTA criteria for significant impacts and presents mitigation measures for identified impacts. Peak-hour level of service calculation worksheets are provided in TIA Appendix D.

Since the level of service calculations indicate that all study intersection operate at acceptable service levels based on the City of Sunnyvale's and the VTA's criteria, the project has a **less than significant impact** at all study intersections under the Background plus Project scenario and no mitigation measures are required.

3.14.5 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

This subsection presents the results of the level of service calculations under Cumulative Conditions with and without the project. Cumulative No Project Conditions are defined as conditions within the next five years (2020). Traffic volumes for Cumulative No Project Conditions comprise existing volumes plus background volumes as well as volumes from pending developments and a five- year growth factor. Cumulative plus Project Conditions are defined as Cumulative No Project Conditions plus traffic generated by the proposed project.

The project would have no impacts on air traffic patterns. As such, it would have no cumulative impacts and this topic is not further discussed.

Cumulative Bicycle, Pedestrian, and Transit Impacts

Impact 3.14.7 The project would have no cumulative impacts on bicycle and pedestrian facilities, and a less than cumulatively considerable impact on transit facilities.

Project impacts on bicycle and pedestrian networks are localized and would not impact city or regional networks. Further, the project would implement improvements to bicycle and pedestrian facilities in the project area and as such would have **no cumulative** impact on such facilities or on any applicable plans or policies.

The project would increase transit delay times for up too 15 seconds; nonetheless, this increase is not substantial and would be only during certain times of day. As such, this impact would be localized and there would be a **less than cumulatively considerable** impact on transit operations.

Cumulative Impacts on Emergency Access and Road Hazards

Impact 3.14.8 The project would have a less than cumulatively considerable impact on emergency access. The project would have no cumulative impact on road hazards.

Emergency access in the project area would not be impacted by the proposed project. No streets or intersections would be closed during construction and as discussed above, the project would increase delays but not in a manner that would warrant signals for neighborhood intersections. As such, the project would have a **less than cumulatively considerable** impact on emergency access.

The proposed project would not require the permanent alteration of any roadways or generate vehicle uses incompatible with the existing roadways. Further, although the project would introduce a larger number of pedestrians in an unsafe roadway condition, this would be a localized impact and would not impact pedestrian facilities in the city or the region. Therefore, the project would have **no cumulative** impact on road hazards.

Cumulative Traffic Impacts

Cumulative No Project Traffic Volumes

Cumulative traffic volumes were developed by applying a five-year growth factor to existing volumes, adding trips from the Background No Project growth assumptions (approved but not yet built and not occupied development projects), and trips from pending development projects in the study area. The development of Cumulative No Project volumes is discussed in more detail below.

Cumulative Traffic Growth

Growth factors for local roads, collectors, and arterials were developed based on the City of Sunnyvale's travel demand forecasting model. The City uses the rates in **Table 3.14-15** to estimate annual regional traffic growth based on the roadway classification.

TABLE 3.14-15
ANNUAL GROWTH RATES

Roadway Classification	AM Peak Hour	PM Peak Hour
Arterial	2.00%	1.75%
Collector	2.28%	2.34%
Local	0.50%	0.50%

Source: City of Sunnyvale 2015

Using 2015 as the base year for Existing Conditions, five-year growth factors (to year 2020) based on roadway classifications were applied to all movements at intersections 1 through 17. A growth factor was not applied to intersections 18 through 20 to be consistent with the Apple Campus 2 TIA and City of Cupertino guidelines.

Approved, Not Occupied, and Pending Projects

In addition to the vehicle trips from approved but not yet built and not occupied development projects discussed previously, vehicle trips from pending development projects in the study area were added to the study intersections. Similar to the approved developments, trip generation estimates from the pending development projects that would add traffic to the study intersections were obtained from their respective traffic reports or estimated based on trip generation rates published in the ITE's *Trip Generation* (9th Edition). The trips for each of the projects were then assigned to the roadway network based on population and employment data, existing and estimated future travel patterns, and recent transportation impact analyses completed in the area. Projects larger than 20 residential units or 10,000 square feet of office/commercial space were considered. TIA Appendix E contains a full list of pending projects from the City of Sunnyvale and surrounding jurisdictions and their assumed trip generation estimates.

The trips for each of the approved, not occupied, and pending development projects were added to the existing volumes, which were multiplied by the annual growth rates discussed above to represent Cumulative No Project Conditions, as shown on **Figure 3.14-15a** and **b.**

Cumulative Improvements

Apart from the background transportation improvements identified in TIA Section 4.2 and in Subsection 3.14.4 above, no additional approved and funded transportation network improvements were assumed to be constructed prior to the cumulative horizon year of 2020. Therefore, the background roadway network was used for the cumulative analysis.

Cumulative plus Project Traffic Volumes

Trips generated from the proposed project (**Figure 3.14-7**a) were added to the Cumulative No Project traffic projections to develop traffic volumes for Cumulative plus Project Conditions. The resulting volumes are shown on **Figure 3.14-16a** and **b**.

Cumulative Intersection Levels of Service

Table 3.14-16 presents the level of service calculations for the study intersections under Cumulative No Project and Cumulative plus Project Conditions. TIA Appendix B contains the corresponding calculation sheets.

TABLE 3.14-16
CUMULATIVE AND CUMULATIVE PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection		Intersection Control[1]	Peak Hour[2]	Cumulative Conditions		Cumulative plus Project Conditions				
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Δ in Crit. V/C[5]	Δ in Crit. Delay[6]	Signal Warrant Met?[7]
1	El Camino Real/ Wolfe Road (CMP)*	Signal	AM PM	50.1 47.7	D D	51.3 49.3	D- D	0.021 0.012	2.2 2.6	N/A
2	Fremont Avenue/ Wolfe Road	Signal	AM PM	30.9 37.2	C D+	31.2 38.0	C D+	0.013 0.014	0.9 1.5	N/A
3	Wolfe Road/ Elizabeth Way	SSSC	AM PM	33.8 **59.2**	D **F**	29.9 **43.0**	D **E**	N/A N/A	N/A N/A	No
4	Wolfe Road/ Marion Way	Signal	AM PM	12.0 15.2	B B	15.3 17.3	B B	0.076 0.050	4.3 3.1	N/A
5	Wolfe Road/ Inverness Way	Signal	AM PM	12.7 9.0	B A	13.2 9.3	B A	0.020 0.000	0.4 0.0	N/A
6	Wolfe Road/ Homestead Road	Signal	AM PM	42.0 44.2	D D	42.3 45.0	D D	0.018 0.009	0.8 1.5	N/A
7	El Camino Real/ Norman Drive*	SSSC	AM PM	10.3 16.7	B C	10.4 16.9	B C	N/A N/A	N/A N/A	No
8	El Camino Real/ Halford Avenue*	Signal	AM PM	20.9 22.7	C+ C+	21.2 22.8	C+ C+	0.000 0.000	0.4 0.0	N/A

Intersection		Intersection Control[1]	Peak Hour[2]	Cumulative Conditions		Cumulative plus Project Conditions				
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Δ in Crit. V/C[5]	Δ in Crit. Delay[6]	Signal Warrant Met?[7]
9/10	El Camino Real/ Lawrence Expressway* (CMP)	Signal	AM PM	28.1 47.4	C D	28.2 47.8	C D	0.004 0.002	0.1 0.6	N/A
11	Lawrence Expressway/ Benton Street*	Signal	AM PM	**81.4** 46.4	**F** D	**89.2** 49.7	**F** D	**0.025** 0.014	**12.3** 4.9	N/A
12	Homestead Road/ Nightingale Avenue	SSSC	AM PM	14.3 15.1	B C	14.3 14.7	B B	N/A N/A	N/A N/A	No
13	Homestead Road/ Peacock Avenue	SSSC	AM PM	14.8 16.8	B C	17.5 19.6	C C	N/A N/A	N/A N/A	No
14	Homestead Road/ Quail Avenue	Signal	AM PM	38.1 47.6	D+ D	38.8 48.7	D+ D	0.015 0.011	0.8 1.5	N/A
15	Homestead Road/ Swallow Drive	SSSC	AM PM	29.7 **38.4**	D **E**	30.7 **39.3**	D **E**	N/A N/A	N/A N/A	No
16	Lawrence Expressway/ Homestead Road* (CMP)	Signal	AM PM	**84.7** 77.9	**F** E-	**86.4** 78.7	**F** E-	**0.006** 0.005	**2.6** 1.2	N/A
17	Lawrence Expressway/ Lochinvar Avenue*	Signal	AM PM	28.2 22.6	C C+	28.5 22.8	C C+	0.002 0.004	0.4 0.3	N/A
18	Wolfe Road/ Pruneridge Avenue	Signal	AM PM	11.3 20.6	B+ C+	11.1 20.7	B+ C+	0.012 0.007	-0.3 0.2	N/A
19	Wolfe Road/ NB I-280 Off-Ramp	Signal	AM PM	27.4 27.6	C C	27.8 27.9	C C	0.014 0.005	0.6 0.6	N/A
20	Wolfe Road/ SB I-280 Off-Ramp	Signal	AM PM	31.3 19.5	C B-	32.6 20.0	C- C+	0.016 0.011	1.7 0.7	N/A

Source: Fehr & Peers 2015

Notes:

** Regionally significant intersection*

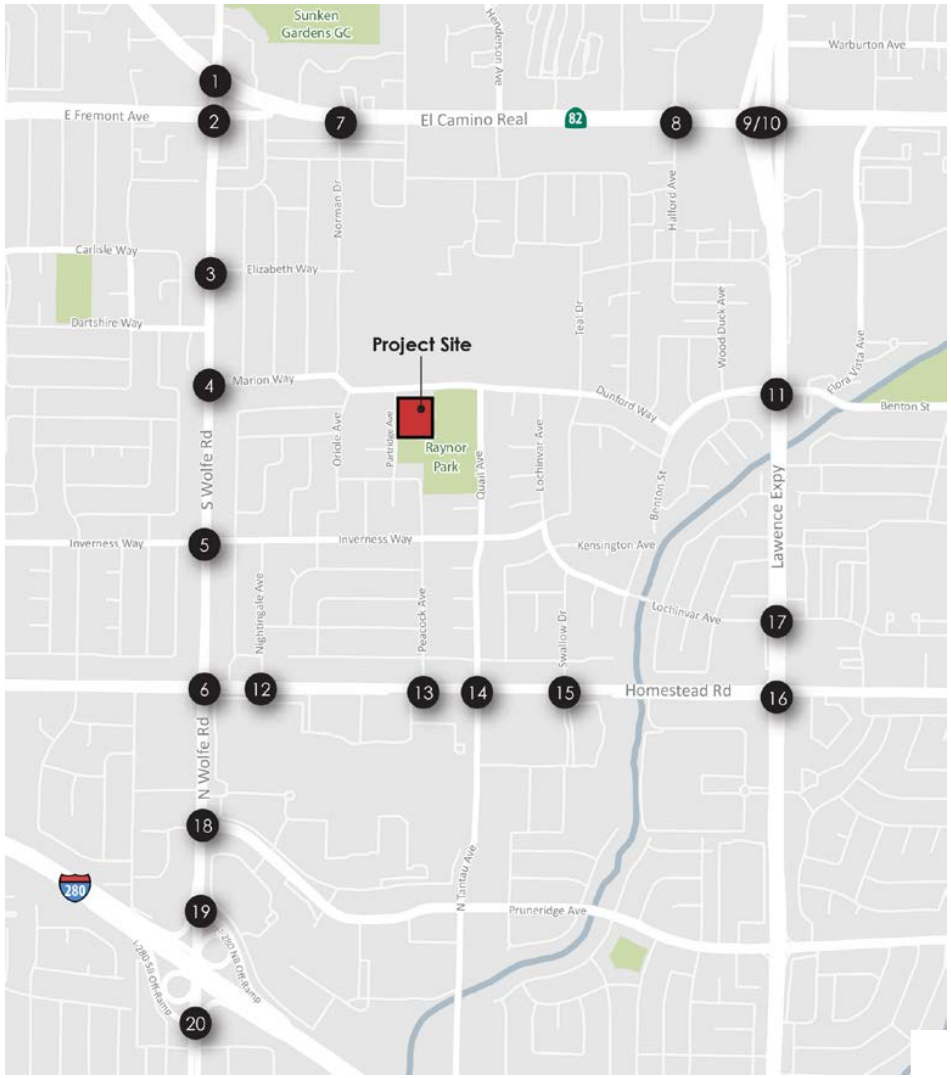
1. *Signal = signalized intersection; SSSC = side-street stop-controlled intersection*
2. *AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM)*
3. *Whole intersection weighted average control delay expressed in seconds per vehicle for signalized intersections. Total control delay for the worst movement is presented for side-street stop-controlled intersections.*
4. *LOS = Level of service calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.*
5. *Change in critical volume-to-capacity ratio (V/C) between Cumulative and Project Conditions.*
6. *Change in critical movement delay between Cumulative and Project Conditions.*
7. *Signal warrant based on California MUTCD Warrant 3, Peak Hour Volume (Urban Area).*

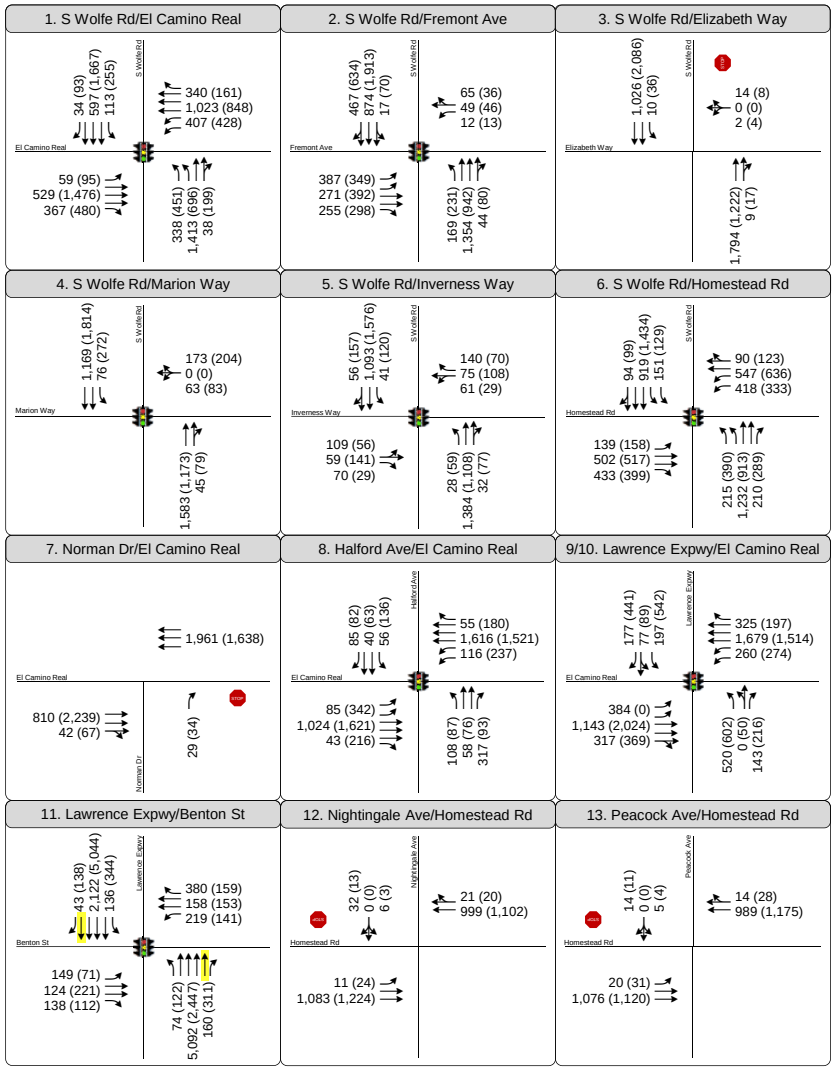
* *Regionally significant intersection with LOS E threshold*

N/A = Not Applicable

Bold font indicates unacceptable operations based on the appropriate jurisdiction's LOS standards. **Bold and highlighted** indicates significant impacts.

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center\Figures





Source: Fehr & Peers

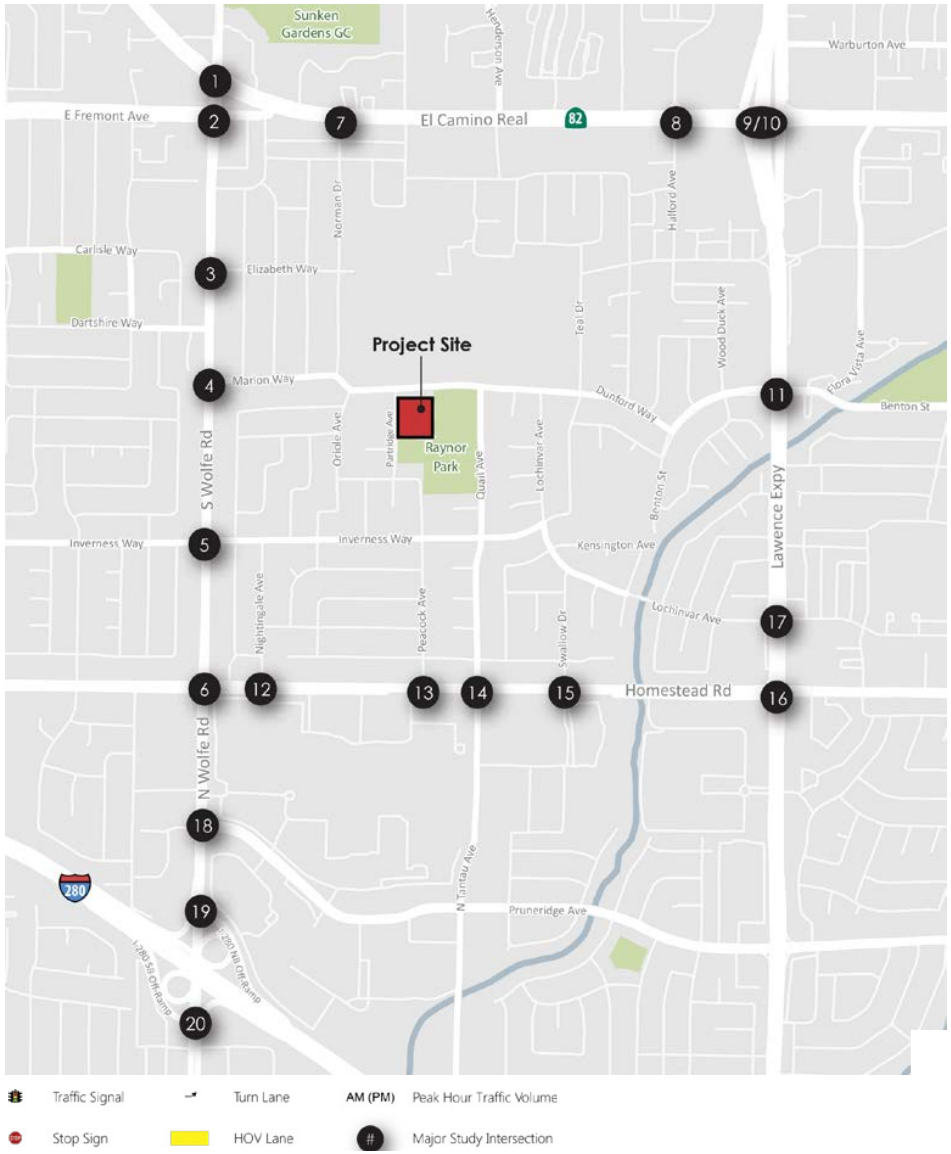
Not to scale

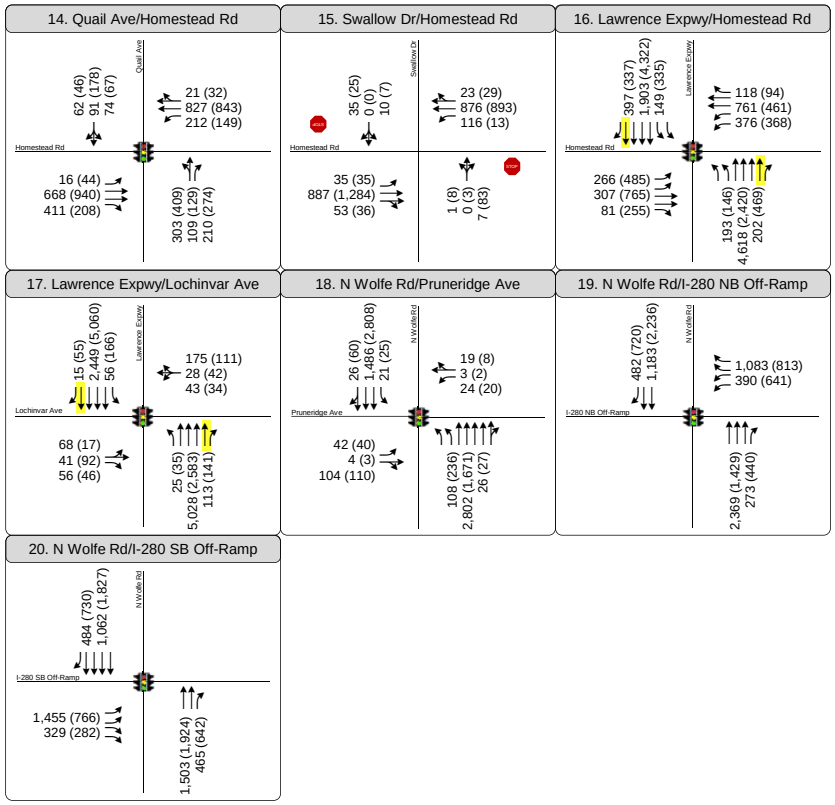
N

Figure 3.14-15a

Cumulative No Project Peak Hour Traffic Volumes

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center Figures





Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume

Stop Sign | HOV Lane | # Major Study Intersection

Source: Fehr & Peers

Not to scale

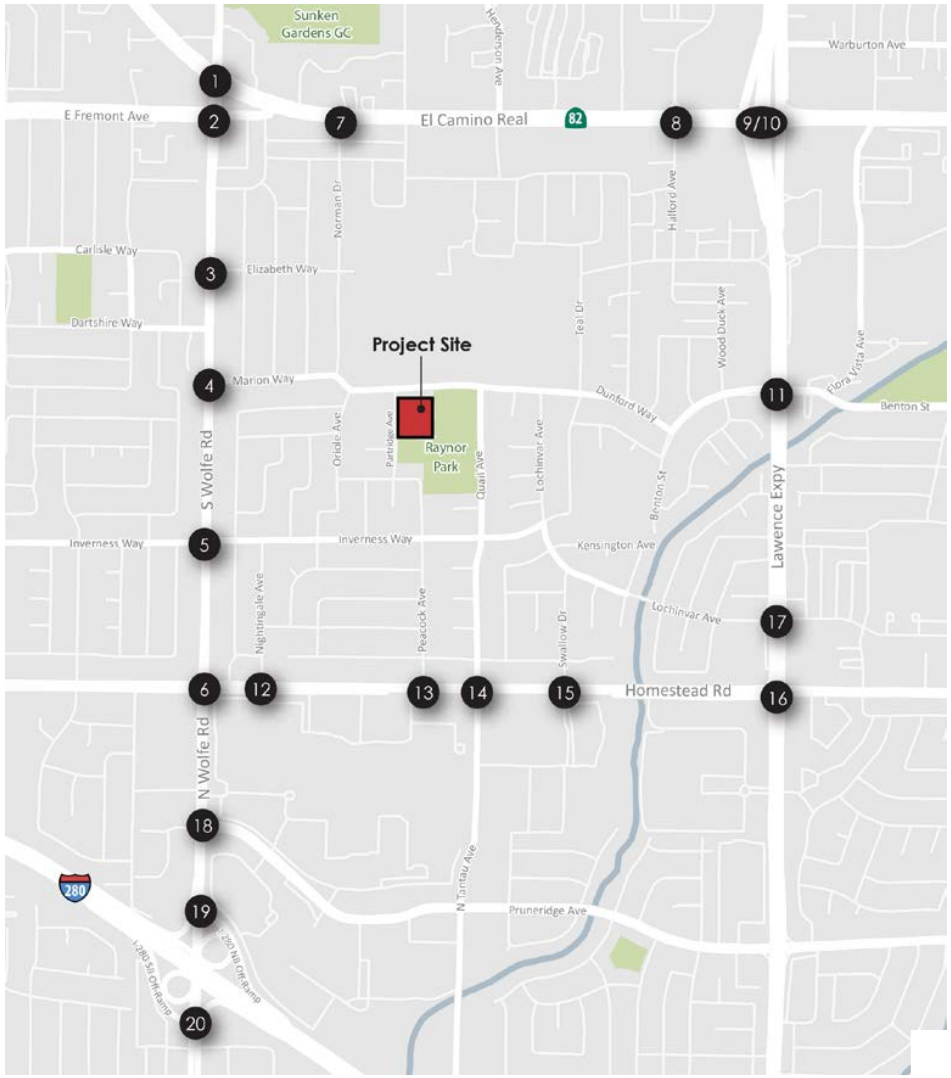
N

Figure 3.14-15b

Cumulative No Project Peak Hour Traffic Volumes

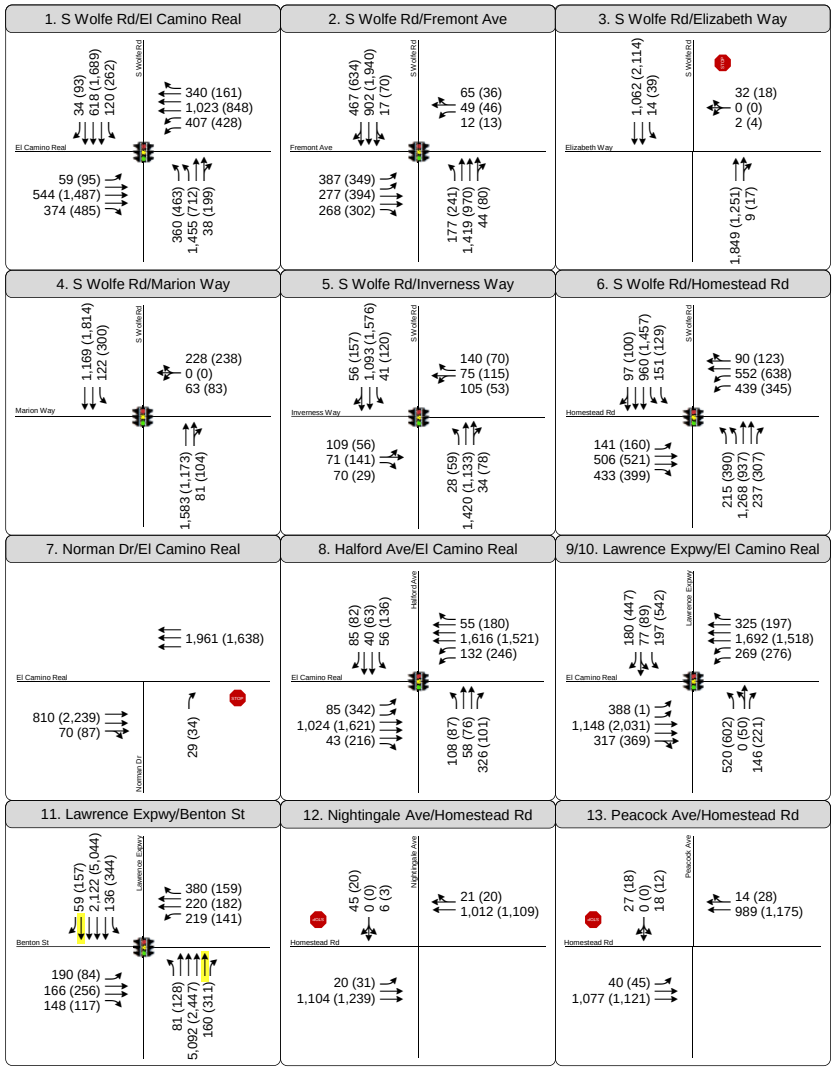
PMC®

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center Figures



Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume

Stop Sign | HOV Lane | # Major Study Intersection



Source: Fehr & Peers

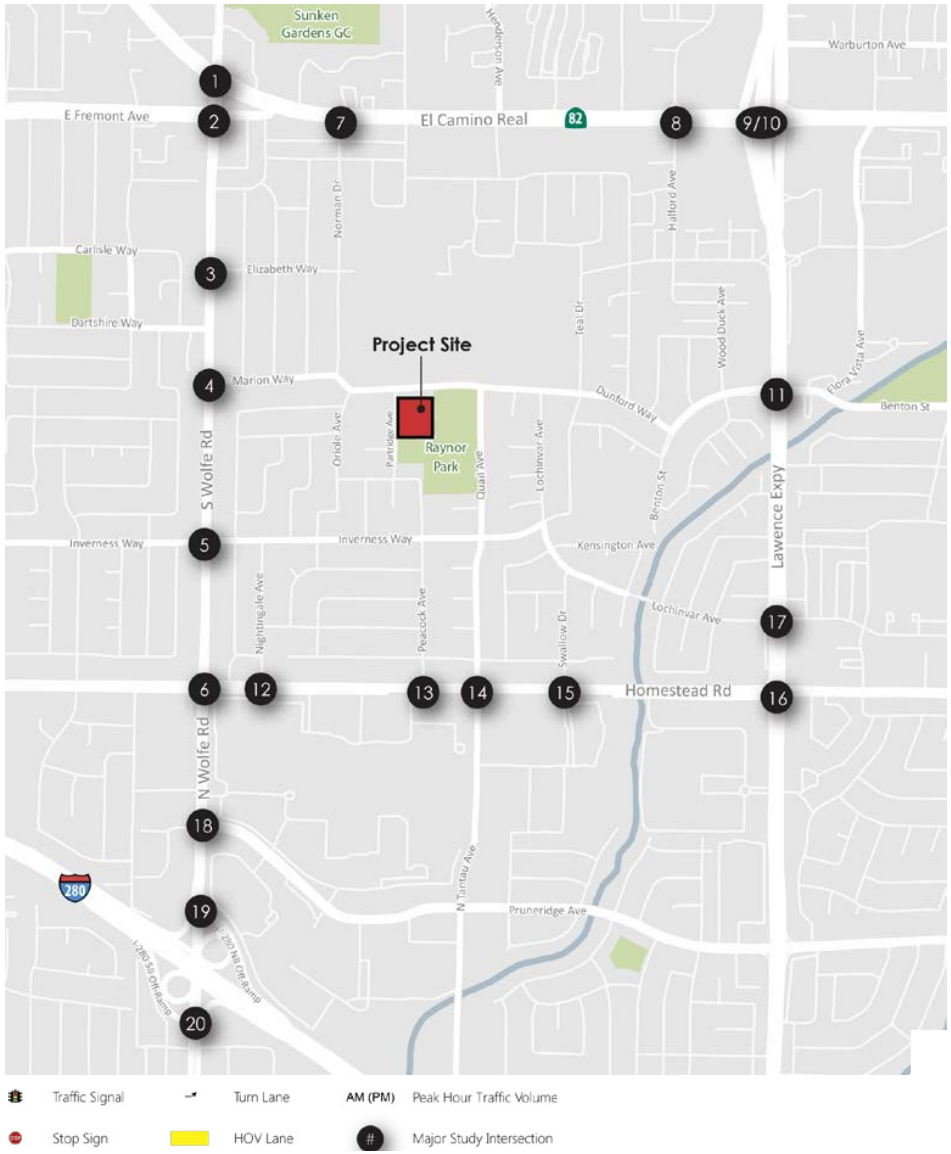
Not to scale

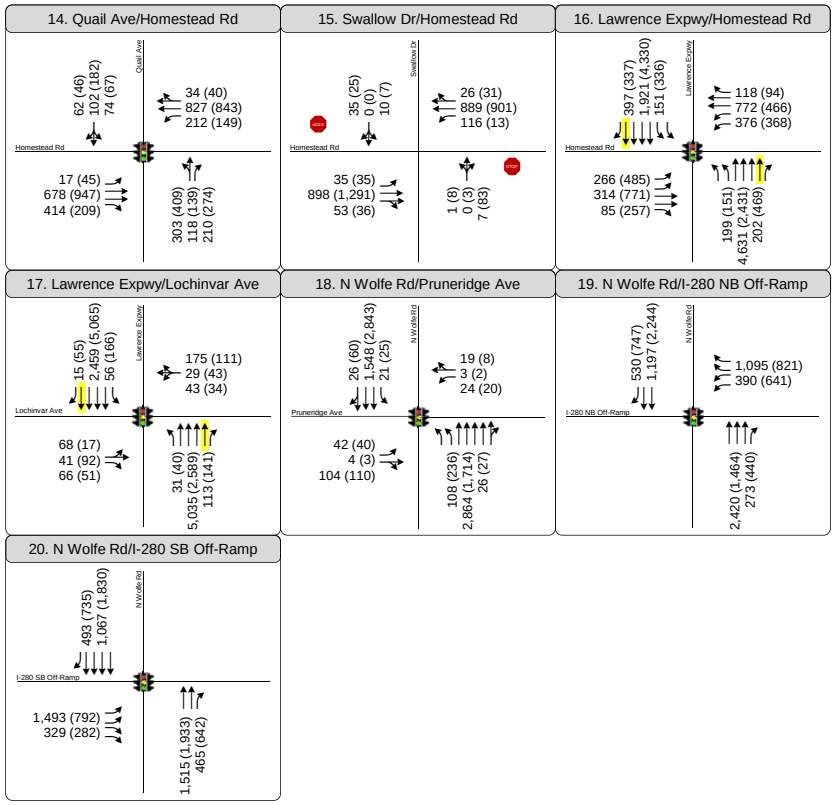
N

Figure 3.14-16a

Cumulative Plus Project Peak Hour Traffic Volumes

T:_CS\Work\Sunnyvale, City of\Raynor Activity Center Figures





Traffic Signal | Turn Lane | AM (PM) Peak Hour Traffic Volume

Stop Sign | HOV Lane | # Major Study Intersection

Source: Fehr & Peers

Not to scale

N

Figure 3.14-16b

Cumulative Plus Project Peak Hour Traffic Volumes

PMC®

As previously discussed, some of the study intersections show a reduction in average delay with the addition of project traffic, which is counterintuitive. The average delay values in the table are weighted averages. Weighted average delays will be reduced when traffic is added to a movement with a low delay. Conversely, relatively small volume increases to movements with high delays can substantially increase the weighted average delay.

Signalized Intersections

Under Cumulative and Cumulative plus Project Conditions, the following signalized intersections would operate at unacceptable service levels (LOS E/F for city intersections and LOS F for regionally significant intersections) during the identified peak hours:

Intersection 11 — Lawrence Expressway/Benton Street: The addition of project traffic exacerbates unacceptable LOS F operations during the AM peak hours.

Intersection 16 — Lawrence Expressway/Homestead Road: The addition of project traffic exacerbates unacceptable LOS F operations during the AM peak hours.

Unsignalized Intersections

Under Cumulative and Cumulative plus Project Conditions, the following unsignalized intersections would operate at unacceptable service levels (LOS E/F for city intersections and LOS F for regionally significant intersections) during the identified peak hours:

Intersection 3 — Wolfe Road/Elizabeth Way: The intersection operates at unacceptable LOS F operations under Cumulative No Project conditions during the PM peak hour. The intersection improves from LOS F under Cumulative No Project conditions to LOS E under Cumulative Plus Project conditions due to vehicles being added to non-critical movements.

Intersection 15 — Homestead Road/Swallow Drive: The addition of project traffic exacerbates unacceptable LOS F operations during the PM peak hour.

TIA Appendix C contains the peak-hour signal warrants.

Cumulative Intersection Impacts and Mitigation Measures

This discussion evaluates the intersection level of service results presented in **Table 3.14-16** against City of Sunnyvale and VTA criteria for significant impacts and presents mitigation measures for identified impacts. Peak-hour level of service calculation worksheets including the recommended mitigation measures are provided in TIA Appendix D.

Intersection 3 – Wolfe Road/Elizabeth Way

Impacts 3.14.9 The project would have a **less than cumulatively significant** on Intersection 3.

Under Cumulative plus Project Conditions, the intersection would operate at unacceptable LOS E during the PM peak hour but would not meet the MUTCD peak-hour signal warrant volume threshold. During the AM peak hour, the intersection would operate at acceptable LOS D. Therefore, based on the City of Sunnyvale's intersection impact criteria, a **less than cumulatively significant** impact would result at the Wolfe Road/Elizabeth Way intersection.

Intersection 11 – Lawrence Expressway/Benton Street

Impact 3.14.10 During the AM peak hour, the addition of project traffic would exacerbate unacceptable LOS F operations at the intersection of Lawrence Expressway and Benton Street and the project would have a **significant and unavoidable** impact.

During the AM peak hour, the addition of project traffic would exacerbate unacceptable LOS F operations at the intersection of Lawrence Expressway and Benton Street. The critical delays would increase by more than 4 seconds and the critical V/C ratios would increase by more than 0.01 between the Cumulative No Project and Cumulative plus Project scenarios for both peak hours. Therefore, the project would have a **significant impact** at the Lawrence Expressway/Benton Street intersection based on the VTA's impact criteria.

The addition of a second eastbound left turn lane from Benton Street onto northbound Lawrence Expressway would improve intersection operations to acceptable LOS E. However, this movement is projected to have 182 vehicles under cumulative AM conditions and 79 during cumulative PM conditions, which normally does not warrant a second left turn lane (the HCM recommends the provision of double left-turn lanes when the volume exceeds 300 vehicles.) The main issue that would result in LOS F operations at this intersection would be the heavy through volumes on Lawrence Expressway. Additional through capacity on Lawrence Expressway is needed to improve operations at this location. However, there are currently no plans to widen Lawrence Expressway. Because of existing traffic volumes on Lawrence Expressway, and the project's additional traffic that does not meet the conditions for the addition of a second left turn lane, mitigation measures for this impact would not be feasible. Therefore, the impact would be considered cumulatively considerable and **significant and unavoidable.**

Intersection 15 – Homestead Road/Swallow Drive

Impact 3.14.12 The project would have a **less than cumulatively considerable** impact at Intersection 15.

Under Cumulative plus Project Conditions, the intersection would operate at unacceptable LOS E during the PM peak hour but would not meet the MUTCD peak-hour signal warrant volume threshold. During the AM peak hour, the intersection would operate at acceptable LOS D. Therefore, based on the City of Sunnyvale's intersection impact criteria, a **less than cumulatively considerable** impact would result at the Homestead Road/Swallow Drive intersection.

Intersection 16 – Lawrence Expressway/Homestead Road

Impact 3.14.13 The project would have a **less than cumulatively considerable** impact at Intersection 16.

During the AM and PM peak hours, the addition of project traffic would exacerbate unacceptable LOS F operations at the intersection. However, the critical delays would not increase by more than 4 seconds, and the critical V/C ratios would not increase by more than 0.01 between the Cumulative No Project and Cumulative plus Project scenarios for either peak hour. Therefore, the project would have a **less than cumulatively considerable impact** at the Lawrence Expressway/Homestead Road intersection based on the VTA's impact criteria.

3.14.6 OPERATIONAL TRANSPORTATION ISSUES

This section briefly discusses exiting operational transportation issues in the City as they relate to left turn pocket queuing analysis. The City does not have formal adopted threshold for queuing impacts, but rather treats queuing issues as operational issues, unless overall LOS thresholds are exceeded. Traffic trips associated with queuing have been accounted for in the LOS analysis above.

The addition of project traffic along the roadway network has the potential to add vehicles to left-turn movement causing the left-turn queue to exceed the turn pocket storage length. Queues that exceed the turn pocket storage length have the potential to impede through traffic movement along an approach. Potentially affected intersections were selected for this evaluation based on where the project would add at least 10 vehicles to a study intersection with a left-turn pocket, which include the following six intersections:

- Intersection 1 Wolfe Road/El Camino Real – Northbound left-turn pocket during AM peak hour.
- Intersection 4 Wolfe Road/Marion Way – Southbound left-turn pocket during AM and PM peak hours.
- Intersection 6 Wolfe Road/Homestead Road – Westbound left-turn pocket during AM and PM peak hours.
- Intersection 8 El Camino Real/Halford Avenue – Westbound left-turn pocket during AM peak hour.
- Intersection 11 Lawrence Expressway/Benton Avenue – Northbound left-turn pocket during AM and PM peak hours.
- Intersection 13 Homestead Road/Peacock Avenue – Eastbound left-turn pocket during AM peak hour.

The 95th percentile queues from the TRAFFIX LOS analysis (Appendix B of the TIA) was used to evaluate the projected queues at the identified left-turn movements. The results of the left-turn queue analysis are presented in **Table 3.14-17.**

Based on the queue analysis presented in **Table 3.14-17**, the westbound left turn pocket at El Camino Real/Halford Avenue intersection and the eastbound left turn pocket at Homestead Road/Peacock Avenue intersection have sufficient capacity to accommodate project queues under the plus Project scenarios for Existing, Background, and Cumulative Conditions.

The analysis indicates that left-turn vehicle queues exceed available storage lengths for Existing, Existing Plus Project, Background, Background Plus Project, Cumulative, and Cumulative Plus Project conditions at the following locations:

- Northbound left-turn pocket at the Wolfe Road/El Camino Real intersection
- Southbound left turn pocket at Wolfe Road/Marion Way intersection
- Westbound left turn pocket at Wolfe Road/Homestead Road intersection
- Eastbound left turn pocket at Lawrence Expressway/Benton Avenue intersection

As such, the project would be required to implement improvement outlined in Table 3.14-17 below as a condition of approval. With implementation of recommendations below the project would have a **less than significant** impact on left-turn pocket queuing at the intersections above.

TABLE 3.14-17
LEFT-TURN VEHICLE QUEUE EVALUATION

Intersection		Pocket	Available Pocket Length[1] (feet)	Peak Hour	Number of Trips Added	Projected Queue Length (feet)[1]			Improvement
						Existing (Existing plus Project)	Background (Background plus Project)	Cumulative (Cumulative plus Project)	
1	Wolfe Road / El Camino Real	NBL	160	AM PM	18 8	**175 (200)** 125 **(150)**	**150 (175)** 175 (175)	**175 (200)** **250 (275)**	None needed: queues can extend into designated trap lane for westbound El Camino at the adjacent Wolfe Road/ Fremont Avenue intersection
4	Wolfe Road / Marion Way	SBL	55	AM PM	37 13	**100 (125)** **175 (200)**	**100 (125)** **200 (200)**	**100 (150)** **225 (225)**	None needed: queues can extend into the existing two-way left-turn lane
6	Wolfe Road / Homestead Road	WBL	210	AM PM	23 11	75 (100) 100 (100)	225 **(250)** 150 (150)	**250 (275)** 150 (175)	No feasible improvements available
8	El Camino Real / Halford Avenue	WBL	215	AM PM	13 6	25 (50) 100 (100)	25 (50) 100 (100)	50 (50) 100 (100)	None needed
11	Lawrence Expwy/ Benton Avenue	EBL	100	AM PM	33 9	**275 (300)** **125 (125)**	**300 (375)** **125 (150)**	**375 (475)** **150 (175)**	Left turn pocket could be extended through restriping and parking removal.
13	Homestead Road / Peacock Avenue	EBL	65	AM PM	12 6	75 (75) 75 (100)	75 (75) 75 (100)	75 (75) 75 (100)	None needed

Source: Fehr & Peers, September 2015.

Notes:

1. Per lane

2. Each vehicle in queue is assumed to occupy 25 feet.