3.14 Transportation and Traffic

This section describes the transportation network and existing conditions in the project study area, a summary of applicable plans and regulations related to implementation and impact analysis of the Proposed Project, as well as the transportation and traffic impacts of the Proposed Project. Transportation and traffic impacts associated with projected ridership, traffic, pedestrian and bike systems, safety hazards, emergency vehicle access, station parking and access are summarized herein, based on the transportation analysis report prepared for the Proposed Project by Fehr & Peers Transportation Consultants, which is Appendix D of the EIR. Impacts on freight were analyzed based on a characterization of existing conditions and future conditions with and without the Proposed Project.

3.14.1 Existing Conditions

3.14.1.1 Regulatory Setting

The Proposed Project falls within the purview of several key state and regional long-range transportation plans, and local general plans. This section describes the regulatory framework of these plans, including the status of implementation. Some of the plans are still in progress and not yet fully adopted.

State and Regional Plans

California Transportation Plan 2025/2030

The *California Transportation Plan* (CTP) 2025 was adopted in 2006 and updated in 2007. The CTP, overseen by the California Department of Transportation (Caltrans), serves as a blueprint for California's transportation system defined by goals, policies, and strategies to meet the State's future mobility needs. The goals defined in the plan fall into three categories: social equity, prosperous economy, and quality environment. Each goal is tied to performance measures. In turn, members from regional and metropolitan planning agencies report to Caltrans these performance measures. The CTP 2030 Addendum updated the CTP 2025, to comply with the Safe, Accountable, Flexible, Efficient, Transportation Equity Act – A Legacy for Users (SAFETEA-LU). This federal law authorized transportation funding through 2009 and established new requirements for statewide and metropolitan transportation planning. Caltrans is presently working on an update of the CTP that would extend to 2040.

Plan Bay Area

Plan Bay Area is the San Francisco Bay Area's plan to meet the requirements of Senate Bill 375, which was signed into law in 2008. The law requires each of the state's metropolitan planning organizations (MPOs) to develop a Sustainable Communities Strategy (SCS) aimed at reducing greenhouse gas (GHG) emissions from passenger vehicles. *Plan Bay Area* is overseen by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG). It serves as the region's SCS and the 2040 Regional Transportation Plan integrating transportation and land-use strategy to manage GHG emissions and plan for future population growth. In July 2013, *Plan Bay Area* was adopted by ABAG and the MTC. The Proposed Project is one of the major projects included in *Plan Bay Area*.

California Public Utilities Commission General Orders

As described in Section 3.13, *Public Services and Utilities*, the California Public Utilities Commission (CPUC) has safety and security regulatory authority over all transit agencies in California. The CPUC's Rail Transit Safety Section focuses on verification of the system safety and security plans of each rail transit agency to ensure these plans meet all state and federal rules and regulations.

Rules established by the CPUC are called General Orders (GOs). The following GOs are related to rail transit safety and security (California Public Utilities Commission 2013).

- **GO 26-D:** Clearances on Railroads and Street Railroads as to Side and Overhead Structures, Parallel Tracks and Crossings. This order is relevant to providing physical clearances around railroad tracks and operations.
- **GO 95:** Overhead Electric Line Construction. This order is relevant to providing electrical clearances around overhead lines. However, this order does not provide any specific guidance for 25 kVA systems proposed for use for the Proposed Project.
- **GO 118-A:** Construction, Reconstruction and Maintenance of Walkways, and Control of Vegetation adjacent to Railroad Tracks. This order is relevant to providing safe access and vegetation control.

The CPUC initiated new rule-making (13-03-009) in 2013 pursuant to Petition 12-10-011 concerning a new GO governing safety standards for the use of 25 kVA electrical lines to power high speed trains. The rules are intended to establish uniform safety requirements governing the design, construction, operation, and maintenance of 25 kVA overhead contact system (OCS), which is to be constructed for the operation of high-speed trains in California. CPUC meetings on this GO has resulted in discussions about the GO being specific to a fully grade-separated dedicated high-speed rail system. The draft GO addresses performance requirements, clearances and protection against electric shock, grounding and bonding, strength requirements, safe working practices, and reporting requirements. Because the OCS for the Proposed Project would be used in the future by both Caltrain and high-speed rail, some of the issues addressed in the draft GO may apply to the Proposed Project OCS. It also appears additional CPUC rule-making proceedings would be needed for the Proposed Project because it would not be a fully grade-separated shared system. As the draft GO proceeds through rule-making, JPB will coordinate with CPUC concerning the applicability of the GO to the Proposed Project and will apply any requirements in the adopted order (as well as additional requirements to be determined) during the final design of the Proposed Project.

Local Plans and Regulations

General Plans and Specific Plans

General plans and specific plans prepared by the local municipalities include specific goals, policies, and actions designed to maintain acceptable roadway traffic operations, reduce vehicle traffic, and maintain acceptable services for transit, pedestrian, and bicycle facilities within the jurisdiction of the municipalities. General plans and specific plans in the project area are discussed in Section 3.10, *Land Use and Recreation*, Appendix D, *Transportation Analysis*, and Appendix H, *Land Use Information*.

Station Area and Downtown Plans

A number of downtown and station area plans near Caltrain stations in the project area have been adopted or implemented in the past decade, or are currently in-progress. In general, these plans are overseen by municipalities along the Caltrain corridor. Appendix D details station area and downtown area plans completed since 2005 or currently in-progress. Some station area plans involve both public and private involvement or investment. In addition, some plans are part of the Grand Boulevard Initiative, a multi-jurisdictional, regional planning effort focused on the El Camino Real Corridor from San Francisco to San Jose (Grand Boulevard Initiative 2013). The Grand Boulevard initiative is currently in-progress.

Caltrain Plans and Policies

Caltrain has several plans relevant to this impact analysis which are described below

Caltrain Comprehensive Access Policy Program Statement

Caltrain adopted its *Comprehensive Access Program Policy Statement* in May 2010. The access guiding principles are as follows (Caltrain 2010):

- Increase access capacity to support ridership growth.
- Prioritize sustainable ("green") access.
- More effectively manage land and capital assets.
- Prioritize cost-effective access modes.
- Enhance customer satisfaction.
- Solidify partnerships to implement improvements.

Based on these guiding principles, the system-wide access mode of transportation priority is as follows: (1) Walk; (2) Transit; (3) Bike; and (4) Auto.

While the overall focus of capital investments at the system-wide level support walking, riding transit and bicycling, access mode prioritization at the station level will need to vary. Land uses and densities around the Caltrain stations vary from urban to suburban. Access strategies in an urban station area will differ from that of a suburban station area. Caltrain's access program prioritizes alternative modes of access at Transit Center stations (such as the San Francisco 4th and King Station), Intermodal Connectivity stations (such as the Millbrae Station), and Neighborhood Circulator stations (such as the Menlo Park Station) and auto access at auto-oriented stations (such as the Tamien Station). Transportation investments need to be tied to land use decisions to result in context-sensitive solutions and maximize return on investment.

The *Comprehensive Access Program Policy Statement* requires the development of an Access Strategic Plan and a Capital Improvement Plan as the next steps in developing a comprehensive access program. The following are example access strategies by mode. They are the types of capital investments that can be made throughout the Caltrain system to shift our access mode of transportation away from auto to walk, transit and bike. These strategies are considered in the development of Caltrain's Access Strategic Plan and the Capital Investment Plan, the next key steps in developing the Comprehensive Access Program.

- All Modes: real-time information; signage/ wayfinding; lighting; security; universal design (Americans with Disabilities Act (ADA) requirements); pedestrian/bicycle crossing signal priority; demand-based pricing strategies; and inviting public spaces;
- Walk: transit-oriented development (TOD); direct circulation; platform circulation management; traffic controls; traffic calming; timed transfers; transit; enhanced service frequency and capacity; platform proximity; and bike routes/lanes/paths.
- Bike: on-board accommodations; bike parking and stations; E-lockers; and bike sharing
- Auto: reserved parking; shared parking; car sharing; dedicated drop-off spaces (kiss-n-ride, taxis, ADA); and parking fees/permits.

Caltrain Bicycle Access and Parking Plan

The *Caltrain Bicycle Access and Parking Plan* complements Caltrain's bikes on board program. The *Caltrain Bicycle Access and Parking Plan* (Caltrain 2008) proposes to increase the number of passengers who bicycle to Caltrain stations by making improvements to access bike parking throughout the system. The plan identifies specific improvements at the top 10 stations which account for 75 percent of the system's cyclist-passenger volumes: San Francisco, 22nd Street, Millbrae, Hillsdale, San Mateo, Redwood City, Palo Alto, Mountain View, Sunnyvale and San Jose Diridon. The plan also prescribes system-wide guidelines and best practices for improving bicycle facilities throughout the Caltrain system.

Caltrain's strategy is to provide a range of options to accommodate passengers' various needs for the bicycle portion of their Caltrain trip. Plan recommendations include:

- Cyclist-specific customer service and marketing.
- Cyclist focused safety and security improvements.
- Increasing overall bicycle parking supply.
- Providing a mix of bike parking for different user needs.
- Improving station access for passengers with bikes.
- Working with cities to improve station bike access.
- Studying innovative station-side concepts such as real-time bicycle capacity information, bike sharing, and subsidies for folding bikes.

The *Caltrain Bicycle Access and Parking Plan* contains Bicycle Parking and Access Guidelines to supplement existing Caltrain Design Criteria and Standards. Plan recommendations are implemented based on the timing of available funding.

3.14.1.2 Environmental Setting

This section presents an assessment of the existing conditions in the study area, and provides a basis for the assessment of future transportation conditions. All data and analysis presented is for the existing conditions in 2013, unless specified otherwise.

Study Area

Caltrain provides inter- and intra-county commuter rail service to the San Francisco Bay Area between San Francisco and Gilroy. The entire Caltrain corridor is divided into six fare zones. The 51-mile project corridor, bounded by the 4th and King Station in San Francisco and the Tamien Station in San Jose, has 24 weekday stations (27 total stations including Broadway in Burlingame, Atherton, and Stanford) across four fare zones (each zone is about 13 miles in length) along the Caltrain right-of-way (ROW). The Caltrain corridor continues south of the Proposed Project area to Gilroy, including two additional fare zones and five additional stations providing limited peak period, peak direction service. Table 3.14-1 displays Caltrain stations within the Proposed Project boundary and the jurisdictions in which these stations are located. Figure 3.14-1 displays the study area geographic boundaries, stations, and zone boundaries.

The study area for transportation and traffic analysis considers roadway, transit, bicycle, and pedestrian facilities that would be affected by Proposed Project operation. These facilities consist of Caltrain stations within the project boundary, regional transit systems that provide connecting service to Caltrain stations, freeways and arterial roads that runs parallel or perpendicular to the project corridor, and intersections and local roadways in the vicinity of Caltrain stations and at-grade crossings.

Existing Transit Conditions

This section summarizes the existing Caltrain transit system and other regional and local transit systems that connect to Caltrain stations.

Caltrain Service and Schedule

The JPB operates Caltrain 365 days a year with reduced schedules on major U.S. holidays. The current Caltrain operating schedule consists of 92 trains each weekday, 36 trains on Saturdays, and 32 trains on Sundays. On weekdays, three of these trains start in Gilroy during the morning commute period, and three terminate in Gilroy during the evening commute period. On Saturdays and Sundays, trains run between San Jose (Diridon) and San Francisco only.

Weekday trains are a mix of Baby Bullets, Limited, and Local trains. Weekend service is a mix of weekend Baby Bullets and Local trains, with two Baby Bullet trains in each direction per day. Baby Bullet express service trains make the trip between San Francisco and San Jose in less than 1-hour. Table 3.14-2 shows the stations with Baby Bullet service in the study area. Local trains are operated at the shoulders of peak periods and serve to transition the service from peak to off-peak. Local trains stop at almost all stations between the San Jose Diridon Station and the San Francisco 4th and King Station, resulting in the longest travel times of all service types. Limited-stop trains operate as skip-stop for one-half of the route and as local trains for the other half, resulting in slightly faster travel times than Local trains.

Table 3.14-1. Caltrain Stations and Jurisdictions in Study Area

County	City	Caltrain Stations[a]
San Francisco	San Francisco	**4th and King** **22nd Street** Bayshore
San Mateo	South San Francisco	South San Francisco
	San Bruno	San Bruno
	Millbrae	**Millbrae**
	Burlingame	Broadway[b] Burlingame
	San Mateo	**San Mateo** Hayward Park **Hillsdale**
	Belmont	Belmont
	San Carlos	San Carlos
	Redwood City	**Redwood City**
	Atherton	Atherton[b]
	Menlo Park	**Menlo Park**[c]
Santa Clara	Palo Alto	**Palo Alto** Stanford[d] California Avenue
	Mountain View	San Antonio **Mountain View**
	Sunnyvale	**Sunnyvale** Lawrence
	Santa Clara	Santa Clara
	San Jose	College Park **San Jose Diridon** **Tamien**

Source: Appendix D, *Transportation Analysis*

[a] Stations with Baby Bullet service are displayed in **bold**.

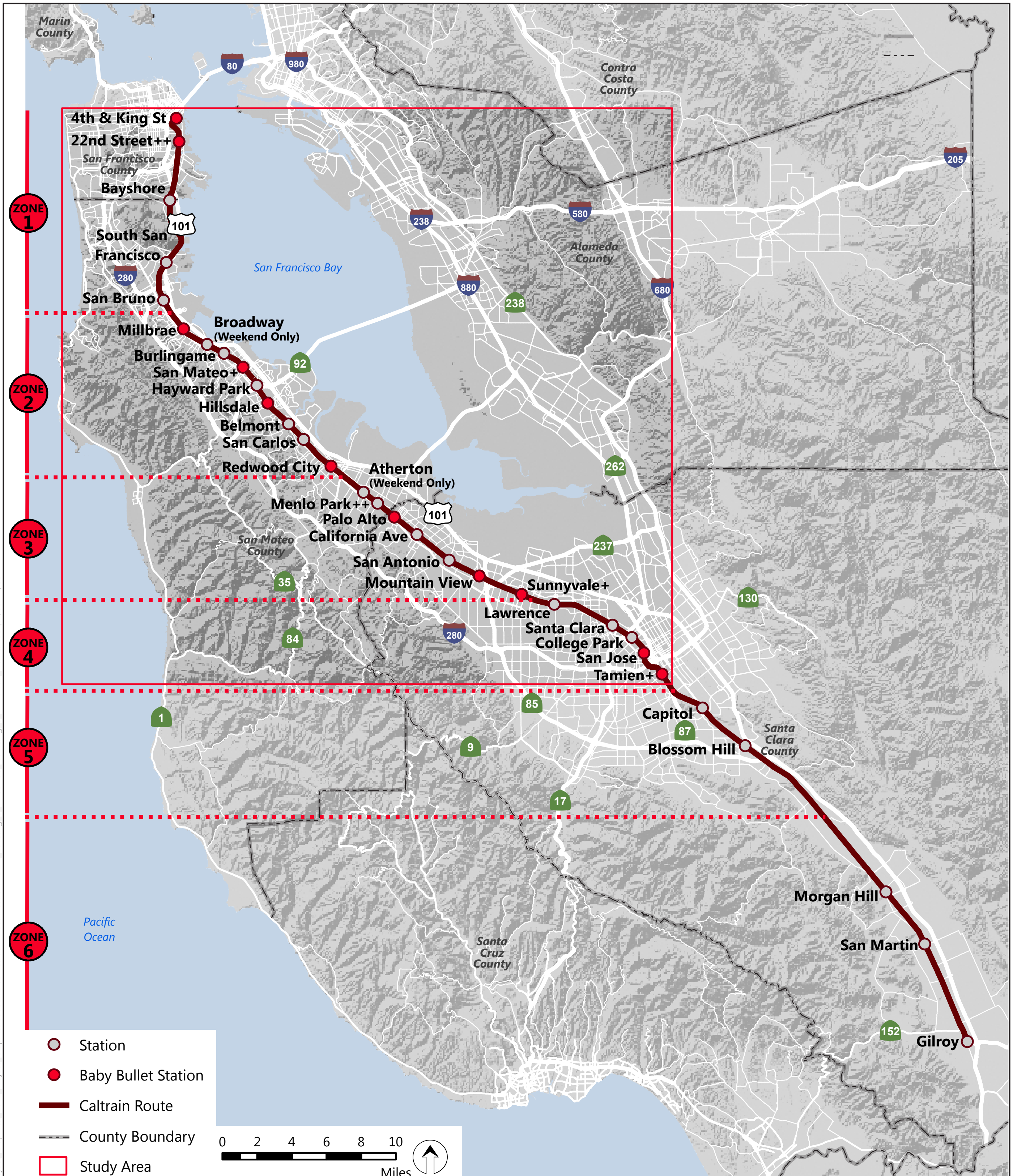
[b] There is no current weekday service to Broadway or Atherton Stations at present, only weekend service. Weekday service would be restored to these stations with the Proposed Project.

[c] Baby Bullet service is provided in the reverse commute direction only.

[d] The Stanford Station is only used for special events, such as Stanford football games.

Scheduled headways[1] vary by time of day, station, and service type. During the AM and PM peak periods, all bullet stations are served by at least one Baby Bullet train per hour with headways ranging between 15 to 30 minutes. The higher frequency bullet stations, including San Francisco 4th and King, Palo Alto, and San Jose Diridon, run at least two Baby Bullet trains per hour. Non-bullet stations operate Limited and Local trains at headways ranging from 30 minutes to 60 minutes during peak periods. During off-peak periods (early morning, midday, and after 7:00 p.m.), headways at all stations are generally about 60 minutes.

[1] The time between arrivals of trains moving in the same direction at a station.



+ Traditional Peak Baby Bullet Service Only
++ Reverse Peak Baby Bullet Service Only

Source: Fehr and Peers 2014.

Figure 3.14-1
Project Study Area
Peninsula Corridor Electrification Project

Caltrain Travel Time

Table 3.14-2 displays average travel times by service type and direction in the study area. Travel times for northbound and southbound directions are calculated between the Tamien or San Jose Diridon Station and the San Francisco 4th & King Station. Because Baby Bullet trains and Limited trains only stop at select stations, travel times on these trains are shorter than Local train travel times. Compared with Local trains, a passenger on a Baby Bullet can cut his/her travel time by about one-third.

Table 3.14-2. Average Caltrain Travel Time Between San Francisco and San Jose (2013)

	Average Travel Time in Minutes	
Service Type	Northbound	Southbound
Local	92	92
Limited	84	82
Baby Bullet	60	63

Source: Appendix D, *Transportation Analysis*

When making travel choices, passengers often weigh factors such as the time- and cost-competitiveness of the modes available to them. Overall, Caltrain is faster than automobile for most southbound trips. For northbound trips, travel by automobile can be faster than Caltrain depending on specific origins and destinations. However, travel times may vary by origin-destination station pair and route. In addition, travel times by automobile are highly variable because of traffic conditions affected by weather, accidents and collisions, time of day, travel direction, and season.

Caltrain Ridership and Travel Patterns

Caltrain has experienced steady ridership growth since 2005. From 2012 to 2013, ridership increased by about 11 percent, which was in-step with job growth, as the region continued to recover from the great recession. In 2013, Caltrain carried approximately 47,000 passengers on a typical weekday. Table 3.14-3 displays the top ten stations with the highest number of average weekday ridership (AWR). The number of daily boardings at the San Francisco 4th and King Station is almost twice the number of daily boardings at the Palo Alto Station.

Table 3.14-3. Top Ten Stations for Average Weekday Ridership (2013)

Station	Total Average Weekday Ridership
4th and King	10,786
Palo Alto	5,469
Mountain View	3,876
San Jose Diridon	3,489
Millbrae	3,255
Redwood City	2,619
Hillsdale	2,317
Sunnyvale	2,274
San Mateo	1,571
Menlo Park	1,526

Sources: Caltrain 2013b; Appendix D, *Transportation Analysis*.

Weekday travel along the Caltrain corridor is characterized by interregional trips that primarily occur during the AM and PM peak periods. Weekday boardings between 6:30 and 10:30 a.m. constitute the AM peak period and PM trips between 4:00 and 8:00 p.m. constitute the PM peak period. The proportion of AM and PM passengers at each station varies. In the AM peak, the northbound ridership is larger than the southbound ridership. Off-peak midday ridership is more than twice as large as the off-peak evening ridership. However, neither off-peak ridership is close to the combined passenger volume traveling north and south in the study area during the AM and PM peak periods. Figure 3.14-2 displays the average weekday ridership by time of day by station.

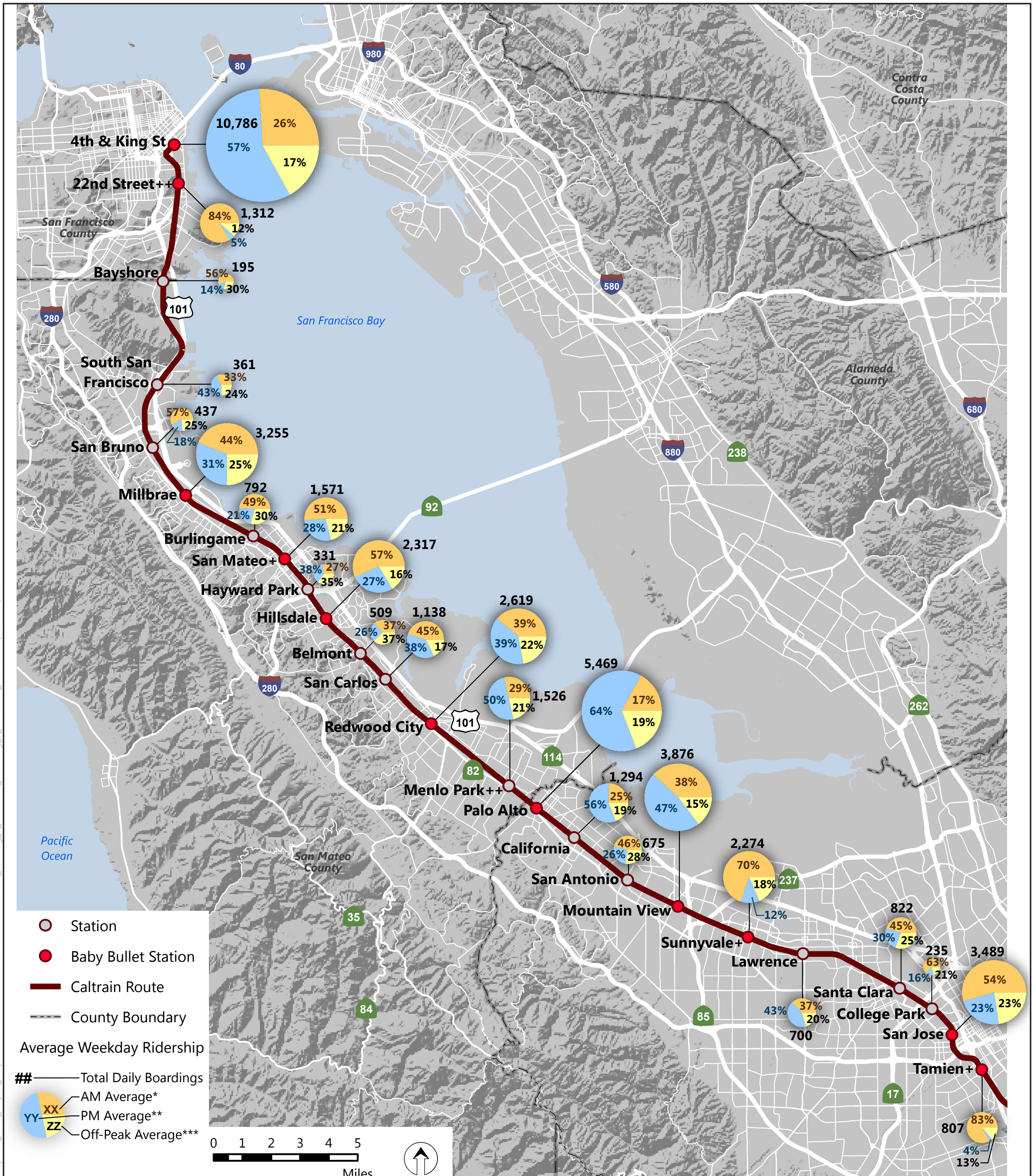
The trip purpose of the majority of weekday Caltrain passengers is commuting, or travel for work, which is about 74 percent of the AWR, followed by the social/recreational trips (14 percent), school trips (8 percent), shopping/personal trips (3 percent), and airport trips (1 percent). The main trip purposes of Caltrain passengers are displayed in Figure 3.14-3.

Caltrain passengers use a range of modes to travel from their origin location to their origin station at the beginning of their trip. Morning and evening access modes vary depending on the activities and errands a passenger may engage in after alighting at a Caltrain station. In general, most trips in the morning are between a person's place of residence and work. In the evening, this pattern reverses, but a passenger may not travel directly home from a station. Instead, they may engage in "trip chaining" or a series of trips before reaching home, their final destination (McGuckin & Murakami 1999). This can also occur in the morning, especially if a person has younger children and must drop them off at school or daycare on the way to a Caltrain station. Trip chaining, in turn, can influence a passenger's travel mode choice.

Travel mode share data was derived from the 2013 Caltrain Station Intercept Survey, conducted in June 2013 at 23 Caltrain stations during the weekday morning commute period (6:30 a.m. to 10:30 a.m.). Although the survey was conducted in the morning, the interviewers asked passengers questions about each passenger's return trip, which typically occurs during PM peak periods. Based on the survey at the Caltrain stations, the overall daily modes of access to Caltrain stations are estimated and shown in Figure 3.14-4.

The top daily access mode for Caltrain passengers traveling to stations is walking (36 percent). The high mode share for walking indicates that a high volume of passengers live or work within reasonable walking distance of their origin station. Travel by transit or public/private shuttle is the second most popular access mode (26 percent) followed by car (23 percent) and bicycle (14 percent). The car mode includes passengers who drove alone, passengers who were dropped off at the station or carpooled, and motorcycle and scooter riders. Of the 23 percent of passengers who accessed Caltrain by car, about 13 percent of passengers drove alone, 8 percent of passengers were dropped off, and 1 percent of passengers carpooled. The majority of Caltrain cyclists bring their bicycles on-board rather than parking their bicycle at their origin station. About 13 percent of passengers bring their bicycles on-board compared with only 1 percent who store their bicycles in lockers, racks, or shared bicycle storage at or near stations.

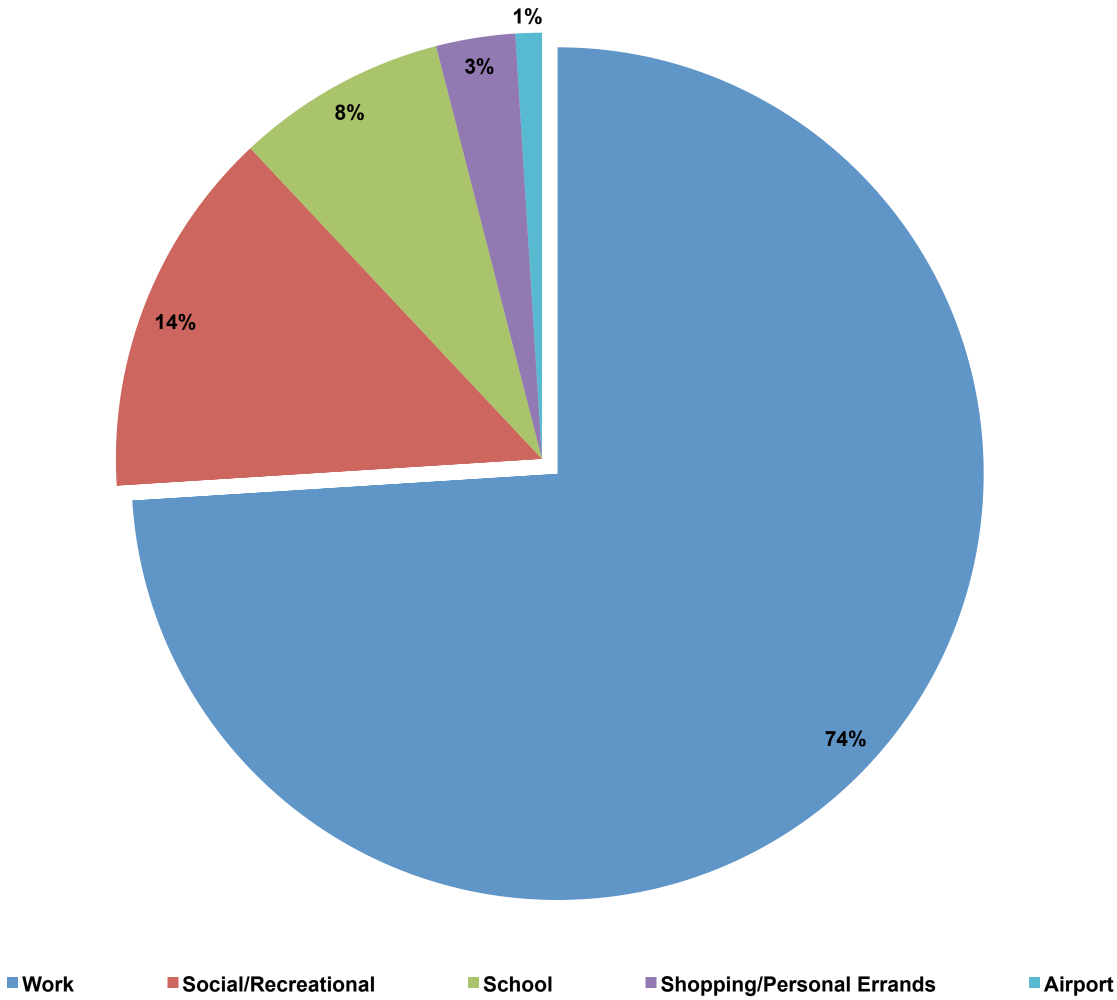
Figure 3.14-5 displays the modes of access for AM and PM peak passengers by stations. The top mode of access for Caltrain passengers traveling to stations in the AM peak period is driving alone (26 percent). In contrast, the top access mode for PM passengers is walking (48 percent). Walking is the second most popular mode for AM passengers. Driving is generally more popular in the morning, than the evening, with driving alone, kiss-and-ride, and carpooling. Kiss-and-ride is generally describes passengers who are dropped off at a station by car. Passengers who drove alone or



\+ Traditional Peak Baby Bullet Service Only
++ Reverse Peak Baby Bullet Service Only
* AM peak period boardings occur between 6:30 AM to 10:30 AM
** PM peak period boardings occur between 4:00 PM to 8:00 PM
*** Off-peak boardings occur between 5:00 AM to 6:29 AM, 10:30 AM to 3:59 PM, and 8:01 PM to 1:32 AM

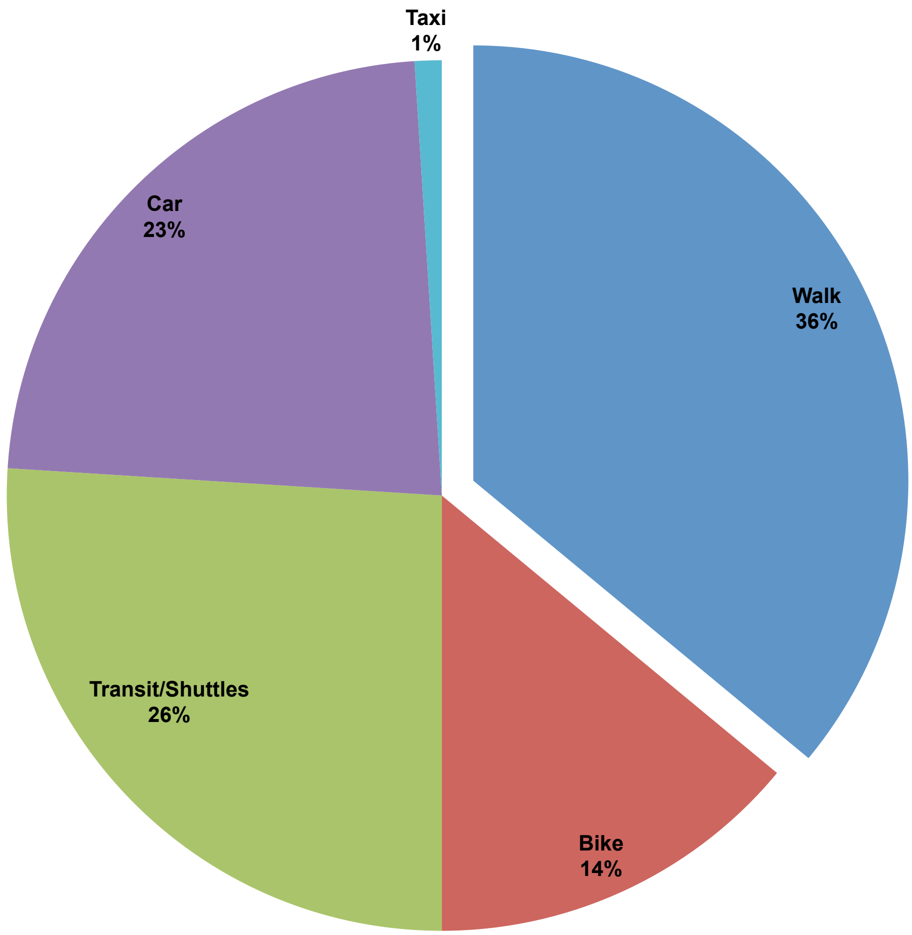
Source: Fehr and Peers 2014.

Figure 3.14-2
Average Weekday Ridership by Station (2013)
Peninsula Corridor Electrification Project



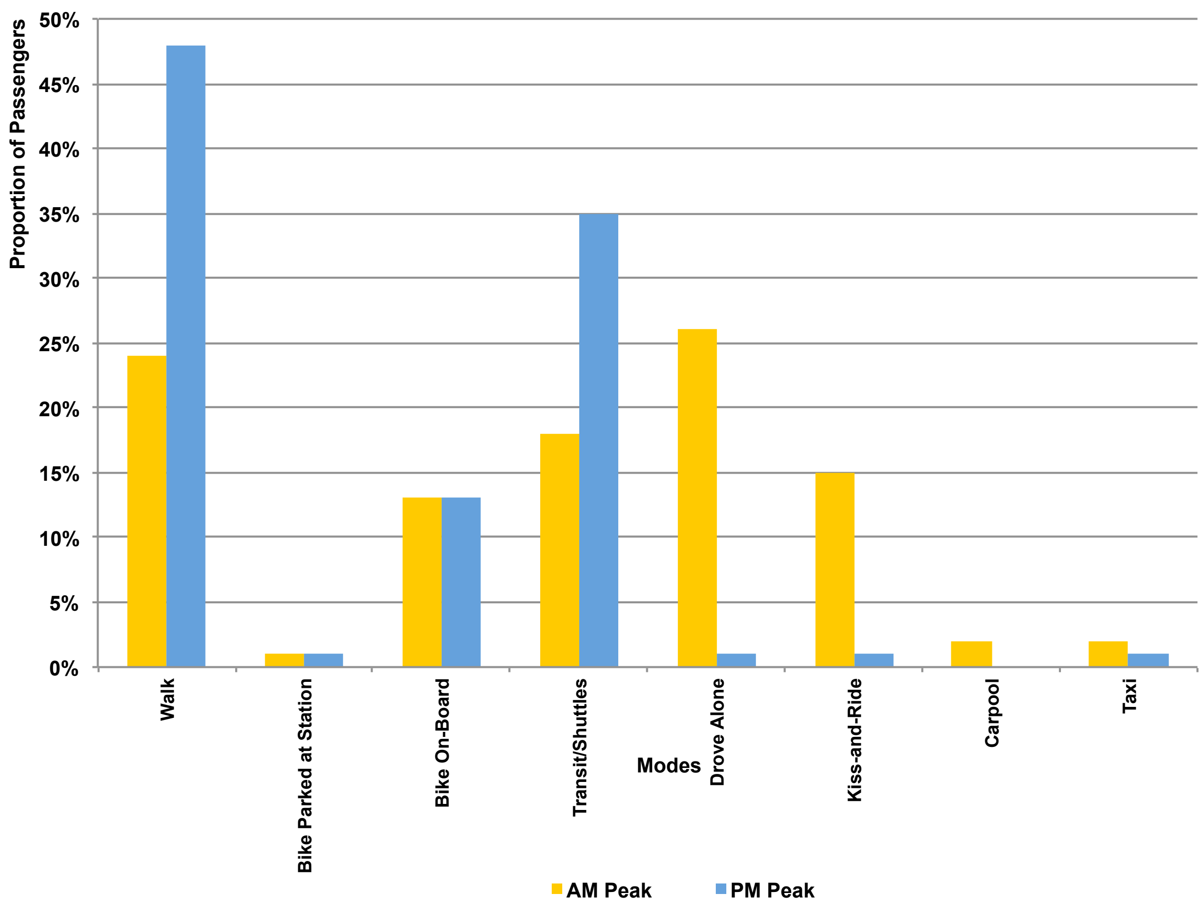
Source: Fehr & Peers 2014

Figure 3.14-3
Trip Purposes of Caltrain Passengers (2010)
Peninsula Corridor Electrification Project



Source: Fehr & Peers 2014

Figure 3.14-4
Daily Mode of Access to Caltrain Stations (2013)
Peninsula Corridor Electrification Project



Source: Fehr & Peers 2014

Figure 3.14-5
AM and PM Peak Mode of Access by Stations (2013)
Peninsula Corridor Electrification Project

carpooled, also referred to as park-and-ride, generally park their car at or near the station. Bicycle usage, both parked and on-board, is even for both time periods.

The travel mode of egress a passenger uses on the destination side of their trip can differ from the mode of access they used at the start of their trip. Mode of egress is the mode a passenger makes use of at their destination station to reach their final destination point, such as a place of work or a shopping center. On average, walking is the most common mode of egress across all stations. Overall, park-and-ride and kiss-and-ride are not as common as other modes of egress.

Regional Transit System

The greater San Francisco Bay Area is served by an extensive public transit network of rail, buses, and ferries. In general, Caltrain is well connected with the regional transit network, offering public transit connecting service to other service providers or public and private shuttles at all stations within the study area. Table 3.14-4 summarizes the service area of all transit systems that currently connect to a Caltrain station within the project area. Figures in Appendix D show all bus and rail systems connected to Caltrain in the project area.

Caltrain system is connected to the following bus transit systems:

- **San Mateo County Transit District (SamTrans)**: SamTrans operates 73 bus routes and paratransit service throughout San Mateo County and parts of San Francisco and Palo Alto. SamTrans buses, including the KX Express and Route ECR along El Camino Real between Palo Alto and Daly City connect to a number of Caltrain stations throughout the project area.
- **MUNI:** MUNI is operated by the San Francisco Municipal Transportation Agency (SFMTA), which oversees all light rail and bus service, bicycle and pedestrian program, taxis, parking, and traffic control operations in the City and County of San Francisco. The MUNI bus system consists of approximately 65 local and express routes. A number of MUNI light rail and bus routes connects to the 4th and King, 22nd Street, and Bayshore Caltrain Stations.
- **Santa Clara Valley Transportation Authority (VTA):** VTA provides light rail, bus, and paratransit service to the municipalities in Santa Clara County. In addition, VTA is the congestion management agency for Santa Clara County, responsible for countywide transportation planning and funding and for managing the county's congestion reduction and air quality improvement. A number of VTA bus routes, including express routes, connect to Caltrain stations within Santa Clara County.
- **Alameda-Contra Costa (AC) Transit:** AC Transit provides bus and paratransit services to 13 cities and adjacent unincorporated areas in Alameda and Contra Costa Counties. AC Transit operates 116 bus lines, including rapid services and transbay lines that traverse the San Francisco-Oakland Bay Bridge. AC Transit connects to Caltrain via the "M" bus line at the Hillsdale Station, the "U" line at the Palo Alto Station, and the Dumbarton Express at the Palo Alto and California Avenue Stations.
- **Santa Cruz Metropolitan Transit District (Santa Cruz METRO):** The Santa Cruz METRO operates about 30 bus routes year-round to Santa Cruz County. Caltrain passengers can travel to Santa Cruz via the Highway 17 Express route from the San Jose Diridon Station. In addition to stopping in downtown Santa Cruz, the route also stops in Scotts Valley and Soquel.
- **Monterey-Salinas Transit (MST):** MST operates 59 bus routes in Monterey and southern Santa Cruz Counties. MST bus routes 55 and 79 connect to Caltrain at the San Jose Diridon Station.

- **Public and Private Shuttle Connections:** Shuttles connecting to Caltrain stations include transportation services that are publically or privately provided by transit agencies, community organizations, employers, and academic and cultural organizations. Most public shuttles operate fixed routes between Caltrain stations and employment sites. Private employer-provided regional shuttles provide direct service to employment sites from either residential neighborhood stops or from major transit hubs, including Caltrain stations. Currently, the Palo Alto Station experiences the highest frequency of public and private shuttles with about 75 shuttles each morning, followed by the Millbrae Station (51 shuttles), and the Mountain View Station (37 shuttles).

Caltrain is also connected to the following rail transit systems:

- **San Francisco Bay Area Rapid Transit (BART):** BART provides rail transit service to the cities in the northern portion of the San Francisco Peninsula, Oakland, Berkeley, Fremont, Walnut Creek, Dublin, Pleasanton, and other cities in the East Bay. Of the five BART lines, Caltrain connects directly to two at the Millbrae Station: the Richmond line and the Pittsburg/Bay Point line. The Pittsburg/Bay Point line includes a connection to San Francisco International Airport. BART passengers can also connect to the San Francisco 4th and King Station via MUNI light rail and bus service.
- **MUNI Light Rail:** MUNI light rail system is a mixture of above- and below-ground service consisting of nine routes serving residential areas and the financial district in San Francisco. A number of MUNI light rail and bus routes connects to the San Francisco 4th and King, 22nd Street, and Bayshore Stations.
- **Altamont Commuter Express (ACE) Commuter Rail:** ACE provides passenger rail service across the Altamont corridor, spanning San Jose to Stockton. ACE trains connect to Caltrain at the Santa Clara and San Jose Diridon Stations.
- **VTA Light Rail:** Of VTA's three light rail lines, two connect to Caltrain stations: The Mountain View–Winchester line at the Mountain View and San Jose Diridon Stations, and Ohlone/Chynoweth–Almaden line at the Tamien Station.
- **Amtrak:** In the San Francisco Bay Area, one Amtrak rail route (Coast Starlight) connects to Caltrain at the San Jose Diridon Station. The Coast Starlight connects the San Francisco Bay Area to Seattle and Los Angeles. In addition, Amtrak Thruway bus service at the San Francisco 4th and King Station connects Caltrain passengers to the closest Amtrak stations in Oakland and Emeryville.
- **Capital Corridor:** The Capital Corridor provides intercity passenger rail service to Sacramento, Oakland, and San Jose. Amtrak Thruway bus provides connections to nearby cities. Commuters traveling on Capitol Corridor trains from Sacramento and the East Bay can connect to Caltrain at the Santa Clara and San Jose Diridon Stations. The Capital Corridor is managed by the Capitol Corridor Joint Powers Authority (CCJPA), a partnership of six local transit agencies in the eight-county service area. BART provides daily management support to the CCJPA, and trains are operated by Amtrak.

1 **Table 3.14-4. Weekday Transit Connections by Stations (2013)**

Station	Station Address	Transit Connections (Provider, Route)
4th & King	700 4th Street, San Francisco, CA 94107	MUNI Bus: 10, 30, 45, 47, 80X, 81X, 83X, 91 owl, T owl, N owl MUNI Light Rail: N-Judah, T-Third Public Shuttles: Amtrak Shuttle
22nd Street	1149 22nd Street, San Francisco, CA 94107	MUNI Bus: 10, 22, 48 MUNI Light Rail: T-Third
Bayshore	400 Tunnel Avenue, San Francisco, CA 94134	MUNI Bus: 8X, 8AX, 8BX, 9, 56 MUNI Light Rail: T-Third SamTrans: 292 Public Shuttles: Bayshore/Brisbane Senior shuttle, Bayshore/Brisbane Commuter Shuttle
South San Francisco	590 Dubuque Avenue, South San Francisco, CA 94080	SamTrans: All services are separated by bridges, etc. from Caltrain station Public Shuttles: Oyster Point, Utah-Grand
San Bruno	297 Huntington Avenue, San Bruno, CA 94066	SamTrans: not close and El Camino Real (where buses run) is 0.25 mile away Public Shuttles: Bayhill San Bruno Shuttle
Millbrae Transit Center	100 California Drive, Millbrae 94030	SamTrans: 397 BART: Richmond Line, Pittsburg/Bay Point (includes connection San Francisco International Airport) Public Shuttles: Broadway/Millbrae, Burlingame Bayside Area, North Burlingame, North Foster City, Sierra Point
Burlingame	290 California Drive, Burlingame, CA 94010	SamTrans: 46, 292 Public Shuttle: Burlingame Trolley
San Mateo	385 First Avenue, San Mateo, CA 94401	SamTrans: 250, 292, 295, 59
Hayward Park	401 Concar Drive, San Mateo, CA 94402	SamTrans: 53, 292, 397 (but not close to station) Public Shuttles: Norfolk
Hillsdale	3333 El Camino Real, San Mateo, CA 94403	SamTrans: ECR, KX, 57, 250, 251, 262, 292, 294, 295, 397, AC Transit: M Public Shuttles: Belmont–Hillsdale, Campus Drive, Lincoln Centre, Mariners Island/PCA, Oracle, Foster City Connections
Belmont	995 El Camino Real, Belmont, CA 94402	SamTrans: ECR, KX, 67, 260, 261, 262, 397, 398 Public Shuttles: Belmont–Hillsdale
San Carlos	599 El Camino Real, San Carlos, CA 94070	SamTrans: ECR, KX, FLXS, 260, 261, 295, 397, 398 Public Shuttles: Electronic Arts, Oracle, Redwood Shores (Bridge Park), Redwood Shores (Clipper)
Redwood City	1 James Avenue, Redwood City, CA 94063	SamTrans: ECR, KX, 270, 274, 275, 276, 278, 296, 297, 397, 398 Public Shuttles: Pacific Shores
Menlo Park	1120 Merrill Street, Menlo Park, CA 94025	SamTrans: ECR, 85, 286, 296 Public Shuttles: Marsh Road, Willow Road
Palo Alto	95 University Avenue, Palo Alto, CA 94301	SamTrans: ECR, 280, 281, 297, 397 VTA Bus: 22, 35, 522 AC Transit: U, Dumbarton Express Public Shuttles: Deer Creek, Stanford Marguerite, Crosstown/Embarcadero, East Palo Alto Community

Station	Station Address	Transit Connections (Provider, Route)
California Avenue	780 Stockton Avenue, San Jose, CA 95126	VTA Bus: 22, 89, 522 AC Transit: Dumbarton Express Public Shuttles: Deer Creek, Stanford Marguerite
San Antonio	190 Showers Drive, Mountain View, CA 94040	VTA Bus: 32, 34, 35, 40 Public Shuttles: Deer Creek, Stanford Marguerite
Mountain View	600 W. Evelyn Avenue, Mountain View, CA 94041	VTA Bus: 34, 35, 51, 52, 902 VTA Light Rail: Mountain View–Winchester Public Shuttles: Duane Avenue, Mary/Moffett, North Bayshore, Shoreline
Sunnyvale	121 W. Evelyn Avenue, Sunnyvale, CA 94086	VTA Bus: 32, 53, 54, 55, 304
Lawrence	137 San Zeno Way, Sunnyvale, CA 94086	Public Shuttles: Bowers–Walsh, Duane Avenue, Mission
Santa Clara	1001 Railroad Avenue, Santa Clara, CA 95050	VTA Bus: 10, Airport Flyer, 22, 32, 60, 81, 522 ACE
College Park	780 Stockton Avenue, San Jose, CA 95126	VTA Bus: 22, 61, 62, 522
San Jose Diridon	65 Cahill Street, San Jose, CA 95110	ACE Amtrak: Coast Starlight Capital Corridor VTA Bus: 22, 63, 64, 65, 68, 81, 180, 181, 522 VTA Light Rail: Mountain View–Winchester Santa Cruz METRO: Highway 17 Express MST: 55 Public Shuttles: DASH (Downtown Area Shuttle)
Tamien	1355 Lick Avenue, San Jose, CA 95110	VTA Bus: 25, 82 VTA Light Rail: Ohlone/Chynoweth–Almaden, Alum Rock–Santa Theresa

Source: Appendix D, *Transportation Analysis*

Existing Traffic Conditions

Roadway System

The Caltrain corridor within the study area runs parallel to major north-south oriented freeways, Interstate (I)-280 and U.S. Highway 101 (U.S. 101). East-west oriented freeways in the study area include I-380 and I-880. Figure 3.14-1 displays the major freeways within the study area. Table 3.14-5 lists major freeways and arterials in study area.

Table 3.14-5. Major Freeways, Expressways, and Arterial Streets in Study Area

County	Orientation	Name	Classification	Extent within Study Area
San Francisco	North-South	U.S. Highway 101	Freeway	San Francisco County to Santa Clara County
San Francisco	North-South	Interstate 280	Freeway	San Francisco County to Santa Clara County
San Francisco	East-West	Cesar Chavez Street	Arterial	San Francisco County
San Mateo	East-West	Interstate 380	Freeway	San Mateo County
San Mateo	North-South	State Route 82/El Camino Real	Arterial	San Mateo County to Santa Clara County
San Mateo	East-West	State Route 92	Freeway	San Mateo County
San Mateo	East-West	State Route 84	Arterial/Expressway	San Mateo County
Santa Clara	East-West	State Route 85	Freeway	Santa Clara County
Santa Clara	East-West	Lawrence Expressway	Arterial/Expressway	Santa Clara County
Santa Clara	North-South	State Route 87	Freeway	Santa Clara County
Santa Clara	Northeast-Southwest	Interstate 880	Freeway	Santa Clara County
Santa Clara	North-South	Alma/Central Expressway	Arterial/Expressway	Santa Clara County

Source: Appendix D, *Transportation Analysis*

I-280 begins in San Francisco and terminates in the south at the U.S. 101 and I-680 interchange in north San Jose. Within the study area, U.S. 101 connects to I-80 in San Francisco and continues south through Santa Clara County. I-380 runs east-west in north San Mateo County, connecting I-280 and U.S. 101 and crossing perpendicular to the Caltrain ROW. In San Jose north of the U.S. 101 and I-280 interchange, I-880 crosses perpendicular to the Caltrain ROW in a northeast to southwest orientation.

The Caltrain ROW runs parallel to or intersects with some major arterials in the study area. In San Francisco, Caltrain runs across east-west arterial Cesar Chavez Street above grade. The corridor runs parallel to State Route (SR) 82 (El Camino Real). El Camino Real is a major north-south oriented roadway that extends from San Mateo County south to Santa Clara County within the study area. In San Mateo County, SR 92 connects El Camino Real with U.S. 101 and continues on to become the San Mateo Bridge, crossing the San Francisco Bay. Also in San Mateo County, Caltrain crosses SR 84 at Woodside Road in Redwood City. SR 84 eventually joins U.S. 101 and continues east across the San Francisco Bay as the Dumbarton Bridge. In Santa Clara County, Caltrain travels parallel to Alma Road/Central Expressway, which terminates at Mineta San Jose International Airport located west of Guadalupe Parkway.

Roadway System Performance

Congestion during the weekday morning and afternoon peak period is common on U.S. 101 in both directions through San Francisco, San Mateo and Santa Clara Counties. During the morning peak period, southbound congestion on U.S. 101 is common in San Francisco, from San Francisco International Airport to San Mateo, and in Palo Alto. Northbound U.S. 101 during the morning peak period is regularly congested from San Jose to north of Mountain View in Santa Clara County, as well as near the San Francisco International Airport and in San Francisco. During the afternoon peak period, southbound U.S. 101 has notable congestion from South San Francisco to Burlingame, San Carlos to Palo Alto, and Mountain View to San Jose. Northbound U.S. 101 during the afternoon is mostly congested in Mountain View, San Carlos, and San Francisco.

I-280 also runs in a north-south orientation on the San Francisco Peninsula and is prone to backups during the peak period. During the morning peak period, southbound congestion is common from Daly City to San Bruno. Northbound morning congestion is common from San Jose to Cupertino and entering San Francisco. During the afternoon peak period, southbound congestion is common in southern San Francisco, Los Altos, and from Cupertino to San Jose. Northbound evening congestion typically occurs from Portola Valley to Woodside in San Mateo County.

At-Grade Crossings with Gates

Currently, there are 42 at-grade crossings of the Caltrain ROW within the study area. An at-grade crossing is an intersection of Caltrain tracks, roadways, walkways, or a combination of these at the same level. All other crossings in the study area are grade-separated, meaning that roadways, walkways, and railroads cross at different, non-conflicting elevations. Of the 42 at-grade crossings, 29 at-grade crossing locations have gates on all sides of the tracks that intersect with other travel modes. Figure 3.14-6 displays all 42 at-grade crossings. The study evaluates the 29 at-grade crossings with gates because Proposed Project operation could potentially affect the gate-down times at the crossing locations.

Gate-down time is a key measurement for both the performance of the existing and future Caltrain operations in this study. Gate-down time is a summation of multiple actions that occur in sequence in order to ensure all travel modes can cross safely at an at-grade crossing. These actions are listed and explained in chronological order below.

1. Gate flashers, located on gate arms to increase visibility, are triggered by a gate crossing event[2].
2. Gate arms descend, moving from vertical to horizontal position, indicating that all vehicular, bicycle, and pedestrian traffic must stop at the crossing to allow the train(s) to pass safely.
3. Train passes and fully clears the crossing.
4. Gate arms rise, moving from horizontal to vertical position.

After this sequence is complete, pedestrian, bicycle, and vehicular traffic can resume regular operations through the crossing. The gate-down times are key inputs into the intersection level of service analysis presented in the section below. The average gate-down times at the 29 at-grade crossings in the study area were calculated empirically from gate-down event records collected in the field (2013). These records included the train number, timestamp of when the gate-down event sequence started, and a timestamp of when the gate-down event ended (when the gate arms were fully raised and the flashing red lights were off). Data on whether two trains occupied the crossing during the same gate down event (a “2-for-1” event), or if the gate-down sequence restarted was also used for this analysis. The gate-down time results are key inputs into the intersection level of service analysis presented in next section.

[2] A gate-down event occurs when a train crosses or stops at a nearby upstream station. It can also occur when two trains pass simultaneously in opposite directions at a crossing.

Source: Fehr and Peers 2014.

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Figure 3.14-6
Study Intersections and At-Grade Crossings

Intersection Levels of Service

To evaluate how the Proposed Project would affect corridor traffic patterns, a total of 82 select intersections in the study area were analyzed. These intersections were selected for evaluation using a tiered approach based on the criteria described below.

- Intersection Operations/Level of Service (LOS): Currently operating at LOS D, E, or F during peak hours.
- Transit-Oriented Development (TOD): Adjacent to station where significant TOD is planned.
- Gate-Down Time: Adjacent to at-grade crossing where the Proposed Project would result in substantial change in gate-down time.
- Intersection Geometry: Unusual geometry and/or signal operations.

Intersections in the study area that meet one or more of the criteria outlined above were selected for study using traffic operations modeling tools. As an additional step to provide additional discussion of potential traffic changes due to the Proposed Project, other intersections in the study area that do not meet the above criteria were reviewed qualitatively.

Intersection operation conditions described in the study are for the weekday AM peak hour typically between 7:00 a.m. and 9:00 a.m. and the weekday PM peak hour typically between 4:00 p.m. to 6:00 p.m. For more detailed information on the traffic model development and analysis process, including how the 82 intersections were selected, see the transportation analysis report in Appendix D, *Transportation Analysis*. The 82 intersections are shown on Figure 3.14-6 along with Caltrain stations and at-grade crossing locations.

The intersection analysis results include a descriptive term known as level of service (LOS). Level of service is a measure of traffic operating conditions, which varies from LOS A, which represents free flow conditions, with little or no delay, to LOS F, which represents congested conditions, with extremely long delays. Methods described in the Highway Capacity Manual (Transportation Research Board 2010) were used to calculate the levels of service for signalized and stop-controlled intersections. Levels of service for signalized intersections are determined by the average delay experienced by vehicles at the intersection. Table 3.14-6 summarizes the relationship between delay and levels of service for signalized intersections.

For stop-controlled intersections, levels of service depend on the average delay experienced by vehicles on the stop-controlled approaches. Thus, for side-street stop-controlled intersections, levels of service are based on the average delay experienced by vehicles entering the intersection from the minor (stop-controlled) streets and vehicles making left-turns from the major street. For all-way stop-controlled intersections, levels of service are determined by the average delay for all movements through the intersection. The levels of service designations for stop-controlled intersections have different threshold values than those for signalized intersections, primarily because drivers expect different levels of performance from distinct types of transportation facilities. In general, stop-controlled intersections are expected to carry lower volumes of traffic than signalized intersections. Thus, for the same level of service, a lower level of delay is acceptable at stop-controlled intersections than at signalized intersections. Table 3.14-6 summarizes the relationship between delay and levels of service for stop-controlled intersections.

Table 3.14-6. Level of Service Designations for Signalized and Stop-Controlled Intersections

	Average Delay per Vehicle (seconds/vehicle)	
LOS Designation	Signalized Intersections	Stop-Controlled Intersections
A	≤ 10.0	≤ 10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 80.0	35.1 to 50.0
F	> 80.0	> 50.0

Source: Appendix D, *Transportation Analysis*

Table 3.14-7 identifies the geographic location of each study intersection and the associated AM and PM peak period levels of service at the study intersections. The study intersections include the at-grade crossing intersections with gates that are identified in the previous section. The traffic operation analysis at these at-grade crossing intersections take into account the vehicle delay during the gate-down events with the average gate-down times collected in the field (2013), as described in the previous section.

Table 3.14-7. Existing Intersection Delay and Levels of Service (2013)

Int. ID	Intersection	Jurisdiction	Peak Hour [a]	Intersection Control	Delay [b]	LOS [c]
ZONE 1						
1	4th Street & King Street	SF	AM PM	Signal	56.6 84.5	E F
2	4th Street & Townsend Street	SF	AM PM	Signal	28.9 28.8	C C
3	Mission Bay Drive & 7th Street	SF	AM PM	Signal	8.3 12.7	A B
4	Mission Bay Drive & Berry Street	SF	AM PM	Signal	2.3 8.4	A A
5	7th Street & 16th Street	SF	AM PM	Signal	67.3 49.5	E D
6	16th Street & Owens Street	SF	AM PM	Signal	10.6 10.7	B B
7	22nd Street & Pennsylvania Street	SF	AM PM	All-way Stop	7.6 7.3	A A
8	22nd Street & Indiana Street	SF	AM PM	All-way Stop	5.3 5.4	A A
9	Tunnel Avenue & Blanken Avenue	SF	AM PM	All-way Stop	7.9 7.2	A A
10	Linden Avenue & Dollar Avenue	SSF	AM PM	Signal	15.1 48.9	B D
11	East Grand Avenue & Dubuque Way	SSF	AM PM	Signal	7.5 7.5	A A

Int. ID	Intersection	Jurisdiction	Peak Hour [a]	Intersection Control	Delay [b]	LOS [c]
12	S Linden Avenue & San Mateo Avenue	SSF	AM PM	Signal	6.7 7.4	A A
13	Scott Street & Herman Street	SB	AM PM	Side-Street Stop	9.8 14.0	A B
14	Scott Street & Montgomery Avenue	SB	AM PM	Side-Street Stop	4.8 5.7	A A
15	San Mateo Avenue & San Bruno Avenue	SB	AM PM	Signal	10.9 >120	B F
ZONE 2						
16	El Camino Real & Millbrae Avenue	MB	AM PM	Signal	43.4 42.7	D D
17	Millbrae Avenue & Rollins Road	MB	AM PM	Signal	33.0 38.8	C D
18	California Drive & Broadway	BG	AM PM	Signal	60.0 52.5	E D
19	Carolan Avenue & Broadway	BG	AM PM	Signal	16.6 42.1	B D
20	California Drive & Oak Grove Avenue	BG	AM PM	Signal	34.3 24.2	C C
21	Carolan Avenue & Oak Grove Avenue	BG	AM PM	Side-Street Stop	>120 92.1	F F
22	California Drive & North Lane	BG	AM PM	Side-Street Stop	14.7 11.4	B B
23	Carolan Avenue & North Lane	BG	AM PM	Side-Street Stop	23.0 17.8	C C
24	Anita Road & Peninsula Avenue	BG	AM PM	Side-Street Stop	15.6 >120	C F
25	Woodside Way & Villa Terrace	SM	AM PM	Side-Street Stop	5.1 4.7	A A
26	North San Mateo Drive & Villa Terrace	SM	AM PM	Side-Street Stop	11.7 12.8	B B
27	Railroad Avenue & 1st Avenue	SM	AM PM	Side-Street Stop	10.4 19.0	B C
28	South B Street & 1st Avenue	SM	AM PM	Signal	22.6 30.5	C C
29	9th Avenue & S Railroad Avenue	SM	AM PM	Side-Street Stop	34.7 21.4	D C
30	South B Street & 9th Avenue	SM	AM PM	Signal	15.0 14.4	B B
31	Transit Center Way & 1st Avenue	SM	AM PM	Uncontrolled	5..1 26.7	A D
32	Concar Drive & SR 92 Westbound Ramps	SM	AM PM	Signal	6.0 6.1	A A
33	S Delaware Street & E 25th Avenue	SM	AM PM	Signal	19.1 20.6	B C

Int. ID	Intersection	Jurisdiction	Peak Hour [a]	Intersection Control	Delay [b]	LOS [c]
34	E 25th Avenue & El Camino Real	SM	AM PM	Signal	32.0 80.6	C F
35	31st Avenue & El Camino Real	SM	AM PM	Signal	19.2 68.7	B E
36	E Hillsdale Boulevard & El Camino Real	SM	AM PM	Signal	43.7 67.1	D E
37	E Hillsdale Blvd. & Curtiss Street	SM	AM PM	Signal	12.0 14.7	B B
38	Peninsula Avenue & Arundel Road & Woodside Way	SM	AM PM	Side-Street Stop	14.3 >120	B F
39	El Camino Real & Ralston Avenue	BL	AM PM	Signal	>120 85.4	F F
40	El Camino Real & San Carlos Avenue	SC	AM PM	Signal	25.6 47.1	C D
41	Maple Street & Main Street	RC	AM PM	Side-Street Stop	10.9 14.3	B B
42	Main Street & Beech Street	RC	AM PM	Side-Street Stop	5.2 8.6	A A
43	Main Street & Middlefield Road	RC	AM PM	Signal	12.5 20.1	B C
44	Broadway Street & California Street	RC	AM PM	Signal	>120 >120	F F
45	El Camino Real & Whipple Avenue	RC	AM PM	Signal	74.7 48.3	E D
46	Arguello Street & Brewster Avenue	RC	AM PM	Signal	14.7 39.4	B D
47	El Camino Real & Broadway Street	RC	AM PM	Signal	27.5 45.5	C D
48	Arguello Street & Marshall Street	RC	AM PM	Signal	15.1 48.7	B D
49	El Camino Real & James Avenue	RC	AM PM	Signal	26.2 33.7	C C
ZONE 3						
50	El Camino Real & Fair Oaks Lane	AT	AM PM	Signal	33.6 27.6	C C
51	El Camino Real & Watkins Avenue	AT	AM PM	Side-street stop	34.5 48.1	D E
52	Fair Oaks Lane & Middlefield Road	AT	AM PM	Side-Street Stop	>120 41.3	F E
53	Watkins Avenue & Middlefield Road	AT	AM PM	Side-Street Stop	31.6 28.3	D D
54	Glenwood Avenue & Middlefield Road	AT	AM PM	Side-Street Stop	49.2 >120	E F
55	El Camino Real & Glenwood Avenue	MP	AM PM	Signal	34.1 29.6	C C

Int. ID	Intersection	Jurisdiction	Peak Hour [a]	Intersection Control	Delay [b]	LOS [c]
56	El Camino Real & Oak Grove Avenue	MP	AM PM	Signal	17.9 30.9	B C
57	El Camino Real & Santa Cruz Avenue	MP	AM PM	Signal	9.1 12.5	A B
58	Merrill St & Santa Cruz Avenue	MP	AM PM	All-way Stop	7.3 8.9	A A
59	Ravenswood Avenue & Alma Street	MP	AM PM	Side-Street Stop	24.4 17.1	C C
60	El Camino Real & Ravenswood Avenue	MP	AM PM	Signal	39.3 119.0	D F
61	Ravenswood Avenue & Laurel Street	MP	AM PM	Signal	31.0 26.3	C C
62	Alma Street & Palo Alto Avenue	PA	AM PM	Side-Street Stop	11.2 14.6	B B
63	Meadow Drive & Alma Street	PA	AM PM	Signal	72.6 62.0	E E
64	El Camino Real & Alma Street & Sand Hill Road	PA	AM PM	Signal	60.7 49.1	E D
65	High Street & University Avenue	PA	AM PM	Signal	12.6 14.1	B B
66	Alma Street & Churchill Avenue	PA	AM PM	Signal	66.0 64.0	E E
67	W Meadow Drive & Park Boulevard	PA	AM PM	Side-Street Stop	>120 29.3	F D
68	Alma Street & Charleston Road	PA	AM PM	Signal	63.5 80.5	E F
69	Showers Drive & Pacchetti Way	MV	AM PM	Signal	4.5 3.7	A A
70	Central Expressway & N Rengstorff Avenue	MV	AM PM	Signal	108.0 85.0	F F
71	Central Expressway & Moffett Boulevard & Castro Street	MV	AM PM	Signal	100.2 83.0	F F
72	W Evelyn Avenue & Hope Street	MV	AM PM	Signal	3.0 4.0	A A
73	Rengstorff Avenue & California Street	MV	AM PM	Signal	50.3 55.6	D E
74	Castro Street & Villa Street	MV	AM PM	Signal	11.8 21.2	B C
75	W Evelyn Avenue & S Mary Avenue	SV	AM PM	Signal	62.4 61.5	E E
76	W Evelyn Avenue & Frances Street	SV	AM PM	Signal	16.1 23.4	B C

Int. ID	Intersection	Jurisdiction	Peak Hour [a]	Intersection Control	Delay [b]	LOS [c]
ZONE 4						
77	Kifer Road & Lawrence Expressway	SCL	AM PM	Signal	96.6 >120	F F
78	Reed Avenue & Lawrence Expressway	SCL	AM PM	Signal	97.3 93.7	F F
79	El Camino Real & Railroad Avenue	SCL	AM PM	Signal	26.6 21.3	C C
80	W Santa Clara Street & Cahill Street	SJ	AM PM	Signal	10.4 12.7	B B
81	S Montgomery Street & W San Fernando Street	SJ	AM PM	Signal	7.9 9.6	A A
82	Lick Avenue & W Alma Avenue	SJ	AM PM	Signal	15.8 20.8	B C

Source: Appendix D, *Transportation Analysis*
Notes:
[a] AM = morning peak hour, PM = afternoon peak hour
[b] Delay measured in seconds.
[c] LOS designation pursuant to 2010 Highway Capacity Manual

Jurisdictions:

SF	San Francisco	SM	San Mateo	MV	Mountain View
SSF	South San Francisco	BL	Belmont	SV	Sunnyvale
SB	San Bruno	SC	San Carlos	SCL	Santa Clara
MB	Millbrae	RC	Redwood City	SCC	Santa Clara County
BG	Burlingame	AT	Atherton	SJ	San Jose
MP	Menlo Park	PA	Palo Alto		

Existing Bicycle and Pedestrian Conditions

Bikeway Facilities Connected to Caltrain Stations

In general, bicycle facilities within the study area are characterized by a network of mostly continuous routes within about 1 mile of stations. Bicycle facilities are classified based on the standard typology described below.

- Class I Bikeway (Bikeway Path): A completely separate ROW designated for the exclusive use of bicycles and pedestrians, with vehicle and pedestrian cross-flows minimized.
- Class II Bikeway (Bikeway Lane): A restricted ROW designated for the use of bicycles, with a striped lane on a street or highway. Bicycle lanes are generally 5 feet wide. Vehicle parking and vehicle and pedestrian cross-flows are permitted.
- Class III Bikeway (Bikeway Route): A ROW designated by signs or pavement markings for shared use with pedestrians or motor vehicles.

Most, but not all, Caltrain stations are connected to the surrounding roadway network via some type of bicycle facility. Existing bicycle facilities connected to Caltrain stations in the study area are shown in a figure in Appendix D. Major Class I bikeways in the study area include the Guadalupe River Trail, Bay Trail, Los Gatos Creek Trail, and the Coyote Creek Trail. The Guadalupe Trail, Los

Gatos Creek Trail, and Coyote Creek Trail are located in Santa Clara County. The San Francisco Bay Trail runs through nine counties, including all three counties within the study area.

The density of bicycle facilities around stations varies. The average Caltrain station has about 13 miles of bicycle facilities within 1 mile. The Sunnyvale Station is surrounded by the most bike facility miles, with 24.3 miles within 1 mile of the station. The Mountain View Station is similar, with 24.1 miles of bike facilities within 1 mile of the station. Most bike facility miles near the Sunnyvale Station are Class III (15.8); around the Mountain View Station, Class II lanes are most common (16.7 miles). The San Carlos, South San Francisco, Palo Alto, and San Francisco 4th and King Stations are also near at least 17 miles of bikeway facility miles. Santa Clara, San Bruno, and College Park Stations are near fewer than 5 miles of bikeway facility miles. Overall, Class III bikeway routes are the most common type of bike facility near stations.

Bicycles Boardings and Parking at Caltrain Stations

Bicycles are allowed on Caltrain during all operating hours. Because bicycle boardings on Caltrain are on the rise, specific cars have been retrofitted to increase bicycle carrying capacity and store bicycles safely during travel.

Bike mode share of ridership has been increasing but the raw number of increased boardings is greater than the increase in the numbers of daily bike boarding. Average daily bike boardings increased by 16 percent from 2011 to 2012, outpacing the total ridership growth rate. From 2012 to 2013, bicycle boarding increased by another 16 percent, compared with a total ridership increase of 11 percent (Caltrain 2013b). Table 3.14-8 displays the top ten stations for bicycles brought on-board by passengers. The 4th and King Station in San Francisco is a major bike boarding station, with almost double the number of bikes that board at Palo Alto.

Table 3.14-8. Top Ten Stations for Bicycle Ridership (2013)

Station	Average Weekday Bicycle Ridership	Total Average Weekday Ridership	Proportion of Total Ridership at Station
San Francisco 4th and King	1,166	10,786	11%
Palo Alto	644	5,469	12%
Mountain View	464	3,876	12%
San Jose Diridon	305	3,489	9%
Redwood City	307	2,619	12%
Hillsdale	191	2,317	8%
Sunnyvale	215	2,274	9%
Menlo Park	169	1,526	11%
22nd Street	174	1,312	13%
California Avenue	199	1,294	15%

Source: Appendix D, *Transportation Analysis*

The boarding of passengers with bicycles is on a first-come, first-serve basis. If a bicycle car is full, the cyclist is asked to exit the train and wait for the next train, a situation commonly referred to as a "bicycle bump or denial." Bicycle denials can also be caused by additional circumstances, including swapped equipment and bicycle stacking that does not use the actual full capacity. In general, bicycle car capacity issues occur at the height of the morning and evening peak periods (SamTrans 2013).

In February 2013, Caltrain conducted annual ridership counts. This effort included a tally of passengers with bicycles who were denied boarding because of bicycle capacity limitations. Data were collected over the course of 1 week and were not averaged. A total of 59 cyclists on seven trains were denied boarding. The majority of boarding denials occurred on southbound trains. In general, fewer than five bicycles are denied boarding at a time, but on occasion bike denials can affect a larger number of bicycles. Bicycle denials tend to occur at the Redwood City, Millbrae, and 22nd Street Stations but have been observed and reported throughout the system. The new passenger information system at the station (visual electronic message signs at the platforms) is able to broadcast and redirect bicyclists away from trains that are full to those that still have capacity.

Cyclists who ride Caltrain can either store their bicycles at Caltrain stations or bring their bicycles on board, both options which are limited by capacity. The majority of Caltrain cyclists bring their bikes on-board the train rather than parking their bike at a Caltrain station. As shown in Figure 3.14-4, of the 14 percent of Caltrain passengers who access stations via bicycle, about 13 percent of passengers bring their bicycles on-board, while about 1 percent of passengers park their bicycles at their origin station. In 2013, a total of 4,900 bicycles boarded daily.

At the Caltrain station, cyclists can store their bicycles on racks, lockers, or shared access bicycle parking facilities. Table 3.14-9 provides an inventory of dedicated bike parking capacity, by station. The only Caltrain station without dedicated bicycle parking is the College Park Station. The majority of bike parking facilities, including racks, lockers and shared facilities is owned and administered directly by Caltrain. At some stations, however, facilities may be owned and operated by a local jurisdiction or other transit property. Table 3.14-9 reflects all publicly available bike parking facilities regardless of administration or ownership.

Because trains have limited on-board space, Caltrain encourages customers to park their bikes at Caltrain stations or make use of the newly-implemented regional bike share pilot program, Bay Area Bicycle Share. The pilot program, led by the Bay Area Air Quality Management District (BAAQMD), was launched in August 2013 and is intended to provide easy access to a network of bicycles. The program proposes 700 bikes at 70 kiosk stations along the Peninsula corridor in San Francisco, Redwood City, Palo Alto, Mountain View, and San Jose. Members are able to check out a bike close to home or work and return it to any of the kiosk stations. The San Francisco 4th & King, Redwood City, Palo Alto, San Antonio, Mountain View, and San Jose Diridon Stations have a bicycle share kiosk at or within one 0.5 mile of the station.

Table 3.14-9. Bicycle Parking Capacity at Caltrain Stations (2013)

Station	Bicycle Rack Spaces	Bicycle Locker Spaces	Other Bicycle Amenities
4th and King	6	180	Attended bicycle parking facility Bay Area Bike Share kiosk
22nd Street	27	0	None
Bayshore	18	8	None
South San Francisco	18	20	None
San Bruno	8	16	None
Millbrae	24	28	None
Burlingame	13	18	None
San Mateo	11	12	None
Hayward Park	18	4	None
Hillsdale	18	12	None
Belmont	18	24	None
San Carlos	36	48	None
Redwood City	18	50	Bay Area Bike Share kiosk
Menlo Park	8	50	Shared access bicycle storage shed
Palo Alto	178	94	Shared access bicycle storage shed Electronic lockers Bay Area Bike Share kiosk
California Avenue	33	42	None
San Antonio	18	38	Bay Area Bike Share kiosk
Mountain View	23	116	Shared access bicycle storage shed Bay Area Bike Share kiosk
Sunnyvale	18	71	None
Lawrence	18	24	None
Santa Clara	18	54	Additional bicycle lockers across the street at VTA Transit Center (adjacent)
College Park	0	0	None
San Jose Diridon	16	48	Bay Area Bike Share kiosk
Tamien	18	18	None

Source: Appendix D, *Transportation Analysis*

Pedestrian Environment in Station Areas

The existing pedestrian infrastructure surrounding Caltrain stations in the study area provides a good level of accessibility, considering the varied mix of land uses around stations. Overall, walking to Caltrain stations is the most popular mode of access for passengers system-wide. As shown in Figure 3.14-4, about 36 percent of Caltrain passengers access Caltrain stations by walking.

Pedestrian Amenities

Although all stations offer mostly consistent pedestrian amenities on the platform, the quality of the pedestrian environment around the station area varies. Pedestrian environment on station platforms and within 0.25 mile of each station were evaluated based on field observations for the following components: wheelchair accessibility, direction of access to station, sidewalk completeness, presence of crosswalks, density of street tress, proximity to freeway, maximum posted speed limit on adjacent streets, and traffic calming measures on surrounding streets. Table 3.14-10 summarizes existing pedestrian environment and amenities within 0.25 mile of each station.

In addition the amenities listed in Table 3.14-10, most stations have audio public address systems to announce emergencies and train delays. Many stations also have electronic message boards to communicate with passengers. Some stations also include space for vendors who sell goods and services to passengers, including food and beverages.

Accessibility for Disabled Passengers

The majority of Caltrain stations are accessible to persons with disabilities, who can board either via a lift or accessible ramp. The following stations do not have wheelchair lifts: 22nd Street, South San Francisco, Broadway, Atherton, and College Park. All stations include a blue boarding assistance area for passengers with disabilities who need boarding assistance from the conductor. Every train has at least one wheelchair accessible car that can accommodate up to three wheelchairs or mobility devices (e.g., two-wheeled Segways). All wheelchair accessible cars are equipped with an accessible restroom.

Pedestrians and Public Crossings

A mix of grade-separated and at-grade crossings exist at Caltrain stations within the study area. For example, at San Jose Diridon and Palo Alto Stations, passengers can access the opposing directional platform via an underground pedestrian walkway. This type of grade-separated crossing does not require a passenger to cross over active railroad tracks. However, at some stations, such as Mountain View and Sunnyvale, at-grade crossings exist for passengers to cross tracks at the same level. These designated at-grade crossings are marked by a sign and/or a gate.

Because trains can operate at speeds up to 79 mph, pedestrians traversing at-grade crossings are advised to take great care by looking both ways and listening for oncoming trains. Caltrain distributes information to educate passengers on public crossing and platform safety on the Caltrain website, at Caltrain headquarters, in station areas, and on-board trains.

Existing Automobile Parking Conditions

This section summarizes existing parking capacity and occupancy at Caltrain parking lots located in station areas. In addition, on-street parking and parking lot capacities within the station areas are discussed. In general, Baby Bullet stations that have Caltrain parking lots tend to experience the highest parking occupancy rates. As shown in Figure 3.14-4, about 23 percent of passengers access Caltrain by car: about 13 percent drove alone, 8 percent were dropped off, and 1 percent carpooled. Passengers who drove alone or carpooled, also referred to as park-and-ride passengers, generally park their car at or near the station during the duration of their trip. Some passengers may leave a second vehicle at their destination station to have access to a private automobile to get to their ultimate destination. In total, about 14 percent of Caltrain passengers are park-and-ride customers.

The majority of Caltrain stations offer 24-hour parking. There are no Caltrain-operated parking lots at the 4th and King and 22nd Street Stations in San Francisco. Table 3.14-11 displays parking capacity and the average daily occupancy at each station in 2012.

Table 3.14-10. Existing Pedestrian Environment and Amenities in Station Areas

Station	Wheelchair Accessibility	Directions of Pedestrian Access[a]	Sidewalk Completeness	Presence of Crosswalks[b]	Density of Street Trees[c]	Near Freeway	Maximum Posted Speed Limit	Traffic Calming[d]
4th and King	Lifts on both platforms	4	75%	3	1	No	35 mph on King Street; 25 mph on other streets	No
22nd Street	No lift available	4	75%	2	2	Yes	25 mph on 22nd Street at Pennsylvania Street	No
Bayshore	Lifts on both platforms	3	25%	2	1	No	35 mph on Tunnel	No
South San Francisco	No lift available	2	75%	1	1	Yes	35 mph on East Grand Avenue	Yes
San Bruno	Lifts on both platforms	4	50%	1	1	No	30 mph on Huntington Avenue	Yes
Millbrae	Lifts and mini-high ramps on both platforms	4	75%	1	2	No	35 on El Camino Real	No
Burlingame	Lifts on both platforms	4	100%	2	2	No	25 mph on Howard Avenue	No
San Mateo	Lifts and mini-high ramps on both platforms	4	100%	3	2	No	25 mph on B Street	Yes
Hayward Park	Lifts on both platforms	4	50%	2	2	Yes	30 mph on Delaware Street	No
Hillsdale	Lifts and mini-high ramps on both platforms	3	75%	1	1	No	35 mph on Hillsdale Boulevard/El Camino	No
Belmont	Lifts on both platforms	4	75%	3	2	No	35 mph on El Camino	No
San Carlos	Lifts and mini-high ramps on both platforms	4	75%	1	2	No	35 mph on El Camino	Yes
Redwood City	Lifts and mini-high ramps on both platforms	4	100%	2	2	No	35 mph on El Camino	Yes
Menlo Park	Lifts and mini-high ramps on both platforms	4	100%	3	3	No	35 mph on El Camino	Yes
Palo Alto	Lifts and mini-high ramps on both platforms	4	75%	2	3	No	35 mph on El Camino	Yes

Station	Wheelchair Accessibility	Directions of Pedestrian Access[a]	Sidewalk Completeness	Presence of Crosswalks[b]	Density of Street Trees[c]	Near Freeway	Maximum Posted Speed Limit	Traffic Calming[d]
California Avenue	Lifts on both platforms	2	75%	2	2	No	35 mph on Alma Street	Yes
San Antonio	Lifts on both platforms	3	75%	3	2	No	45 mph Central Expressway	Yes
Mountain View	Lifts and mini-high ramps on both platforms	3	75%	3	2	No	45 mph on Central Expressway	Yes
Sunnyvale	Lifts and mini-high ramps on both platforms	4	75%	3	1	No	35 mph on Mathilda Avenue	No
Lawrence	Lifts on both platforms	2	50%	0	1	No	40 mph on Kifer Road	No
Santa Clara	Lifts and mini-high ramps on both platforms	3	75%	3	2	No	35 on El Camino Real	No
College Park	No lift available	2	75%	1	3	No	40 on Coleman Avenue	No
San Jose Diridon	Lifts and mini-high ramps on tracks 6–9	3	100%	3	1	No	35 mph on W Santa Clara Street	No
Tamien	Lifts on both platforms	2	75%	3	2	Yes	35 mph on W Alma Avenue	Yes

Source: Appendix D, *Transportation Analysis*

[a] Measurement of the number of directions a pedestrian can access the station, out of four possible directions. (Scale of 0 to 4)

[b] Measurement of marked crosswalks on streets adjacent to the station. (Scale of 0 to 3)

[c] Measurement of street tree density at station and on surrounding streets. Street trees can provide some shade from weather elements and enhance the urban design of station areas. (Scale of 0 to 3)

[d] Measurement indicating if traffic calming measures are in place on surrounding local or residential streets. Common traffic calming measures include curb extensions, pedestrian refuge islands, and speed bumps.

Several stations are close to or beyond full parking capacity. Average daily parking is slightly beyond capacity at Sunnyvale, with more than 100 percent of cars parked in the lot. Parking in excess of 100 percent possibly indicates vehicles parked illegally in the Caltrain lot in restricted areas. Parking at some Baby Bullet stations is very close to full capacity (90 percent or above) at Mountain View, San Jose Diridon, and Tamien Station. Millbrae, Hillsdale, and Palo Alto Station parking lots are all between 75 percent and 90 percent full. At stations with lower ridership, many lots are not full. At stations where parking is at, near, or beyond capacity, passengers who choose to drive tend to look for parking in non-Caltrain lots or on streets near the stations.

Table 3.14-11. Parking Capacity and Average Weekday Occupancy at Caltrain Station Lots (2012)

Station[a]	Caltrain Parking Lot Available (Yes / No)	Parking Capacity (Number of Parking Spots)	Average Daily Parking Occupancy
4th and King	No	--	--
22nd Street	No	--	--
Bayshore	Yes	38	13%
South San Francisco	Yes	74	51%
San Bruno	Yes	170	22%
Millbrae	Yes	490[b]	80%[b]
Burlingame	Yes	69	30%
San Mateo	Yes	42	20%
Hayward Park	Yes	210	3%
Hillsdale	Yes	513	86%
Belmont	Yes	375	20%
San Carlos	Yes	207	32%
Redwood City	Yes	553	46%
Menlo Park	Yes	155	33%
Palo Alto	Yes	350	87%
California Avenue	Yes	169	31%
San Antonio	Yes	193	33%
Mountain View	Yes	336	97%
Sunnyvale	Yes	391	100%
Lawrence	Yes	122	30%
Santa Clara	Yes	190	62%
College Park[c]	No	--	--
San Jose Diridon	Yes	576	99%
Tamien	Yes	245	98%

Source: Appendix D, *Transportation Analysis*

[a] Stations with Baby Bullet service are displayed in **bold.**

[b] There are approximately 2,980 spaces in shared parking with BART and the lot is 80% utilized, leaving approximately, 640 available spaces. This analysis assumes that 50% of those spaces (320 spaces) are available for Caltrain riders.

[c] There is no Caltrain lot at the College Park station. Parking is on the street. Given limited ridership and no plans to change service levels, parking demand was not evaluated at this location.

Existing Freight Rail Service

Freight service operates on the JPB-owned Caltrain corridor along with Caltrain passenger service and other tenant passenger service (ACE, Amtrak and Capitol Corridor). From San Francisco to Santa Clara, freight and passenger both use the same tracks, although there are areas where freight has spur tracks and sidings that lead to customer locations outside the Caltrain ROW. South of Santa Clara (south of Control Point [CP]) Coast at Milepost [MP] 44.7), freight has a dedicated freight track ("MT-1") owned by the Union Pacific Railroad (UPRR) to the southern end of the Caltrain corridor (at CP Lick at MP 52.0). All tracks in the Caltrain corridor are dispatched by Caltrain. South of MP 52.0, the ROW is owned by UPRR, which dispatches trains on its system, including Caltrain passenger trains. Because the Proposed Project is limited to the Caltrain corridor, Caltrain is the sole dispatcher within the project area.

Freight operates in the JPB-owned Caltrain corridor under a Trackage Rights Agreement (TRA) between UPRR and the JPB. This TRA provides that between midnight and 5 a.m., at least one main track will always be in service for freight. Between 10 a.m. and 3 p.m., the TRA requires the JPB to provide at least one 30-minute headway window. In practice today, freight commonly runs between 8 p.m. and 5 a.m., with occasional daytime service. Freight service hours are not limited by the TRA on the UP-owned MT-1 track between CP Coast and CP Lick (Santa Clara to south of Tamien Station).

Caltrain reviewed dispatch data for freight operations in the corridor in December 2012, which indicated that there is an average of seven round trips per day along the Caltrain corridor as follows and as shown in Figure 3.14-7.

- San Francisco to South San Francisco freight yard—one round trip daily during daytime ("South City" Local).
- South San Francisco freight yard to Redwood City—one round trip daily during nighttime ("Broadway").
- South San Francisco freight yard to San Jose (Newhall Yard)—one round trip daily during nighttime ("Mission Bay").
- South Terminal Area (South of CP Coast)—four round trips daily ("Salinas," "Granite Rock 1," "Granite Rock 2," and "Permanente") and one one-way daily ("MRVSJ").

Freight service does vary in response to freight customer needs and activity. For example, there was a notable decline in freight operations during the 2008–2009 recession and slow recovery afterwards, but freight service has been increasing in recent years with the economic recovery. In addition to the routine daily traffic noted above, freight operators also run periodic trains to serve non-routine episodic freight needs along the Caltrain corridor.

Due to a concern about potential height clearance requirements with the installation of the OCS, Caltrain also reviewed dispatch data for the past 8 years to identify the highest freight car (or "load") that had been authorized on the Caltrain corridor. Table 3.14-12 shows that data for the existing maximum freight heights that have operated in the corridor.

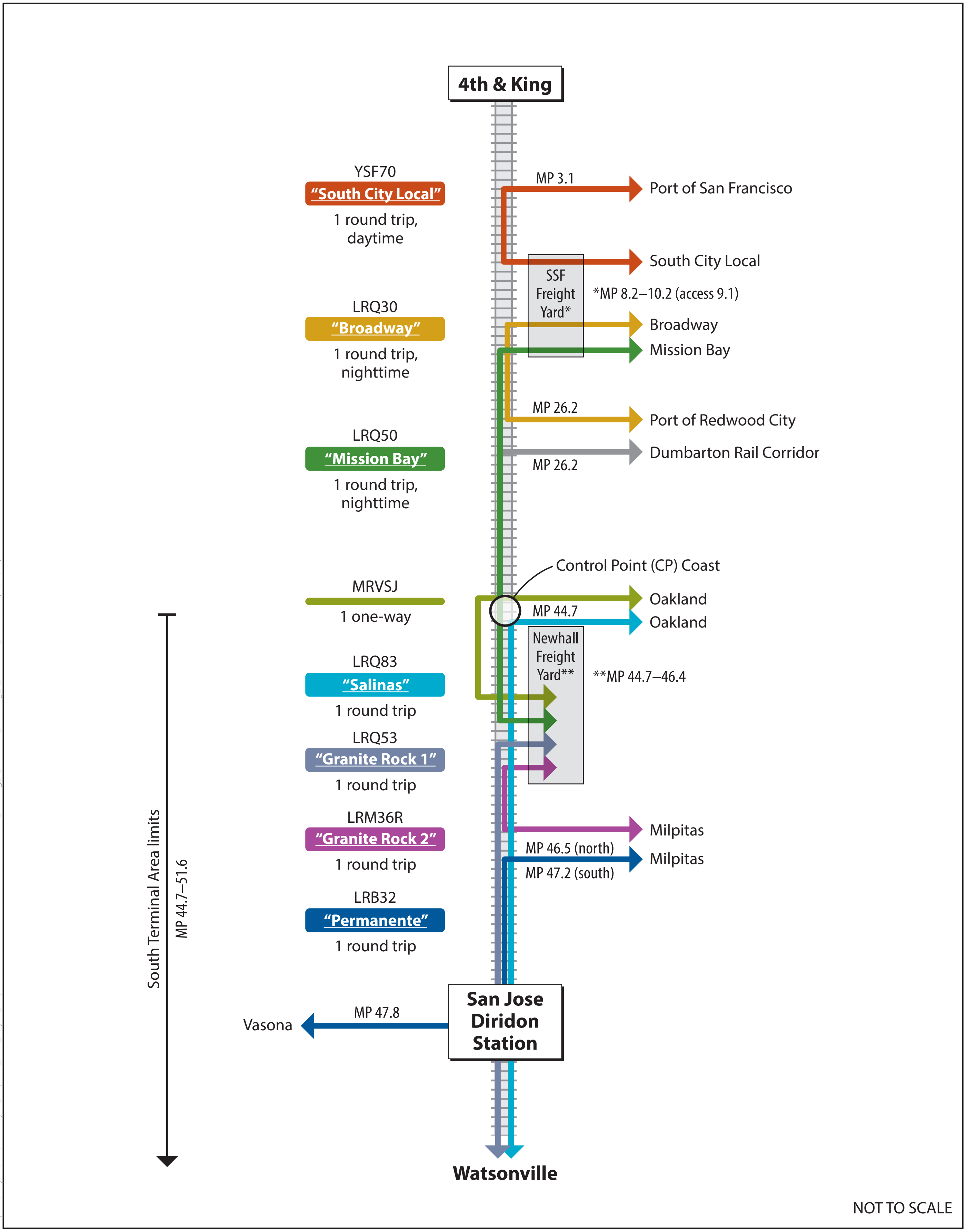

Figure 3.14-7
Existing Freight, October–December 2012
Peninsula Corridor Electrification Project

Table 3.14-12. Historic Freight Heights at Constrained Locations along the Caltrain ROW

Location	Historic Load (feet)
MP 1.29 Mariposa Street	15.92
MP 1.33 Tunnel 1	15.92
MP 1.72 22nd Street	15.92
MP 1.90 23rd Street	15.92
MP 1.93 Tunnel 2	15.92
MP 3.13 Oakdale Ave. OH	17.08
MP 3.19 Tunnel 3	17.08
MP 4.15 Paul Avenue	17.08
MP 4.27 Tunnel 4	17.08
MP 8.60 Oyster Point Parkway	18.92
MP 29.69 San Francisquito Bridge	18.92
MP 36.50 State Highway 85	18.92
MP 40.75 Lawrence Expressway	18.92
MP 46.15 Hedding Avenue	20.25
MP 47.89 San Carlos Avenue	20.25
MP 50.59 Curtner Avenue	20.25
MP 51.08 Private Overpass	20.25

Source: Caltrain dispatch data, 2006–2013

3.14.2 Impact Analysis

3.14.2.1 Methods for Analysis

Construction impact analysis is based on evaluation of the Proposed Project's effects during construction on the existing transportation and traffic conditions described above.

The analysis year for the operational impact analysis is 2020. As described in Chapter 2, *Project Description*, the Proposed Project's construction and testing is expected to be complete in 2019. Although electrified service is planned to start in 2019, 2020 was chosen for the impact analysis because it would represent a full year of project operation. In addition, 2020 is a year that lines up with well with other regional transportation analyses.

This section provides a comparison of with-project conditions in 2020 with the conditions with the No Project scenario as the operational baseline for the purposes of CEQA, because the Proposed Project can only have operational impacts once the new electrified service is actually operating. Although State CEQA Guidelines specify that the baseline should "normally" be the existing conditions extant at the time of preparation of the environmental document, the existing (2013) conditions are not the conditions that would be affected by operation of the Proposed Project. Thus, it would be fundamentally misleading to the public and decision-makers to measure the Proposed Project's impact by comparing 2020 with-project conditions with 2013 existing conditions. This section does disclose the existing conditions so that the reader may understand the changes that will occur relative to transportation and traffic both with and without the Proposed Project in 2020. All of the assumptions about 2020 conditions are documented in Appendix D, *Transportation Analysis*, and Appendix I, *Ridership Technical Memorandum*, and are based on regionally adopted assumptions about future land use growth and transportation network development.

An analysis was also conducted for conditions with and without the Proposed Project in 2040. The results of this analysis are presented in Section 4.1, *Cumulative Impacts*, because the 2040 conditions reflect an extensive amount of land use growth as well as projected transportation improvement completions over the next 26 years.

A more detailed description of the impact analysis for all subject areas other than freight service is provided in Appendix D, *Transportation Analysis*. A more detailed description of the system ridership modelling is provided in Appendix I.

Traffic and Roadway Systems

Analysis Scenarios

Proposed Project operation impacts on transportation and transit systems in the study area are evaluated for the following scenarios.

2020 No Project Scenario

This scenario reflects regional land use growth, population and employment growth, future transit connections, future transportation improvements, and Caltrain operations that are projected to occur in the study area by 2020 without the Proposed Project. These projected land use growth, transportation projects, and transit services are reflected in the travel demand forecasting model used to predict the future transit ridership and roadway traffic for the 2020 No Project condition.

Land Use Growth and Transportation System Changes

The VTA travel demand forecasting model was updated to reflect the 2013 conditions and adjusted and validated to reflect 2013 Caltrain system ridership (refers to VTA model thereafter). The model networks were also updated to reflect the current transit and highway networks. After the model was validated to the 2013 conditions, the projected land use growth and transit and transportation improvements by 2020 were input into the model and used to predict the future transit ridership and roadway traffic in 2020, which were then used to evaluate the Proposed Project's impacts on transit and transportation systems.

Land use projections contained in the ABAG SCS, prepared in September 2012, were used to develop the ridership and regional travel demand forecasts. Overall, the Caltrain service area is projected to experience significant growth in households, population, and jobs, with fairly balanced levels of growth spread out between the three counties in the study area.

Transportation and transit projects as defined in the *Plan Bay Area* regional transportation plan, adopted in mid-2013, were used to code in background improvements in the model networks. MTC provided the years of opening for the projects identified in *Plan Bay Area*. The background highway and transit projects that were planned to open by year 2020 are included in the 2020 model. The transportation projects include projects in the study area as well as key projects a regional traveler would consider transferring to in order to complete an inter-regional trip in the study area. For a list of projects reflected in the travel demand forecasting model, see the ridership technical memorandum in Appendix I.

Caltrain Operations

The 2020 No Project scenario is mostly identical to existing Caltrain operations in terms of schedule and frequency. The 2020 No Project scenario presumes continued diesel-hauled trains. No additional trains are assumed to be added by 2020. The two main changes from existing conditions are included as part of the 2020 No Project scenario.

- Relocation of San Bruno Station. As part of a grade-separation project currently under construction, the San Bruno Station will be moved from its current location at 297 Huntington Avenue to the corner of San Bruno and Huntington Avenue in 2014. The station relocation would not affect the schedule or frequency of trains at this station.
- Implementation of Caltrain Communications Based Overlay Signal System (CBOSS) Positive Train Control (PTC) advanced signal system. Currently being installed and scheduled to be operational by 2015, the CBOSS PTC system would increase safety both on the tracks and at at-grade crossings and improve reliability and operating performance of the current signal system. Travelers crossing the tracks via car, bike, or on foot would benefit from reduced gate-down times at select crossings and improved local traffic circulation. The CBOSS PTC system will be interoperable with all rail services operating on the same tracks, including freight (Caltrain 2013a).

2020 Project Scenario

This scenario reflects 2020 land use growth and transportation system changes combined with the Proposed Project.

Land Use Growth and Transportation System Changes

The projected land use growth and the proposed transit and transportation improvements used to develop the 2020 travel demand forecasting model for this scenario are the same as those used for the 2020 No Project condition.

Caltrain Operations

The 2020 Project scenario includes the following changes from existing conditions that would result in an increase in Caltrain capacity and operating performance.

- Conversion of Caltrain from diesel-hauled trains to electric multiple unit (EMU) trains for approximately 75 percent of the service[3] between the 4th and King Street Station in San Francisco and the Tamien Station in San Jose.
- Operation of up to six Caltrain trains per peak hour, per direction at operating speeds of up to 79 mph.
- Implementation of CBOSS PTC advanced signal system.

[3] As noted in Chapter 2, *Project Description*, the remaining 25 percent would be diesel-hauled.

EMU trains are more efficient than the current diesel-powered locomotives because they can accelerate and decelerate faster than diesel-hauled vehicles. As a result, EMUs would provide faster and/or more frequent service to more stations and, by extension, carry more passengers. The CBOSS PTC system, combined with the EMU fleet, would improve headways and operation flexibility by allowing trains to safely travel closer together along the ROW. This would translate to more frequent and dependable passenger service.

The 2020 Project scenario assumes an electrified rail corridor with the CBOSS PTC system. Combined, these two improvements would allow for substantial capacity and operating performance improvements for all service types (Baby Bullets, Limited, and Local trains). The number of daily weekday trains would increase from the current 92 to 114.

Table 3.14-13 summarizes the average weekday trains per day, by station, for the 2020 No Project and 2020 Project scenarios. Under the 2020 Project scenario, the total number of daily trains serving each station would increase across the study area, with the exception of College Park, which Caltrain would continue to serve with four trains daily. Two stations that do not have weekday service in existing conditions and in the 2020 No Project scenario would have weekday service in the 2020 Project condition: Broadway and Atherton. It should be noted that the proposed trains are based on a prospective 2020 schedule that was developed only for analytical purposes for this EIR. Although the schedule has yet been finalized, it is the best available data to be used for identifying the potential traffic operation impact of the Proposed Project. The actual schedule may vary, which could influence the number of station trains at some stations.

Table 3.14-13. Average Weekday Daily Trains by Station with Prototypical Schedule

Station	Existing, 2020 No Project Scenario	2020 Project Scenario	Change with Project
4th and King	92	114	+22
22nd Street	58	90	+42
Bayshore	40	66	+26
South San Francisco	46	78	+32
San Bruno	56	66	+10
Millbrae	82	114	+32
Broadway	0	54	+54
Burlingame	58	66	+8
San Mateo	70	96	+26
Hayward Park	40	66	+26
Hillsdale	74	102	+28
Belmont	46	66	+20
San Carlos	64	78	+14
Redwood City	72	102	+30
Atherton	0	54	+54
Menlo Park	66	96	+30
Palo Alto	86	108	+22
California Avenue	52	66	+14
San Antonio	46	66	+20
Mountain View	80	108	+28
Sunnyvale	62	84	+22

Station	Existing, 2020 No Project Scenario	2020 Project Scenario	Change with Project
Lawrence	56	66	+10
Santa Clara	58	66	+8
College Park	4	4	No change
San Jose Diridon	92	114	+22
Tamien	40	48	+8

Note: Based on prototypical schedule.
Source: Appendix D, *Transportation Analysis*

Caltrain Ridership, Mode of Access, and Mode of Egress Models

Ridership forecasting provides estimates of the total number of passengers that would ride Caltrain as a result of the Proposed Project. The forecasting also provides information on how access to individual stations along the Caltrain corridor would change in the future.

VTA develops and maintains a travel forecasting model for Santa Clara and San Mateo Counties, along with adjacent travel markets. The model estimates trips throughout the metropolitan area by various modes, including Caltrain and access-modes to Caltrain. The model is sensitive to multiple factors including population and employment densities, auto ownership rates, demographics (e.g., age, income level, household size), and transit network connections. Ridership projections for transit systems that are assumed to connect to Caltrain in years 2020 are from the VTA model. However, because the model's scope is regional, it is not able to capture all of the details of extremely localized conditions at the station-level.

Caltrain has developed a calibration process that adjusts the VTA model outputs using factors found to be correlated to Caltrain station level ridership as well variables for which the model might be over- or undercompensating. For purposes of this study, calibration was performed for all stations providing service all day during weekdays within the study area.

Fehr & Peers also developed the mode of access and mode of egress models to estimate access and egress mode shares to Caltrain stations. Using intercept passenger surveys conducted in 2013, the models estimate the actual proportions of riders accessing and egressing by auto (park-and-ride, kiss-and-ride), transit, walking, and bicycling.

Regional and City Vehicle Miles Traveled

A performance measure used to quantify the amount of vehicle travel is vehicle miles traveled (VMT). VMT measures the amount of miles vehicles travel along over roadway networks. VMT measurement has one primary limitation: it is not directly observed and, therefore, cannot be directly measured. It is calculated based on the number of vehicles multiplied by the distance traveled by each vehicle. The amount of VMT can be obtained through extensive surveys of residents, visitors, and employees, or by using a validated travel demand forecasting model that estimates vehicle demand. VMT estimates derived from the models are dependent on the level of detail in the network and other variables related to vehicle movement through the network. The traffic volume and distance traveled depends on land use types, density and intensity, and patterns as well as the supporting transportation system. The VTA model was used to provide the regional and city by city VMT estimates for analysis scenarios.

Intersection Levels of Service Analysis

Traffic operations at all 82 select intersections in the study area were analyzed under the 2020 No Project scenario and the 2020 Project scenario. To obtain the level of service and the delay, the existing peak hour traffic microsimulation models (VISSIM and SimTraffic) were updated to reflect future peak hour operating conditions. This included updates to forecasted traffic volumes, signal timings, gate-down times, and frequencies of Caltrain at at-grade crossings.

Transit Systems

The potential impact of the Proposed Project on other transit systems was evaluated using the VTA model of system ridership with and without the Proposed Project using the same 2020 scenarios described above for traffic and roadway systems. The development and assumptions of the system ridership model are discussed in greater detail in Appendix I, *Ridership Technical Memorandum*.

Bicycle and Pedestrian Systems

The potential impact of the Proposed Project on bicycle and pedestrian systems was evaluated based on the profile and functionality of the existing systems and the physical changes that would occur under Proposed Project conditions.

Emergency Vehicle Access

The potential impact of the Proposed Project on emergency vehicle access was evaluated based on a comparison of the changes to roadway facilities and operations with and without the Proposed Project.

Caltrain Station Parking and Access

To forecast parking demand, first, forecasts for daily boardings per station per scenario were generated by the calibrated ridership model. The ratio of 2013 boardings occurring before noon to daily boardings was applied to the daily boardings forecasts to generate forecasts for boardings occurring before noon by station in future scenarios. To forecast the number of Caltrain riders arriving to the station and parking before noon by station and scenario, the park-and-ride access mode from the AM mode of access model was then applied to the forecasts of boardings occurring before noon. An average vehicle occupancy rate of 1.1 was applied to these values to forecast vehicle parking demand per station and scenario.

As confirmed by the intercept surveys, not all Caltrain park-and-rider passengers park in Caltrain lots; some park on-street or in non-Caltrain lots. For most stations, however, the majority of park-and-ride passengers parked in a Caltrain lot. Therefore, it was assumed that, generally, park-and-ride demand generated by the Proposed Project would be met a Caltrain lot if space was available. However, for seven stations (Bayshore, San Bruno, Millbrae, Hayward Park, San Carlos, Menlo Park, and Lawrence) the intercept survey found that at least two-thirds of park-and-ride passengers parked on street or in non-Caltrain parking lots, even though the Caltrain lots had ample available parking. Therefore, for those seven stations, the proportion of park-and-ride passengers parking in a Caltrain lot was assumed to be the same as the proportion recorded from the intercept survey.

Impacts of the Proposed Project on station access were evaluated by identifying whether project operations would have any effect on routes of access to the Caltrain stations.

Freight Rail Service

The potential impact of the Proposed Project on freight service was evaluated based on consideration of the impacts of potential changes in freight service operational hours and overhead height clearances with the project area.

3.14.2.2 Thresholds of Significance

The State CEQA Guidelines Appendix G (14 CCR 15000 et seq.) identifies significance criteria that lead agencies may consider for determining whether a project could have significant impacts on existing transportation and circulation. Pursuant to the CEQA Guidelines Appendix G, a project impact would be considered significant if construction or operation of the Proposed Project would cause any of the following conditions.

- 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 nonmotorized 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.
- Conflict with an applicable Congestion Management Plan, including, but not limited to, LOS standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.
- Substantially increase hazards because of a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access.
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or that otherwise decrease the performance or safety of such facilities.
- 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.

The CEQA Guidelines are intended to provide general guidance for lead agencies evaluating impacts on the transportation system. The criteria for determining project impacts were identified by Caltrain based on consideration of the applicable policies, regulations, and guidelines defined by the Caltrain and local jurisdictions and by consideration of the CEQA Guidelines.

The significance criteria used in this EIR for the transportation and traffic impact analysis are as follows:

Overall Project

For the overall project, the Proposed Project's impact is considered significant if it results any of the following conditions.

- The Proposed Project would result in an increase in VMT per service population in the study area (e.g., San Francisco, San Mateo and Santa Clara Counties).
- The Proposed Project would interfere with, conflict with, or preclude other planned improvements such as transit projects, roadway extensions/expansions, and pedestrian or bicycle facility improvements.
- The Proposed Project would conflict or create inconsistencies with adopted regional transportation plans.
- The Proposed Project would result in unsafe access between Caltrain stations and adjacent streets.

The specific subject criteria by which to evaluate these broad general criteria are explained in the sections below.

Traffic and Roadway System

The Proposed Project would create a significant impact on the traffic and roadway system if any of the following criteria are met or exceeded:

- The project conflicts or creates inconsistencies with local traffic plans.
- The project substantially disrupts existing traffic operations, as defined below:

  For signalized intersections, the significance criteria are based on the typical average criteria for jurisdictions along the Caltrain corridor. Specifically, a significant project impact to a signalized intersection occurs if the project results in one of the following conditions:

  - The project causes an intersection to deteriorate from LOS D or better to LOS E or F, or
  - The project causes an intersection operating at LOS E or F under baseline (no project) conditions to increase in overall delay by 4 seconds or more.

  The above criteria apply to all signalized intersections except where a jurisdiction has adopted criteria permitting higher levels of congestion in certain areas or at certain intersections, in which case these criteria are used.

  For stop-controlled intersections, the significance criteria are defined to occur if the project results in both of the following conditions:

  - The project results in a change from LOS A–E to LOS F conditions for the worst case movement, and
  - The intersection satisfies one or more traffic signal warrants.
- The project creates a temporary but prolonged impact due to lane closures, need for temporary signals, emergency vehicle access, traffic hazards to bikes/pedestrians, damage to roadbed, or truck traffic on roadways not designated as truck routes.

Transit System

The project would create a significant impact related to transit service if any of the following criteria are met or exceeded:

- The project creates demand for public transit services above the capacity which is provided, or planned.
- The project disrupts existing transit services or facilities.
- The project interferes with planned transit services or facilities.
- The project conflicts or creates inconsistencies with adopted transit system plans, guidelines, policies, or standards.
- The project substantially increase hazards for transit systems because of a design feature or otherwise substantially compromises the safety of transit facilities.

Pedestrian System

The project would create a significant impact related to the pedestrian system if any of the following criteria are met or exceeded:

- The project disrupts existing pedestrian facilities.
- The project interferes with planned pedestrian facilities.
- The project conflicts or creates inconsistencies with adopted pedestrian system plans, guidelines, policies, or standards.

Bicycle System

The project would create a significant impact related to facilities if any of the following criteria are met or exceeded:

- The project substantially disrupts existing bicycle facilities.
- The project substantially interferes with planned bicycle facilities.
- The project conflicts or creates substantial inconsistencies with adopted bicycle system plans.

Emergency Vehicles

The project would create a significant impact if the following criteria is met or exceeded:

- The project results in inadequate emergency vehicle circulation and/or access.

Station Vehicle Parking and Access

The project would create a significant impact if either of the following criteria is met or exceeded:

- The project does not meet Caltrain's *Comprehensive Access Program Policy Statement* or *Bicycle Access and Parking Plan.*
- The project would result in the construction of off-site parking facilities that would have secondary physical impacts on the environment.

Freight Rail Service

The project would create a significant impact if the following criteria is met or exceeded:

- The project results in a change in freight rail service such that resultant diversions to truck or other freight modes would result in significant secondary impacts related to air quality, noise, greenhouse gas emissions, or traffic operation (as defined by the other applicable significance criteria in this EIR).

3.14.2.3 Impacts and Mitigation Measures

Roadway Traffic Operations

Impact TRA-1a	Substantially disrupts existing or future traffic operations during construction
Level of Impact	Significant
Mitigation Measure	TRA-1a: Implement construction road Traffic Control Plan
Level of Impact after Mitigation	Less than significant

Construction activities for the Proposed Project would consist of the installation of OCS poles and wires, erection of overbridge protection barriers on roadway bridges that cross the Caltrain alignment, and the construction of traction power facilities (TPFs), specifically, traction power substations (TPSs), paralleling stations and the switching station. Most of the construction activities would be contained within specific work sites or within the Caltrain ROW. Although construction would temporarily increase trucks and employee vehicles on public roadways accessing the work sites, the impact from increase trips on roadway traffic operation would be minimal. However, the following construction activities could require temporary closures of travel lanes or road segments, which would reduce the vehicle capacity of the roadway segments, disrupt the traffic flow, and potentially increase vehicle delays on the roadway segments.

- Installation of OCS wires may require lane or road closures at at-grade crossing when the wires are installed across the roads.
- Installation of overbridge protection barriers may require one-lane closures on the side of the road the barriers are installed.
- Installation of the transmission line or underground conduit between the PG&E substations and the TPS and between the TPS and the Caltrain ROW or utility relocations may require lane or road closures when the work is conducted across public roadways.

Although the closures, where required, would be short-term, the construction impact on traffic operation is considered significant. Implementation of Mitigation Measure TRA-1a would reduce the temporary construction impact on roadway traffic to a less-than-significant level.

Mitigation Measure TRA-1a: Implement construction road Traffic Control Plan

The JPB would coordinate with the traffic departments of local jurisdictions and with all corridor emergency service providers to develop a Traffic Control Plan to mitigate construction impacts on transit service, roadway operations, emergency responses, pedestrian and bicycle facilities, and public safety. Measures that will be implemented throughout the course of project construction, will include, but not limited to, the following:

- Maintain acceptable response times and performance objectives for emergency response services.
- Limit number of simultaneous street closures and consequent detours of transit and vehicular traffic within each immediate vicinity, with closure time frame limited as much as feasible for each closure, unless alternative traffic routings are available.
- Implement traffic control measures to minimize traffic conflicts and delays to the traveling public for local roadways where lane closures and restricted travel speeds will be required for longer periods.
- Provide advance notice of all construction-related street closures, durations, and detours to local jurisdictions, emergency service providers, and motorists.
- Provide safety measures for vehicles, bicyclists and pedestrians to transit through construction zones safely.
- Limit sidewalk, bicycle, and pedestrian walkway closures to one location within each vicinity at a time, with a closure time frame limited as much as feasible for each closure unless alternative routings for pedestrian and bicycle transit are available.
- Provide designate areas for construction worker parking wherever feasible to minimize use of parking in residential or business areas.

Impact TRA-1b	Conflicts or creates inconsistencies with regional traffic plans or substantially disrupts future regional traffic operations from Proposed Project operation
Level of Impact	Less than significant

Transportation is a major contributor to GHG emissions and a direct result of population and employment growth, which generates vehicle trips to move goods, provide public services, and connect people with work, school, shopping, and other activities. Growth in travel (especially vehicle travel) is due in large part to changes in urban development patterns (i.e., the built environment). VMT measures the amount of miles vehicles travel on roadway networks.

Because the Proposed Project would shift travel demand from driving trips to transit trips and reduce the regional vehicle traffic and VMT on major highways and arterials in the study area, the Proposed Project would not substantially disrupt future regional traffic operations. In addition, many adopted regional transportation plans take into consideration the electrification of the Caltrain system when developing their respective plans. In the *Plan Bay Area,* MTC identifies the electrification of the Caltrain system as one of the major transit project expected for the future; therefore, the Proposed Project would not conflict or create inconsistencies with regional traffic plans.

Overall, as summarized in Table 3.14-14, regional VMT is expected to increase between 2013 and 2020. However, regional VMT in the peak and off-peak periods would be less under the 2020 Project scenario compared with the 2020 No Project scenario. Total daily VMT under the 2020 Project scenario is projected to decrease by approximately 235,000 miles compared with the 2020 No Project scenario

Table 3.14-14. Average Regional Daily Vehicle Miles Traveled

	Vehicle Miles Traveled		
Scenario	Peak Hours	Off-Peak Hours	Daily Total
Existing Condition	96,261,904	82,400,965	178,662,869
2020 No Project	104,704,796	90,671,307	195,376,103
2020 Project	104,517,191	90,624,331	195,141,522

Source: Appendix D, *Transportation Analysis*.

While certain locations near the stations or on the Caltrain corridor may experience increases in traffic due to more automobiles driving to and from stations (see discussion below under Impact TRA-1c), numerous roadways along the Caltrain corridor would see reduced traffic volumes as a result of the Proposed Project. In particular, major arterials, such as El Camino Real, SR 84, SR 92, I-280, and U.S. 101 and other roadways, would see reductions in overall vehicle traffic, as the Proposed Project would shift travel demand from driving trips to transit trips.

Table 3.14-15 displays daily VMT within each city for 2020 No Project and 2020 Project scenarios. City-level VMT is calculated by accounting for the total mileage of all vehicle trips within each city's boundaries, which known as the "boundary method" calculation.

Daily VMT in all cities along the corridor would decrease under the 2020 Project scenario compared with the 2020 No Project scenario. Total daily VMT under the 2020 Project scenario is projected to decrease by an average of 1.8 percent in all cities along the corridor compared with the 2020 No Project scenario.

While certain locations on the Caltrain corridor may experience increases in traffic due to more automobiles driving to and from stations, the total effect is that total VMT in each city would decrease because of the Proposed Project.

Thus, the Proposed Project would have a beneficial impact on regional and city-level traffic overall by reducing vehicle miles traveled. Impact TRA-1c analyzes localized traffic impacts.

Table 3.14-15. Weekday Daily Regional Vehicle Miles Traveled within Each City, 2020 Scenario

	2020 No Project			2020 Project		
City	Peak[a]	Off-Peak[b]	All	Peak[a]	Off-Peak[b]	All
San Francisco	4,153,000	3,526,000	7,680,000	4,141,000	3,497,000	7,638,000
South San Francisco	700,000	574,000	1,275,000	695,000	506,000	1,200,000
San Bruno	499,000	363,000	862,000	496,000	360,000	856,000
Millbrae	210,000	164,000	374,000	209,000	136,000	344,000
Burlingame	480,000	427,000	906,000	476,000	422,000	898,000
San Mateo	1,260,000	1,114,000	2,374,000	1,252,000	1,101,000	2,354,000
Belmont	165,000	120,000	285,000	163,000	119,000	282,000
San Carlos	701,000	263,000	963,000	315,000	260,000	574,000
Redwood City	785,000	712,000	1,497,000	780,000	703,000	1,483,000
Atherton	65,000	38,000	104,000	65,000	38,000	103,000
Menlo Park	636,000	611,000	1,247,000	632,000	602,000	1,234,000
Palo Alto	800,000	664,000	1,464,000	795,000	657,000	1,451,000
Mountain View	1,006,000	872,000	1,878,000	1,002,000	865,000	1,867,000
Sunnyvale	1,379,000	1,099,000	2,478,000	1,372,000	1,077,000	2,449,000
Santa Clara	1,199,000	753,000	1,952,000	1,193,000	747,000	1,940,000
San Jose	9,722,000	7,750,000	17,473,000	9,705,000	7,673,000	17,378,000
TOTAL	**23,760,000**	**19,050,000**	**42,812,000**	**23,291,000**	**18,763,000**	**42,051,000**

Source: Appendix D, *Transportation Analysis*.
[a] Peak travel is defined as travel occurring from 5:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 7:00 p.m.
[b] Off-peak travel is defined as travel occurring from 9:00 a.m. to 3:00 p.m. and from 7:00 p.m. to 5:00 a.m.

Impact TRA-1c	Conflicts or creates inconsistencies with local traffic plans or substantially disrupts future local traffic operations from Proposed Project operation in 2020
Level of Impact	Significant
Mitigation Measure	TRA-1c: Implement signal optimization and roadway geometry improvements at impacted intersections for the 2020 Project Condition
Level of Impact after Mitigation	Significant and unavoidable

Although the Proposed Project would reduce regional vehicle miles travelled, the Proposed Project would also affect local traffic operations along the Caltrain corridor in several ways. First, the number of trains would increase, increasing the number of gate down occurrences relative to the No Project scenario. Second, the increased train service and added train capacity would change traffic patterns resulting in potential increases in traffic near stations coupled with reduced traffic on parallel roads.

For the study at-grade crossing intersections overall, the average gate-down time per event is reduced at many crossings under the Project scenario compared with the No Project scenario in 2020. However, the increase in the number of trains is expected to result in an increase in the aggregate gate-down time over the peak hour at 14 locations compared with the No Project scenario in 2020. Gate-down time during the peak hour would improve relative to the No Project scenario at seven locations. Gate-down time during the peak hour would be higher in one peak hour and lower in the other peak hour compared with the No Project scenario at eight locations (for example at the Villa Terrace at-grade crossing in San Mateo, the Proposed Project would have less gate-down time in the AM peak hour, but more gate-down time in the PM peak hour compared with the No Project scenario).

The increase in number of gate-down events, along with increasing the number of corresponding signal preemption events, may degrade intersection operations even though the gate-down time per event is lower. The peak hour intersection results (level of service and average vehicle delay) for the 2020 No Project and 2020 Project scenarios are presented in Table 3.14-16.

It should be noted that the analysis is based on a prospective 2020 schedule that was developed only for analytical purposes for this EIR. Although the schedule has yet been finalized, it is the best available data to be used for identifying the potential traffic operation impact of the Proposed Project. The actual schedule may vary, which could influence the schedule at some of the local stations, but would not be expected to substantially change the estimated vehicle delay at the study intersections.

The traffic operation analysis accounts for the changes in gate-down times at at-grade crossings and changes in local traffic patterns and traffic volumes near the stations. As shown in Table 3.14-16, a comparison of the intersection levels of service and delays under the 2020 No Project scenario with the 2020 Project scenario indicates that the Proposed Project would cause traffic delays for 21 study intersections to exceed the significance thresholds during the AM and/or PM peak hours. This is considered a significant impact.

Local roadway improvements, including signal optimization and roadway geometry improvements are proposed as part of Mitigation Measure TRA-1c to improve the operations and to reduce or eliminate the localized significant impact at the impacted intersections and at-grade crossings. Table 3.14-17 summarizes the intersection impacts and the associated mitigation measures proposed to reduce these identified impacts. Localized traffic impacts would be reduced to a less-than-significant level at 12 of the significantly affected locations. The impact would remain significant and unavoidable at the other 9 locations because either the proposed signal optimization and roadway geometry improvements would be insufficient to reduce the impact sufficiently or no feasible mitigation is available.

While grade separations are a technically feasible way to reduce traffic impacts at the at-grade locations, it is a highly expensive mitigation strategy. Caltrain has supported past and present grade-separation projects (such as the current San Bruno Grade Separation project) and will support future efforts at grade separation where acceptable to local communities and where local, state, and federal funding can be obtained to fund these improvements. However, using an average assumed cost of $50 million to $100 million per crossing (grade separations can cost much more sometimes), grade separating the at-grade crossings closest to the nine significantly affected intersections (after mitigation in Mitigation TRA-1c) would cost $450 million to $900 million. The budget for the Proposed Project is $1.225 billion by comparison. Thus, Caltrain cannot commit to a comprehensive program of grade separations at this time to address all significantly affected intersections and this impact is considered significant and unavoidable.

Table 3.14-16. Intersection Delay and Levels of Service, 2020 No Project and 2020 Project Alternatives

Int. ID	Intersection	Jurisdiction	Peak Hour[a]	Intersection Control	2020 No Project Delay[b]	2020 No Project LOS[c]	2020 Project Delay[b]	2020 Project LOS[c]	Change in Delay
ZONE 1									
1	4th Street & King Street	SF	AM PM	Signal	**>120** **>120**	**F** **F**	**>120** **>120**	**F** **F**	0 **34.2**
2	4th Street & Townsend Street	SF	AM PM	Signal	**>120** **>120**	**F** **F**	**>120** **>120**	**F** **F**	-31.6 **35.1**
3	Mission Bay Drive & 7th Street	SF	AM PM	Signal	10.1 13.4	B B	10.5 14.3	B B	0.4 0.9
4	Mission Bay Drive & Berry Street	SF	AM PM	Signal	1.9 6.9	A A	1.5 9.8	A A	-0.4 0.9
5	7th Street & 16th Street	SF	AM PM	Signal	**90.9** **67.7**	**F** **E**	**>120** **64.5**	**F** **E**	**29.7** -3.2
6	16th Street & Owens Street	SF	AM PM	Signal	11.3 13.4	B B	11.6 13.7	B B	0.3 0.3
7	22nd Street & Pennsylvania Street	SF	AM PM	All-way Stop	9.2 7.3	A A	9.5 8.4	A A	0.3 1.1
8	22nd Street & Indiana Street	SF	AM PM	All-way Stop	6.1 5.4	A A	5.7 6.0	A A	-0.4 0.6
9	Tunnel Avenue & Blanken Avenue	SF	AM PM	All-way Stop	15.3 39.8	C E	23.1 37.8	C E	7.8 -2.0
10	Linden Avenue & Dollar Avenue	SSF	AM PM	Signal	15.9 40.9	B D	18.0 54.1	B D	2.1 13.2
11	East Grand Avenue & Dubuque Way	SSF	AM PM	Signal	8.9 10.9	A B	10.4 12.3	B B	1.5 1.4
12	S Linden Avenue & San Mateo Avenue	SSF	AM PM	Signal	8.0 8.6	A A	8.0 19.4	A B	0 10.8
13	Scott Street & Herman Street	SB	AM PM	Side-Street Stop	11.3 15.1	A C	9.6 14.6	A B	-1.7 -0.5
14	Scott Street & Montgomery Avenue	SB	AM PM	Side-Street Stop	5.9 6.2	A A	6.4 6.9	A A	0.5 0.7
15	San Mateo Avenue & San Bruno Avenue	SB	AM PM	Signal	19.9 20.8	B C	21.5 19.1	C C	1.6 -1.7
ZONE 2									
16	El Camino Real & Millbrae Avenue	MB	AM PM	Signal	**75.7** **85.1**	**E** **F**	**105.4** **>120**	**F** **F**	**29.7** **53.4**
17	Millbrae Avenue & Rollins Road	MB	AM PM	Signal	38.0 **58.6**	D **E**	49.4 **88.2**	D **F**	11.4 **29.6**
18	California Drive & Broadway	BG	AM PM	Signal	**61.2** **58.0**	**E** **E**	**65.2** **62.4**	**E** **E**	4.**0** **4.4**
19	Carolan Avenue & Broadway	BG	AM PM	Signal	20.7 48.6	C D	28.8 44.5	C D	8.1 -4.1
20	California Drive & Oak Grove Avenue	BG	AM PM	Signal	**91.3** 26.8	**F** C	53.2 29.9	D C	-38.1 3.1
21	Carolan Avenue & Oak Grove Avenue	BG	AM PM	Side-Street Stop	**>120** **>120**	**F** **F**	**>120** **>120**	**F** **F**	**>60** **>60**
22	California Drive & North Lane	BG	AM PM	Side-Street Stop	16.3 11.2	C B	15.5 12.9	C B	-0.8 1.7

Int. ID	Intersection	Jurisdiction	Peak Hour[a]	Intersection Control	2020 No Project Delay[b]	2020 No Project LOS[c]	2020 Project Delay[b]	2020 Project LOS[c]	Change in Delay
23	Carolan Avenue & North Lane	BG	AM PM	Side-Street Stop	32.9 13.5	D B	38.5 15.4	E C	5.6 1.9
24	Anita Road & Peninsula Avenue	BG	AM PM	Side-Street Stop	17.2 **53.3**	C **F**	14.4 33.4	B D	-2.8 -19.9
25	Woodside Way & Villa Terrace	SM	AM PM	Side-Street Stop	5.1 5.5	A A	5.2 5.3	A A	0.1 -0.2
26	North San Mateo Drive & Villa Terrace	SM	AM PM	Side-Street Stop	12.0 15.8	B C	11.6 16.0	B C	-0.4 0.2
27	Railroad Avenue & 1st Avenue	SM	AM PM	Side-Street Stop	12.6 17.8	B C	8.9 14.3	A B	-3.7 -3.5
28	South B Street & 1st Avenue	SM	AM PM	Signal	21.6 47.6	C D	16.3 50.8	B D	-5.3 3.2
29	9th Avenue & S Railroad Avenue	SM	AM PM	Side-Street Stop	41.8 41.8	E E	44.5 35.7	E E	2.7 -6.1
30	South B Street & 9th Avenue	SM	AM PM	Signal	15.3 21.8	C C	16.6 18.5	B B	1.3 -3.3
31	Transit Center Way & 1st Avenue	SM	AM PM	Uncontrolled	5.3 12.5	A B	4.2 11.4	A B	-1.1 -1.1
32	Concar Drive & SR 92 Westbound Ramps	SM	AM PM	Signal	7.0 9.2	A A	7.1 18.0	A B	0.1 8.8
33	S Delaware Street & E 25th Avenue	SM	AM PM	Signal	16.4 **69.5**	B **E**	15.5 43.2	B D	-0.9 -26.3
34	E 25th Avenue & El Camino Real	SM	AM PM	Signal	34.5 **90.6**	C **F**	30.9 **82.2**	C **F**	-3.6 -8.4
35	31st Avenue & El Camino Real	SM	AM PM	Signal	21.7 37.9	C D	21.2 44.2	C D	-0.5 6.3
<u>36</u>	E Hillsdale Boulevard & El Camino Real	SM	AM PM	Signal	**77.6** 49.9	**E** D	**<u>86.6</u>** 46.6	**<u>F</u>** D	**<u>9.0</u>** -3.3
37	E Hillsdale Blvd. & Curtiss Street	SM	AM PM	Signal	30.7 10.8	C B	38.1 10.2	D B	7.4 -0.6
38	Peninsula Avenue & Arundel Road & Woodside Way	SM	AM PM	Side-Street Stop	18.8 **54.5**	C **F**	16.8 31.2	C D	-2.0 -23.3
39	El Camino Real & Ralston Avenue	BL	AM PM	Signal	**>120** **>120**	**F** **F**	**>120** **>120**	**F** **F**	-8.3 1.6
40	El Camino Real & San Carlos Avenue	SC	AM PM	Signal	21.5 **67.9**	C **E**	21.9 42.3	C D	0.4 -25.6
41	Maple Street & Main Street[d]	RC	AM PM	Side-Street Stop	39.3 51.5	E F	35.4 31.7	E D	-3.9 -19.8
42	Main Street & Beech Street	RC	AM PM	Side-Street Stop	6.4 12.8	A B	7.9 42.4	A E	1.5 29.6
43	Main Street & Middlefield Road[d]	RC	AM PM	Signal	24.2 >120	C F	25.7 >120	C F	1.5 >60
44	Broadway Street & California Street[d]	RC	AM PM	Side-Street Stop	>120 >120	F F	>120 >120	F F	>-60 >-60
45	El Camino Real & Whipple Avenue	RC	AM PM	Signal	**59.0** 53.5	**E** D	48.7 45.2	D D	-10.3 -8.3

Int. ID	Intersection	Jurisdiction	Peak Hour[a]	Intersection Control	2020 No Project Delay[b]	2020 No Project LOS[c]	2020 Project Delay[b]	2020 Project LOS[c]	Change in Delay
46	Arguello Street & Brewster Avenue[d]	RC	AM	Signal	36.9	D	46.6	D	9.7
			PM		>120	F	115.3	F	-49.0
47	El Camino Real & Broadway Street[d]	RC	AM	Signal	60.6	E	58.9	E	-1.7
			PM		108.7	F	114.1	F	5.4
48	Arguello Street & Marshall Street[d]	RC	AM	Signal	47.2	D	34.4	C	-12.8
			PM		95.7	F	82.7	F	-13.0
49	El Camino Real & James Avenue[d]	RC	AM	Signal	29.2	C	28.8	C	-0.4
			PM		79.2	E	91.1	F	11.9
ZONE 3									
50	El Camino Real & Fair Oaks Lane	AT	AM	Signal	37.1	D	40.5	D	3.4
			PM		30.2	C	33.5	C	3.3
51	El Camino Real & Watkins Avenue	AT	AM	Side-street stop	35.3	E	43.1	E	7.8
			PM		**>120**	**F**	**>120**	**F**	**>60**
52	Fair Oaks Lane & Middlefield Road	AT	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	>-60
			PM		**>120**	**F**	**77.8**	**F**	>-60
53	Watkins Avenue & Middlefield Road	AT	AM	Side-Street Stop	**52.5**	**F**	**49.5**	**F**	-3.1
			PM		**>120**	**F**	**91.5**	**F**	-30.3
54	Glenwood Avenue & Middlefield Road	AT	AM	Side-Street Stop	**70.9**	**F**	**>120**	**F**	**50**
			PM		**>120**	**F**	**>120**	**F**	**>60**
55	El Camino Real & Glenwood Avenue	MP	AM	Signal	53.6	D	**94.6**	**F**	**41.0**
			PM		**72.1**	**E**	**111.8**	**F**	**39.7**
56	El Camino Real & Oak Grove Avenue	MP	AM	Signal	**56.3**	**E**	**66.6**	**E**	10.3
			PM		50.9	D	40.1	D	-10.8
57	El Camino Real & Santa Cruz Avenue	MP	AM	Signal	30.5	C	21.9	C	-8.6
			PM		27.9	C	29.4	C	1.5
58	Merrill St & Santa Cruz Avenue	MP	AM	All-way Stop	12.9	B	11.2	B	-1.7
			PM		**20.3**	**C**	**>120**	**F**	>60
59	Ravenswood Avenue & Alma Street	MP	AM	Side-Street Stop	40.6	E	29.8	D	-10.8
			PM		41.8	E	27.1	D	-14.7
60	El Camino Real & Ravenswood Avenue	MP	AM	Signal	**73.6**	**E**	**75.0**	**E**	1.4
			PM		**>120**	**F**	**>120**	**F**	1.8
61	Ravenswood Avenue & Laurel Street	MP	AM	Signal	**73.4**	**E**	37.0	D	-36.4
			PM		**>120**	**F**	50.1	D	>-60
62	Alma Street & Palo Alto Avenue	PA	AM	Side-Street Stop	8.4	A	13.3	B	4.9
			PM		12.4	B	31.4	D	19.0
63	Meadow Drive & Alma Street	PA	AM	Signal	**104.2**	**F**	**110**	**F**	**5.8**
			PM		**>120**	**F**	**>120**	**F**	**29.1**
64	El Camino Real & Alma & Sand Hill Road	PA	AM	Signal	**58.5**	**E**	**78.7**	**E**	**20.2**
			PM		54.9	D	53.5	D	-1.4
65	High Street & University Avenue	PA	AM	Signal	10.1	B	12.8	B	2.7
			PM		18.6	B	18.4	B	-0.2
66	Alma Street & Churchill Avenue	PA	AM	Signal	**83.9**	**F**	**108.9**	**F**	**25.0**
			PM		**>120**	**F**	**>120**	**F**	**9.2**
67	W Meadow Drive & Park Boulevard	PA	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	>-60
			PM		**>120**	**F**	**>120**	**F**	>-60
68	Alma Street & Charleston Road	PA	AM	Signal	**>120**	**F**	**>120**	**F**	28.4
			PM		**>120**	**F**	**>120**	**F**	9.0

Int. ID	Intersection	Jurisdiction	Peak Hour[a]	Intersection Control	2020 No Project		2020 Project		Change in Delay
					Delay[b]	LOS[c]	Delay[b]	LOS[c]	
69	Showers Drive & Pacchetti Way	MV	AM PM	Signal	4.4 5.0	A A	4.8 5.3	A A	0.4 0.3
70	Central Expressway & N Rengstorff Avenue	MV	AM PM	Signal	**>120** **>120**	**F** **F**	**>120** **>120**	**F** **F**	-10.9 **18.7**
71	Central Expressway & Moffett Boulevard & Castro Street	MV	AM PM	Signal	**>120** **>120**	**F** **F**	**>120** **>120**	**F** **F**	**37.2** **11.7**
72	W Evelyn Avenue & Hope Street	MV	AM PM	Signal	3.8 5.7	A A	3.8 5.8	A A	0 0.1
73	Rengstorff Avenue & California Street	MV	AM PM	Signal	29.5 **55.6**	C **E**	31.4 40.5	C D	1.9 -15.1
74	Castro Street & Villa Street	MV	AM PM	Signal	11.7 **65.5**	B **E**	14.7 **68.5**	B **E**	3.0 3.0
75	W Evelyn Avenue & S Mary Avenue	SV	AM PM	Signal	**68.7** **80.1**	**E** **F**	**56.7** **97.3**	**E** **F**	-12.0 **17.2**
76	W Evelyn Avenue & Frances Street	SV	AM PM	Signal	20 26.3	B C	31.9 36.6	C D	11.9 10.3
ZONE 4									
77	Kifer Road & Lawrence Expressway[e]	SCL	AM PM	Signal	111.4 >120	F F	114.6 >120	F F	3.2 2.9
78	Reed Avenue & Lawrence Expressway	SCL	AM PM	Signal	**107.3** **86.4**	**F** **F**	**107.4** **68.1**	**F** **F**	0.1 -18.3
79	El Camino Real & Railroad Avenue	SCL	AM PM	Signal	17.8 21.9	B C	20.1 22.1	C C	2.3 0.2
80	W Santa Clara Street & Cahill Street	SJ	AM PM	Signal	25.8 47.8	C D	23.0 **62.8**	C **E**	-2.8 **15.0**
81	S Montgomery Street & W San Fernando Street	SJ	AM PM	Signal	22.8 **64.3**	C **E**	29.0 **>120**	C **F**	6.2 **>60**
82	Lick Avenue & W Alma Avenue	SJ	AM PM	Signal	23.2 30.3	C C	31.4 45.6	C D	8.2 15.3

Source: Appendix D, *Transportation Analysis*

Notes:

Jurisdictions:

SF	San Francisco	SM	San Mateo	MV	Mountain View
SSF	South San Francisco	BL	Belmont	SV	Sunnyvale
SB	San Bruno	SC	San Carlos	SCL	Santa Clara
MB	Millbrae	RC	Redwood City	SCC	Santa Clara County
BG	Burlingame	AT	Atherton	SJ	San Jose
MP	Menlo Park	PA	Palo Alto		

[a] AM = morning peak hour, PM = afternoon peak hour

[b] Delay measured in seconds

[c] LOS designation pursuant to 2010 Highway Capacity Manual

[d] Downtown Redwood City has no level of service standard for intersections in the *Downtown Precise Plan* area (Policy BE-29.4).

[e] City of Santa Clara level of service exemptions exist for new development, to facilitate alternate transportation in Station Focus Areas.

Bold font represents an LOS that is below the established threshold of significance as per the Significance Criteria

Bold Underline font represents locations and conditions where the Proposed Project would result in a significant impact relative to the No Project scenario.

Based on a prototypical schedule.

Mitigation Measure TRA-1c: Implement signal optimization and roadway geometry improvements at impacted intersections for the 2020 Project Condition

Table 3.14-17 summarizes the intersection impacts and the associated mitigation measures proposed to minimize localized traffic impacts. Detailed description for improvements at each impacted intersections are included in the transportation analysis report in Appendix D, *Transportation Analysis*. Possible mitigation measures include signal optimization and roadway geometry improvements, as discussed below:

- Signal optimization: Signal timing optimization would be performed to reduce delay at signalized intersections. This can include optimizing the cycle time, splits, and phasing. In addition, for closely spaced intersections, optimizing the offset and better signal coordination will also reduce delay.
- Roadway geometry changes: Changing the roadway geometry could help reduce intersection delay. This would include changing the roadway width by widening the street or changing the existing geometry configuration through restriping. Intersection #64 (El Camino Real and Alma Street and Sand Hill Road) is an example of where roadway geometry could be altered as a mitigation measure to reduce intersection delay.

Table 3.14-17. Summary of Intersection Impacts and Mitigation Measures

Int. ID	Intersection	Impacted Peak Hour	Mitigation Strategies	Impact Significance after Mitigation
Signalized Intersections				
1	4th Street and King Street	PM	Revise signal timing and phasing to better coordinate with 4th Street and Townsend Street	Less than significant
2	4th Street and Townsend Street	PM	Revise signal timing and phasing to better coordinate with 4th Street and King Street	Less than significant
5	7th Street and 16th Street	AM	Widen northbound approach to lengthen left turn pocket Remove parking lane to create a third lane for the eastbound approach Revise signal timing and phasing to better coordinate with 16th Street and Owens Street	Less than significant
16	El Camino Real and Millbrae Avenue	AM and PM	Adjust signal timings to better serve traffic after project implementation	Less than significant
17	Millbrae Avenue and Rollins Road	PM	Adjust signal timings to better serve traffic after project implementation	Less than significant
18	California Drive and Broadway	AM and PM	Adjust signal timings to better serve traffic after project implementation	Less than significant
36	E Hillsdale Boulevard and El Camino Real	AM	Adjust signal timings to better serve traffic after project implementation	Less than significant
55	El Camino Real and Glenwood Avenue	AM and PM	Adjust signal timings to better serve traffic after project implementation	Significant and unavoidable[a]
56	El Camino Real and Oak Grove Avenue	AM	Adjust signal timings to better serve traffic after project implementation	Significant and unavoidable[a]
63	Meadow Drive and Alma Street	AM and PM	No feasible mitigations exist[b]	Significant and unavoidable
64	El Camino Real and Alma Street and Sand Hill Road	AM	Widen west leg of Sand Hill Road by adding one lane to allow southbound right turns on red Adjust signal timings to better serve traffic after project implementation	Less than significant
66	Alma Street and Churchill Avenue	AM and PM	No feasible mitigations exist[b]	Significant and unavoidable
68	Alma Street and Charleston Road	AM and PM	No feasible mitigations exist[b]	Significant and unavoidable
70	Central Expressway and N Rengstorff Avenue	PM	No feasible mitigations exist[b]	Significant and unavoidable
71	Central Expressway and Moffett Boulevard and Castro Street	AM and PM	No feasible mitigations exist[b]	Significant and unavoidable

Int. ID	Intersection	Impacted Peak Hour	Mitigation Strategies	Impact Significance after Mitigation
75	W Evelyn and S Mary Avenue	PM	No feasible mitigations exist[c]	Significant and unavoidable
80	W Santa Clara Street and Cahill Street	PM	Adjust signal timings to better serve traffic after project implementation	Less than significant
81	South Montgomery Street and W San Fernando Street	PM	Adjust signal timings to better serve traffic after project implementation	Less than significant
Stop-Controlled Intersections				
21	Carolan Avenue and Oak Grove Avenue	AM and PM	Signalize intersection	Significant and unavoidable[d]
51	El Camino Real and Watkins Avenue	AM and PM	Signalize intersection	Less than significant
54	Glenwood Avenue and Middlefield Road	AM and PM	Signalize intersection	Less than significant

Source: Appendix D, *Transportation Analysis*

[a] Less-than-significant after mitigation but a secondary impact would be produced at Intersection #61 (Ravenswood Avenue and Laurel Street). After mitigation, the delay would increases by more than 4 seconds at Intersection #61.

[b] Addition of through lanes along Central Expressway and Alma Street may reduce the impact at this location, but the addition of through lanes is subject to ROW constraints and is, therefore, infeasible.

[c] Implementation of a grade-separated crossing may reduce the impact but is subject to fiscal constraints. Therefore, this mitigation is considered infeasible for purposes of this document.

[d] Intersection impacts would be less than significant after mitigation, but a secondary impact would be produced at Intersection #20 (California Drive and Oak Grove Avenue) with the signalization of Carolan Avenue/Oak Grove Avenue. After mitigation, average vehicle delay would increase by more than 4 seconds at Intersection #20.

Transit Systems

Impact TRA-2a	Disrupts existing or planned transit services or facilities during construction
Level of Impact	Significant
Mitigation Measures	TRA-1a: Implement construction road Traffic Control Plan TRA-2a: Implement Construction railway disruption control plan
Level of Impact after Mitigation	Less than significant

During the construction, installation of OCS poles and wires would require the use of on-track equipment in many locations. The majority of the work could be accomplished during the nighttime using single-track access; however, some portions of the work would require some multiple track shutdowns and could only be installed by using complete weekend outages, requiring suspension of passenger service, to increase working efficiency and reduce public safety risks. Although most of the on-track work would be conducted during nighttime hours with occasional service shutdowns occurring during weekends, the construction impact on Caltrain passengers (or ACE, Capitol Corridor, or Amtrak trains between Santa Clara and San Jose) that take trains at night or on the weekend is considered significant.

In addition, to accelerate construction completion, construction strategies to improve construction efficiency with minimizing construction impacts are included in the Proposed Project as shown in Chapter 2, *Project Description*, Table 2-5. The strategies that could potentially disrupt Caltrain service and affect Caltrain passengers and the connecting transit services include revising the Caltrain schedule, reducing the span of Caltrain service day, reducing the number of trains, shutting down service for specific weekends, and closing a station temporarily during construction. Although specific strategies have yet been determined, any of the strategies, if selected, would result in temporary significant impacts on Caltrain passengers and the connecting transit services.

Implementation of Mitigation Measure TRA-2a would reduce the temporary construction impact on rail passenger and freight service disruption to a less-than-significant level by minimizing the duration of potential disruption to service during construction.

Similar to Impact TRA-1a**,** construction impact on roadway transit services could be potentially significant when temporary lane or road closures are required on roadway segments, bridges, and at-grade crossings with transit services. Implementation of Mitigation Measure TRA-1a would reduce the temporary construction impact on roadway transit services to a less-than-significant level.

Mitigation Measure TRA-2a: Implement construction railway disruption control plan

The JPB will make the efforts to contain disruption to Caltrain, tenant passenger, and freight services during construction. Measures that will be implemented throughout the course of project construction, will include, but not limited to, the following:

- Require contractors to coordinate with rail dispatch to minimize disruption of rail service in the corridor.

- Where feasible, limit closure of any tracks for construction activities to off-peak periods and weekends, when service is less frequent or late night, when no passenger service is scheduled.
- Where feasible, maintain acceptable service access for passenger and freight service.
- Where one open track cannot be maintained for passenger or freight use, limit multi-track closures to one location at a time, as much as feasible
- Where multi-track closures result in temporary elimination of transit rail service, work with local and regional transit providers to provide alternative transit service around the closure area including increased bus and shuttle service.
- Provide advance notice of all construction-related track closures to all affected parties. Provide advance notice to transit riders of any temporary disruption in transit service.

Impact TRA-2b	Creates demand for public transit services above the capacity which is provided or planned; interferes with existing or planned transit services or facilities; or conflicts or creates inconsistencies with adopted transit system plans, guidelines, policies, or standards from Proposed Project operations
Level of Impact	Beneficial (Caltrain); Less than Significant (other transit services)

Proposed Project implementation would not conflict or create inconsistences with adopted transit plans, guidelines, policies or standards adopted by study area cities, counties, the MTC, or the State of California. Some of the adopted plans would extend through 2020 or expire after. On the city level, Caltrain is a beneficial component of currently approved and ongoing station area plans, downtown specific plans, and general plans. In some cases, a city's Caltrain station is the focal point of a plan or at least a major aspect of the circulation element within the city's general plan. On the regional level, Caltrain is consistent with *Plan Bay Area*. The Proposed Project is one of the major projects included in *Plan Bay Area*. *Plan Bay Area* serves as the region's SCS and the 2040 Regional Transportation Plan (preceded by *Transportation 2035 Plan for the San Francisco Bay Area*), integrating transportation and land-use strategy to manage greenhouse gas emissions and plan for future population growth. The transition from a diesel-hauled to electrified (EMU) fleet would contribute to regional greenhouse gas reduction goals. On the state-level, Caltrain is consistent with the State's blueprint for meeting future mobility needs. For example, the electrification of Caltrain would contribute to the quality environment goals, as EMUs are far more environmentally efficient than diesel-hauled locomotives. As a result, the impact of the Proposed Project relative to transit planning would be less than significant and beneficial.

Caltrain Transit Ridership and System Capacity

Table 3.14-18 displays ridership projections for the No Project and Project scenarios in 2020.

Table 3.14-18. Daily Ridership Forecasts by Station, San Francisco 4th and King to Tamien[a]

Station	Existing Conditions	2020 No Project	2020 Project
4th and King	10,790	13,000	14,340
22nd Street	1,310	1,950	2,310
Bayshore	200	440	730
South San Francisco	360	550	800
San Bruno	440	480	500
Millbrae	3,260	3,970	5,130
Broadway	0	0	390
Burlingame	790	890	760
San Mateo	1,570	1,740	1,910
Hayward Park	330	490	1,070
Hillsdale	2,320	2,740	3,370
Belmont	510	510	750
San Carlos	1,140	1,370	1,440
Redwood City	2,620	2,970	3,180
Atherton	0	0	280
Menlo Park	1,530	1,580	1,520
Palo Alto	5,470	6,380	7,910
California Avenue	1,290	1,410	1,380
San Antonio	680	750	840
Mountain View	3,876	4,580	5,920
Sunnyvale	2,270	2,720	3,280
Lawrence	700	920	1,160
Santa Clara	820	890	1,090
College Park[b]	--	--	--
San Jose Diridon	3,490	4,270	5,600
Tamien	810	1,220	2,100
Total	**46,560**	**55,830**	**67,730**

Source: Appendix D, *Transportation Analysis*.

[a] Excludes boardings south of Tamien Station

[b] No service increases are proposed at the College Park Station and ridership at this station is very low at present (118 boardings/day). While College Park boardings are included in overall system ridership estimates, no analysis of localized traffic around this station was conducted given the low level of boardings and lack of proposed service increases.

Under the No Project scenario, corridor population and employment growth accompanied by changes to other transit connections and increases in highway congestion would contribute to the increase of Caltrain ridership, compared with the current condition. The change is not evenly distributed across all stations in the study area. With higher land use growth and transit connectivity, stations experiencing the greatest ridership increases, in percentage, would be 22nd Street, Bayshore, South San Francisco, San Bruno, and Hayward Park. These ridership gains are in line with the steady growth in Caltrain ridership since 2006. In percentage terms, San Francisco 4th and King would be one of the lowest growth stations, reflecting a redistribution of the trip origins and destinations to shorter intra-Peninsula travel in the future.

Proposed Project implementation would further increase the ridership because the Proposed Project would increase train frequencies and improve service levels as EMUs would be able to make more stops while maintaining travel times. The Proposed Project would raise 2020 ridership by 21 percent over the 2020 No Project condition. Stations with the greatest ridership increases in percentage between 2020 No Project and 2020 Project would be Bayshore, South San Francisco, Hayward Park and Tamien. Compared with 2020 No Project, small decreases in ridership are projected for Burlingame, Menlo Park, and California Avenue.

It should be noted that the specific station ridership forecasts are based on a prospective 2020 schedule that was developed only for analytical purposes for this EIR. The actual schedule may vary, which could influence some of the local station ridership, but would not be expected to substantially change the overall system ridership estimates. In advance of mixed service in 2020, Caltrain staff would analyze station-to-station ridership patterns and conduct public outreach to develop the actual customer timetable.

As a result, the impact would be less than significant and beneficial for the Caltrain system.

Ridership and Impact on Connecting Transit Systems

The ridership projections on the regional transit systems that connect to the Caltrain service assume that transit systems that currently connect to Caltrain, as described above, would remain in service in 2020. In addition, as described above, transit connections and extensions that were planned to open by years 2020 are also reflected in the projection. The planned transit projects are described in detail in Appendix D, *Transportation Analysis*, and Appendix I, *Ridership Technical Memorandum*. Ridership projections for connecting systems are derived from the VTA model. Ridership projections for the following systems are summarized in Table 3.14-19.

As shown in Table 3.14-9, the total number of system-wide boardings on Caltrain would be greater for the Project scenario than under the No Project scenario. The added Caltrain boardings associated with the Project scenario would result in a need for increased connecting transit services. Therefore, ridership on connecting systems would increase by 1.4 percent for the 2020 Project condition as compared with 2020 No Project condition.

Table 3.14-19. Ridership on Transit Systems Connecting to Caltrain

Connecting Transit System	Existing Conditions (observed)	No Project	Project	Change Project vs. No Project
BART	366,600	459,500	459,100	-0.1%
SamTrans Bus (Local and BRT)	39,800	73,400	75,800	3.3%
VTA Light Rail	34,600	70,600	70,700	0.1%
VTA Bus (Local and BRT)	103,100	165,600	167,100	0.9%
VTA BRT	-	42,500	42,500	0.0%
Muni Metro	173,500	203,800	205,200	0.7%
Muni Bus	531,700	592,600	595,500	0.5%
Shuttles (Public and Private)	NA	12,200	16,600	36.1%
Total	1,250,600	1,626,000	1,648,800	1.4%

Source: Appendix D, *Transportation Analysis*
BRT = bus rapid transit

As shown in Table 3.14-19, growth in the region by 2020 will increase demand for increased transit service. The Proposed Project is one of many projects in the planning phase to address that increased demand.

One concern is that the Proposed Project might result in induced ridership for other systems that would result in changes in physical conditions such as through the construction of additional transportation infrastructure to address the increased ridership. As shown in Table 3.14-19, compared with the 2020 No Project scenario, the Proposed Project is expected to slightly lower ridership on BART and slightly increase ridership on VTA and Samtrans. The largest induced ridership for public transit systems would be for SamTrans bus service (+ 3.3 percent). While the increased demand may increase the need for bus service and vehicles, given that Caltrain facilities already contain bus connections and the modest level of increase, the induced ridership is not expected to result in substantial new capital improvements for SamTrans beyond that which it would plan for without the Proposed Project. A similar conclusion applies for other public transit systems, all of which are estimated to have less than 1 percent increases due to induced ridership from the Proposed Project. Like Caltrain, other transit providers must plan for their future needs and construct the facilities to meet their system rider demands as feasible given funding availability.

The Proposed Project would also contribute substantially to increases in Caltrain and private shuttles. Although this increase by itself is not expected to require substantial new facilities, it would contribute to the need for bus shelters, stops, and maintenance facilities.

Because infrastructure improvements for transit services other than Caltrain and their funding are outside the responsibility of the JPB, the responsibility for managing the environmental effects of any additional transit facilities or service that might be necessary to meet future demands lies with each transit operator. For future improvements that may be necessary to accommodate increased Caltrain shuttle service due to increased ridership from the Proposed Project, such as shuttle bus stops, shelters, or other facilities, Caltrain will be required to complete the appropriate state (and federal if required) environmental review for such improvements and shall adopt feasible mitigation for any significant environmental impacts thus identified. For future improvements that may be necessary to accommodate increased other transit service due to increased ridership from the Proposed Project, the responsible transit operations will be required complete the appropriate state (and federal if required) environmental review for such improvements and shall adopt feasible mitigation for any significant environmental impacts thus identified.

At this time, it appears unlikely that the relatively modest increases in ridership for other transit services due to the Proposed Project would require the construction of additional transit infrastructure. Thus any secondary impacts due to construction of additional facilities would be less than significant and the Proposed Project's impact related to induced demand for additional transit infrastructure would be less than significant.

Potential Conflicts between Proposed Project and Other Planned Transit Systems

Potential safety, operational, or construction conflicts between the other planned transit systems and the Proposed Project such as SFMTA's proposal to reroute the 22-Fillmore Electric Trolley Bus to 16th Street, the Downtown Extension, or the BART Silicon Valley Extension are addressed separately in Section 4.1, *Cumulative Impacts*.

Impact TRA-2c	Substantially increase hazards for transit system operations because of a design feature or otherwise substantially compromise the safety of transit facilities
Level of Impact	Less than significant

Under existing conditions, Caltrain operates a commuter railroad of 92 trains per day between San Jose and San Francisco at speeds up to 79 mph. Caltrain trains operate along the corridor in compliance with FRA requirements applicable to the different segments of the corridor in terms of speed and clearances required to safely operate the railroad. At-grade crossing warning devices are in place to provide advanced warning to motorists, pedestrians, and bicyclists of approaching trains and Caltrain trains use train horns per the FRA horn regulations to provide additional warning for safety purposes.

As described in Section 3.14.2.1, *Methods for Analysis*, Caltrain is presently enhancing the safety of the Caltrain corridor through the CBOSS PTC project, which will be completed by 2015. PTC helps to eliminate the potential for train-to-train collisions and over-speed rule violations (trains exceeding the civil speed limit). The train will be automatically stopped before collisions occur. It also provides additional safety for railroad workers on the tracks and requires interoperability between all rail services operating on the same tracks. This interoperability assures compliance among all vehicles using the same tracks with the PTC system. This is important for Caltrain as other operators on Caltrain tracks include intercity rail and freight. The Caltrain CBOSS PTC project also specifies additional capabilities to enable increased safety and operating performance for Caltrain and future high-speed rail service.

Additional benefits of the CBOSS PTC project include:

- Increased operating performance of the current signal system, enabling more frequent and more dependable passenger service to meet growing demand.
- Improved at-grade crossing warning functions.
- Integrated communication among all subsystems (such as the central control facility, train and wayside) for improved safety performance for highway vehicles and the riding public.
- Safe operations between Caltrain and other tenant railroads.

The CBOSS PTC project will improve safety along the corridor compared with existing conditions for both the 2020 No Project and 2020 Project scenarios.

The Proposed Project would increase daily service to 114 trains per day by 2020. These trains would operate at speeds up to 79 mph, the same top speed as at present. The proposed EMUs can accelerate and decelerate faster than diesel locomotives, which can help to improve safety because, in the event of an emergency, the EMUs would be able to stop in a shorter distance than diesel locomotives. Even though the number of trains would increase by approximately 20 percent, given the increased performance and control with the new EMUs and the safety benefit of CBOSS PTC, there should not be an increased risk of collision with vehicles, pedestrians, and bicycles compared with the existing conditions or compared with the 2020 No Project scenario.

As discussed in Section 3.8, *Hazards and Hazardous Materials*, the Proposed Project's new OCS would not pose an impediment to routine emergency equipment access for the Caltrain system or connecting transit systems like BART, SamTrans, Muni, or VTA and the Proposed Project would not have a significant impact on emergency response or evacuation plans.

As discussed in Section 3.13, *Public Services and Utilities*, the OCS would be installed in compliance with industry safety standards and the future applicable CPUC General Order developed for 25 kVA systems concerning electrical safety operation. Vegetation and structural clearances would be maintained to provide for electrical safety.

As discussed below, the Proposed Project would provide adequate vertical clearance for both existing passenger rail vehicles as well as freight vehicles to safely operate on the Caltrain corridor as well as comply with any applicable FRA waiver requirements for temporal separation between EMUs and heavy freight trains to minimize the risk of freight-passenger collisions[4].

Thus, the Proposed Project would have a less-than-significant impact related to transit system hazards and safety.

Pedestrian Systems

Impact TRA-3a	Disrupts existing or planned pedestrian facilities during construction
Level of Impact	Significant
Mitigation Measure	TRA-1a: Implement construction Traffic Control Plan
Level of Impact after Mitigation	Less than significant

Construction impact on pedestrian facilities would be limited to locations where sidewalks or paths would require temporary closure to facilitate construction activities. This would occur related to closure of at-grade crossings when installing OCS infrastructure or when relocating utilities. The impact could be significant on pedestrian facilities, when temporary sidewalk or walking path closure is required. Implementation of Mitigation Measure TRA-1a would reduce the temporary construction impact to a less-than-significant level.

[4] FRA initiated rule-making in 2013 regarding standards for alternative compliant vehicle. It is possible that FRA may consider revisions to the current requirements for temporal separation which may allow for wider freight operational hours than specified in the FRA waiver.

Impact TRA-3b	Disrupts existing pedestrian facilities, interferes with planned pedestrian facilities, or conflicts or creates inconsistencies with adopted pedestrian system plans, guidelines, policies, or standards from Proposed Project operations
Level of Impact	Significant
Mitigation Measure	TRA-3b: In cooperation with the City and County of San Francisco, implement surface pedestrian facility improvements to address the Proposed Project's additional pedestrian movements at and immediately adjacent to the San Francisco 4th and King Station
Level of Impact after Mitigation	Less than significant

Many cities are locating pedestrian facilities in locations near and complementary to Caltrain station areas. In some instances, pedestrian infrastructure enhancements are included in a city or county's bicycle or pedestrian plan, such as in the *City of South San Francisco Bicycle Master Plan* and the *San Mateo County Comprehensive Bicycle and Pedestrian Plan*. A full list and summaries of these pedestrian and bicycle plans for study area jurisdictions is in Appendix D, *Transportation Analysis*.

Increased ridership under Proposed Project conditions would subsequently cause increased pedestrian volumes at pedestrian facilities surrounding Caltrain stations. The existing pedestrian facilities were evaluated to determine if pedestrian facilities would be capable of accommodating increased pedestrian volumes. Results showed the existing facilities are capable of accommodating increased pedestrian volumes at all stations with the exception of the 4th and King Station in San Francisco.

Existing pedestrian facilities, including sidewalks and crosswalks, surrounding the 4th and King Station currently experience high levels of pedestrian activity. This trend is projected to continue in future years.

As discussed in Appendix D, *Transportation Analysis*, boardings at the 4th and King Station would increase from 10,700 under existing conditions to 13,000 under 2020 No Project conditions or to 14,340 with the Proposed Project (an increase of 1,340 over 2020 No Project conditions). In 2040, without the Proposed Project (and the San Francisco Downtown Extension [DTX] and Transbay Transit Center [TTC]), daily boardings at the 4th and King Station would increase to 16,560. In 2040, with the Proposed Project (and DTX/TTC), boardings would increase to 15,230 (1,330 fewer boardings than under 2040 No Project conditions). There would be fewer boardings because customers would continue to the TTC located in downtown San Francisco instead of getting off at the 4th and King station. Thus, the Proposed Project would contribute to increased pedestrian activity from 2020 until DTX/TTC infrastructure is completed. Other transit improvements in proximity to the 4th and King stations, such as the Central Subway project, would also add pedestrians in this area.

Due to existing high levels of pedestrian activity and the anticipated increase in pedestrian activity under Proposed Project conditions as compared with No Project conditions, pedestrian facility capacity may be exceeded in 2020. Pedestrian facility flow and safety improvements will be implemented pursuant to Mitigation Measure TR-3b described below to allow the orderly movement of pedestrians, bicyclists, private vehicles, buses, and shuttles around the 4th and King Station. With this mitigation, the impact at the San Francisco 4th and King Station would be less than significant.

Mitigation Measure TRA-3b: In cooperation with the City and County of San Francisco, implement surface pedestrian facility improvements to address the Proposed Project's additional pedestrian movements at and immediately adjacent to the San Francisco 4th and King Station

The JPB, in cooperation with the City and County of San Francisco, will improve surface pedestrian facilities at the San Francisco 4th and King Station where needed to accommodate the Proposed Project's increase in pedestrian volumes. This mitigation applies to increased pedestrian traffic under Proposed Project conditions that would occur within the impact window beginning in 2020 and ending when DTX/TTC is fully operational.

Both the JPB and the City and County of San Francisco will implement a pedestrian access study to identify the surface improvements necessary to accommodate the Proposed Project's increased pedestrian demand during the impact window identified above. The JPB's responsibility will be to implement mutually agreed upon improvements necessary to accommodate pedestrian demand within the Caltrain station and JPB-owned right-of-way. The City and County of San Francisco will be responsible for implementing improvements on City streets and the public right-of-way surrounding the 4th and King Station. Because there are multiple contributors to pedestrians to the station, including Caltrain, Muni Metro J and T Lines, Muni bus lines, the future Central Subway, and other transit line and local land use development, cost shall be shared on a fair-share basis as determined mutually by the JPB and the City and County of San Francisco.

The following surface improvements to pedestrian facilities will address increased pedestrian demand caused by the Proposed Project. These improvements will be studied in detail in the pedestrian access study.

- Widened curb waiting areas and added pedestrian bulbouts where high levels of demand cannot be accommodated by existing facilities.
- A pedestrian "scramble" at the intersection of 4th and Townsend Streets. A pedestrian scramble is an intersection that is striped and designed to allow pedestrians to cross diagonally in all directions during an all-way red signal at which all motor vehicles are stopped.
- Signalization improvements for both 4th and Townsend and 4th and King intersections. While a pedestrian scramble is not likely to be feasible at the intersection of 4th Street and King Street due intersection size, traffic volumes, and SMFTA at-grade transit operations, all-way pedestrian signals at existing crosswalks are potentially feasible.
- Widened crosswalks to increase pedestrian volumes and improve pedestrian sidewalk widths on the immediate approaches to the intersections of 4th and Townsend and 4th and King Streets, as appropriate and feasible.
- Pedestrian safety countermeasures, such as pedestrian barriers and improved signage, as necessary to address safety issues that are directly related to increased pedestrian volumes at station access points.

The improvements identified in the access study shall be completed in a manner that does not interfere with SMTA bus operations, SFMTA Metro or bicycle facilities in and around the station area.

This measure does not include any above- or below-ground pedestrian facilities, because the Proposed Project's impact can be address through feasible surface treatments described above.

Bicycle Facilities

Impact TRA-4a	Substantially disrupts existing bicycle facilities or interferes with planned bicycle facilities during construction
Level of Impact	Significant
Mitigation Measure	TRA-1a: Implement construction Traffic Control Plan
Level of Impact after Mitigation	Less than significant

Construction impact on bicycle facilities would be similar to the impact discussed in Impact TRA-3a. The impact would be significant on bicycle facilities when temporary shoulder or road closures are required on roadway segments, bridges, and at-grade crossings with bicycle lanes or high bicycle traffic. Implementation of Mitigation Measure TRA-1a would reduce the temporary construction impact to a less-than-significant level.

Impact TRA-4b	Substantially disrupts existing bicycle facilities or interferes with planned bicycle facilities; or conflicts or creates substantial inconsistencies with adopted bicycle system plans from Proposed Project operations
Level of Impact	Significant
Mitigation Measure	TRA-4b: Continue to improve bicycle facilities at Caltrain stations and partner with bike share programs where available following guidance in Caltrain's Bicycle Access and Parking Plan
Level of Impact after Mitigation	Less than significant

The Proposed Project may increase future demand for bicycle facilities however, most plans in the study area account for increased bicycle volumes through added bicycle infrastructure. The Proposed Project would not change the alignment and does not impede any existing or planned bicycle projects because the new improvements are limited to overhead infrastructure and the TPFs (which do not affect bicycle facilities).

Caltrain would continue accommodating bicycles on board EMUs. Any unmet on-board demand for bikes-on-board could be accommodated through the provision of increased bike parking at stations. This would allow passengers to safely and securely park their bikes before boarding the train. If a passenger is in need of a bike to egress from their destination station, they may also be able to use Bay Area Bike Share, travel by another mode, or to leave a bike securely parked at their destination station to facilitate their last-mile connection. Although long-range future plans for Bay Area Bike Share are not yet available, the program would be expanded to include 1,000 bikes and 100 stations in 2014 (Cabanatuan 2013).

As explained above, Caltrain's *Bicycle Access and Parking Plan* includes a long-term plan of increasing bicycle parking supply for a variety of user needs, improving station access for bicyclists, working with cities to improve station bike access, and considering other station-side concepts.

Mitigation Measure TRA-4b would require Caltrain to continue implementation of its current planning improve bicycle facilities at Caltrain stations using the guidance provided in the *Bicycle Access and Parking Plan.* Over time Caltrain will use these guidelines to meet potential increased demand for such facilities. Thus, with mitigation, the Proposed Project would have a less-than-significant impact on bicycle facilities.

Mitigation Measure TRA-4b: Continue to improve bicycle facilities at Caltrain stations and partner with bike share programs where available, using the guidance in the Caltrain's Bicycle Access and Parking Plan

Caltrain will improve bicycle facilities at Caltrain stations where needed to accommodate increased demand over time for such facilities including bike parking and bike lockers necessary to safely and securely park bikes that are not taken on the train. Caltrain will work local and regional bike share programs to provide opportunities for Caltrain riders to utilize bike share facilities located at Caltrain stations (where feasible) or nearby (where not).

Emergency Vehicle Access

Impact TRA-5a	Results in inadequate emergency vehicle circulation and/or access during construction
Level of Impact	Significant
Mitigation Measure	TRA-1a: Implement construction Traffic Control Plan
Level of Impact after Mitigation	Less than significant

The Proposed Project could have a temporary impact on emergency vehicle access if an emergency occurs at the time when the Proposed Project construction requires temporary access or egress limitations. As described above, Mitigation Measure TRA-1a will require the preparation of a traffic control plan to help ensure continued emergency access to Caltrain ROW, at-grade crossings, and all nearby properties. Caltrain will coordinate with local public works department, local emergency providers, and Caltrans in the development of the traffic control plan to specifically address emergency response concerns. Thus, with mitigation, the Proposed Project's impact related to emergency response or evacuation would be less than significant.

Impact TRA-5b	Results in inadequate emergency vehicle circulation and/or access from Proposed Project operations
Level of Impact	Less than significant

The existing roadways surrounding Caltrain stations in the study area enable emergency vehicle response to all areas. Emergency vehicles often identify and use multiple routes dependent upon time of day and traffic conditions. Peak period traffic congestion generally does not result in delay for emergency vehicles, which have ROW and often utilize multi-lane major arterials for access. Emergency vehicles are permitted to use transit-only lanes or other vehicle-restricted lanes if necessary.

Emergency vehicles traveling on streets that cross the at-grade crossings would experience some additional delay at the intersections that would exceed the acceptable levels of service and that would have longer gate-down times with Proposed Project implementation. Unlike at intersections with traffic signals where emergency vehicles can pass through the intersection at reduced speeds even when receiving a red signal indication, emergency vehicles would not be able to cross through the at-grade crossings when the railroad gates are down. This may cause some minor delay to emergency vehicles, though delays would not substantially differ from typical congestion that already occurs around at-grade crossing locations and would only affect the small number of emergency vehicles that are actually traveling though study intersections.

Despite these localized traffic delay impacts, emergency vehicle response times are a function of travel along the entire path from their base to the incident location. The Proposed Project overall would substantially reduce overall vehicle miles travelled in the Peninsula corridor by approximately 235,000 miles/day in 2020 (compared with the No Project scenario) which would substantially improve congestion on a broad general basis. Most of the VMT reductions would be during peak hours, which is especially important in reducing congestion. The broad-based congestion improvement is expected to more than offset the localized effects at individual at-grade crossings and near Caltrain stations and result in a net improvement (compared with the No Project Scenario) in the emergency response times.

As a result, impacts related to emergency vehicle access and emergency response times would be considered less than significant.

Station Vehicle Parking and Access

Impact TRA-6a	Provide inadequate parking supply during construction
Level of Impact	Less than significant

Vehicle parking for construction vehicles, equipment, and workers is expected to be provided within Caltrain ROW and staging and access areas identified in Chapter 2, *Project Description*. Therefore, the parking supply on areas near the construction sites is not anticipated to be affected by the construction. The parking impact is considered less than significant.

Implementation of Mitigation Measure TRA-1a would further reduce the impact.

Impact TRA-6b	Does not meet Caltrain's *Comprehensive Access Program Policy Statement* or *Bicycle Access and Parking Plan* or would result in the construction of off-site parking facilities that would have secondary physical impacts on the environment from Proposed Project operations
Level of Impact before Mitigation	Less than significant

The Proposed Project would not interfere with the implementation and completion of the *Comprehensive Access Program Policy Statement* or the *Bicycle Access and Parking Plan*. The Proposed Project would increase both vehicular traffic around Caltrain stations but locations with high vehicle volumes are signalized and allow pedestrians to cross safely. No additional new at-grade crossings are planned with the Proposed Project and the implementation of CBOSS PTC further improves safety.

The remainder of this section concerns station parking facilities.

Parking is currently provided by Caltrain at most existing stations with the exception of the San Francisco 4th and King and the 22nd Street Stations. Most stations have supplemental parking options including on-street parking and non-Caltrain parking lots. System-wide, most Caltrain lots reach capacity prior to off-site lots and on-street spots; therefore, parking demand analysis for future scenarios take into account the capacity at Caltrain lots and the capacity from on-street parking and non-Caltrain lots within 0.25 miles of the Caltrain station.

Modeling of potential parking demand was completed for informational purposes based on behavioral forecasts (see Appendix D, *Transportation Analysis*). Actual parking demand will fluctuate based on day and month and based on people's changing mode of access to Caltrain. The parking supply and demand forecasted for 2020 is shown in Table 3.14-20.

The parking demand is forecasted to increase by 2020 at most stations regardless of the Proposed Project. This increase is due to increased ridership and changes in future modes of access. Although existing on street and non-Caltrain lot parking would accommodate some excess demand, there are still stations that exceed the supply of on-street parking, non-Caltrain and Caltrain lots. These stations include 4th and King, 22nd Street, South San Francisco, Hillsdale, Mountain View, Sunnyvale, and Tamien in the 2020 scenario. At most stations where impacts occur under Project scenarios they also occur in No Project scenarios, though to a lesser extent.

Caltrain's 2010 *Comprehensive Access Program Policy Statement*, emphasizes station access by walking, transit, and bicycling over automobile access at most stations. The policy targets different access strategies at different stations based on the station characteristics and access opportunities. For example, the San Francisco 4th and King Station is a transit center where the access priority for autos is the lowest priority after transit, walking and bicycles. At intermodal connectivity and neighborhood circulator stations, auto access is not a priority. At auto-oriented stations, auto access is the primary priority access mode followed by biking.

Table 3.14-20. Excess Weekday Parking Demand Beyond Capacity of Caltrain Lots and On-Street Parking

Station	2020 No Project	2020 Project
4th and King	35	124
22nd Street	0	18
Bayshore	0	0
South San Francisco	0	14
San Bruno	0	0
Millbrae	0[a]	0[a]
Broadway	No data	0
Burlingame	0	0
San Mateo	0	0
Hayward Park	0	0
Hillsdale	0	33[b]
Belmont	0	0
San Carlos	0	0
Redwood City	0	0
Atherton	-	0
Menlo Park	0	0
Palo Alto	0	0
California Avenue	0	0
San Antonio	0	0
Mountain View	0	136
Sunnyvale	189	447[c]
Lawrence	0	0

Station	2020 No Project	2020 Project
Santa Clara	0	0
San Jose Diridon	0	0
Tamien	0	455
Total Excess Demand	224	1,227

Source: Appendix D, *Transportation Analysis*
[a] Includes use of shared parking with BART.
[b] Includes potential loss of 10 spaces with PS4 Option 1.
[c] Includes potential loss of 10 spaces with PS6 Option 2.

Since some of the parking deficits identified above are at stations where providing automobile access is not a priority, provision of substantial additional parking facilities at these stations would conflict with Caltrain's *Comprehensive Access Program Policy Statement*. Where parking deficits are at auto-oriented stations, provision of additional auto parking would be a priority, where feasible and where funding is available The *Comprehensive Access Program Policy Statement* is implemented by Caltrain in cooperation with local jurisdictions as part of Caltrain's long-term planning and capital improvement program; however access improvements are implemented on a funding available basis. Caltrain also works with local jurisdictions, other transit agencies, and local, state and federal funding partners to fund improvements to access to Caltrain stations via alternatives to automobiles including transit connections, bicycle and walking. Where future investments in these access modes are realized, they will help to reduce some of the excess parking demand. Caltrain is also working with many local jurisdictions concerning transit-oriented developments including exploring shared parking opportunities where appropriate.

However, despite these efforts, given the funding limitations, priorities and long-term nature of Caltrain's implementation of its *Comprehensive Access Program Policy Statement*, it is likely that not all of the parking deficits will be addressed when the Proposed Project is in operation.

A parking deficit in and of itself, or the need to find a parking space off-site, while inconvenient is not inherently a significant physical impact on the environment. Some station users unaware of the parking deficits may circle[5] but experienced station users will modify their behavior to take into account the parking deficits and take alternative actions. Those actions may include arriving earlier, using other nearby stations with available parking[6], using the kiss and ride, using parking areas further from the station, or accessing the station via other modes such as transit, biking or walking.

At the extreme, lack of vehicle parking could result in some riders deciding to use an alternative transit system, carpool, or drive to their destination alone. This could result in lower Caltrain ridership than estimated in this EIR. As an unrealistic worst-case example, if the system deficit of approximately 1,000 spaces in excess of the Proposed Project were to mean 1,000 less Caltrain riders, then 2020 ridership would be lower by 2 percent than predicted overall for 2020. However, given that the Proposed Project would still result in substantial ridership increases (approximately 11,000 in 2020 compared with the No Project conditions) even in this worst-case situation, the

[5] While circling vehicles may result in additional vehicle emissions, traffic and traffic noise, additional circling is not likely result in substantial additional criteria pollutant emissions, traffic, or noise around Caltrain stations above the thresholds used in this EIR.

[6] For example, users of the Hillsdale Station could utilize the nearby Hayward Park and Belmont Stations, which are forecasted to have a parking surplus in 2020.

environmental consequences would be less than significant because the Proposed Project's benefits to regional traffic, noise, air quality, and greenhouse gases would still be substantial (though slightly smaller). In this scenario, the localized traffic impacts around the stations with parking deficits would be slightly better than with full ridership.

The other potential impact of a parking deficit in and around Caltrain stations would be potential increased demand for additional off-site parking facilities, the construction of which might result in other secondary environmental impacts. However, as described above, Caltrain expects that the dominant response to parking deficits will be behavioral change on the part of the commuting public.

Thus, while the Proposed Project may result in a parking deficit at some stations, even with implementation of its access program, as described above this is not considered to result in a significant environmental impact. Thus the Proposed Project would not result in a significant physical impact to the environment related to air quality, noise, traffic or greenhouse gas emissions or the secondary impacts of construction of parking facilities due to the potential parking deficits that may occur.

Freight Rail Service

Impact TRA-7a	Results in a change in freight rail service such that resultant diversions to truck or other freight modes would result in significant secondary impacts during construction
Level of Impact	Significant
Mitigation Measure	TRA-2a: Implement construction railway disruption control plan
Level of Impact after Mitigation	Less than significant

As described above under Impact TRA-2a, installation of OCS poles and wires would require the use of on-track equipment in many locations. Work could be accomplished during the nighttime using single-track access in many cases; however, some portions of the work would likely require some multiple track shutdowns at night which could result in temporary suspension of freight service in constrained areas.

Implementation of Mitigation Measure TRA-2a would reduce the temporary construction impact on freight service disruption to a less-than-significant level by minimizing the duration of potential disruption to service during construction.

Impact TRA-7b	Results in a change in freight rail service such that resultant diversions to truck or other freight modes would result in significant secondary impacts during operations
Level of Impact	Less than significant

The Proposed Project could affect existing freight service in two ways: 1) through time constraints due to the requirements for temporal separation between proposed EMUs and freight trains in the FRA waiver; and 2) through potential height restrictions due to OCS installation.

Cumulative Impacts on Freight Service due to Temporal Separation Requirements

Caltrain has been issued a waiver by FRA to allow the operation of the light-weight EMUs on the same system as heavy freight trains. However, the FRA waiver requires a temporal separation between the two different types of vehicles. It should be noted that the FRA is currently in a rule-making process for properties that want to operate "Alternative Compliant Vehicles" which is relevant to the EMUs in the Proposed Project. It is Caltrain's understanding that when the rulemaking is in place, the FRA waiver and the temporal separation requirement may no longer be necessary.

Given that the rulemaking is not yet in place, for the purpose of this EIR, temporal separation is assumed as described in the current FRA waiver. Based on the waiver, the Proposed Project would result in restriction of freight to midnight to 5 a.m. (compared with 8 p.m. to 5 a.m. at present) along the portion of the Caltrain corridor north of Santa Clara (north of CP Coast)[7].

At present, approximately three round-trip trains operate in this part of the Caltrain corridor. A smaller operational window is more likely to affect the longer freight moves. The South City Local already operates over a 2-night window due to equipment constraints and, thus, is not likely to be significantly affected by the constrained operational window. The more lengthy moves, particularly from South San Francisco to San Jose, would be more susceptible to time issues. If these longer freight round trips could not be completed in a single night using a single train consist, then trips may need to be staggered over several nights, as is done on the South City Local at present. Alternatively, additional trains operating in each direction (one-way transit per night) or lengthier trains could be employed in order to maintain the same level of service as a round-trip that could otherwise be completed in the same night.

While inconvenient and requiring change in freight operational practices north of Santa Clara, the compression of freight service hours to midnight to 5 a.m. would not be expected to result in a diversion of freight hauling from freight trains to trucks or other modes and, thus, would not result in any potential secondary impacts related to air quality, greenhouse gas emissions, noise, or traffic congestion.[8]

Section 4.1, *Cumulative Impacts*, discusses the potential impacts that may occur in the future with cumulative passenger and freight rail service relative to the restriction in operational windows.

Impacts on Freight Service due to Changes in Vertical Clearances

Installation of the OCS would lower the existing vertical clearance at the San Francisco tunnels and at bridges and other crossings and structures over the Caltrain ROW. This could affect the ability of existing freight to continue operations if the vertical clearance is lowered below the highest height of current freight vehicles using the Caltrain ROW. Figure 3.14-8 illustrates clearances with OCS installation at a prototypical tunnel and overhead structure location.

As discussed in Chapter 2, *Project Description*, the Proposed Project would include minor modifications at several of the San Francisco tunnels and at certain undercrossings to ensure that adequate vertical clearance is provided to accommodate existing Caltrain trains, the proposed

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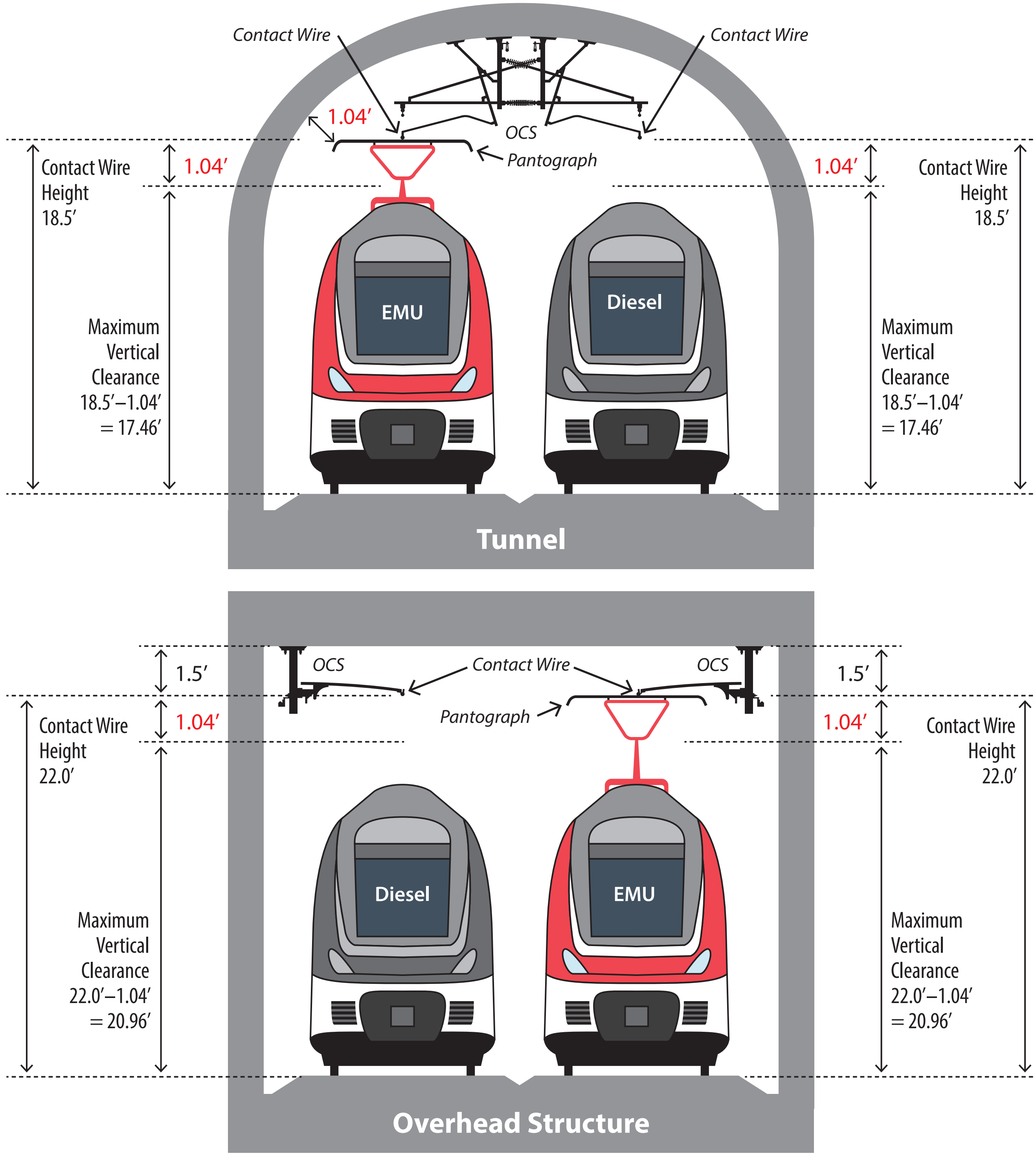
[7] Freight service hours are not limited by the TRA on the UPRR-owned dedicated freight MT-1 track between CP Coast and CP Lick (Santa Clara to south of Tamien Station); operational hours would not be limited on this track.

[8] It should be noted that this is common practice on other light density freight lines shared with transit such as the RiverLine in New Jersey and some of the San Diego Trolley system.

EMUS, and the existing freight train heights. Consequently, existing freight vehicles that are currently used on the Caltrain corridor would not be restricted by lowered overhead clearances. Thus, no impact on existing freight service is expected due to the change in overhead clearances.

Section 4.1, *Cumulative Impacts*, discusses the potential impacts that may occur in the future if freight operators decide to use railcars that are higher than existing railcars now used on the corridor. This potential impact is disclosed as a potential cumulative impact because it does not involve the freight railcars that have been used in the last 8 years and, thus, would not be a baseline environmental impact.



Legend

1.04′ Minimum electrical clearance between top of train and contact wire and between the EMU pantograph and overhead or side structures.

Example Equipment Heights

Caltrain Existing Equipment . . Up to 15.92′
Freight .... 15.92′, 17.08′, 18.92′, 20.25′ (based on last 8 years use)
EMU .... 15.1′

NOT TO SCALE — PROTOTYPICAL LOCATION

Graphics ... 00606.12 (2-07-2014)

Figure 3.14-8
Vertical Clearances with OCS System in Potentially Constrained Areas
Peninsula Corridor Electrification Project