Chapter 4
Other CEQA-Required Analysis

This chapter identifies cumulative impacts, significant and unavoidable impacts, significant irreversible environmental changes, and growth-inducing impacts.

4.1 Cumulative Impacts

CEQA defines cumulative impacts as "two or more individual effects which, when considered together, are considerable," and suggests that cumulative impacts may "result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355). CEQA documents are required to include a discussion of potential cumulative effects when those effects would be significant, and the State CEQA Guidelines suggest two possible methods for assessing potential cumulative effects: 1) the "list" approach and 2) the "projection" approach (State CEQA Guidelines Section 15130).

The focus of analysis is to identify the Proposed Project's *contribution* to cumulative impacts that are significant and to assess whether the Proposed Project's contribution would be considerable. Where the Proposed Project would have no impact on a resource or can be clearly shown to have a less-than-considerable contribution to potential cumulative impacts, the discussion of cumulative impacts is brief. Where cumulative impacts can be shown to be less than significant in the area where the Proposed Project would contribute, the discussion is also brief. Where the Proposed Project has a potential to contribute considerably to a significant cumulative impact, the analysis is more detailed but remains focused on the Proposed Project's potential contribution rather than articulating the cumulative impact comprehensively.

Under CEQA, the Peninsula Corridor Joint Powers Board (JPB) is not responsible to mitigate the overall cumulative impact. Specifically, the High-Speed Rail (HSR) Blended Service (described fully in Section 4.1.3.1, *Rail Projects Planned within the Caltrain Corridor*) is not the Proposed Project being analyzed in this EIR or that is being considered by the JPB for potential approval. The JPB is responsible for analyzing potentially feasible mitigation to address the Proposed Project's considerable contributions to identified significant cumulative impacts only. Thus, the obligation to assess mitigation is limited to the "fair share" portion of a significant cumulative impact that is due to the Proposed Project's considerable contribution. Other cumulative projects have a similar obligation for their contributions to significant cumulative impacts. Thus, for example, in any future environmental evaluation of Blended Service, the California High-Speed Rail Authority (CHSRA) would be responsible for assessing feasible mitigation for its direct project impacts as well as any considerable contributions to significant cumulative impacts.

4.1.1 Approach and Methodology

CEQA Guidelines Section 15130(b) states that the discussion of cumulative impacts should include:

- Either 1) a list of past, present, and probable future projects producing related or cumulative impacts or 2) a summary of projections contained in an adopted general plan or similar

document, or in an adopted or certified environmental document, that described or evaluated conditions contributing to a cumulative impact.

- A discussion of the geographic scope of the area affected by the cumulative impact.
- A summary of expected environmental effects to be produced by these projects.
- Reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

This EIR used a hybrid approach, explained below, to best disclose different cumulative impacts.

- *Projections*: This approach is used to disclose broad regional cumulative impacts related to regional air quality, greenhouse gas emissions, public services and utilities, and transportation/traffic (for general growth driving traffic and transit use).
- *List Approach*: Specific projects in or adjacent to the Caltrain corridor from San Francisco to San Jose were examined for the potential, along with the Proposed Project, to result in cumulatively significant localized impacts. This analysis considered transportation projects proposed for the Caltrain Corridor, as well as land development projects that are planned directly adjacent to the Caltrain Corridor. The list approach was used for analyzing impacts related to aesthetics, local air quality, biological resources, cultural resources, electromagnetic fields and electromagnetic interference (EMF/EMI), geology, soils and seismicity, hazards and hazardous materials, hydrology and water quality, land use and recreation, noise and vibration, and transportation/traffic (for analysis of construction transportation and traffic effects and for transportation improvements assumed for cumulative ridership and traffic analysis).

Table 4-1 summarizes the methodology used for each cumulative subject analysis as well as the geographic area of analysis.

As described in Section 3.0, *Approach to Impact Analysis*, the Proposed Project would have no impact on mineral resources or agricultural resources. Because the Proposed Project would have no impact, it cannot contribute to any potential cumulative impacts and these resource areas are not discussed further in the cumulative impact analysis.

4.1.2 Projections/Regional Growth Characteristics

The Association of Bay Area Governments (ABAG) projections of land use and population growth were used to estimate overall growth in San Francisco, San Mateo and Santa Clara Counties. These projections are shown in Table 4-2. The Santa Clara Valley Transportation Authority (VTA) travel demand forecasting model (VTA Model[1]) VTA was used to develop the travel forecasts for development and growth through the year 2040 in the corridor. The ridership estimates and the ABAG projections of land use and growth were also used to model traffic conditions along the corridor.

[1] VTA's transportation model is an analytical tool that predicts travel patterns based upon spatial relationship between socio-economic characteristics of population and employment locations, tripmaking and economic-related activities in those areas and interconnecting transportation facilitates, including roadway, transit and bicycle and pedestrian modes of travel. The VTA *Local Transportation Model Consistency Guidelines* (2009) outlines how the model may be used by local jurisdictions to develop the local transportation models.

Table 4-1. Summary of Cumulative Impact Methodology

Resource Issue	Cumulative Method	Geographic Area of Impact
Aesthetics	List	Caltrain ROW and vicinity
Air Quality	Projection (Criteria Pollutants) List (Toxic Air Contaminants)	Criteria pollutants: San Francisco Bay Area Air Basin Toxic air contaminants: Caltrain ROW and immediate vicinity
Biological Resources	List	Terrestrial species: Caltrain ROW and immediate vicinity Aquatic species: ROW, vicinity and downstream
Cultural Resources	List	Caltrain ROW and adjacent
EMF/EMI	List	Caltrain ROW and adjacent
Geology, Soils and Seismicity	List	Caltrain ROW and adjacent
GHG Emissions and Climate Change	Projection (GHG emissions) List (vulnerability to Climate change impacts)	The planet (GHG emissions) San Francisco Peninsula (vulnerability to climate change Impacts)
Hazards and Hazardous Materials	List	Caltrain ROW and adjacent
Hydrology and Water Quality	List	Caltrain ROW and downstream water bodies
Land Use and Recreation	List Projection (recreation demand)	Caltrain ROW and adjacent
Noise and Vibration	List	Caltrain ROW and adjacent
Population and Housing	Projection	San Francisco, San Mateo, and Santa Clara Counties
Public Services and Utilities	List (Construction Disruption) Projection (Operations)	Caltrain ROW and adjacent (Construction) Service areas of regional providers to project sites (Operations)
Transportation/ Traffic	List (Construction Analysis and Transportation Improvements) Projection (Operational Traffic)	Caltrain ROW, roadways crossing ROW and roadways near stations (traffic level of service, bicycle and pedestrian facilities) San Francisco Peninsula (regional traffic, regional transit systems)

Table 4-2. 2010–2040 Population, Housing and Employment Growth in the Counties of the Caltrain Corridor

	Total Population				Occupied Housing Units				Employment (Total Jobs)			
Area	2010	2040	Change	% Diff	2010	2040	Change	% Diff.	2010	2040	Change	% Diff.
San Francisco County	805,235	1,076,305	271,070	34	345,811	447,248	101,437	29	568,730	760,230	191,500	34
San Mateo County	718,451	899,169	180,718	25	257,837	316,868	59,031	23	346,320	462,870	116,550	34
Santa Clara County	1,781,642	2,411,704	630,062	35	604,204	819,607	215,403	36	906,270	1,263,834	357,564	40

Note: The data for 2040 is based on data derived used in the VTA system ridership model. As explained in Appendix I, the socioeconomic data used for the ridership model was based on available ABAG SCS forecasts in late 2012 when project EIR analysis began. The ABAG 2013 projections released in fall 2013 are slightly different, but the differences are not large enough to have a significant influence on the ridership forecasts or on the EIR traffic analysis.

Source: U.S. Census 2010; Appendix I, *Ridership Technical Memorandum*.

4.1.3 Projects Considered

Reasonably foreseeable future projects are defined as the projects that have been adopted or have otherwise demonstrated likelihood to occur based on documentation from project sponsors.

There are three types of cumulative projects considered: rail projects planned within the Caltrain Corridor, other regional transportation improvements, and land development adjacent to the Caltrain ROW. For land development along the Caltrain ROW, the JPB requested lists of reasonably foreseeable projects from cities along the Caltrain and additional projects were added based on general knowledge. The geographic areas considered for cumulative impact analyses vary by individual resource, and can include different scales of impact (such as for criteria pollutants or greenhouse gases). The geographic area is noted in the beginning of each subject analysis.

Table 4-3 presents the applicable planning jurisdictions, the potential cumulative impact areas, the estimated construction schedule associated with each cumulative project, and the distance of the cumulative project to the Caltrain ROW. The project numbers in Table 4-3 correspond to the project numbers in Figure 4-1. Figure 4-1 shows the approximate location of each project with respect to the Caltrain ROW and proposed project components. The column titled "Potential Cumulative Impact Areas" generally summarizes the anticipated cumulative impact areas known at this time. Project information listed in Table 4-3 is based on information supplied by the cities the surrounding Caltrain ROW and available environmental documents and information posted on agency websites.

The source of cumulative project information, unless otherwise noted in text below, is the references noted at the end of Table 4-2.

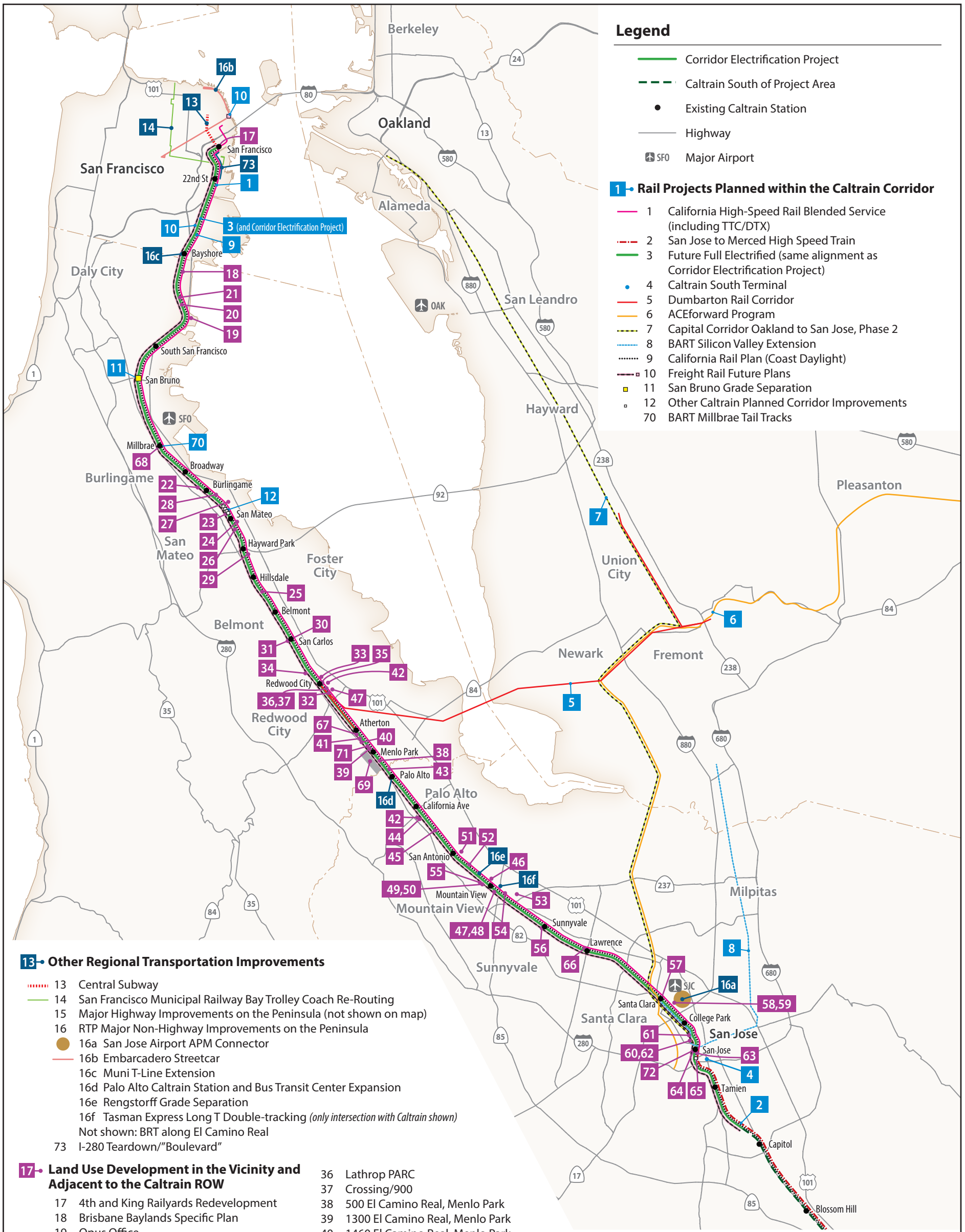

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Figure 4-1
Projects Considered in the Cumulative Analysis
Peninsula Corridor Electrification Project

Table 4-3. Projects Considered In the Cumulative Analysis

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
Rail Projects Planned within the Caltrain Corridor						
1	San Jose – San Francisco	California High-Speed Rail Phase 1 Blended Service (including Transbay Terminal Center and Downtown Extension Project)	**Construction:** Separated in time; but overlap from San Jose to San Francisco. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality; Noise; Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics; Air Quality; Biological Resources; EMF/EMI; GHG emissions; Hydrology and Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Estimated completion by sometime between 2026 and 2029; assumed construction sometime after 2019 but before 2026/2029.	In the Caltrain corridor from San Francisco to San Jose and the 1.3 miles from San Francisco Transbay Transit Center to the San Francisco 4th and King Station	None, but design of passing tracks, and Diridon and Millbrae Stations may require realignment of some Proposed Project OCS poles and wires.
2	San Jose – Merced	San Jose to Merced High-Speed Train (as part of Phase 1 blended system)	**Construction:** Separated in time but overlap at Diridon Station only. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; Biological Resources; EMF/EMI; GHG emissions; Hydrology and Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2021–2026	Overlap with Caltrain corridor only at San Jose Diridon Station; project then heads southeast away from Caltrain ROW	None, but design of Diridon Station may require realignment of some Proposed Project OCS poles and wires.
3	San Jose – San Francisco	Future Full Electrified	**Construction:** No construction impacts, only replacement of rolling stock. **Operations:** Air Quality, EMF/EMI, GHG Emissions, Noise and Vibration.	Complete between 2020 and 2026/2029	Caltrain ROW	None
4	Santa Clara, San Jose	Caltrain South Terminal (Phase II and III)	**Construction:** Overlap between Santa Clara and Tamien Stations and in time. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Service increases included in other projects so impacts only related to permanent physical improvements. Aesthetics, Hydrology and Water Quality; and Land Use and Recreation.	2017–2023	Caltrain ROW	None but construction will require coordination.
5	City of Menlo Park, City of East Palo Alto, City of Union City, City of Fremont, City of Newark, City of Redwood City	Dumbarton Rail Corridor	**Construction:** No construction in Caltrain corridor, but construction east of corridor in Redwood City. No overlap in time or location. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Air Quality; GHG emissions; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Sometime after 2020	Caltrain ROW	None
6	Stockton – San Jose and Stockton – Merced	ACEforward Program	**Construction:** No construction in Caltrain ROW (covered by South Terminal Project) so no overlap in area, but potential overlap in time. Nearest potential area of construction would be Alviso wetlands area. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Overlap from Santa Clara to San Jose only. Air Quality; GHG emissions; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2018–2022 or after	Within Caltrain ROW from San Jose to Santa Clara; then forks east towards City of Fremont along Union Pacific Rail Road track	None
7	City of San Jose, City of Fremont, City of Santa Clara, City of Emeryville, City of Oakland	Capital Corridor Oakland to San Jose, Phase 2	**Construction:** No construction in Caltrain ROW (covered by South Terminal Project) so no overlap in area. Nearest area of construction would be Santa Clara double track area. Potential overlap in time. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Overlap from Santa Clara to San Jose only. Air Quality; GHG emissions; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2016–2023 or after	Within Caltrain ROW from Santa Clara to San Jose only	None

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
8	City of San Jose, City of Santa Clara	BART Silicon Valley Extension	**Construction:** Overlap in time and in area from Santa Clara Station to Diridon Station. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Overlap in adjacent operations from Santa Clara to San Jose only. Aesthetics; Air Quality; EMF/EMI; GHG emissions; Noise and Vibration; Public Services and Utilities.	2012–2023	Caltrain ROW at Santa Clara Station	None but connections between BART and Caltrain stations at Diridon and Santa Clara will require coordination
9	San Jose – San Francisco	*California State Rail Plan* (Coast Daylight)	**Construction:** No construction in corridor. **Operations:** Air Quality, GHG emissions, Noise and Vibration, Transportation and Traffic.	No construction in corridor; Service date start by 2020	Caltrain ROW from San Jose to San Francisco	None
10	San Jose – San Francisco	Freight Rail Future Plans	**Construction:** No construction needed for current freight trains; Use of taller trains in future may require construction to provide clearances at bridges and tunnels. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Air Quality; GHG emissions; Noise and Vibration; Public Services and Utilities.	Incremental over time; specific timing unknown	Caltrain ROW	Trains taller than current trains may require construction to provide clearances at bridges and tunnels. New freight will have to comply with FRA temporal separation requirements.
11	City of San Bruno	San Bruno Grade Separation Project	**Construction:** No overlap in time but overlap in location in San Bruno. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics; Noise and Vibration; Transportation and Traffic.	2010–2014	Caltrain ROW	None; project will be completed before Proposed Project.
12	Cities of San Mateo, Santa Clara, and San Jose and other location	Other Caltrain Planned Corridor Improvements	**Construction:** Would overlap in location and some improvements would overlap in time. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics; Air Quality; GHG emissions; Noise and Vibration; Public Services and Utilities	2013 onward	Caltrain Corridor and project vicinity	None, but may require coordination during construction.
70	City of Millbrae	BART Millbrae Tail Tracks	**Construction:** Overlap south of Millbrae Station. Potential overlap in time. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics; Air Quality; EMF/EMI; GHG emissions; Noise and Vibration; Public Services and Utilities.	Assumed by 2019	Caltrain ROW	May require coordination on placement of OCS poles and wires south of Millbrae BART station.
Other Regional Transportation Improvements						
13	City and County of San Francisco	Central Subway	**Construction:** Overlap in time and adjacent area at San Francisco 4th and King Station. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Air Quality; EMF/EMI; GHG emissions; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2010–2019	Caltrain ROW	None but construction coordination may be required if both projects are active near San Francisco 4th and King Station at same time.
14	City and County of San Francisco	San Francisco Municipal Railway Bay Trolley Coach Re-Routing	**Construction:** Overlap at 16th Street crossing of Caltrain ROW and possibly in time. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Air Quality; EMF/EMI; GHG emissions; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Sometime before 2019	Passes over Caltrain tunnel ROW	Potential conflict requires technical solution to resolve crossing of two incompatible OCS power systems at 16th Street crossing

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
15	Caltrans, VTA (Various jurisdictions)	Major Highway Improvements on the Peninsula	Includes following projects: VTA Silicon Valley Express Lanes Program; U.S. Highway 101 improvements including HOV/T lane from San Francisco county line to Whipple Avenue; express lanes between Whipple Ave. and Cochrane Road, and auxiliary lanes from Marsh Road to Embarcadero Road to State Route 85; and U.S. Highway 101 corridor interchange improvements at Candlestick Point (San Francisco), Produce Avenue (South San Francisco), SR 92 (San Mateo), Oregon Expressway (Palo Alto), and Zanker Road (San Jose). **Construction:** Possible overlap in time but no overlap in location. Air Quality; Biological Resources; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Air Quality; GHG emissions; Hydrology & Water Quality; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Varies	Less than 0.2	None
16	Caltrans, VTA (Various jurisdictions)	RTP Major Non-Highway Improvements on the Peninsula	Includes following projects: Embarcadero Streetcar (San Francisco); Southern Intermodal Terminal and MUNI T-Line Extension (San Francisco); Future grade separations in San Mateo County; Bus Rapid Transit along El Camino Real; Palo Alto Caltrain Station and Bus Transit Center Expansion; Grade separation at Rengstorff Avenue; Tasman Express Long T double tracking: Mineta San Jose International Airport Automated People Mover Connector. **Construction:** Possible overlap in time and location. Air Quality; Biological Resources; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Air Quality; EMF/EMI; GHG emissions; Hydrology & Water Quality; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Varies	Caltrain ROW; and 1.0[a]	Coordination needed between grade-separation projects and OCS pole and wire design.
73	City and County of San Francisco	I-280 Teardown/ "Boulevard"/ 4th and King underground station	**Construction:** No overlap in time but overlap in location at 4th and King Station, Caltrain ROW south to 23rd Street. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown	4th and King Station, Caltrain ROW south to 24rd Street, I-280 in San Francisco and additional areas	Yes. Project likely to be after 2019 based on current status of planning. May require new tunnel for Caltrain/HSR from 23rd to 4th and King and/or complete rebuild of 4th and King Station.
Land Development in the Vicinity and Adjacent to Caltrain ROW						
17	City and County of San Francisco	4th and King Railyards Redevelopment	**Construction:** No overlap in time but overlap in location at 4th and King. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology & Water Quality; Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown (likely after 2019)	Adjacent, and in OCS/ESZ area outside ROW.	Potentially depending on station configuration. Project likely to be after 2019 based on current status of planning. May require relocation of OCS pole at wires at station.
18	City of Brisbane	Brisbane Baylands Specific Plan	**Construction:** Overlap in location and directly adjacent. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Phased over 20 years (2015–2035)	Adjacent, and in OCS/ESZ area outside ROW	Proposed Project will have minor encroachments on land included in specific plan which won't change overall plans but may require minor adjustments.
19	City of Brisbane	Opus Office	**Construction:** No overlap in location. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.10	None

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
20	City of Brisbane	3710–3760 Bayshore Boulevard	**Construction:** No overlap in location. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.02	None
21	City of Brisbane	3700 Bayshore Boulevard	**Construction:** No overlap in location. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.02	None
68	City of Millbrae	Millbrae BART Station TOD	**Construction:** No overlap in location but directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	Adjacent	None, but may require coordination during construction.
22	City of Burlingame	1225 Floribunda Avenue	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.08	None
23	City of San Mateo	Mi Rancho Market	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.02	None
24	City of San Mateo	Gas and Shop	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.13	None
25	City of San Mateo	Sadigh Mixed Use	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.03	None
26	City of San Mateo	Nazareth Terrace	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.06	None

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
27	City of San Mateo	Cal Water Operations Office	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.11	None
28	City of San Mateo	800 & 888 N. San Mateo Drive Apartments	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2013	0.11	None
29	City of San Mateo	2090 Delaware Apartments	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2014	0.10	None
30	City of San Carlos	San Carlos Transit Village	**Construction:** Overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	To be determined	Adjacent, and in OCS/ESZ area outside ROW	Caltrain coordinating with project regarding OCS/ESZ location and project landscaping/vegetation.
31	City of San Carlos	Wheeler Plaza Redevelopment	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; possibly before 2019	0.10	None
32	City of Redwood City	145 Monroe Street	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2014	0.07	None
33	City of Redwood City	Classics at Redwood City	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2015	0.08	None
34	City of Redwood City	Finger Avenue	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.11	None

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
35	City of Redwood City	201 Marshall Street	**Construction:** No overlap in location or time. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2014	0.03	None
36	City of Redwood City	Lathrop PARC	**Construction:** No overlap in time but overlap in location and directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2011–2014	Adjacent, and in OCS/ ESZ area outside ROW	Proposed Project will have minor encroachment for OCS/ESZ which may constrain uses directly along Caltrain ROW but should not affect project overall.
37	City of Redwood City	Crossing/900	**Construction:** No overlap in location but directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2015	Adjacent	None but may require coordination during construction
67	Town of Atherton	Atherton Town Hall Complex	**Construction:** No overlap in location but directly adjacent. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; possibly by 2019	Adjacent	None but may require coordination during construction.
71	City of Menlo Park	389 El Camino Real	**Construction:** No overlap in location or time. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013/2014	0.06	None
38	City of Menlo Park	500 El Camino Real	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.05	None
39	City of Menlo Park	1300 El Camino Real	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	0.08	None
40	City of Menlo Park	1460 El Camino Real	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2014	0.11	None

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
41	City of Menlo Park	1706 El Camino Real Medical Office	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2013	0.14	None
69	City of Menlo Park	El Camino Real/ Downtown Specific Plan	**Construction:** Overlap in time, location and adjacent. Air Quality; Biological Resources, Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Next 30 years	Adjacent, and in OCS/ ESZ area outside ROW	Proposed Project would have minor encroachments on land included in Specific Plan, which would not change overall plans but may require minor adjustments.
42	City of Palo Alto	395 Page Mill Road	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Applicant withdrew application. Construction unknown.	0.12	None
43	City of Palo Alto	145 Hawthorne	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; possible before 2019	0.07	None
44	City of Palo Alto	195 Page Mill Road (Park Plaza)	**Construction:** Overlap in location and adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	Adjacent, and in OCS/ESZ area outside ROW	Proposed Project would have minor encroachments on land included in project, which would not change overall plans but may require minor adjustments. PS5 Option 2 is also adjacent to this project.
45	City of Palo Alto	3445 Alma Street (Alma Plaza)	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2009–2013	0.08	No
46	City of Mountain View	100 Moffett Boulevard	Aesthetics, Air Quality; Cultural Resources; Geology, Soils, and Seismicity, Greenhouse Gas Emission and Climate Change, Hazards and Hazardous Materials, Land Use and Recreation; Noise and Vibration; Public Services and Utilities, and Transportation and Traffic.	Unknown; likely before 2019	0.03	No
47	City of Mountain View	209–405 West Evelyn	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2014	0.03	No
48	City of Mountain View	100–200 West Evelyn	**Construction:** No overlap in time but overlap in location and adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2014	Adjacent and in Proposed Project OCS/ESZ area outside ROW	Proposed Project would have minor encroachments on land included in project, which would not change overall plans but may require minor adjustments

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
49	City of Mountain View	902 Villa Street	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2014	0.08	No
50	City of Mountain View	871 West Evelyn	**Construction:** No overlap in time but directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2013	Adjacent	No
51	City of Mountain View	San Antonio Station	**Construction:** No overlap in location but directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; possibly before 2019	Adjacent	No, but may require coordination during construction.
52	City of Mountain View	Northpark Apartments	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2014	0.09	No
53	City of Mountain View	South Whisman Precise Plan	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; possibly before 2019	0.20	No
54	City of Mountain View	Tripointe Homes	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2013–2015	0.08	No
55	City of Mountain View	Pacific Press – Courtyard	**Construction:** Overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; possibly before 2019	Adjacent and in Proposed Project OCS/ESZ area outside ROW	Proposed Project would have minor encroachments on land included in project, which would not change overall plans but may require minor adjustments.
56	City of Sunnyvale	Carmel Lofts	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2014	0.08	No

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
66	City of Sunnyvale, City of Santa Clara	Lawrence Station Area Plan	**Construction:** Overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; possibly before 2019	Adjacent and in Proposed Project OCS/ESZ area outside ROW	Proposed Project would have minor encroachments on land included in Area Plan, which would not change overall plans but may require minor adjustments.
57	City of Santa Clara	Santa Clara Station Area Plan	**Construction:** Overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown; likely before 2019	Adjacent and in Proposed Project OCS/ESZ area outside ROW	Proposed Project will have minor encroachments on land included in Area Plan which won't change overall plans but may require minor adjustments.
58	City of San Jose	Earthquakes Stadium	**Construction:** No overlap in time or location but directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2014	Adjacent	None
59	City of San Jose	Former FMC site, aka Coleman Highline (PDC98-104, PD12-019)	**Construction:** No overlap in location but directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Construction to start in 2014 or 2015	Adjacent	None but may require coordination during construction.
60	City of San Jose	Alameda (PD12-017)	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Construction to start in 2015	0.06	None
61	City of San Jose	Morrison Park Townhomes (PD06-094)	**Construction:** No overlap in time or location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2012–2014	0.08	None
62	City of San Jose	785-807 The Alameda (PDC13-007)	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2014–2015	0.11	None
63	City of San Jose	Baseball Stadium (PP05-214)	**Construction:** Overlap in location and adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Unknown	Adjacent and in Proposed Project OCS/ESZ area outside ROW	Proposed Project would have minor encroachments on land included in project, which would not change overall plans but may require minor adjustments.

Project Number	Jurisdiction	Project Title	Potential Cumulative Impact Areas	Estimated Construction Schedule	Location relative to the Proposed Project (miles)	Potential Conflicts between Proposed Project and Cumulative Project?
64	City of San Jose	Park Avenue Senior and Family Housing (PDC13-012)	**Construction:** No overlap in location. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	2015–2017	0.02	None
65	City of San Jose	OSH West San Carlos (H13-008) (Now Lowe's)	**Construction:** Overlap in location and directly adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Approved; construction planned; date unknown	Adjacent and in Proposed Project OCS/ESZ area outside ROW	Proposed Project would have minor encroachments on land included in project, which would not change overall plans but may require minor adjustments.
72	City of San Jose	Diridon Station Area Plan	**Construction:** Overlap in location and adjacent. Air Quality; Cultural Resources; Geology & Soils; GHG emissions; Hazards and Hazardous Materials; Hydrology and Water Quality, Noise, Public Services and Utilities; Transportation and Traffic. **Operations:** Aesthetics, Air Quality; GHG emissions; Hydrology & Water Quality; Land Use and Recreation; Noise and Vibration; Public Services and Utilities; Transportation and Traffic.	Over next 2–3 decades	Adjacent and in Proposed Project OCS/ESZ area outside ROW	Proposed Project would have minor encroachments on land included in Area Plan, which would not change overall plans but may require minor adjustments.

[a] The 1.0 mile distance corresponds to the San Jose Airport – VTA Connector PRT System Project. The Caltrain ROW is 1.0 mile from Mineta San Jose International Airport.

Sources: ABAG and MTC. 2013a; ABAG and MTC, No date; BART 2013; Brisbane Baylands 2010; LTK 2013; Caltrain 2013a; Caltrain 2013b; Caltrans 2013; CCJPA 2013; CHSRA 2012a; CHSRA 2012b; CHSRA 2012c; CHSRA 2012d; CHSRA 2012e; CHSRA 2010a; CHSRA 2010b; CHSRA 2010c; CHSRA 2010d; CHSRA 2010e; CHSRA/City of San Jose 2012; City of Brisbane 2013; City of Brisbane 2005; City of Burlingame; 2013; City of Menlo Park 2013a; City of Menlo Park 2013b; City of Menlo Park 2013c; City of Menlo Park 2013d; City of Mountain View 2012; City of Mountain View 2009; City of Palo Alto 2013a; City of Palo Alto 2013b; City of Palo Alto 2013c; City of Palo Alto 2012; City of Redwood City 2013a; City of Redwood City 2013e; City of San Carlos 2012; City of San Francisco 2012; City of San Jose 2013a; City of San Jose 2013b; City of San Jose 2013c; City of San Jose 2012; City of San Mateo 2013a; City of San Mateo 2013b; City of San Mateo 2013c; City of San Mateo 2013d; City of San Mateo 2013e; City of San Mateo 2013f; City of San Mateo 2013g; City of Sunnyvale 2013; Civil Engineering Associates 2007; Grand Boulevard Initiative. 2012; ICF International 2012; Lamphier-Gregory 2011; LSA Associates 2007; LTK 2012; PFRUG 2013; Richmond Mining Limited, undated; Richmond Mining Limited 2010; SFMTA 2013; SJRRC 2013; VTA 2010; TJPA 2004 and subsequent; Greenway, Greg. Pers. Comm.

4.1.3.1 Rail Projects Planned within the Caltrain Corridor

High-Speed Rail Blended Service from San Jose to San Francisco

This project is Project #1 on Table 4-3 and in Figure 4-1.

The CHSRA previously prepared a final program-level environmental analysis of a statewide HSR system (CHSRA 2005). The program-level analysis included an evaluation of various alignments for high-speed service. In 2008, the CHSRA issued a final program-level environmental analysis of the Bay Area to Central Valley alignments. This analysis identified the Pacheco Pass and the Caltrain alignment as its preferred alternative. There were several legal challenges to the final program-level environmental analysis of the environmental analysis for the Bay Area to Central Valley alignments that resulted in court orders to make certain revisions to the Final Program EIR. Revisions to the Final Program EIR were completed in 2010 and 2012. Subsequent to certification of the 2012 revisions, the CHSRA confirmed that the selected route for the California HSR system is the Pacheco Pass alignment from the Central Valley to the Bay Area and the Caltrain corridor for the Bay Area segment from San Jose to San Francisco.

In 2009, CHSRA began project-level analysis of a grade-separated, four-track system from San Jose to San Francisco, including an alternatives analysis and a supplemental alternatives analysis. The four-track proposals by CHSRA were controversial along the Peninsula corridor, with a diversity of opinions about the project. Taking into account these concerns, CHSRA decided in 2012 to change its approach for the Peninsula corridor and embrace a Blended Service concept in which Caltrain and CHSRA would share operations on the corridor and CHSRA would primarily be located within the Caltrain right of way (CHSRA 2012a).

Blended Service would consist of electrified Caltrain trains[2] and HSR trains mostly using the same tracks from San Francisco to San Jose, with a section of passing tracks for scenarios with up to four HSR trains per peak hour per direction (pphpd). There would be no Blended Service south of Santa Clara. Caltrain and CHSRA have engaged in planning level studies of Blended Service to demonstrate its viability. The details of Blended Service are not available at this time. Additional planning and design will be done later and evaluated in a separate environmental evaluation of Blended Service by the CHSRA. For purposes of this cumulative analysis, two representative Blended Service scenarios are considered: the "6-2" scenario and the "6-4" scenario:

- Under the "6-2" scenario, up to two HSR trains pphpd in addition to the six Caltrain trains pphpd planned under the Proposed Project has been analyzed by Caltrain. This scenario would not require passing tracks.
- Under the "6-4" scenario, up to four HSR trains pphpd in addition to six Caltrain trains pphpd planned under the Proposed Project has been analyzed by Caltrain. This scenario would require one section of passing track (see discussion below).

[2] The Peninsula Corridor Electrification Project would replace approximately 75 percent of the revenue service fleet with EMUs for service from San Francisco to San Jose. Additional funding would need to be secured beyond that available for the Proposed Project to provide sufficient rolling stock to have 100 percent electrified service from San Francisco to San Jose. Diesel service would continue from Gilroy to San Jose under all scenarios.

Additional "Core Capacity" projects (as described in the nine-party MOU[3] for the *High Speed Rail Early Investment Strategy For a Blended System in the San Francisco to San Jose Segment Known as the Peninsula Corridor of the Statewide High-Speed Rail System*) including needed upgrades to stations, tunnel, bridges, potential passing tracks, other track modifications and rail crossing improvements including selected grade separations will be required to accommodate the mixed traffic capacity requirements of high-speed rail service and commuter services on the Caltrain corridor. However the specific Core Capacity projects have not been identified or defined at this time. These projects would be identified in future discussions and evaluations between CHSRA and Caltrain and other agencies. Core Capacity projects would be subject to separate, project-level environmental evaluation by the implementing agency/agencies.

Table 4-4 presents some key conceptual assumptions that have been studied by Caltrain about Blended Service at this time. These assumptions are used in the cumulative impact analysis in this EIR.

As noted in Table 4-4, the cumulative analysis in this EIR presumes speeds for Blended Service up to 110 mph in light of the following considerations:

- The blended system has been simulated by Caltrain at speeds of up to 110 mph and shows a blended system to be viable.
- The 2012 Partially Revised Program EIR for the Bay Area to Central Valley states the following: "The HST could operate at maximum speeds of 100–125 mph along the Peninsula providing 30-minute express travel times between San Francisco and San Jose." (CHSRA 2012f)
    - CHSRA has confirmed that with speeds up to 110 mph, a 30-minute express travel time can be achieved between San Jose and San Francisco as required by Prop 1A (CHSRA 2013a).
    - If it is determined to be necessary to analyze speeds greater than 110 mph in the future, additional simulations will be performed to understand the viability and implications of the speed range identified by CHSRA in the 2012 Partially Revised Program EIR.
    - If speeds beyond 110 mph are ultimately proposed by CHSRA for the Caltrain corridor, they will be evaluated in the separate environmental document for evaluating HST service on the San Francisco Peninsula.

The blended system will be part of the roughly 540–mile HST system travelling between San Francisco and Los Angeles.

Ridership

HSR ridership has been evaluated by CHSRA for 2030 under low and high ridership scenarios. Table 4-5 shows Blended Service ridership estimates for 2030 under the low and high scenarios for the Peninsula corridor stations. These estimates are for HSR ridership only; no joint HSR/Caltrain service ridership modeling has been completed. No estimate of blended system ridership with a Redwood City HSR station was included in the *2012 Revised Business Plan* (CHSRA 2012a) or the Draft *2014 Business Plan* (CHSRA 2014a). For the purposes of this EIR, all HSR ridership is assumed

[3] Memorandum of Understanding (MOU). *High Speed Rail Early Investment Strategy for a Blended System in the San Francisco to San Jose Segment known as the Peninsula Corridor of the Statewide High-Speed Rail System.* City and County of San Francisco, San Francisco County Transportation Authority, Transbay Joint Powers Authority, San Mateo County Transportation Authority, Santa Clara Valley Transportation Authority, City of San Jose, and MTC. See discussion in Chapter 1, *Introduction*.

to be in addition to Caltrain ridership to analyze maximum potential traffic and other impacts due to increased ridership at combined HSR/Caltrain stations.

CHSRA released its Draft *2014 Business Plan* (CHSRA 2014a) in early February 2014 which presents higher ridership estimates than in the *2012 Revised Business Plan*; these estimates are provided in Table 4-5 below.

Station Improvements

Station design is at a preliminary conceptual level except for the Transbay Transit Center (TTC). The concepts for station improvements at San Francisco (TTC), Millbrae, Redwood City, and San Jose Diridon Stations to accommodate HSR/Caltrain Blended Service are described below.

San Francisco Transbay Transit Center (TTC) and Downtown Rail Extension (DTX)

The Transbay Joint Powers Authority (TJPA), consisting of the City and County of San Francisco, the State of California, Alameda-Contra Costa Transit District, the JPB, and Caltrans (ex officio) is leading the planning and implementation of the TTC and Downtown Rail Extension (DTX) projects.

A Final EIS/EIR for the DTX and TTC projects and the related redevelopment project (collectively, the Transbay Program) was completed in 2004. A number of addenda have been completed since 2004. TJPA is presently preparing a Supplemental EIS/EIR for certain changes to the Transbay Program as noted below.

The Transbay Program consists of three components.

- A new, multi-modal transportation facility (the TTC) at the site of the former Transbay Terminal at First and Mission Streets, which is currently under construction.
- A 2-mile extension (the DTX) of Caltrain commuter rail service from its current San Francisco terminus at 4th and King Streets to the new TTC.
- Development of a mix of new and transit-oriented uses on publicly-owned property in the vicinity of the new TTC, including an estimated 3,000 new homes and mixed-use commercial development.

Other features analyzed in the 2004 Final EIS/EIR are an off-site bus storage facility, new bus ramps connecting to the Bay Bridge, a temporary bus facility for use during the construction of the TTC, and a reconfigured Caltrain layover yard. The new TTC has also been designed to serve the proposed HSR system. As part of the DTX project, the track between Caltrain's existing 4th and King Street terminal and the new downtown terminal would be electrified.

Phase 1 of the project consists of the TTC and is presently under construction with expected completion in approximately 2017.

Phase 2 consists of the 2-mile extension of Caltrain service to the TTC from the existing Caltrain terminal at Fourth and King Street. The Supplemental EIS/EIR currently being prepared by TJPA will analyze proposed modifications to Phase 2, including the DTX track curvature entering the TTC, extension of platform rail levels to accommodate HSR requirements, an intercity bus facility, vent shaft enlargements and other minor refinements. The DTX work is on hold due to a funding gap and, thus, it appears likely that DTX will be completed after the Proposed Project. Scheduling is depending on funding availability.

Table 4-4. Key Assumptions in High-Speed Rail Blended Service Conceptual Description

Subject	Assumption	Source
Number of HSR trains (per peak hour per direction)	Up to 4[a]	CHSRA 2012 Business Plan, *Estimating High-Speed Train Operating and Maintenance Cost for the CHSRA 2012 Business Plan* (CHSRA 2012b) CHSRA 2014 *Business Plan Ridership and Revenue Technical Memorandum*, Draft 2014 Business Plan. (CHSRA 2014b)
Number of trains/day for 2040	Up to 40 round trips (80 trains)[b]	CHSRA 2012 Business Plan, *Estimating High-Speed Train Operating and Maintenance Cost for the CHSRA 2012 Business Plan* (CHSRA 2012b).
Hours of operation	5 a.m. to 12:30 a.m.	San Francisco to San Jose Preliminary Alternatives Analysis Report Appendix K (CHSRA 2010a)
Study Speeds	Up to 79 mph and up to 110 mph[c]	*Caltrain/California HSR Blended Operations Analysis* (LTK 2012)
Ridership Forecasts	See Table 4-5	
Merging HSR tracks from Diridon to Santa Clara	Two tracks from San Jose Diridon Station to Santa Clara Station	Conceptual locations described in *Caltrain/California HSR Blended Operations Analysis* (LTK 2012) and *Caltrain/HSR Blended Service Plan Operations Considerations Analysis* (LTK 2013)
Potential number of passing tracks	One location (see description in text)	Same as above.
Storage yards and maintenance facilities	Specific location(s) not known (see text discussion)	*Caltrain/HSR Blended Service Plan Operations Considerations Analysis* (LTK 2013)
HSR Station Descriptions	Transbay Terminal (San Francisco)	Transbay Transit Center Program Final SEIS/EIR (2004) and subsequent addenda. (TJPA 2004 and subsequent)
	Millbrae	San Francisco to San Jose Supplemental Alternatives Analysis Report (CHSRA 2010b).
	Redwood City (to be determined)	California High-Speed Rail Program Revised 2012 Business Plan: Building California's Future (CHSRA 2012a)
	San Jose Diridon	San Francisco to San Jose Supplemental Alternatives Analysis Report (CHSRA 2010b) San Jose Visual Design Guidelines (CHSRA/City of San Jose 2012) San Jose to Merced Preliminary Alternatives Analysis (CHSRA 2010e)

Subject	Assumption	Source
Planned grade separations	Center Street (if Millbrae Station constructed as in SF–SJ Supplemental Alternatives Analysis Report) Other grade separations[d] (to be determined)	San Francisco to San Jose Supplemental Alternatives Analysis Report (CHSRA 2010b)

Notes:

[a] The CHSRA 2012 Revised Business Plan *Ridership and Revenue Forecasting* (CHSRA 2012c) and the Draft 2014 Business Plan *Ridership and Revenue Technical Memorandum*, (CHSRA 2014b) presume Phase 1 Blended Service would have up to four trains per peak hour and up to four trains per off-peak hour. This EIR presumes up to 40 daily round-trip high-speed trains in 2040 based on the CHSRA 2012 Business Plan, *Estimating High-Speed Train Operating and Maintenance Cost for the CHSRA 2012 Business Plan* (CHSRA 2012b). The Draft 2014 Business Plan *Service Planning Methodology* document (CHSRA 2014c) includes an assumption of 53 daily round trip trains starting in 2029 and continuing beyond 2040. Caltrain's Blended Service planning to date has not studied the 2014 Business Plan estimates because the plan was released on February 7, 2014 and conceptual Blended Service studies were completed in 2012 and 2013. Thus, this Draft EIR is based on the 40 daily round-trip high-speed trains consistent with Blended Service studies completed by Caltrain. The subsequent CHSRA project-level environmental evaluation will address proposed high-speed train service levels along the San Francisco Peninsula.

[b] As noted in the prior footnote, this Draft EIR presumes 40 daily high-speed trains up to 2040.

[c] As described in text above, Caltrain has simulated Blended Service operations for speeds up to 79 mph and up to 110 mph and thus this EIR evaluates these two speed scenarios in this cumulative analysis. If it is determined to be necessary to analyze speeds greater than 110 mph in the future, additional simulations will be performed to understand the viability and implications of the 100 to 125 mph speed range identified by CHSRA in the 2012 Partially Revised Program EIR (CHSRA 2012f). If speeds beyond 110 mph are ultimately proposed by CHSRA for the Caltrain corridor, they will be evaluated in the separate environmental document for evaluating HST service on the San Francisco Peninsula.

[d] Blended Service is not defined as a fully grade-separated system. See discussion in text about other potential grade separations.

Table 4-5. Projected Blended Service High-Speed Rail 2029/2030 Weekday Daily Boardings at Peninsula Corridor Stations without Optional Redwood City HSR Station

Station	*Revised 2012 Business Plan* (CHSRA 2012c)		Draft *2014 Business Plan* (CHSRA 2014a)
	2030-Low Scenario	2030-High Scenario	2029 -Phase 1 Blended
San Francisco (TTC)	11,500	20,500	15,400
Millbrae	2,600	4,200	6,900
San Jose	3,300	6,100	8,200

The critical aspects for Blended Service are as follows:

- HSR service (up to four trains pphpd) would terminate or originate at the TTC with multiple dedicated platforms.
- The new line between the 4th and King Caltrain Station and TTC would be electrified as part of the DTX project.
- Caltrain service, once electrified, would extend to the TTC with the completion of the DTX. In concept, Caltrain service has been studied with split service between the 4th and King Caltrain Station and TTC, with some trains terminating at each station.

San Francisco 4th and King Station and Approach

Based on current planning, the HSR service would not stop at either the San Francisco 4th and King Caltrain Station or the future 4th and Townsend underground station. It would continue underground through the 4th and Townsend Station to the TTC. The surface station at 4th and King would be for Caltrain service terminating at that point. The underground 4th and Townsend Station would be a stop for Caltrain service terminating at the TTC. The platforms of the two stations would be connected vertically by stairs, escalators, and elevators to an underground mezzanine.

Pursuant to current DTX designs, DTX tracks would begin just north of 16th Street with new tracks and sidings as the alignment approaches the 4th and Townsend and the 4th and King Stations. The surface tracks and underground tracks would separate at approximately Berry Street.[4]

The Proposed Project would electrify the 4th and King Station and yard, including the existing six platforms and 12 tracks. This would allow for electrified operations to start in 2019. At present, the Proposed Project does not include funding to reconfigure the station and yard.

The station configuration covered in the 2004 EIS/EIR and approved by the TJPA would reconstruct the storage yard with three surface platforms and six tracks on the southern portion of the existing facility and add a new one-platform underground station on the northern portion near Townsend and Fourth Street. The schedule for completion of the DTX has not yet been determined, thus, it is possible that station reconfiguration, if appropriate, will occur sometime after 2019, when funding is available. Should funding become available prior to 2019, it may be possible to reconfigure the station and yard prior to electrification.

[4] The Mission Bay Drive crossing would remain at-grade based on current designs.

Millbrae Station

The most recent design for a HSR station at Millbrae was presented in the 2010 HSR Alternatives Analysis for the Peninsula corridor and would include two dedicated HSR tracks and platforms at-grade. The Caltrain station would be split level with one platform at-grade and one below-grade (CHSRA 2010c). A grade separation at Center Street in Millbrae would be necessary because of the changes at the Millbrae Station (CHSRA 2010a). The station design will need to be reevaluated to ensure appropriate scale for the blended system.

Redwood City Station

No decision has been made by CHSRA or Caltrain or any other party that there will be a Redwood City Station. Based on the designs in the 2010 HSR Alternatives Analysis, the Redwood City Station could be either elevated or below-grade in a trench. If there is a Redwood City HSR station that is elevated or below-grade, then there would also be grade separations at the nearby street crossings (CHSRA 2010a). The station design will need to be reevaluated to ensure appropriate scale for the blended system.

San Jose Diridon Station

The San Jose Diridon Station would have dedicated platforms for HSR. The design of the station improvements has been the subject of prior and ongoing study. CHSRA is currently in the process of refining design alternatives for the HSR alignment through San José. These alternatives will be evaluated by the CHSRA when they prepare the San José to Merced and/or San Francisco to San José HSR EIR/EIS documents.

At present, potential designs for the San Jose Diridon Station show either an elevated or a below-grade station. Depending on the vertical placement of the station, the approaches from the south and the north to the station could be in a tunnel or on an aerial structure. The approaches would likely transition from two tracks to four tracks as they approach the station to allow for four tracks in the station (CHSRA 2010a, 2010b, 2010e).

Additional Trackage

Merging HSR Tracks from Diridon to Santa Clara

Blended Service would include two new dedicated HSR tracks between the San Jose Diridon Station and just north of the Santa Clara Caltrain Station (CHSRA 2010b). The dedicated tracks would proceed northward on either an aerial structure or in a tunnel from the San Jose Diridon Station and merge into middle of the Caltrain mainline at grade north of Control Point (CP) De La Cruz which is just north of the Caltrain Santa Clara Station (CHSRA 2010b).

Passing Tracks

As described above, the "6-4" scenario would require passing tracks. It is important to note that no decisions have been made about the locations of passing tracks; the subsequent design and environmental process will define the actual proposed passing track locations. The locations studied to date are identified to support a "proof of concept" approach only. Proposed passing track locations could include other variations than those studied to date. However, because the locations analyzed in the capacity studies completed to date are the only locations that have been studied,

these locations are used in this EIR to disclose at a very general level what the impacts of passing tracks may be with Blended Service.

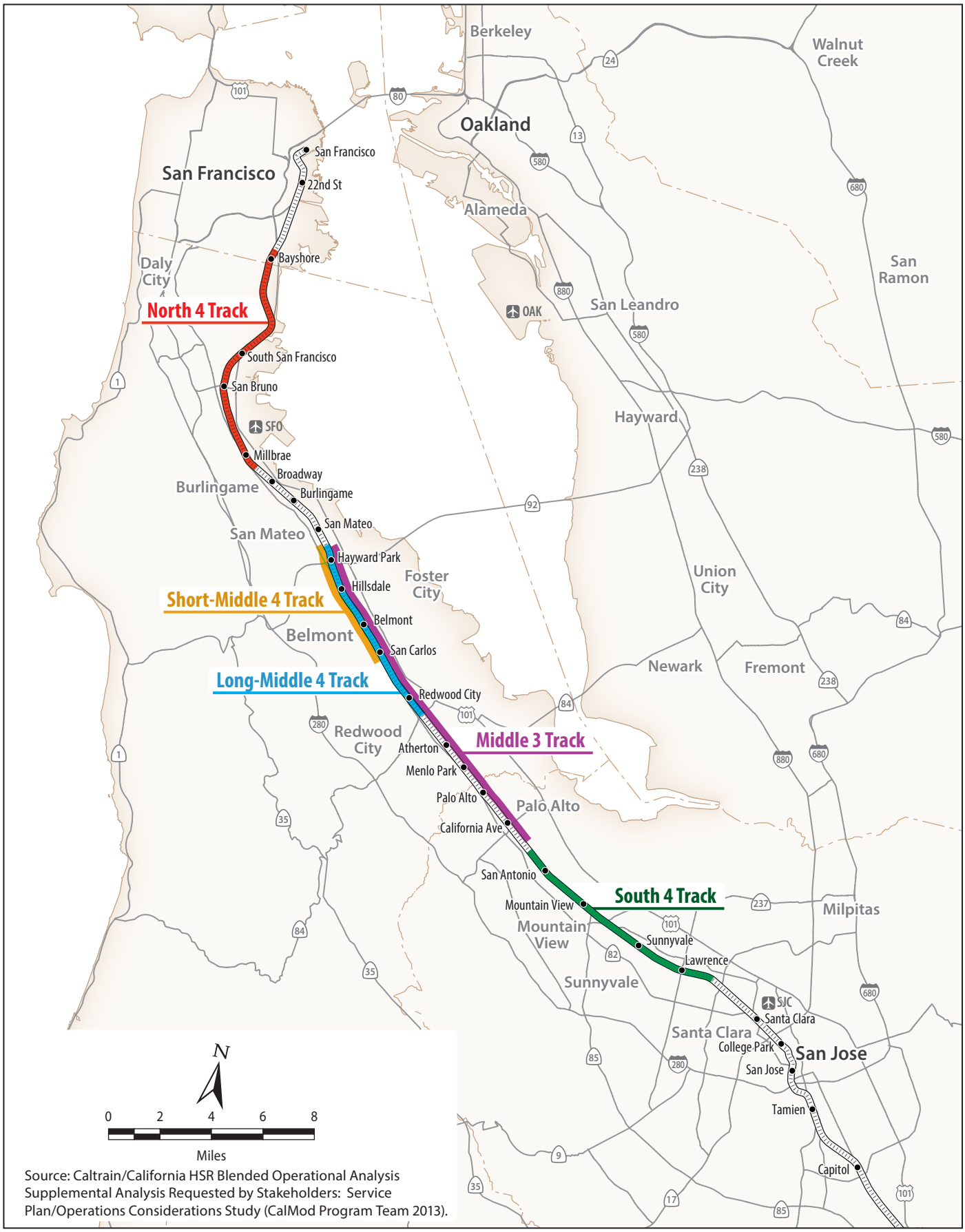
Passing tracks would be added to the existing tracks in limited segments of the corridor to be used by HSR trains to bypass Caltrain trains stopping at stations. The conceptual information used in this EIR about passing tracks comes from two planning studies completed in 2012 and 2013.

- Caltrain/California HSR Blended Operations Analysis (LTK 2012).
- Caltrain/California HSR Blended Operational Analysis Supplemental Analysis Requested by Stakeholders: Service Plan/Operations Considerations Study (LTK 2013).

Passing tracks required for operational overtakes (i.e., one same-direction train passing another) would improve the integration of Caltrain and HSR services, avoid either service being substantially delayed at a passing track location by the other service, and are required to support the "6/4" scenario. The operational studies completed by Caltrain (LTK 2012; LTK 2013) provide further information on the overtake's operational requirements; the reader is referred to those studies for further detail.

Five potential overtake locations have been conceptually defined and are shown in Figure 4-2.:

- The North 4-Track:
  - 10.2-mile-long, 4-track segment of tracks from milepost (MP) 5 (San Francisco) to MP 15.2 (Burlingame), including existing four-track configuration at Bayshore Station.
  - Includes four Caltrain stations: Bayshore, South San Francisco, San Bruno, and Millbrae.
  - Includes one HSR station: Millbrae.
- The Long-Middle 4-Track:
  - 9.1-mile-long, 4-track segment of tracks from MP 18.1 (San Mateo) to MP 27.2 (south part of Redwood City), including existing 4-track configuration south of Redwood City.
  - Includes five Caltrain stations: Hayward Park, Hillsdale, Belmont, San Carlos, and Redwood City.
- The Short-Middle 4-Track:
  - 6.1-mile-long, 4-track segment of tracks from MP 18.1 (San Mateo) to MP 24.2 (San Carlos).
  - Includes four Caltrain stations: Hayward Park, Hillsdale, Belmont, and San Carlos.
- The Middle 3-Track:
  - 15.6-mile-long, 3-track segment of tracks from MP 18.1 (San Mateo) to MP 33.7 (southern part of Palo Alto)
  - Includes ten Caltrain stations: Hayward Park, Hillsdale, Belmont, San Carlos, Redwood City, Atherton, Menlo Park, Palo Alto, Stanford, and California Avenue.
- The South 4-Track:
  - 7.8-mile-long, 4-track segment of tracks from MP 33.8 (Mountain View) to MP 41.6 (Santa Clara south of Lawrence Station), including existing 4-track configuration at Lawrence Station.
  - Includes four Caltrain stations: San Antonio, Mountain View, Sunnyvale and Lawrence.



Source: Caltrain/California HSR Blended Operational Analysis Supplemental Analysis Requested by Stakeholders: Service Plan/Operations Considerations Study (CalMod Program Team 2013).

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Figure 4-2
Potential Passing Track Locations Studied to Date
Peninsula Corridor Electrification Project

The four-track overtake options allow two dedicated tracks for HSR for a limited segment of the corridor—one track per direction. The three-track overtake option allows one dedicated track for HSR for a limited segment of the corridor—one track that must be shared in both directions. One-half of the three-track overtake supports northbound trains and the other half supports southbound trains.

The operational studies completed by Caltrain (LTK 2012; LTK 2013) evaluated HSR and Caltrain performance of different passing tracks options; the reader is referred to those studies for details. Those operational studies are incorporated by reference into this EIR.

Other Trackage Improvements

At present the Caltrain corridor is rated for speeds of up to 79 mph. Blended Service at speeds greater than 79 mph up to 110 mph will require additional track improvements that could include upgrades of tracks, trackbeds, ties, interlockings as well as possible curve realignments and other improvements.[5] Potential improvements have not been identified at this time but would be identified as part of subsequent Blended Service design.

CHSRA Storage Yards and Maintenance Facilities

When the four-track, fully grade-separated HSR system was contemplated in the Peninsula corridor, a storage/maintenance facility of approximately 100 acres was contemplated at several locations, including San Francisco, Brisbane/Bayshore, San Francisco International Airport and Santa Clara. The Brisbane/Bayshore site was described as the most feasible (CHSRA 2010a).

Given that Caltrain and CHSRA are now committed to a blended system on the Peninsula, previous assumptions for HSR operations and maintenance facilities have changed. The CHSRA will be re-evaluating the Peninsula for site-specific and operationally feasible locations that would meet the needs for maintenance and storage of high speed train sets. Suitable potential sites will be identified and evaluated through the blended system environmental process, a later process that is separate and distinct from this EIR.

Grade Crossing Improvements/Grade Separations

Apart from the grade separation assumed in the 2010 HSR Alternatives Analysis at Center Street in Millbrae and the grade separations that would be necessary for the HSR aerial section from San Jose Diridon Station to north of the Santa Clara Caltrain Station (described previously above), no decisions have been made regarding the potential additional at-grade crossing improvements or grade separations necessary for Blended Service. To date, Blended Service has been defined as a partially grade-separated system, not a fully grade-separated system.

FRA's regulatory requirements for at-grade crossings greater than 79 mph are as follows (FRA 2014):

- For 110 mph or less: At-grade crossings are permitted. States and railroads cooperate to determine the needed warning devices, including passive crossbucks, flashing lights, two quadrant gates (close only "entering"' lanes of road), long gate arms, median barriers, and

[5] As described above, Caltrain has evaluated Blended Service for speeds up to 79 mph and up to 110 mph; thus these two scenarios are evaluated in this EIR. Any consideration of speeds in excess of 110 mph would need to be evaluated in subsequent Blended Service design for viability and evaluated in the separate environmental evaluation by CHSRA for Blended Service.

various combinations. Lights and/or gates are activated by circuits wired to the track (track circuits).

- For 110 to 125 mph: FRA permits crossings only if an "impenetrable barrier" blocks highway traffic when train approaches.
- Above 125 mph: No at-grade crossings permitted.

As noted above, at this time, Caltrain has only studied Blended Service operations up to 110 mph which have been shown to meet Prop 1A required timeframes for HSR service. For speeds greater than 79 mph up to 110 mph, there may be a need for additional at-grade crossing improvements; specific improvements would need to be identified during subsequent Blended Service design.

Additional grade separations may also be desirable for operational purposes. Further, when combining HSR service with Caltrain and other tenant railroads, cumulative localized traffic and noise impacts are likely at many locations along the corridor and grade separations at some locations may be considered in the environmental analysis for Blended Service as mitigation.

The separate environmental process for the Blended Service will need to analyze all impacts related to Blended Service including noise and traffic impacts related to increased train trips along the Caltrain corridor as well as the impacts of any proposed passing tracks and any proposed at-grade crossing or grade-separation improvements.

Other Core Capacity Projects

In addition to the improvements described above concerning stations, passing tracks, other track improvements and grade separations, there will be additional Core Capacity projects including improvements to tunnels and bridges or other improvements needed to accommodate mixed traffic capacity requirements of HSR service and Caltrain commuter rail service. These other projects would be identified as part of subsequent Blended Service design and would be evaluated in the separate environmental document prepared by CHSRA.

Schedule

Based on the CHSRA *Revised 2012 Business Plan* (and the Draft *2014 Business Plan*), HSR service could be extended to San Jose by 2026 and to San Francisco by sometime between 2026 and 2029. It is possible, but unknown at this time, that San Jose Diridon would serve as a temporary northern terminus for the HSR system between the time service is provided to San Jose and the time that service is provided to San Francisco.

As noted above, while TTC is under construction, the exact timing for the DTX and Core Capacity projects is not known at present.

California High-Speed Rail San Jose to Merced (as part of Phase 1 Blended System)

This is project number 2 in Table 4-3 and Figure 4-1.

The San Jose to Merced section of the California HSR system is a 125-mile corridor running from the Diridon Station in Downtown San Jose to Merced, where the system would connect to the Central

Valley section (Merced to Fresno).[6] From the Diridon Station in San Jose, trains in the San Jose to Merced section would travel south to Gilroy, east through the Pacheco Pass, and then to Chowchilla before turning north to Merced.

San Jose to Merced will be the linkage between San Francisco/San Jose corridor and the Central Valley portion of the HST system and upon completion would be part of the 540-mile Phase 1 Blended System.

The proposed stations are Diridon Station in San Jose, a station in Gilroy, and a downtown Merced station. The San Jose to Merced section of the California HSR system would overlap with the Proposed Project at Diridon Station in San Jose. Capital costs for the San Jose to Merced section are estimated to be $5.4 billion dollars. The purpose of this project and the entire California HSR System is to provide a new mode of high-speed intercity travel that would link major metropolitan areas of the state and provide added capacity to meet increases in intercity travel demand in California.

Environmental review for the San Jose to Merced section began in 2009 and a Draft EIS/EIR is currently being developed. A Preliminary Alternatives Analysis was prepared in 2010 and a Supplemental Alternatives Analysis Report, which evaluated potential route alignments that will be considered in the Draft EIR/EIS, was prepared in 2011. The Preliminary Alternatives Analysis (CHSRA 2010X) evaluated multiple options for the San Jose Approach subsection and recommended the SR 87/I-280 Alignment Alternative. This alignment would be on an aerial structure heading southward from the Diridon Station along the Caltrain ROW to approximately Park Avenue and then would depart from the Caltrain ROW to cross the I-280/SR 87 interchange and then come parallel to the Caltrain ROW next to the Tamien Station. For the Monterey Highway subsection, the alignment would continue south from the Tamien Station along the Caltrain ROW on an aerial structure to Almaden Road, then be an at-grade section from Almaden Road to near Pullman Way and transition back to an aerial structure from near Pullman Way to just north of the Capitol Expressway. While the San Jose to Merced section proceeds further south, the project limits for the Caltrain Peninsula Corridor Electrification Project end just south of Pullman Way. Unlike the Blended Service, there would be no shared track between Caltrain and HSR for the HSR San Jose to Merced segment as HSR would have dedicated tracks.

The San Jose to Merced HSR Project EIR/EIS will tier from the Final Statewide Programs EIR/EIS and the Final Bay Area to Central Valley HSR EIR/EIS. Service is planned to commence along this segment in 2026.

Caltrain Projects

Future Full Electrified (San Francisco to San Jose)

This is project number 3 in Table 4-3 and Figure 4-1.

As described in Chapter 2, *Project Description*, the Proposed Project budget of $440 million for rolling stock would provide for electrification of approximately 75 percent of the revenue service fleet from San Francisco to San Jose. It is the JPB's long-term plan to fully electrify the service from San Francisco to San Jose for the same reasons supporting the Proposed Project. In addition, to accommodate Blended Service (as described above), the Caltrain service between San Jose and San

[6] North of San Jose, the California High-Speed Rail system would connect to San Francisco through Blended Service, discussed above.

Francisco must be fully electrified. The Proposed Project would install the electrical infrastructure necessary to support a fully electrified service, but Caltrain would need to purchase additional EMU rolling stock to support this service.

As shown in Table 4-6, full electrification would require approximately 40 to 50 additional EMU vehicles. Based on the 2009 estimated budget of $440 million for 96 EMUs, the additional EMUs could require an additional $193 to $248 million in funding that has not been secured at this time. As funding becomes available, the JPB intends to replace retiring diesel locomotives with EMUs. If Blended Service is realized by sometime between 2026 and 2029, Caltrain would need to be fully electrified at that time to maintain the levels of service called for in the Proposed Project.

Table 4-6. Fleet Requirements of the Peninsula Corridor Electrification Project (2019) and a Future Fully Electrified Service (San Jose – San Francisco)

Year	Diesel Locomotives	EMUs	Diesel-Hauled Vehicles	Total Vehicles
2019[a] (Six trains per peak hour/direction)	9	96	45	150
2040[b] (Six trains per peak hour/direction)	6	138 to 150	31	175 to 187

[a] The majority of vehicles would be replaced in 2019 as they reach the end of their design life. Additional vehicles would be replaced after 2019 as they reach the end of their design life.

[b] Diesel operation limited to San Jose–Gilroy shuttle service. 2040 EMU estimate is a conceptual estimate.

Caltrain South Terminal Project

This is project number 4 in Table 4-3 and Figure 4-1.

The South Terminal Project is a multi-phased project to improve the South Terminal Area (STA) portion of the Caltrain corridor between Santa Clara and San Jose to adequately accommodate potential future rail traffic levels. Where constraints with existing infrastructure are identified, improvements are recommended to address the operational needs of Caltrain and its tenants: Altamont Commuter Express (ACE), Capitol Corridor, and Amtrak Long Distance Coast Starlight service. Phase 1 of the project is already complete. Table 4-7 summarizes Phase II and Phase III of the South Terminal Project

Table 4-7. Projects Identified as Improvements to South Terminal Area

Segment	Improvement
CP Shark to CP Alameda[a]-	South Terminal Phase II—Fourth main track, CEMOF to Diridon. This additional fourth track would be approximately 2,000 feet long and would require minor right of way acquisition. To incorporate the 4th track, the existing track systems would require rearrangement. Associated signal control work would be included.
CP Bird to Tamien Station	South Terminal Phase III—. This project includes the construction of an additional track south of the South Terminal, between the San Jose Diridon Station and the I-280 crossing. Additionally, associated signal work is included and a new control point would be constructed between the Auzerais Avenue crossing and the I-280 crossing. The Auzerais crossing would be reconstructed. This additional track would be approximately 2,000 feet long and would run across the widened portion of the newly constructed Los Gatos Creek Bridge.

[a] CP Shark and CP Alameda are in San Jose. CP Alameda extends north from Diridon Station to north of Santa Clara street and connects to CP Shark, immediately west of SAP Center in San Jose. CP Shark extends to north of Julian Street.

CEMOF = Central Equipment Maintenance Operations Facility.

CP = control point.

I-280 = Interstate 280.

There are no schedules as of yet for these projects.

San Bruno Grade Separation

This is project number 11 in Table 4-3 and Figure 4-1.

The San Bruno Grade Separation Project, which is currently in construction, will elevate Caltrain tracks above three existing at-grade street crossings at San Bruno, San Mateo, and Angus Avenues to improve safety for pedestrians and motorists, and to help reduce traffic congestion from U.S. Highway 101 in San Bruno. Additionally, a new elevated Caltrain station will be constructed between San Bruno and San Mateo Avenues to replace the existing station at Sylvan Avenue. There will be 201 parking spaces and a "kiss-and-ride" lot.

The project will include three pedestrian underpasses, one near Sylvan Avenue, one at the new station, and one between Euclid Avenue and Walnut Street. The elevated station will have elevators to provide easy access for Caltrain riders. The surrounding streets and sidewalks will be improved, including those at Posy Park. Construction is expected to be completed in April 2014 (Caltrain 2013b).

Caltrain Planned Corridor Improvements

This is project number 12 in Table 4-3 and Figure 4-1.

Caltrain Communications Based Overlay Signal System Positive Train Control

The Caltrain Communications Based Overlay Signal System (CBOSS) Positive Train Control (PTC) Project will provide a new advanced signal system. The project, which is in construction now, involves installation of PTC which is a requirement by the FTA on all commuter and freight

railroads. The project will help eliminate train-to-train collisions and over-speed mistakes and provide additional safety measures for railroad workers. The Caltrain CBOSS PTC Project will meet the federal mandate to implement PTC by 2015 and increase system capacity to allow for future increase in ridership and demand. The project components are compatible with Caltrain's existing diesel-based trains, and will also be compatible with the future Caltrain electric powered fleet. In addition, the Caltrain's CBOSS PTC project is being designed to ensure interoperability with HSR as well as existing passenger and freight tenants (Caltrain 2013).

Other Caltrain Improvements

Caltrain improvements that are being planned other than CBOSS PTC, the Proposed Project, the STA improvements, and the San Bruno project include the following:

- Rehabilitation of the Existing System—long-term repairs, reconstruction, and modernization of the existing tracks, signals, bridges, stations, rolling stock, and other systems.
- Bridge replacements in San Francisco, San Mateo[7] and at Los Gatos Creek.
- The modernization of stations such as removing the hold-out rule.
- At-grade crossing improvements and a system-wide fencing program to improve safety.
- South San Francisco Station Improvement Project, which would remove the holdout rule and improve access to station platforms.
- Station security improvements.

Trackwork rehabilitation improvements consist of the following:

- Replacing jointed rail track with continuous welded rail track.
- At-grade crossing improvements.
- Drainage improvements.

Planned rehabilitation improvements include tunnel rehabilitation, retrofit of existing structures to current seismic safety standards, new bridge decks, and new foundations where needed.

Rehabilitation improvements at stations include the following:

- Station security improvements.
- Provision of 600-foot-long (or longer) side platforms.
- Wide center platforms at selected locations.
- Improved lighting, shelters, and communications facilities at station waiting area.
- Facilities to meet Americans with Disabilities Act (ADA) requirements.
- Underpasses for pedestrians.
- Inter-track fencing to keep passengers from attempting to cross the tracks.
- Bridge rehabilitation.

[7] Bridges are presently being replaced in San Mateo at the East Poplar, East Santa Inez Avenue, Monte Diablo, and Tilton Avenue underpasses. The bridge replacement will be completed by 2016. The bridge replacement project has already been environmentally cleared.

Dumbarton Rail Corridor

This is project number 5 in Table 4-3 and Figure 4-1.

The Dumbarton Rail Corridor project will extend rail service between the Redwood City Caltrain Station and the Union City BART Station by reconstructing a 20.5-mile existing rail corridor. The purpose of the Dumbarton Rail Corridor Project is to improve transbay public transportation service and interconnections to reduce roadway congestion, improve travel reliability, improve air quality, and address greenhouse gas reduction goals from transportation and development. In the East Bay, the service would use the Union Pacific Railroad's Centerville Line and Oakland Subdivision to reach Union City. The service would then utilize the Dumbarton Line, including crossing the currently out-of-service Dumbarton Rail Bridge across the San Francisco Bay (located east of the SR 84 highway bridge). The Dumbarton Rail Corridor service would operate on the Caltrain mainline beginning at Redwood Junction in Redwood City, with service continuing north to San Francisco and south to San Jose. . The extension will connect to existing public transportation services such as BART, ACE, Amtrak's Capital Corridor, Caltrain, and regional bus service.

The reconstruction of the rail corridor will include track improvements, new moveable rail bridges, new train stations in Menlo Park (Willow Road), at Newark's Dumbarton transit-Oriented Development area, and adjacent to the Union City BART Station, upgrading the Centerville Station in Fremont, a centralized train signal control system, and a layover yard in the East Bay, among other improvements. Depending on the alternative selected, some of these improvements may be within the Caltrain corridor.

An Alternatives Study was completed in March 2011 and an environmental review of the project was initiated. However, Alameda County Measure B, which would have provided funding, did not pass in November 2013. As a result, the JPB and the Federal Transit Administration (FTA) have placed the project on hold until new funding is identified.

A number of different alternatives have been considered for the Dumbarton Rail Corridor. For the purpose of this EIR, the analysis assumed that six diesel locomotive trains will travel from Union City during the AM peak commute period. Three of these trains will travel to San Francisco and three to San Jose. In the PM peak period, these trains will make the reverse trip from San Francisco and San Jose back to Union City.

ACEforward Program

This is project number 6 in Table 4-3 and Figure 4-1.

The ACEforward Program is an initiative of the San Joaquin Regional Rail Commission (SJRRC) to expand ACE service. The project is intended to improve ACE service between Stockton and San Jose and to extend service to Modesto and Merced. The purpose of the project is to enhance commuter and intercity rail service for riders in the northern San Joaquin Valley and the eastern and southern parts of the Bay Area. ACE commenced its environmental process for the ACEforward Program in June 2013 and intends to complete an EIR/EIS for the program by 2016.

Infrastructure improvements currently under study by ACE would provide for:

- Operation of a fifth and sixth round trip between Stockton and San Jose by 2018.
- Operation of 10 or more round trips between Stockton and San Jose by approximately 2022.

- Operation of six round trips between Stockton and Merced by approximately 2022.

Within the Caltrain project area, the ACE service operates on the Caltrain ROW between Santa Clara and San Jose. The ACEforward program includes increases of up to six round trips on this segment by 2018 and up to 10 round trips or more by approximately 2022. As noted above, this is one of the projects that depends on the improvements to the south terminal area. Further improvements in the south terminal may be needed and are being studied. Additionally, beyond the south terminal area, the ACEforward Program presumes capital improvements east of the Caltrain corridor at certain locations between Stockton and Santa Clara.

Capitol Corridor Oakland to San Jose, Phase 2

This is project number 7 in Table 4-3 and Figure 4-1.

The Capitol Corridor service is operated by the Capitol Corridor Joint Powers Authority (CCJPA). Initially, the service provided six daily trains between Sacramento and San Jose. Between 2002 and 2006, the CCJPA increased service multiple times in response to the growing demand. The CCJPA is now working on the Capitol Corridor Oakland to San Jose Project.

Phase 1 of the Oakland to San Jose track improvements and the Yolo Causeway main track, completed in 2004, allowed the Capitol Corridor to reach its current service level. The Capitol Corridor currently runs 32 weekday (22 weekend) trains between Sacramento and San Jose, and 14 daily trains between Oakland and San Jose. (Capitol Corridor Joint Powers Authority 2010)

Phase 2 of the Oakland to San Jose track improvements will increase frequency of Capitol Corridor service from 14 daily trains to 22 daily trains between Oakland and Santa Clara/San Jose. CCJPA has identified a list of track infrastructure projects to allow for the expansion of the Capitol Corridor rail service, and is moving forward with design plans and environmental review. As noted above, this is one of the projects that depends on the improvements to the south terminal area. Further improvements in the south terminal may be needed and are being studied. The project does not include any capital improvements within the Additionally, beyond the south terminal area, the Phase 2 Oakland to San Jose project presumes capital improvements east of the Caltrain corridor at certain locations between Oakland and Santa Clara.

BART Silicon Valley Extension

This is project number 8 in Table 4-3 and Figure 4-1.

The VTA and Bay Area Rapid Transit (BART) District are planning a 16.1-mile extension of the BART system to serve Santa Clara County. The extension would extend from Fremont to the Santa Clara Caltrain Station. The extension will be constructed in phases. The first phase, the Warm Springs Extension, covers 5.4 miles beginning just south of the planned BART Warm Springs Station in Fremont. The second phase, Berryessa Extension, will extend along the Union Pacific Rail Road (UPRR) line through Milpitas to the Berryessa District of San Jose, near Las Plumas Avenue. The third phase, Santa Clara Extension, would be from Berryessa to Santa Clara.

Major construction on the Warm Springs Extension began in August of 2009. The Warm Springs Extension is expected to open for revenue service in the fall of 2015.

The Berryessa Extension is also under construction and is scheduled to be open in 2018. BART trains are expected to run every 15 minutes during peak commute periods on two BART lines: Green

line (Berryessa–Daly City) and the Orange Line (Berryessa–Richmond). The projected opening day ridership is approximately 23,000 average weekday riders.

The Santa Clara Extension is in the environmental review phase and is expected to be in service by 2023. The Santa Clara Extension is the only part of the project that would be located in and adjacent to the Caltrain corridor. The Santa Clara Extension includes potential stations at Diridon and Santa Clara connected to the Caltrain stations and a subway or at-grade alignment between Diridon and Santa Clara. BART would be in its own ROW separate from Caltrain.

Coast Daylight

This is project number 9 in Table 4-3 and Figure 4-1.

The *California State Rail Plan* establishes strategies and priorities for the Department of Transportation to improve passenger and freight rail service for the public. Part of this plan proposes new intercity rail routes. The proposed intercity route, the Coast Daylight, would connect San Francisco, San Jose, Salinas, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles. Currently the Coast Starlight, an Amtrak route, provides service from between Los Angeles and the Pacific Northwest, serving markets in California. The route operates once per day in each direction between Los Angeles and the Bay Area. The proposed Coast Daylight route would have twice as many stops at the Coast Starlight.

Coast Daylight service would support several statewide transportation objectives (Caltrans 2013):

- Providing additional capacity to serve corridor growth in a cost-effective manner with minimal impacts on local communities, natural resources, and air quality and GHG emissions.
- Increasing use of intercity passenger rail service as part of a multi-modal strategy identified in regional and county goals and plans.
- Improving rail operations by reducing travel times and increasing reliability and safety.
- Providing early implementation of a “one-seat” ride from downtown San Francisco to downtown Los Angeles.

The present proposal is to run two daily roundtrips from San Francisco to Los Angeles. No capital improvements are proposed within the Caltrain corridor for this project. The feasibility of this project is yet to be determined and is dependent on its compatibility with a blended system in the Peninsula Corridor

Pending that feasibility assessment, for the purposes of this EIR cumulative analysis only, this service is assumed to start by 2020.

Freight Rail Future Plans

This is project number 10 in Table 4-3 and Figure 4-1.

As described in Section 3.14, *Transportation and Traffic*, levels of freight operations in the corridor as of late 2012 were estimated at approximately seven round trips per day.

- 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").

In addition to this routine daily traffic, freight operators also run periodic trains to serve non-routine episodic freight needs along the Caltrain corridor.

UPRR and various freight rail operators and users along the Caltrain corridor expect freight service to grow over time to accommodate demands from their various customers for freight deliveries.

- **Port of San Francisco:** The annual numbers of rail cars for the past 3 years has grown from 475 railcars in 2010, to 1,165 railcars in 2011, to 1,950 railcars in 2012 (Greenway, pers. comm.). The port projects year-on-year growth from 2012 forward to be 15 percent (Greenway, pers. comm.). Richmond Mining Limited (now Nevada Mining) has identified potential use of port facilities at Piers 90–96 to handle its iron ore (Richmond Mining, undated) and provided a letter of intent in 2010 identifying the Port of San Francisco as its favored port of loading (Richmond Mining Limited 2010). If this project were to be realized, then, starting in 2016, iron ore could start moving at a rate of 500 additional railcars/month initially and then potentially grow to as many as 1,700/month by 2018 (Greenway, pers. comm.). Assuming 75 iron ore railcars per train consist[8], 1,700 railcars/month would correspond to approximately 23 additional trains per month or less than one train/day on average. It should be noted that no environmental analysis has been commenced or completed for the proposed expansion of Piers 90–96 operations for iron ore export or the associated increase in freight rail operations. There are also other potential port options in Oakland and Richmond that could be utilized for iron ore shipping. Thus, for the likelihood for a large-scale increase in iron ore shipments along the Peninsula corridor is unknown at this time.
- **Union Pacific Railroad:** Representatives of UPRR informed Caltrain that they expect general freight growth of 4 percent per year. Representatives of UPRR also noted that if the Monterey Shale oil deposit is developed substantially in the future, there might be an increase in oil shipments through the South Terminal Area to oil refineries in the East Bay and Benicia. The potential for a large increase in Monterey Shale exploitation is a subject of intense concern and controversy at present; the potential for increased oil shipments through the Caltrain project area is unknown at this time.
- **Freight Operators:** The Peninsula Freight Rail Users Group, a collection of freight rail operators and users in the Caltrain Corridor including the Ports of Redwood City and San Francisco, the San Francisco Bay Railroad, CEMEX, Granite Rock, and a number of other rail users, identified in their scoping letter on the Proposed Project EIR that "it is foreseeable that freight volumes will expand significantly over the coming decades, even without any expansion of infrastructure." (Peninsula Freight Rail Users Group 2013).
- **California State Rail Plan:** The Draft *California State Rail Plan* (Caltrans 2013) estimates that tonnage at the ports of Oakland and San Francisco is expected to increase 2.5 times between

[8] Estimates of iron ore consists in Utah range from 75- to 100-car consists. See: http://utahrails.net/mining/iron-mountain.php

2007 and 2040. However, the plan does not provide a separate estimate for how much of this growth is expected for the Port of San Francisco or an estimate of freight rail increases along the Caltrain Corridor.

With continued economic growth on the Peninsula corridor from the present to 2040 and beyond, there will be an expanded demand for the transport of bulk cargoes and bulky materials, which could be met by expanded freight rail. Should large-scale bulk carriers decide to ship materials either in or out of the Ports of Redwood City or San Francisco, such as the proposal to expand iron ore shipments described above, there could be a substantial demand for freight shipments through the Caltrain corridor.

As discussed in Section 3.14, *Transportation and Traffic*, freight operations are primarily limited to operational hours of 8 p.m. to 5 a.m. with limited slots available outside of this period at present. With the Proposed Project, the FRA waiver allowing the use of light-weight EMUs on the Peninsula Corridor requires freight traffic to be limited to the hours between midnight and 5 a.m. to provide temporal separation between light-weight passenger trains and heavy freight trains. The FRA is currently engaged in a rule-making process that may alter the requirements for temporal separation which may allow larger freight operational hours. Unless FRA modifies the temporal separation requirement, any increases in freight traffic would be assumed to occur between midnight and 5 a.m. If FTA determines that temporal separation is not required, then freight increases would be assumed to occur between 8 p.m. and 5 a.m.

Freight train consists vary substantially in length. Bulk carriers, such as those that could be associated with transport of iron ore, can be particularly lengthy.

BART Millbrae Tail Tracks

This is project number 70 in Table 4-3 and Figure 4-1.

BART anticipates extending the Millbrae tail track by an additional 200–300 feet southerly into Burlingame to accommodate all 10-car trains on these tail tracks in the near future (BART 2013).

Summary of Assumed Cumulative Rail Service

Table 4-8 describe cumulative rail service assumed along the Caltrain corridor by 2040 based on review of project documents for the cumulative rail projects described above.

Table 4-8. Cumulative Existing and Future (2040) Daily Train Service Along the Caltrain Corridor

System	Tamien - Diridon	Diridon - Santa Clara	Santa Clara - Redwood City	Redwood City - San Francisco	Source
Existing (2013) Service					
Caltrain	40	92	92	92	Existing Caltrain Schedule
ACE	8	8			ACE Schedule (ACE trains layover at Tamien yard)
Capitol Corridor		14			CCJPA Schedule
Coast Starlight	2	2			AMTRAK schedule
Freight	4	9	2	6	Caltrain dispatch data
Total	**54**	**125**	**94**	**98**	
Future (2040) Service					
Caltrain	48	114	114	114	Proposed Project NOP (Appendix A)
High-Speed Rail			80	80	CHSRA *Revised 2012 Business Plan* (CHSRA 2012a)[a]
ACE	20	20			ACEforward NOP (SJRRC 2013)
Capitol Corridor		30			CCJPA Draft 2013 Vision Plan (CCJPA 2013)
Coast Daylight	4	4	4	4	2013 *California State Rail Plan* (Caltrans 2013)
Dumbarton Rail Corridor		6	6	6	2013 *California State Rail Plan* (Caltrans 2013)
Coast Starlight	2	2			No change
Freight	8	19	4	12	108% increase based on assumed 4% per annum increase
Cumulative Total	**80**	**195**	**208**	**216**	
Change from 2013	*26*	*70*	*114*	*118*	

[a] As noted above, the Draft 2014 Business Plan *Service Planning Methodology* document (CHSRA 2014c) includes an assumption of 53 daily round trip trains starting in 2029 and continuing beyond 2040. Caltrain's Blended Service planning to date has not studied the 2014 Business Plan estimates because the plan was released on February 7, 2014 and conceptual Blended Service studies were completed in 2013. Thus, this Draft EIR is based on the 40 daily round-trip trains that have been studied by Caltrain to date. If more than 40 daily round-trip high-speed trains operate on the Caltrain corridor, then some operational impacts, such as noise, vibration, or localized traffic congestion, may be worse than disclosed in this analysis. The subsequent CHSRA project-level environmental evaluation will address proposed high-speed train service levels along the San Francisco Peninsula.

4.1.3.2 Other Regional Transportation Improvements

Central Subway

This is project number 13 in Table 4-3 and Figure 4-1.

The Central Subway Project is a 1.7-mile extension of Muni's T Third Line from the 4th Street Caltrain Station to Chinatown, with a street-level stop at 4th and Brannan, and three underground stops at Yerba Buena (4th and Folsom Streets), Union Square (Stockton Street at Union Square), and Chinatown (Stockton and Washington Streets). The station to be located at Stockton Street at Union Square will be connected to the Powell Street BART/Muni Station to allow for convenient transfers to BART, Muni Metro lines, the Powell Street Cable Car, and Muni bus lines in the area. The extension will provide a direct connection from the Bayshore and Mission Bay areas to the South of Market, Union Square, downtown, and Chinatown areas. The extension will also provide connection from locations along the new 1.7-mile corridor to the 4th and King Caltrain Station through the already existing 4th and King/Berry T-Third line station.

The Central Subway Project is Phase 2 of San Francisco Municipal Transportation Agency's (SFMTA) Third Street Light Rail Transit Project. Phase 1 of the SFMTA Third Street Light Rail Transit Project, included a 5.1-mile light rail line along the Third Street corridor that opened in 2007. The Central Subway segment of the T-Third Line is expected to be open to the public in 2019. (SFMTA 2013)

San Francisco Municipal Railway 22-Fillmore Electric Trolley Bus Coach Re-Routing

This is project number 14 in Table 4-3 and Figure 4-1.

SFMTA proposes to move the 22-Fillmore Trolley route off of 17th and 18th Streets and onto 16th Street between Kansas Street and 3rd Street in order to between connect to the growing Mission Bay neighborhood and to provide continuous transit service along 16th Street. A revised 33-Stanyan would replace the 22-Fillmore on Connecticut and 18th Streets. SFMTA is also proposing other improvements along the 22-Fillmore route in order to reduce travel time, increase average operating speed, and improve service reliability.

This proposed realignment would mean that the trolley would cross the Caltrain tracks at-grade at 16th Street. With the proposed electrification under the Proposed Project, there would be a conflict between the overhead wires for the electric trolley coach (which is a direct current 600 volt system) and the Proposed Project (which is an alternating current 25 kV system). These electrification systems are not compatible. At discussed in the cumulative analysis of transportation below, Caltrain has identified two technical solutions that would facilitate both the Proposed Project and the 22-Fillmore to use the at-grade 16th Street crossing without conflict.

Major Highway Improvements on the Peninsula

This is project number 15 in Table 4-3 and Figure 4-1.

In the face of rapid growth on the Peninsula and San Francisco, a variety of highway improvements are planned. Major planned highway improvements within several miles of the Caltrain corridor that would cost more than $100 million apiece and that are listed in *Plan Bay Area* include the following (ABAG and MTC 2013a, no date):

- VTA Silicon Valley Express Lanes Program will convert existing carpool lanes to express lanes and add new lanes along SR 237, SR 85, and U.S. Highway 101 corridors throughout Santa Clara County (including express lanes along I-880 between U.S. Highway 101 and I-280).
- U.S. Highway 101 improvements including a high-occupancy vehicle lane from the San Francisco county line to Whipple Avenue (Redwood City); conversion of HOV lane to express lane between Whipple Avenue and Santa Clara County line; and auxiliary lanes from Marsh Road (Menlo Park) to Embarcadero Road (Palo Alto) to SR 85 (Mt. View).
- U.S. Highway 101 corridor interchange improvements at Candlestick Point (San Francisco), Produce Avenue (South San Francisco), SR 92 (San Mateo), Oregon Expressway (Palo Alto), and Zanker Road (San Jose).

Some of these projects are fully funded; others are not yet fully funded but are assumed to be funded in future years. These projects and other projects included in *Plan Bay Area* are not enough to solve the transportation problems in the corridor. The *Plan Bay Area* Final EIR (ABAG and MTC 2013b) indicates that even with these projects in place, there will be more peak period congestion and more total vehicle hours of delay in the region. Thus, there is a need for additional transit in the corridor to reduce future congestion and improve travel opportunities. Improved Caltrain service would help meet this need.

Other Major Non-Highway Improvements on the Peninsula

This is project number 16 in Table 4-3 and in Figure 4-1.

Major planned non-highway transportation improvements within several miles of the Caltrain corridor that would cost more than $100 million apiece and that are listed in *Plan Bay Area* include the following (ABAG and MTC 2013a, no date):

- Embarcadero Streetcar: Extend historic streetcar service from Fort Mason to Caltrain's San Francisco 4th and King Station.
- Southern Intermodal Terminal and MUNI T-Line Extension: Extend MUNI T-Line from Bayshore/Sunnydale to Caltrain Bayshore Station (San Francisco).
- Future grade separations in San Mateo County: Grade separations at approximately two or three high-priority candidate locations along the Caltrain corridor to separate vehicular and rail traffic for safety purposes. The locations are not yet known.
- Bus Rapid Transit (BRT) along El Camino Real: Provide BRT along El Camino Real from Palo Alto to Daly City.
- Palo Alto Caltrain Station and Bus Transit Center Expansion: Improve bus transit capacity, amenities and access to downtown Palo Alto, the Stanford campus and Stanford Shopping Center (Palo Alto).
- Grade separation at Rengstorff Avenue: Depress Rengstorff under the Caltrain tracks (Mountain View).
- Tasman Express Long T double tracking: Double-tracking of VTA's Mountain View light rail line (Mountain View/Sunnyvale, Santa Clara, San Jose).

- Mineta San Jose International Airport Automated People Mover (APM) Connector: Provide direct service from the airport to VTA's Guadalupe light-rail station, and the Santa Clara Caltrain station, and future Santa Clara BART Station.

Some of these projects are fully funded; others are not yet fully funded but are assumed to be funded in future years.

San Francisco Interstate I-280 Teardown/Boulevard/4th and King Underground Station Conceptual Planning

This is project number 73 in Table 4-3 and Figure 4-1.

The City and County of San Francisco will be conducting a study (entitled the Railyard Alternatives and I-280 Boulevard Feasibility Study) that will evaluate the feasibility of removing the end of the I-280 freeway after Mariposa Street, extending the Caltrain (and future HSR) tracks underground, creating a surface boulevard that would connect the cross-streets of Potrero Hill and SOMA neighborhoods to Mission Bay, reconnecting the adjacent neighborhoods at the San Francisco 4th and King Station, and potentially redeveloping the 4th and King Station.

Key potential elements of this concept include the following:

- The City is exploring the potential removal of I-280 north of Mariposa Street and the replacing it with an at-grade boulevard. A similar concept was completed along Octavia Boulevard with the removal of the Central Freeway and along the Embarcadero with the removal of the Embarcadero Freeway following the 1989 Loma Prieta earthquake. Planning is at an early phase but may involve a new boulevard with vehicle, bicycle, and pedestrian lanes and access, as well as commercial and residential development of areas adjacent to the boulevard, and new connections between areas east and west of the existing I-280.
- As part of the evaluation of the removal of I-280, the City is also exploring the potential to underground or realign the northern portion of the Caltrain corridor from somewhere north of Mariposa Street to the 4th and King Station.
- In addition, the City is also exploring the potential for either reconfiguring or replacing the existing 4th and King Station to allow for potential redevelopment providing housing and employment in the area.
- Other components of the City of San Francisco Railyard Alternatives and I-280 Boulevard Feasibility Study currently underway are considering the alignment and construction methods of the Downtown Tunnel Extension (DTX) to the Transbay Transit Center (TTC); the possibility of constructing a loop track out of the north end of the TTC which may allow for a two-track, rather than a three-track section, through the 4th and Townsend Station area; and the funding and financial opportunities from potential development that could be designated as a potential funding source for future improvements in the area, a dedicated funding stream for Caltrain, and/or general City funds.
- The anticipated study schedule is from June 2014 to July 2016.

This project is not part of any approved City planning document, has not been environmentally reviewed, and project funding has not been identified. Given this project is at a very early phase of development, it cannot be analyzed in any detail in this cumulative impact analysis.

If such a project were to advance, development would occur after the Proposed Project is complete. To complete such a project could require substantial changes to the Caltrain alignment in San Francisco and the 4th and King Station. While the removal of Proposed Project's electrical infrastructure (wires and poles) in the vicinity would require additional construction effort and cost, the electrical infrastructure would not pose a physical impediment to future development and the costs of removal would be minor in comparison with the cost of the potential improvements described above.

4.1.3.3 Land Development Adjacent to Caltrain ROW

Planned, proposed, and under-construction land development projects adjacent or within 0.15 miles of the Caltrain ROW have the potential to be affected by the Proposed Project. Table 4-9 describes all land use projects, in various stages of development, within approximately 0.15 miles of the Caltrain ROW.

4.1.4 Cumulative Impact Analysis

This section discusses the cumulative impact analysis. Table 4-10 summarizes the cumulative impact analysis findings.

4.1.4.1 General Characteristics of Cumulative Projects for the Cumulative Analysis

Construction

There is the potential for cumulative construction impacts where cumulative projects and the Proposed Project overlap in location or are adjacent (affecting the same resource/receptor but potentially at different times), or if they overlap in time (affecting the same resource/receptor at the same time).

Blended Service

Construction of the San Jose to Merced section of the HSR system would occur sometime after 2020 and be completed by 2026.

Construction associated with Blended Service between San Jose and San Francisco would include passing tracks, station development at Diridon and Millbrae (and possibly Redwood City), trackage improvements, at-grade crossing improvements and a maintenance facility. Construction would occur sometime after 2020 after the Proposed Project construction is completed.

Thus, construction of the Proposed Project and HSR improvements would not overlap in time. However, with a 4-year construction schedule for Proposed Project and then a multi-year construction period for HSR, there would be potential for cumulative construction impacts that would be longer in duration with both projects than with only the Proposed Project.

Table 4-9. Land Use Development Projects Adjacent to the Caltrain ROW

Project Name (Ref #)	Description	Location	Status	Location Relative to Proposed Project
San Francisco				
4th and King Railyards Redevelopment (#17)	Existing and planned high-density residential, commercial and office uses (San Francisco Planning Department 2012)	San Francisco 4th and King Caltrain Station	Early planning	Within Caltrain ROW, Adjacent, and in OCS/ ESZ area outside ROW
Brisbane				
Brisbane Baylands Specific Plan (#18)	684-acre, 12-million-square-foot development to include a variety of uses (UPC 2010)	Between U.S. Highway 101 and Bayshore Boulevard	Proposed	Adjacent and in OCS/ ESZ area outside ROW
Opus Office (#19)	Two buildings with 448,000 square feet of office uses (City of Brisbane 2013)	3000–3500 Marina Boulevard	Proposed	0.10 mi from ROW
3710–3760 Bayshore Boulevard (#20)	2.9-acre development of two buildings with 30 residential units (City of Brisbane 2013)	3710–3760 Bayshore Boulevard	Approved. Building permit application submitted in 2010.	0.02 mi from ROW
3700 Bayshore Boulevard (#21)	3.6-acre development with 386 condominiums and a 4.5-acre development with 21 single-family lots (City of Brisbane 2013)	3700 Bayshore Boulevard	Tentative subdivision map submitted	0.02 mi from ROW
Millbrae				
Millbrae BART Station TOD (#68)	350 residential units and approximately 160,000 square feet of office and commercial space. (Note: The Station Area Plan provides a long-term framework for more substantial development over time.)	El Camino Real and Millbrae Avenue	Planning	Adjacent
Burlingame				
1225 Floribunda Avenue (#22)	3-story, 6-unit residential condominium (City of Burlingame 2013)	1225 Floribunda Avenue	Proposed	0.08 mi from ROW
San Mateo				
Mi Rancho Market (#23)	2-story, 12,500-square-foot market with 25 parking spaces (City of San Mateo 2013e)	80 North B Street	Proposed	0.02 mi from ROW
Gas and Shop (#24)	New fuel island, curb cut, and canopy at existing gas station (City of San Mateo 2013d)	609 East 4th Avenue	Proposed	0.13 mi from ROW

Project Name (Ref #)	Description	Location	Status	Location Relative to Proposed Project
Sadigh Mixed Use (#25)	Mixed-use building with 4,000 square feet of retail and 10 residential condominiums (City of San Mateo 2013g)	4300 S. El Camino Real	Approved	0.03 mi from ROW
Nazareth Terrace (#26)	Mixed-use building including 3,010 square feet of retail, 7,273 square feet of office, and 11 residential units (City of San Mateo 2013f)	234 7th Avenue	Approved	0.06 mi from ROW
Cal Water Office (#27)	2-story, 18,184-square-foot office building (City of San Mateo 2013c)	341 and 345 N. Delaware Street	Approved	0.11 mi from ROW
800 & 888 N. San Mateo Drive Apartments (#28)	3.08-acre development of 155 apartments units (City of San Mateo 2013a)	SE corner of Peninsula Avenue and North San Mateo Drive	Under construction	0.11 mi from ROW
2090 Delaware Apartments (#29)	2.38-acre development of 111 apartment units (City of San Mateo 2013b)	NW corner of S. Delaware Street and Pacific Boulevard	Under construction	0.10 mi from ROW
San Carlos				
San Carlos Transit Village (#30)	Eight new buildings that would house 407,298 square feet of residential uses including 280 multiple-family dwelling units, 23,797 square feet of office uses, and 14,326 square feet of retail uses (City of San Carlos 2012)	North of San Carlos Caltrain Station	Approved	Adjacent and in OCS/ ESZ area outside ROW
Wheeler Plaza Redevelopment Project (#31)	2.65-acre redevelopment of city-owned parcel including 9,855 square feet of commercial uses and 108 residential units above a 3-level parking garage (Lamphier-Gregory 2011)	1 block west of El Camino Real and southwest of the San Carlos Avenue/Laurel Street	Proposed	0.10 mi from ROW
Redwood City				
145 Monroe Street (#32)	2.27-acre, 6-story development of 305 residential units (City of Redwood City 2013a)	Franklin Street/Monroe Street	Proposed	0.07 mi from ROW
Classics at Redwood City (#33)	0.5-acre, 3-story development with 18 residential units and 35 subterranean parking stalls (City of Redwood City 2013c)	755 Brewster Avenue	Proposed	0.08 mi from ROW
Finger Avenue (#34)	1.7-acre development of 9 residential units	80 Finger Avenue	Proposed	0.11 mi from ROW

Project Name (Ref #)	Description	Location	Status	Location Relative to Proposed Project
201 Marshall Street (#35)	0.7-acre development with 116 residential units and parking (City of Redwood City 2013b)	201 Marshall Street	Under construction	0.03 mi from ROW
Lathrop PARC (#36)	0.7-acre, 60,000-square-foot nursing facility with 114 beds (City of Redwood City 2013d)	134 Maple Street	Under construction	Adjacent and in OCS/ ESZ area outside ROW
Crossings/900 (#37)	296,000-square-foot office development with 904 parking stalls (City of Redwood City 2013e)	950 Middlefield Road	Under construction	Adjacent
Atherton				
Atherton Town Hall Complex (#67)	Update the existing town complex	91 Ashfield Road	In planning phase; Construction timing unknown	0.03 mi from ROW
Menlo Park				
389 El Camino Real (#71)	Demolition of an existing single-family house and residential triplex, and construction of 26 residential units	389 El Camino Real	Under construction	0.06 mi from ROW
500 El Camino Real (#38)	8.43-acre redevelopment with 170 housing units, 10,000 square feet pf retail space, and 199,500 square feet of office space (City of Menlo Park 2013a)	500 El Camino Real	Proposed	0.05 mi from ROW
1300 El Camino Real (#39)	3.4-acre development with 110,065 square feet of office uses and 424 parking spaces (City of Menlo Park 2013b)	1300 El Camino Real	Approved	0.08 mi from ROW
1460 El Camino Real (#40)	26,800-square-foot, 2-story office building with submerged parking and 16 two-story townhouse units with partially submerged parking (City of Menlo Park 2013c)	1452 &1460 El Camino Real and 1457 & 1473 San Antonio Street	Approved	0.11 mi from ROW
1706 El Camino Real Medical Office (#41)	2-story, 10,148 square-foot office building for medical/dental office use (City of Menlo Park 2013d)	1706 El Camino Real	Approved	0.14 mi from ROW
El Camino Real/ Downtown Specific Plan (#69)	Redevelopment over the next 30 years of the El Camino Real corridor, the downtown area and the rail station area	Caltrain station, downtown area, and areas east and west of El Camino Real	Approved	Adjacent and in OCS/ ESZ area outside ROW

Project Name (Ref #)	Description	Location	Status	Location Relative to Proposed Project
Palo Alto				
395 Page Mill Road (#42)	Two 4-story buildings with 311,000 square feet of R&D/office uses, in addition to existing 3-story building with 1,329 parking stalls (City of Palo Alto 2013b)	395 Page Mill Road	Proposed	0.12 mi from ROW
145 Hawthorne (#43)	10,503-square-foot development of three detached residential units (City of Palo Alto 2013)	145 Hawthorne Avenue	Planning	0.07 mi from ROW
195 Page Mill Road (Park Plaza) (#44)	3-story mixed-use building with 82 residential rental units (104,174 square feet) and 47,917 square feet of ground floor commercial and retail use (City of Palo Alto 2013a)	195 Page Mill Road	Under construction	Adjacent and in OCS/ESZ area outside ROW
3445 Alma Street (Alma Plaza) (#45)	20,000-square-foot grocery store and an additional 6,000 square feet of commercial space (City of Palo Alto 2013c)	3445 Alma Street	Under construction	0.08 mi from ROW
Mountain View				
100 Moffett Boulevard (#46)	2.9-acre development of three 2- to 4-story buildings with 190 units (ICF International 2012)	100 Moffett Boulevard	Planning	0.03 mi from ROW
209-405 West Evelyn (#47)	4.2-acre development of 65 residential units (Grand Boulevard Initiative 2012)	209–405 West Evelyn	Under construction	0.03 mi from ROW
100-200 West Evelyn (#48)	4.33-acre development with 48,738 square feet of office space (Grand Boulevard Initiative 2013)	100–200 West Evelyn	Under construction	Adjacent and in OCS/ESZ area outside ROW
902 Villa Street (#49)	4-story building with 21,745 square feet of office space (Grand Boulevard Initiative 2013)	902 Villa Street	Under construction	0.08 mi from ROW
871 West Evelyn (#50)	4-story building with 65,000 square feet of office space.	871 West Evelyn	Under construction	Adjacent
San Antonio Station (#51)	Remove Heritage Trees	100 Mayfield Avenue	Planning	Adjacent
Northpark Apartments (#52)	Addition of 134 residential units to an existing 188 residential unit apartment complex (Environmental Planning Commission 2012)	111 North Rengstorff Avenue	Under construction	0.09 mi from ROW

Project Name (Ref #)	Description	Location	Status	Location Relative to Proposed Project
South Whisman Precise Plan (#53)	New, 38-acre residential community with 1,210 housing units and 37,000 square feet of commercial space (Mountain View City Council 2009)	Ferguson Road, Near Whisman Station	Phased over time	0.20 mi from ROW
Tripointe Homes (#54)	Four rowhouses	129 Ada Avenue	Planning	0.08 mi from ROW
Pacific Press – Courtyard (#55)	Precise Plan Amendment	1200 Villa Street	Inactive	Adjacent and in OCS/ ESZ area outside ROW
Sunnyvale				
Carmel Lofts (#56)	Two buildings with 133 apartment units in 4 stories and 8,000 square feet of ground floor retail space (City of Sunnyvale 2013)	Adjacent to Plaza del Sol off of Frances Avenue and Olson Way	Under construction	0.08 mi from ROW
Lawrence Station Area Plan (Sunnyvale and Santa Clara) (#66)	Planning document for the vicinity of the Lawrence Station that includes mixed-use development	106 Lawrence Station Road	Planning	Adjacent and in OCS/ ESZ area outside ROW
Santa Clara/San Jose				
Santa Clara Station Area Plan (#57)	Plan for 432 acres surrounding Santa Clara Transit Center for future transit-oriented development (VTA 2010)	Santa Clara Caltrain Station	Approved. Incremental construction over time	Adjacent and in OCS/ ESZ area outside ROW
San Jose				
Earthquakes Stadium (#58)	18,000-seat professional sports stadium.	1105-1125 Coleman Avenue	Under construction	Adjacent
Former FMC site, also called Coleman Highline (PDC98-104, PD12-019) (#59)	Up to 3 million square feet of office/R&D space next to Earthquakes stadium	1115 Coleman Avenue	Construction in 2014/ 2015	Adjacent
Alameda (PD12-017) (#60)	2.19-acre development of a 33,900-square-foot grocery store (Whole Foods) (San Jose Planning Commission 2012)	155 Stockton Avenue	Construction in 2013/2014	0.06 mi from ROW

Project Name (Ref #)	Description	Location	Status	Location Relative to Proposed Project
Morrison Park Townhomes (PD06-094) (#61)	4.44-acre multi-family attached residential development with 250 townhome units, 425 parking stalls, and 1.16 acres of open space (Civil Engineering Associate 2006)	Cinnabar and Stockton Streets	Under construction	0.08 mi from ROW
785-807 The Alameda (PDC13-007) (#62)	1.04-acre development with 98 residential units and 22,660 square feet of commercial use (City of San Jose 2013b)	785-807 The Alameda	Planning	0.11 mi from ROW
Baseball Stadium (PP05-214) (#63)	1.5-million-square-foot baseball stadium with a capacity of 45,000 and 1,200 space parking garage (LSA Associates 2007)	245 S. Montgomery Street	EIR certified	Adjacent and in OCS/ ESZ area outside ROW
Park Avenue Senior and Family Housing (PDC13-012) (#64)	2.15-acre development of 181 family and senior apartments (City of San Jose 2013c)	777 Park Avenue	Planning	0.02 mi from ROW
OSH West San Carlos (H13-008) (#65)	48,000-square-foot commercial building (City of San Jose 2013a)	720 W. San Carlos Street	Construction Summer 2013	Adjacent and in Proposed Project OCS/ ESZ area outside ROW
Diridon Station Area Plan (#72)	Plan for expansion of and development around the Diridon Transit Station (approximately 500 acres)	At and adjacent to Diridon Station	Planning	Adjacent and in OCS/ ESZ area outside ROW

Sources: See Table 4-2.

Other Rail Projects in or Adjacent to the Caltrain ROW

As described in Table 4-3, only some of the other rail projects would have actual construction in or adjacent to the Caltrain ROW, specifically, Caltrain South Terminal (#4), BART Silicon Valley Extension (#8), bridge or tunnel work if needed to accommodate higher freight service in the future (#10), San Bruno Grade Separation project (#11), other Caltrain improvements (#12), and the BART Millbrae tail tracks (#70). Some of these projects would be constructed prior to Proposed Project construction, some during, and some after the Proposed Project is completed.

Other Transportation Projects

As described in Table 4-3, only some of the other transportation projects would have actual construction in or adjacent to the Caltrain ROW, specifically, Central Subway (#13), Muni 22-Fillmore re-route (#14); some of the non-highway improvements (#16), and San Francisco's potential future project related to I-280 teardown (#73). Some of these projects would be constructed prior to Proposed Project construction, some during, and some after the Proposed Project is completed.

Land Development Projects Adjacent to the Caltrain Row

As shown in Table 4-3, none of the land development projects, with the exception of potential future redevelopment of the 4th and King Station and yard (#17) is located within the Caltrain ROW. However, a number of these projects are adjacent to the Caltrain ROW and some of them are located in areas of minor encroachment by the Proposed Project for OCS or ESZ requirements. Some of these projects would be constructed prior to Proposed Project construction, some during, and some after the Proposed Project is completed.

Operations

Blended Service

Operation of a statewide HST will yield transportation and environmental benefits, including: enhanced inter-regional mobility from a new transportation mode; reductions in statewide and Bay Area vehicle miles travelled; reduced energy consumption for transportation; air quality improvements; and reduced emissions of greenhouse gases (CHSRA 2005).

CHSRA plans for operational HSR service to San Jose by as early as 2026; thus there could be potential cumulative effects after that date of the San Jose to Merced section of HSR where it is parallel to the Caltrain ROW between San Jose Diridon Station and south of the Tamien Station. The earliest date for potential Blended Service between San Jose and San Francisco would be sometime between 2026 and 2029. Thus, there would be no cumulative operational impacts of the Proposed Project and Blended Service until those dates.

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Table 4-10. Summary of Cumulative Impacts Analysis

Resource Issue	Geographic Area of Impact	Rail Projects Planned in the Caltrain ROW				Other Regional Transportation Improvements		Land Development Adjacent to Caltrain ROW		Cumulative Impact (including Proposed Project)		Is Proposed Project's Contribution Considerable?	
		CAHSR Blended Service		Other Projects									
		Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Aesthetics	Caltrain ROW and vicinity	LTSM	PS	LTSM	PS	LTSM	PS	LTSM	PS	LTSM	PS	LCCM	CCU
Air Quality	Criteria pollutants: San Francisco Bay Area Air Basin	LTSM	Beneficial	LTSM	Beneficial	LTSM	PS	LTSM	LTSM	LTSM	LTSM	LCCM	Beneficial
	Toxic air contaminants: Caltrain ROW and immediate vicinity	LTSM	LTS	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LCCM	Beneficial
Biological Resources	Terrestrial species: ROW and adjacent Aquatic species: ROW and downstream	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LCCM	LCCM
Cultural Resources	Caltrain ROW and adjacent to ROW	**Historical Resources**											
		PS/UNK	NI	PS/UNKN	NI	PS/UNK	NI	PS/UNK	NI	PS/UNK	NI	LCCM	NI
		Archaeological Resource											
		LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LCCM	NI
		Human Remains											
		LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LCCM	NI
EMF/EMI	Caltrain ROW and adjacent to ROW	**Electromagnetic Fields**											
		LTS	LTS	LTS	NI	LTS	NI	LTS	NI	LTS	LTS	LCC	LCC
		Electromagnetic Interference											
		LTS	LTSM	LTS	NI	LTS	NI	LTS	NI	LTS	LTSM	LCC	LCCM
Geology, Soils and Seismicity	Caltrain ROW and adjacent to ROW	LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LCCM	NI
GHG Emissions and Climate Change	The Planet (GHG emissions) San Francisco Peninsula (vulnerability to climate change impacts, excluding sea level rise)	**Greenhouse Gas**											
		Beneficial		LTSM		LTSM		LTSM		LTSM		Beneficial	
		Climate Change (excluding Sea Level Rise)[a]											
		NI	LTS	NI	LTS	NI	LTS	NI	PS	NI	PS	NI	LCC
Hazards and Hazardous Materials	Caltrain ROW and adjacent to ROW	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LCCM	LCCM
Hydrology and Water Quality	Caltrain ROW and downstream	**Hydrology and Water Quality (other than Flooding due to Sea Level Rise)**											
		LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LCCM	LCCM
		Flooding due to Sea Level Rise											
		NI	PS	NI	PS	NI	PS	NI	PS	NI	PS	NI	CCU
Land Use and Recreation	Adjacent to Caltrain ROW	LTSM	PS	LTSM	PS	LTSM	PS	LTSM	PS	LTSM	PS	LCCM	LCCM
Noise and Vibration	Caltrain ROW and adjacent to ROW	**Noise**											
		PS	PS	PS	PS	PS	PS	PS	LTSM	PS	PS	CCU	CCU
		Vibration											
		LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LCCM	LCCM
Population and Housing	Project counties	LTSM	LTSM	LTSM	NI	LTSM	LTSM	LTSM	NI	LTSM	NI	NI	NI
Public Services and Utilities	Caltrain ROW and adjacent to ROW (Construction)	**Disruption to Utilities**											
		LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LTSM	NI	LCCM	LCC

Resource Issue	Geographic Area of Impact	Rail Projects Planned in the Caltrain ROW				Other Regional Transportation Improvements		Land Development Adjacent to Caltrain ROW		Cumulative Impact (including Proposed Project)		Is Proposed Project's Contribution Considerable?	
		CAHSR Blended Service		Other Projects									
		Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
	Service areas of regional providers to project sites (Operations)	**Public Services**											
		LTSM	LTS	LTSM	LTS	LTSM	LTS	LTSM	LTSM	LTSM	LTSM	LCCM	LCC
		Landfill Capacity											
		LTSM	LTS	LTSM	LTS	LTSM	LTS	LTSM	LTSM	LTSM	LTSM	LCC	LCC
Transportation and Traffic	Caltrain ROW, roadways crossing ROW, and roadways near stations (traffic level of service, bicycle and pedestrian facilities) San Francisco Peninsula (regional traffic, regional transit systems)	LTSM	PS	LTSM	PS	LTSM	PS	LTSM	PS	LTSM	PS	LCCM	CCU

[a] Flooding related to sea level rise is included in the hydrology and water quality impacts.
LTS = Less than significant.
LTSM = LTS with mitigation.
PS = Potentially significant.
NI = No impact.
UNK = Unknown.
NA =Not applicable.
LCC = Less than considerable contribution.
LCCM = LCC with project mitigation.
CCU = Cumulatively considerable and unavoidable.

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Other Rail Projects in the Caltrain ROW

The other rail projects have various planned in-service dates. Some, such as ACEforward (#6), Capitol Corridor improvements (#7), and the Coast Daylight project (#9), would increase service in the Caltrain corridor by 2020. Freight service could increase, as well. Once the Proposed Project is operational (first full year expected to be 2020), there is potential for cumulative operational impacts to occur as other passenger and freight rail service increases over time. To analyze the potential full impact of such proposed increases, this analysis uses the service increases shown in Table 4-8 for 2040.

Land Development Projects Adjacent to the Caltrain Row

As shown in Table 4-3, none of the land development projects, with the exception of potential future redevelopment of the 4th and King Station and yard (#17) is located within the Caltrain ROW. However, a number of these projects are adjacent to the Caltrain ROW and some of them are located in areas of minor encroachment by the Proposed Project for OCS or ESZ requirements. Some of these projects would be constructed prior to Proposed Project construction, some during, and some after the Proposed Project is completed.

Operations

Blended Service

Operation of a statewide HST will yield transportation and environmental benefits, including: enhanced inter-regional mobility from a new transportation mode; reductions in statewide and Bay Area vehicle miles travelled; reduced energy consumption for transportation; air quality improvements; and reduced emissions of greenhouse gases (CHSRA 2005).

CHSRA plans for operational HSR service to San Jose by as early as 2026; thus there could be potential cumulative effects after that date of the San Jose to Merced section of HSR where it is parallel to the Caltrain ROW between San Jose Diridon Station and south of the Tamien Station. The earliest date for potential Blended Service between San Jose and San Francisco would be sometime between 2026 and 2029. Thus, there would be no cumulative operational impacts of the Proposed Project and Blended Service until those dates.

Other Rail Projects in the Caltrain ROW

The other rail projects have various planned in-service dates. Some, such as ACEforward (#6), Capitol Corridor improvements (#7), and the Coast Daylight project (#9), would increase service in the Caltrain corridor by 2020. Freight service could increase, as well. Once the Proposed Project is operational (first full year expected to be 2020), there is potential for cumulative operational impacts to occur as other passenger and freight rail service increases over time. To analyze the potential full impact of such proposed increases, this analysis uses the service increases shown in Table 4-8 for 2040.

Other Transportation Projects

Other transportation projects concerning highways, light rail, or other transit systems would not result in cumulative operational impacts along the Caltrain ROW itself. However, there is potential for cumulative operational impacts at areas where light rail or transit projects intersect with

Caltrain stations or the Caltrain ROW and for traffic overall with roadway projects that may facilitate increased traffic.

Land Development Projects Adjacent to the Caltrain ROW

Land development projects would not affect rail service itself, but could result in cumulative operational impacts related to general traffic, air quality, noise and other operational issues in combination with the Proposed Project. In addition, land development projects adjacent to the Caltrain ROW would result in additional residential and commercial receptors of operational train noise impacts resultant from Proposed Project and other rail projects.

4.1.4.2 Aesthetics

Impact CUMUL-1-AES: Cumulative impacts on visual aesthetics

The geographical context area for the analysis of potential cumulative aesthetic impacts consists of the areas adjacent to, within, and in the vicinity of the Caltrain ROW. The existing setting for the Proposed Project is presented in Section 3.1, *Aesthetics*. Cumulative projects within this geographic context include all projects listed in Table 4-3, but the cumulative impact area is limited to the extent of cumulative projects in or adjacent to the Caltrain ROW. The Proposed Project would not contribute to any potential cumulative aesthetic impacts that occur at distance from the Caltrain ROW, such as the potential impacts of HSR between San Jose and Merced.

Construction

Scenic Vistas

The Caltrain ROW and adjacent areas are primarily located in the midst of urban and suburban development on the Peninsula corridor. As discussed in Section 3.1, *Aesthetics*, while some of the area has a high localized visual quality, there are very limited long-range scenic vistas that include the Caltrain ROW, due to the developed character of the ROW and vicinity, its location at-grade in a generally flat area and due to the intervening vegetation and buildings blocking scenic vistas.

Visual signs of construction of the Proposed Project, Blended Service improvements, HSR San Jose to Merced, and other construction along the Caltrain ROW would include construction equipment and stockpiling of soils, as well as new structures. During this phase, construction activity would be highly noticeable to residents and others in the immediate vicinity.

The view from bridges would be fleeting for crossing motorists, bicyclists, and pedestrians, and construction would not affect their long-range views because viewers would be elevated above the Caltrain ROW and other construction activities. The view from adjacent multi-level buildings of the Santa Cruz Mountains, San Francisco Bay, or San Bruno Mountain would not be blocked by cumulative construction activities. Cumulative construction activities would not likely be seen from distant hillsides because of intervening features and activities except for substantial elevated structures. Elevated structures could be associated with HSR north and south of the San Jose Diridon Station if an aerial station option is selected.

Ground level views from adjacent residential, commercial, and park areas would be affected by construction where the Caltrain ROW is visible from these adjacent areas, but these views are short-range in character, not long-range scenic vistas.

Cumulative construction activities although of a longer duration when combining Proposed Project and cumulative projects would, thus, have less-than-significant impacts on scenic vistas. Thus, the Proposed Project would have a less-than-considerable contribution to cumulative aesthetic impacts relative scenic vistas.

Scenic Resources within or along a Designated Scenic Roadway

As discussed in Section 3.1, *Aesthetics*, there are no designated scenic roadways directly adjacent to the Caltrain ROW between San Jose and San Francisco except I-280 in San Francisco. Given that I-280 is elevated where it crosses the Caltrain ROW and Proposed Project, and that Blended Service and other rail projects would use the Caltrain ROW itself, construction of cumulative rail service is not likely to affect any scenic resources associated with I-280. The Proposed Project would not affect any scenic resources within a designated scenic roadway during construction. While other cumulative projects may affect scenic resources along a designated scenic roadway during construction, the Proposed Project would not make any contribution to such potential impacts that are not in or adjacent to the Caltrain ROW itself. Therefore, the Proposed Project's contribution to potential cumulative construction impacts on scenic resources along a designated scenic roadway would be less than considerable

Visual Character

This impact concerns temporary visual changes during construction. Cumulative construction of concern for this analysis would occur in or adjacent to the Caltrain ROW. As described in Section 3.1, *Aesthetics*, the character of the areas adjacent to the Caltrain corridor vary from residential to commercial to industrial and includes a number of park areas as well. Cumulative construction would be most out of character in residential and park areas and less out of character in commercial and industrial areas or in transportation corridors (like the Caltrain ROW). Where construction activities are present for an extended period of time in or directly adjacent to residential or park areas, there could be a temporarily significant aesthetic impact.

For the Proposed Project, Mitigation Measure AES-2a is required to minimize the Proposed Project's temporary impacts on residential and park areas outside the Caltrain ROW. Although other cumulative projects may also result in a temporary change of visual character of areas adjacent to the Caltrain ROW during construction, with the recommended mitigation measure, the Proposed Project's contribution to cumulative temporary changes in visual character would be less than considerable.

Light and Glare

Both the Proposed Project and Blended Service improvements would require night-time construction. Other railway and transportation projects and possibly some of the land use projects may also require night-time construction as well. This could result in light spill over into adjacent residential areas, which if uncontrolled could be significant.

During Proposed Project nighttime construction, pursuant to Mitigation Measure AES-4a, the JPB will require the project contractor to ensure that construction crews working at night direct any artificial lighting onto the work site, to minimize spill over light or glare in adjacent residential areas. With this mitigation, the project's contribution to a potential cumulative impact on light and glare during construction is not considerable.

Operation

Scenic Vistas

Blended Service

As noted above, the Caltrain ROW is not a readily observable part of a scenic vista due to its setting in an urban and suburban context with few long-range scenic views of the ROW itself. In the San Jose to Merced HSR segment, the approaching aerial tracks between the Caltrain Tamien Station and the San Jose Diridon Station would elevated and would be highly observable as part of long range views of downtown San Jose. For Blended Service improvements north of Diridon, potentially elevated structures between San Jose to Santa Clara and for grade separations elsewhere would have the greatest potential to affect scenic vistas. The maintenance yard, if proposed at the Brisbane/Bayshore location close to U.S. Highway 101, may also be readily observable by passing motorists, although this area at present consists of formerly used industrial and landfill property and is not particularly of a high visual quality. Passing tracks will be noticeable to local communities, but if at-grade, would not disrupt scenic vistas.

All Other Projects

Cumulative projects along the Caltrain ROW could also affect scenic vistas from buildings, hillsides, and bridges and other locations, particularly where new highly elevated structures are proposed that are dissimilar to existing development along the ROW.

Proposed Project Cumulative Contribution

While cumulative projects could affect scenic vistas where new structures affect long-range views of the Santa Cruz Mountains, San Francisco Bay, or other visual resources, the Proposed Project itself would only have minimal impacts on long-range views because the Proposed Project improvements would be difficult to distinguish among the developed areas along the Caltrain ROW. Moreover, the Proposed Project improvements installed as part of the Caltrain ROW would be consistent with the character of the ROW as a rail corridor such that they would not substantially change this part of a long-range view. Consequently, the Proposed Project's contribution to the cumulative impact on scenic vistas would be less than considerable.

Scenic Resources within or along a Designated Scenic Roadway

As noted above, the Proposed Project would not affect any scenic resources within a designated scenic roadway. While other cumulative projects may affect scenic resources along a designated scenic roadway, the Proposed Project would not make any contribution to such potential impacts that are not in or adjacent to the Caltrain ROW itself. Therefore, the Proposed Project's contribution to potential cumulative operational impacts on scenic resources along a designated scenic roadway would be less than considerable.

Visual Character

Blended Service

The aerial structures and new trackage proposed for HSR for the San Jose to Merced segment approaching San Jose from north of SR 82 and the Diridon Station would be located along the Caltrain ROW and would affect the visual character of existing areas along the ROW, particularly

where the Caltrain ROW is adjacent to residential areas in San Jose. A potential aerial structure from the Diridon Station to Santa Clara would also change the visual character of this area although much of the Caltrain ROW is adjacent to commercial and industrial areas to the east.

The Blended Service proposed improvements between Santa Clara and San Francisco could affect the visual character of areas along the passing tracks, at Diridon and Millbrae Stations (and possibly Redwood City Station), at the maintenance yard location, and potentially in other areas where grade separations or other improvements are proposed. While station changes could be substantial, given that these are existing stations, the new stations would be generally consistent with existing visual character. However, depending on the specific design, though compatible with current uses, the actual character could be substantially changed. This would be more acute at a historic station (such as Diridon) than a station with extensive recent visual changes (such as Millbrae).

The impact of the passing tracks on visual character would depend on their location and design. The general visual setting of the preliminary 5 locations studied to date is as follows

- The North 4 Track (San Francisco to Burlingame): Areas adjacent to the northern part of this section are primarily industrial and commercial in Brisbane and South San Francisco. Areas adjacent to the southern part of this section are dominated by adjacent residential areas in San Bruno (including two parks), a mix of residential and commercial uses in Millbrae and Burlingame.
- The Long-Middle 4 Track (San Mateo to Redwood City): Areas adjacent to the northern part of this section contains a mix of adjacent commercial and residential areas in San Mateo, transitioning to primarily residential areas in Belmont, primarily commercial areas in San Carlos, with a mix of commercial and residential areas in Redwood City. Several parks are adjacent in San Mateo and Redwood City.
- The Short-Middle 4 Track (San Mateo to San Carlos): Areas adjacent to the northern part of this section contain a mix of adjacent commercial and residential areas in San Mateo (including one adjacent park), transitioning to primarily residential areas in Belmont and commercial areas in San Carlos.
- The Middle 3 Track (San Mateo to Palo Alto): Areas adjacent to the northern part of this section contain a mix of adjacent commercial and residential areas in San Mateo, transitioning to primarily residential areas in Belmont, commercial areas and San Carlos and a mix of commercial and residential areas in Redwood City. The southern part of this section includes adjacent residential areas in Atherton, Menlo Park, and Palo Alto, with commercial areas in downtown Menlo Park and Palo Alto. Several parks are adjacent in San Mateo, Redwood City, Atherton and Palo Alto.
- The South 4-Track (Mountain View to Santa Clara): Areas adjacent to this section contains a mix of residential and commercial areas including several parks in Mountain View.

Within areas where adjacent land uses are commercial or industrial in character, additional passing tracks, even if outside the ROW, would not have a significant impact on visual character. In residential areas or areas with parks, expansion outside the ROW for passing tracks, where necessary, could change the visual character of the land immediately adjacent to the existing Caltrain ROW itself.

The impact of a new maintenance yard and any grade separations or other improvements would also depend on their location. The previously studied maintenance yard location in Brisbane/

Bayshore (in the 2010 CHSRA alternatives analysis) is in an area of historic industrial, railroad and landfill use, but the area is proposed for redevelopment with residential, commercial, industrial and park use by the Brisbane Baylands project. Depending on the uses extant at the time of Blended Service, the addition of maintenance yard at the Brisbane/Bayshore location may or may not be consistent with the visual character at that time.

As indicated in Table 4-8, the corridor is presently used by nearly 100 trains per day between Santa Clara and San Francisco and 125 trains per day between Santa Clara and San Jose. Thus, the addition of HST trains themselves (in combination with other rail increases) will not change the visual character of the Caltrain corridor as a transportation corridor. The changes in noise and vibration due to additional trains on adjacent land uses is discussed separately below.

Overall aesthetic impacts of new HSR facilities for the San Jose to Merced segment and for Blended Service facilities between San Jose and San Francisco are considered potentially significant depending on their ultimate location and design. The highest potential for significant visual character impacts would be for any elevated grade separations or passing tracks outside the Caltrain ROW if located in sensitive visual areas such as residential areas or parks.

All Other Projects

During operation, the cumulative projects could change the visual character in the project area due to permanent structures and changes in landscaping.

Cumulative transportation projects would introduce new features such widened roadways, bridges and interchanges, aerial and at-grade tracks, overhead power lines and grade separations. Cumulative transportation projects would also increase passenger and freight rail, light rail, and roadway use as well although such increase in use would not change the aesthetic character of existing roadway, rail, and light rail corridors unless facilities in new locations are proposed. In some cases, cumulative transportation projects would affect Caltrain station aesthetics (such as at Diridon, Santa Clara, 4th and King, Millbrae, and Palo Alto, among others) that are also affected by the Proposed Project.

Other passenger and freight service increases would contribute to the change in intensity of the Caltrain corridor combined with increased Caltrain and HSR rail service due to the more than doubling of overall number of trains by 2040.

Cumulative land use development would introduce new building structures which may or may not be consistent with the current visual character. Many locations along the Caltrain ROW, particularly in downtown areas and near many Caltrain stations are seeing increased density of residential and commercial development including transit-oriented development. In many of the more suburban communities, this increased density and diversity of land use represents a change from the single-family residential visual character of some of these communities. In more urbanized areas, such as San Francisco or downtown San Jose, the change in character is more one of intensity in that these areas are substantially developed at present with new development only increasing the existing densities and heights of development.

Proposed Project Cumulative Contribution

As discussed in Section 3.1, *Aesthetics*, the Proposed Project would have permanent effects on aesthetics along the Caltrain ROW due to the OCS, the TPFs, and tree removal/trimming.

The addition of the OCS would affect the visual character of some visually sensitive areas, including adjacent residential areas, parks and Caltrain historic stations. Implementation of Mitigation Measure AES-2b would ensure that OCS poles recede into the visual landscape as much as feasible. Because the OCS would be limited to along the Caltrain ROW itself and would be a linear feature consistent with existing railroad ROW visual character and Mitigation Measure AES-2b would help to reduce the visual obviousness of the OCS, the Proposed Project's OCS would make a less-than-considerable contribution to potential cumulative impacts on visual character.

However because of permanent tree removal for the OCS/ESZ requirements, the Proposed Project may have a localized significant and unavoidable impact on visual character in specific locations where implementation of required mitigation (Mitigation Measure BIO-5) for tree replacement would not avoid a significant change in localized visual character. Where cumulative projects also substantially change visual character in areas where the Proposed Project would also have permanent aesthetic effects, there may be a cumulatively significant impact on localized visual character. In such areas, albeit localized, the Proposed Project is considered have a cumulatively considerable and unavoidable impact on visual character.

Light and Glare

Blended Service

Blended Service could introduce new lighting at stations at Diridon, Millbrae, and possibly Redwood City, as well as at any new maintenance areas. If uncontrolled such additional lighting could spill over into adjacent residential areas; however such lighting is usually readily controllable through appropriate lighting controls.

In addition, the HSR trains, when running at night would increase train light along the Caltrain ROW itself. Because the Caltrain ROW already has train light as part of the existing setting at night, the addition of more train light is not considered a significant impact.

All Other Projects

Other cumulative projects could introduce new lighting as part of residential, commercial, or transportation projects. If uncontrolled, additional structural lighting could spill over into adjacent residential areas; however such lighting is usually readily controllable through appropriate lighting controls. Transportation projects would likely increase train and vehicle light along existing transportation corridors, including the Caltrain ROW. Where this occurs on existing rail and roadway corridors, the addition of more train or vehicle light is not considered a significant impact.

Proposed Project Cumulative Contribution

The Proposed Project could introduce new lighting or glare associated with the TPFs and OCS that could affect the visual character of the area along the Caltrain ROW if uncontrolled and this could contribute to cumulative light and glare impacts. However, with the implementation of Mitigation Measures AES-2b and AES-4b, the Proposed Project's contribution to potential cumulative light and glare impacts would be reduced to a less-than-considerable level.

4.1.4.3 Air Quality

As discussed in Section 3.2, *Air Quality*, the Proposed Project would be consistent with regional air quality plans and would only result in routine construction odors, and would reduce operational

odors. Thus these issues are not the focus of this cumulative analysis which focused on criteria pollutants and toxic air contaminants.

The geographic context for the analysis of cumulative criteria pollutant impacts is the San Francisco air basin as criteria pollutant emissions are a regional concern. Past, present and probable future cumulative projects within this geographic context include all projects listed in Table 4-3 as well as the general growth included in Table 4-1.

The geographic context for the analysis of cumulative toxic air contaminants impacts is the immediate area along the Caltrain ROW that is presently affected by diesel emissions and would be changed with the Proposed Project. Past, present and probable future cumulative projects within this geographic context include only those projects listed in Table 4-3 that are in, adjacent to the Caltrain ROW or within a short distance from the Caltrain ROW.

Impact CUMUL-2-AQ: Cumulative effects on air quality

Construction

Criteria Pollutants

During construction of the cumulative projects listed in Table 4-3 and the overall growth shown in Table 4-1, criteria pollutants that could impact air quality in the San Francisco air basin would be emitted. Construction of the cumulative projects may emit criteria pollutants singularly that could exceed the allowable threshold for criteria pollutants in the basin or could exceed these thresholds for the combined effect of cumulative construction that occurs at the same time. Therefore, the cumulative projects would have a significant cumulative impact on air quality due to construction. In the Bay Area, all discretionary projects evaluate their construction air quality emissions and usually compare them to the BAAQMD's construction daily or annual thresholds for criteria pollutants. The BAAQMD's thresholds are designed so that if all projects meet those thresholds, then regionally construction would not have a significant effect on regional air quality. Through the CEQA process, lead agencies usually require that individual projects that exceed the thresholds provide mitigation to reduce emissions to the threshold levels, where feasible. However, for some large projects, it may not be feasible to always reduce to the adopted thresholds.

For the San Jose to Merced HSR segment and for Blended Service improvement construction, CHSRA would employ the project design features that it has included in prior project-level documents, such as fugitive dust controls. The project-level environmental documents for the HST Merced to Fresno segment (CHSRA 2012d) and the HST Fresno-Bakersfield segment (CHSRA 2012e) both concluded that project construction criteria pollutants would be significant before mitigation, but could be reduced to a less than significant levels with project mitigation (including reduction of exhaust emissions from construction equipment and on-road vehicles and purchase of offsets where onsite mitigation was insufficient to lower construction emissions below relevant thresholds). A similar conclusion is likely for San Jose to Merced HSR segment and Blended Service improvements construction, although construction emissions along the Caltrain corridor should be lower than these Central Valley segments.

As described in Section 3.2, *Air Quality*, the Proposed Project would have a significant impact on criteria pollutant emissions before mitigation for construction. However, with the implementation of Mitigation Measures AQ-2a through AQ-2c, the Proposed Project's criteria pollutant emissions would be reduced below the BAAQMD thresholds. Thus, the Proposed Project's contribution to

potential cumulative impacts on air quality related to criteria pollutants would be reduced to a less-than-considerable level.

Toxic Air Contaminants

Construction of the Blended Service improvements and a portion of the HSR San Jose to Merced segment would occur along the Caltrain ROW with the possible exception of the maintenance yard (depending on location) and would result in toxic air contaminant emissions (in the form of diesel particulate matter (DPM)) due to construction equipment and vehicles.

Construction of other rail improvements and other cumulative projects along the Caltrain ROW could emit TACs (primarily in the form of DPM) that could impact public health of sensitive receptors along the Caltrain ROW. The TACs would be emitted from construction equipment and exhausts of workers' vehicles. The project-level environmental documents for the HST Merced to Fresno segment (CHSRA 2012d) and the HST Fresno-Bakersfield segment (CHSRA 2012e) both concluded that project construction TAC pollutants would be not be significant for alignment construction but would be significant for certain sensitive receptors close to a station or concrete batch plant. These impacts were found to be reduced to a less than significant level with project mitigation. A similar conclusion is likely for the construction of the San Jose to Merced HSR segment and the Blended Service improvements, although construction emissions along the Caltrain corridor should be lower than these Central Valley segments.

Therefore, the cumulative projects could have a potential significant cumulative impact on public health from TAC emissions on sensitive receptors along the Caltrain ROW.

As described in Section 3.2, *Air Quality*, the Proposed Project would not have a significant impact related to TAC/DPM emissions for construction. Implementation of Mitigation Measures AQ-2b through AQ-2c as mitigation for criteria pollutants would further reduce the Proposed Project's TAC/DPM emissions. Thus, the Proposed Project's contribution to potential cumulative impacts on air quality related to TAC/DPM emissions for construction would be less than considerable.

Operation

Criteria Pollutants

Blended Service

Operationally, HSR trains would not add any local criteria pollutant emissions due to train operation, since HSR trains would use electricity and not use diesel fuel. Indirect criteria pollutant emissions would occur at power plants providing the electricity for HSR (depending on fuel source[9]), but such plants are highly regulated under state and federal law to be consistent with the air basin plans for areas in which they are located to not result in significant impacts to regional air quality. There would be some criteria pollutant emissions associated with maintenance yard operations and maintenance of HSR facilities as well as worker commutes, but such emissions are not expected to be substantial.

On a broader scale, Blended Service would offset vehicular and air travel criteria pollutant emissions for individuals choosing to take the high speed train for regional or state-wide travel instead of driving or flying. The Program EIS/EIR for the state-wide HST system (CHSRA 2005) concluded that

[9] CHSRA is exploring the potential to power the HSR with 100 percent renewable power (CHSRA 2013b).

statewide criteria pollutants would be reduced by 0.5 to 1.4 percent with the HST system compared with the No Project conditions overall.

All Other Projects

During operation of the other cumulative rail projects, there would be criteria pollutant emissions from diesel-based rail services such as ACE, Dumbarton Rail Corridor (DRC), Capitol Corridor, and Amtrak, as well as from freight rail. Due to federal regulations, emissions associated with diesel trains will dramatically decline over time which will reduce present and future emissions associated with rail service. Light-rail systems such as VTA's system are electrically powered and thus have no direct emissions, but have indirect emissions due to electricity provision. Both light and heavy-rail services provide alternatives to vehicular travel and freight rail provides an alternative to trucking and thus usually result in a net reduction in criteria pollutant emissions relative to vehicular travel or trucking. A similar conclusion applies to bus transit projects, like BRT or shuttles.

During operation of the cumulative highway projects, there may be an increase in vehicular emissions if such projects result in induced traffic. If such projects result in a net decrease in vehicle miles traveled (through high-occupancy vehicle lanes for example), then they would reduce criteria pollutant emissions. All major highway projects receiving federal funding must be consistent with the regional air quality plans.

During operation of the cumulative land use projects, there could be an increase in criteria pollutant emissions from increased vehicular travel. Over time, state and federal regulations are seeking to dramatically reduce the emissions of new vehicles through increased gas mileage as well as emission controls. Whether or not there will be an increase in criteria pollutant emissions due to land use development along the Peninsula corridor will depend on the rate of growth, vehicle technology, transit options, alternatives to vehicle travel such as bicycle use, and air quality regulation over time.

Proposed Project Cumulative Contribution

As discussed in Section 3.2, *Air Quality*, the Proposed Project would switch from diesel to electrically powered trains, and thus decrease the amount of criteria pollutants emitted during operation. In addition, by increasing service, the Proposed Project would provide increased alternatives to vehicle travel and thus reduce vehicle emissions as well. As a result, the Proposed Project's contribution to cumulative criteria pollutant impacts would be beneficial.

Toxic Air Contaminants

Blended Service

Operationally, HSR operations would not add any DPM emissions along the Caltrain ROW due to train operation, since HSR trains would not use diesel fuel. There may be some diesel emissions associated with maintenance yard operations and maintenance of HSR facilities as well but the impact will depend on the proximity of the maintenance yard to sensitive receptors. The previously proposed Bayshore/Brisbane location is presently an industrial area that would be less sensitive than alternative locations that may be closer to residential areas, however this area is proposed to be converted to residential, commercial and other uses by the Brisbane Baylands project.

All Other Projects

During operation of the other cumulative rail projects, there could be increased DPM emissions from diesel-based rail services such as ACE, DRC, Capitol Corridor, AMTRAK as well as freight rail. Due to federal regulations, emissions associated with diesel trains will dramatically decline over time which will reduce present and future DPM emissions associated with rail service. Light-rail systems such as VTA's system are electrically powered and thus have no DPM emissions. Freight rail provides an alternative to trucking and thus can result in a net reduction in DPM emissions, although the location of the freight rail emissions (along the Caltrain ROW) and the displaced trucking (generally along freeways and major arterials) are different meaning that different sensitive receptors will have different impacts.

During operation of the cumulative highway projects, there may be an increase in truck DPM emissions if such projects result in induced truck traffic. Due to federal regulations, emissions associated with diesel trucks will also dramatically decline over time which will reduce present and future DPM emissions associated with trucking.

During operation of most cumulative land use projects, substantial TAC or DPM emissions are not expected as most residential and commercial traffic is presently with gasoline vehicles which do not result in substantial TAC/DPM emissions. However, materials delivery to such development will be via truck, most of which are diesel trucks and thus some minor increases in DPM emissions will also occur (although truck DPM emissions will decline over time due to regulation).

Proposed Project Cumulative Contribution

As discussed in Section 3.2, *Air Quality*, the Proposed Project would switch from diesel to electrically powered trains, and thus decrease the amount of TAC/DPM pollutants emitted during operation, thus improving health conditions along the entire Caltrain corridor between San Jose and San Francisco. As a result, the Proposed Project's contribution to cumulative TAC impacts would be beneficial.

4.1.4.4 Biological Resources

Impact CUMUL-3-BIO: Cumulative effects on biological resources

This analysis focused on potential cumulative loss of sensitive biological resources, which is defined as including special-status species, riparian habitats or other sensitive natural communities, protected wetlands or waters, and wildlife migration or nursery sites. This analysis also examines potential cumulative conflicts with local biological protection ordinances or adopted habitat conservation plans.

The geographic context for the analysis of cumulative biological resources impacts includes the Caltrain ROW and immediate vicinity. For potential impacts to terrestrial species, the Caltrain ROW is the geographic context and for aquatic species the geographic context includes the streams traversed by the ROW and downstream. The cumulative projects included in this cumulative analysis include all projects listed in Table 4-3.

Construction

As discussed in Section 3.3, *Biological Resources*, the Caltrain ROW is primarily an urban and suburban rail corridor with only limited areas of sensitive biological habitat. Construction of HSR

San Jose to Merced and Blended Service improvements along the Caltrain corridor could potentially affect the same biological resources affected by the Proposed Project. Blended Service improvements construction could also affect biological resources not affected by the Proposed Project due the maintenance yard (depending on location). Additional tree removal may also need to occur for the San Jose to Merced construction and where Blended Service passing tracks are located outside of existing Caltrain tracks for the additional OCS and ESZ for those passing tracks. Aquatic habitat could also be degraded from an increase in erosion and sedimentation during construction.

The project-level environmental documents for the HST Merced to Fresno segment (CHSRA 2012d) and the HST Fresno-Bakersfield segment (CHSRA 2012e) both concluded that project construction impacts to biological resources would be significant before mitigation, but could be reduced to a less than significant levels with project mitigation. A similar conclusion is likely for construction of the San Jose to Merced and Blended Service improvements, although given the urban/suburban nature of the Caltrain Corridor, there are far less areas of biological sensitivity potentially affected along the Caltrain ROW and thus impacts would be less than on the Central Valley segments (or on natural lands crossed by the San Jose to Merced HSR segment).

Construction activities for other cumulative projects could also result in the loss of biological resources due to grading, paving and tree removal where sensitive biological resources are present. Aquatic habitat could be degraded from an increase in erosion and sedimentation during construction. However, in most cases, project-level mitigation will be able to reduce impacts to a less than significant level.

As described in Section 3.3, *Biological Resources*, the Proposed Project could have significant impacts to special-status species, riparian habitats or other sensitive natural communities, protected wetlands or waters and to trees along the Caltrain ROW without mitigation. However, with implementation of Mitigation Measure BIO 1a-1h (special-status species), BIO-2 (sensitive natural communities), BIO-3 (wetlands and waters), BIO-5 (tree avoidance, minimization, and replacement) and BIO-6 the Proposed Project's project-level impacts on biological resources due to construction would be reduced to a less-than-significant level. The Proposed Project construction would not occur in pristine areas, but, rather, in a developed rail corridor; thus, impacts would be to remnant biological resources within that context. Given that context, with mitigation, the Proposed Project's residual construction impacts would be limited in scale and extent. Consequently, Proposed Project construction, with mitigation, would make a less than considerable contribution to any potential cumulative impacts on biological resources due to construction.

Operation

Blended Service

While increased train traffic would occur with HSR operations and the Proposed Project, operational conditions are not expected to be significantly different from pre-project conditions relative to biological resources. Routine tree maintenance would be conducted along the Caltrain ROW for all areas where OCS clearance is required, but these activities would be similar to existing maintenance practices albeit they would be conducted in more expansive areas and more frequently than at present.

HSR tracks south of Diridon for the San Jose to Merced segment and additional station space at Diridon, Millbrae, and potentially Redwood City would require additional impervious spaced which would result in additional runoff generation. In addition, a new maintenance facility would also have

new impervious spaces as well as the operational use of fuels and other materials. Any new facilities would need to comply with applicable state and federal water quality requirements concerning stormwater runoff and control of fuels and other materials with potential to pollute downstream waters.

All Other Projects

For the most part, impacts to biological resources along the Caltrain corridor from the cumulative projects would occur during the construction phase; however there could be new impacts related to operations of some of the cumulative projects. Where development occurs on existing vacant sites, there could be increases in the stormwater runoff which could degrade water quality in surface waters downstream of the Caltrain ROW corridor and affect aquatic species. However, current water quality regulations implemented through the countywide stormwater NPDES permits requires treatment of stormwater runoff for substantial new projects precisely to manage the cumulative impact on water quality of new development in the corridor. Some of the projects may also handle fuel or other hazardous materials.

Proposed Project Cumulative Contribution

As described in Section 3.3, *Biological Resources*, the Proposed Project could have significant impacts to nesting bird or bat species during tree maintenance along the Caltrain ROW without mitigation. However, with implementation of Mitigation Measure BIO-1j, impacts due to disruption of bird nesting or bat roosting would be reduced to a less-than-significant level. The additional permanent project facilities (traction power substations, switching station, and paralleling stations) would have limited areas of new impervious surfaces that would result in limited increases in stormwater generation potential. As discussed in Section 3.9, *Hydrology and Water Quality*, these facilities would comply with the respective countywide stormwater programs, which would result in less-than-significant indirect impacts on the water quality and hydrology of waters and wetlands. Consequently, with mitigation Proposed Project operation would make a less-than-considerable contribution to potential cumulative impacts on biological resources due to operations.

4.1.4.5 Cultural Resources

Impact CUMUL-4-CUL: Cumulative effects on cultural resources

Methodology

Historical Resources

The geographical context area for architectural historical resources was defined to include the area directly adjacent to the Caltrain ROW, the parcels surrounding the proposed traction power facility sites and the Caltrain ROW. The project APE/study area includes a variety of historical structures considered historic resource under CEQA and eligible for the national or California registers. Table 3.4-3 in Section 3.4, *Cultural Resources*, lists the 25 eligible and listed properties within Proposed Project APE. Cumulative projects within this geographic context include all projects within and adjacent to the Caltrain ROW. An adverse change to an eligible and listed property in the NRHP and CRHR during the construction phase of a cumulative project could result in significant cumulative impacts on historical archeological resource.

Archaeological Resources

The geographic context for the analysis of potential cumulative impacts on archeological resources includes areas where cumulative projects overlap with the Proposed Project to affect a single resource. Present and probable future cumulative projects within this geographic context include all projects within and adjacent to the Caltrain ROW. If known or unknown archeological resources are disturbed, the identified cumulative projects could result in significant cumulative impacts on archaeological resources.

Human Remains

The geographic context for the analysis of potential cumulative impacts on human remains includes areas where cumulative projects overlap with the Proposed Project site to affect a single resource. Present and probable future cumulative projects within this geographic context include all projects within and adjacent to the Caltrain ROW. If known or unknown human remains are disturbed, the identified cumulative projects could result in significant cumulative impacts on a cultural resource.

Construction

Historic Resources

Construction of the HSR improvements would include improvements at the Diridon Station and Millbrae Station, both of which are NRHP and CRHP listed structures. In addition, it is possible that there may be historic resources (including historic buildings as well as any historic tree groves if present) located in areas ultimately proposed for passing tracks or a maintenance yard (or possibly for other improvements like grade separations) that might be affected by HSR construction.

Some of the other cumulative projects (including projects Nos. 4, 5, 12, 16, 30, 57, 67, 68, 69, and 72) could also affect historic Caltrain stations at Millbrae, San Carlos, Atherton, Menlo Park, Palo Alto, Santa Clara, and San Jose or historic underpassings. The San Mateo Bridge Project will remove and replace the four historic underpasses in San Mateo and, thus, the Proposed Project would not have an effect on those underpasses because they will be removed by another project prior to the completion of the Proposed Project. If freight rail service requires additional height clearances, modifications could affect historic railroad tunnels in San Francisco as well as the historic bridge over San Francisquito Creek.

While cumulative projects may affect other historic resources away from the Caltrain ROW, the Proposed Project would not affect such resources and thus such resources are not discussed further in this analysis.

There could be significant cumulative impacts to the historic resources noted above.

As discussed in Section 3.4, *Cultural Resources*, the implementation of Mitigation Measures CUL-1a through CUL-1f would reduce the Proposed Project's effects on historic tunnels, stations, and underpasses along the Caltrain ROW with the possible exception of San Francisco Tunnel 4. While other cumulative projects may have significant impacts on the same historic resources affected by the Proposed Project and their impact may or may not be mitigable, the Proposed Project's residual impacts on these resources after Proposed Project mitigation would be minimal, except possibly at Tunnel 4. Therefore, the Proposed Project's potential contribution to cumulative impacts on historical resources due to construction would be less than considerable.

Archaeological Resources

Based on the cultural resource evaluation for the Proposed Project, construction of the HSR San Jose to Merced segment and Blended Service improvements along the Caltrain ROW could impact archeological resources in the City of San Francisco, City of San Jose, and identified sensitive archeological zones in or adjacent to the study area and within the Caltrain ROW. Blended Service improvements construction could also affect other archeological resources at the maintenance area or in passing track locations outside the Caltrain ROW.

During construction, earth moving activities for other cumulative projects in or adjacent to the Caltrain ROW could also impact archaeological resources that may be affected by the Proposed Project. An overlap in the construction area for some of these projects increases the likelihood of finding unknown or impacting known archeological resources. Construction activities for cumulative projects that are not adjacent to the Caltrain ROW could impact archeological resources but the site disturbance areas for these projects would not overlap with Proposed Project.

Thus, there is a potential for cumulative impacts on archaeological resources due to potential multiple disturbances of resources that may be encountered in or along the Caltrain ROW.

As discussed in Section 3.4, *Cultural Resources*, the implementation of Mitigation Measures CUL-2a, CUL-2b, CUL-2c, CUL-2d, CUL-2e, and CUL-2f would reduce the Proposed Project's effects on archaeological resources along the Caltrain ROW to a less-than-significant level. While other cumulative projects may have significant impacts on the same archaeological resources affected by the Proposed Project, the Proposed Project's residual impacts on these resources after Proposed Project mitigation would be minimal. Therefore, the Proposed Project's potential contribution to cumulative impacts on archaeological resources due to construction would be less than considerable.

Human Remains

Construction activities for the cumulative projects could impact human remains and result in cumulative impacts where project disturbance areas overlap. However, with implementation of Mitigation Measures CUL-3, the Proposed Project's contribution to any potential cumulative impacts on human remains would be less than considerable.

Operation

For the most part, cumulative projects would not require further ground disturbance or disturbance to historic structures after construction. As discussed in Section 3.4, *Cultural Resources*, the Proposed Project would have no impact on cultural resources during operations. Therefore, there would be no cumulative cultural resource impacts resulting from Proposed Project operation, and the Proposed Project would make no contribution to any impact.

4.1.4.6 EMF/EMI

Impact CUMUL-5-EMF: Cumulative increase in electromagnetic fields or electromagnetic interference

The geographic context for the analysis of potential cumulative impacts of electromagnetic fields (EMF) and electromagnetic interference (EMI) includes the Caltrain ROW and the area adjacent to the Caltrain ROW.

The only cumulative projects that could change EMFs in this area are electrified rail projects including: Blended Service (#1), San Jose – Merced High Speed Train (#2), Caltrain Full Electrification (#3), BART Silicon Valley (#8), BART Millbrae Tail Tracks (#70), Central Subway (#13), the re-routing of the 22-Fillmore trolley (#14) and several light-rail projects (#16). Land development projects would not involve substantial generation of EMFs at concern levels but may introduce new receptors along the Caltrain ROW.

The concern with EMFs is potential health risks to receptors along the Caltrain ROW. The concern with EMI is potential interference with sensitive electrical equipment along the Caltrain ROW due to increased EMF levels.

Construction

Construction activities from cumulative projects along the Caltrain ROW would temporarily increase the amount of EMF. As discussed in Section 3.5, *Electromagnetic Fields and Electromagnetic Interference*, all construction equipment generates a small amount of EMF but not at levels considered to be a potential health risk concern. As a result, cumulative EMF/EMI impacts resulting from construction would be less than significant, and the contribution of the Proposed Project would be less than considerable.

Operation

The location of potential cumulative increases in EMF levels along the Caltrain ROW due to cumulative projects are as follows:

- Proposed Project: from south of Tamien Station to San Francisco (AC EMF field, 60 Hz).
- Blended Service and HSR San Jose to Merced: San Jose (from 2 miles south of Tamien Station) to San Francisco (AC EMF field, 60 Hz).
- Caltrain Full Electrification: San Jose to San Francisco (due to larger number of electrified trains) (AC EMF field, 60 Hz).
- BART Silicon Valley: San Jose to Santa Clara (DC EMF field).
- BART Millbrae Tail Tracks: 200–300 feet south of the current BART yard in Millbrae (DC EMF field).
- Central Subway Project: near the San Francisco 4th and King station (surface effects attenuated by being underground) (DC EMF field).
- Re-routing of the 22- Fillmore trolley: along 16th Street (DC EMF field).
- Extension of the MUNI T-Line: near the Caltrain Bayshore Station (DC EMF field).
- Tasman Express Long T double-tracking: near the Mountain View Caltrain Station (due to additional light rail trains) (DC EMF field).
- Mineta San Jose International Airport APM Connector: near the Santa Clara Caltrain Station (unknown design; unknown EMF field generation).

As noted above, only some of the cumulative projects use alternating current (AC) systems and generate AC EMF fields like the Proposed Project. Cumulative projects that use direct current (DC) systems generate static DC EMF fields, which have higher health thresholds than those for variable AC EMFs. As described in the final EIS for the BART Silicon Valley Extension, because BART uses DC

traction power, contributions from BART to the magnetic field levels of the ambient power frequency (60 Hz AC) were described as negligible (VTA 2010). Thus, EMFs from DC systems should not be simply added to those from AC systems and compared with a single standard. Instead, one should compare DC EMF levels with DC thresholds and AC EMF levels with AC thresholds. Because the Proposed Project OCS would have an AC system, the focus of this cumulative analysis in regards to health concerns is on potential cumulative EMF impacts from AC systems.

For HSR San Jose to Merced operations and Blended Service from San Jose to San Francisco, potential EMF levels associated with HSR can be estimated based on assessment of other sections of the HSR project. In the Final EIR/EIS for the Merced to Fresno segment of the HSR project, the EMF levels were estimated. When the California HSR project is complete, the predicted HSR-generated EMF/EMI levels to which the general public is expected to be exposed would be lower than the applicable HSR project Maximum Permissible Exposure (MPE) standards[10] for humans in uncontrolled (open) environments used for HSR evaluations. Specifically, it was estimated that fenceline EMF levels would be 177 milligauss (mG) (CHSRA 2012d). As described in Section 3.5, *Electromagnetic Fields and Electromagnetic Interference*, the Proposed Project's EMF levels along the Caltrain ROW were estimated at up to 41 mG. With full electrification, EMF levels for Caltrain electrified service could increase by perhaps 25 percent. The EMF levels along the fenceline for Blended Service should be well below the threshold used in this EIR of 833 mG. Thus, the Proposed Project would make a less than considerable contribution to potential health risks associated with EMFs.

Concerning EMI, the projects specified above could also result in interference with electrical equipment along the Caltrain ROW. Both DC and AC systems could contribute to potential interference concerns.

For HSR service, analysis in the Fresno to Bakersfield Revised Draft EIR/EIS (CHSRA 2012e) was used to examine potential HSR EMI impacts. In that document, potentially significant impacts were identified where the HSR route crossed adjacent to at least one facility with sensitive equipment such as medical imaging systems and mitigation was proposed that would lower potential EMI impacts to a less than significant level.

Prior to mitigation, there is the potential for cumulative EMI effects due to HSR Service, the Proposed Project and other projects. As discussed in Section 3.5, *Electromagnetic Fields and Electromagnetic Interference*, the Proposed Project was identified as having potentially significant EMI impacts on sensitive equipment, and Mitigation Measure EMF-2 would require system design to minimize EMI effects and to coordinate with adjacent facilities with potential sensitive equipment.[11] With implementation of Mitigation Measure EMF-2, the Proposed Project's contribution to any potential cumulative EMI effects would be reduced to a less-than-considerable level.

[10] The CHSRA Merced-Fresno EIR/EIS (CHSRA 2012d) MPE for the EMF health risks for the general public are the same as the EMF thresholds used in this EIR: 833 mG for magnetic fields and 4.2 kV/m for electrical fields.

[11] Similar mitigation may be required for Blended Service.

4.1.4.7 Geology, Soils and Seismicity

Impact CUMUL-6-GEO: Cumulative exposure of people or structures to geologic or seismic hazards or destruction of unique paleontological/geologic resources

Geology and soil-related impacts are typically site-specific and depend on the local geologic and soil condition. The geographic context for the analysis of cumulative construction geologic, soil, and paleontological resource impacts includes areas within and adjacent to the Caltrain ROW. Past, present, and probable future cumulative projects within this geographic context include the projects listed in Table 4-3 that are within the Caltrain ROW or adjacent.

Construction

Construction impacts are limited to the potential for increased erosion and potential damage to paleontological resources. Impacts related to other geological, seismic, and soil hazards for new structures are discussed under operations.

Erosion

Construction of cumulative projects could result in cumulative erosion impacts unless controlled. All major projects, including the Proposed Project, must comply with the Construction General Permit NPDES, which requires substantive controls on project erosion such that significant cumulative impacts due to erosion are not expected. Therefore, the Proposed Project's contribution to potential cumulative erosion impacts would be less than considerable.

Paleontological Resources/Unique Geologic Features

Cumulative construction projects may encounter paleontological resources. However, as discussed in Section 3.6, *Geology, Soils and Seismicity*, the Caltrain ROW and adjacent areas are highly disturbed urban areas that are unlikely to contain intact unique geologic or paleontological features. In addition, the below-ground disturbance associated with the Proposed Project is limited overall in extent. Consequently, the potential for the Proposed Project to contribute to potential cumulative impacts on paleontological resource or unique geologic features is less than considerable.

Operation

New transportation, residential, commercial and other facilities and services could increase exposure of people or structures to geologic, seismic and soil hazards could result in a significant cumulative impact. The project area is likely to experience a strong seismic activity and geologic instability (e.g., soil liquefaction or collapse) that could damage structures or expose people to greater risks of loss of life and injury. In addition, there could be cumulative exposure due to construction in areas of expansive soils. Therefore, there could be a significant cumulative impact from the increase exposure of structures and people to risks and damage associated with geologic, seismic and soil hazards. All cumulative projects would be subject to comply with applicable state and local codes, including design standards (e.g., California Building Code), which address these impacts.

As discussed in Section 3.6, *Geology, Soils and Seismicity*, the Proposed Project could also result in various impacts related to geologic, seismic or soil hazards. With implementation of Mitigation Measures GEO-1, 4a, and 4b would reduce the Proposed Project's exposure to risks of geologic,

seismic and soil hazards. Therefore, the Proposed Project's contribution to the increase of exposure to these hazards would be less considerable.

4.1.4.8 Greenhouse Gas Emissions and Climate Change

Impact CUMUL-7-GHG: Cumulative greenhouse gas emissions or exposure of people or structures to reasonably foreseeable impacts of climate change

The geographic context for the analysis of cumulative construction and operation related impacts to greenhouse gas emissions is the planet. All of the projects in Table 4-3 are included in the analysis as well as cumulative GHG emissions from California, the United States, and the rest of the world.

For the analysis of potential exposure of people or structures to reasonable foreseeable impacts of climate change, the geographic context is the San Francisco Peninsula and is only analyzed for operational conditions. Past, present, and probable future cumulative projects within this geographic context consist of all projects listed in Table 4-3.

Greenhouse Gas Emissions

During construction, all cumulative projects would emit GHGs due to construction equipment and vehicles. Construction activities are temporary, but the lifespan of the most emitted greenhouse gas, carbon dioxide, can be up to 100 years and many of the other GHGs can last for decades.

HSR Operations

Operationally, HSR would not add any GHG direct local emissions due to train operation, since HSR trains would use electricity and not use diesel fuel. Indirect GHG emissions would occur at power plants providing the electricity for HSR. There will also be some GHG emissions associated with maintenance yard operations and maintenance of HSR facilities as well as worker commutes, but such emissions are not expected to be substantial. On a broader scale, HSR service would offset vehicular and air travel GHG emissions for individuals choosing to take the high speed train for regional or state-wide travel instead of driving or flying. The effects of high-speed rail service on GHG emissions were estimated by considering the GHG analysis in the Final EIS/EIR for the Merced –Fresno HSR segment (CHSRA 2012d), which concluded that operational GHG emission reduction in the segment region (due to car and plane trips removed in the Merced-to-Fresno area) would offset segment construction GHG emissions within less than six months. Overall, the statewide HST system, with Phase 1 blended system operations would result in reductions of 0.79 to 1.40 million metric tons of CO2e in 2029 and 1.15 to 1.85 million MT CO2e in 2035 (CHSRA 2013b).

All Other Projects

During operation of the other cumulative rail projects, there would be GHG emissions from diesel-based rail services such as ACE, DRC, Capitol Corridor, and Amtrak, as well as from freight rail. Light-rail systems such as VTA's system are electrically powered and thus have no direct GHG emissions, but have indirect GHG emissions due to electricity provision. Both light and heavy-rail services provide alternatives to vehicular travel and freight rail provides an alternative to trucking and thus usually result in a net reduction in GHG emissions relative to vehicular travel or trucking. A similar conclusion applies to bus transit projects, like BRT or shuttles.

During operation of the cumulative highway projects, there may be an increase in vehicular GHG emissions if such projects result in induced traffic. If such projects result in a net decrease in vehicle miles traveled (through high-occupancy vehicle lanes for example), then they would reduce GHG pollutant emissions.

During operation of the cumulative land use projects, there could be an increase in GHG pollutant emissions from increased vehicular travel as well as building energy consumption, waste generation, water and waste treatment and other sources. Over time, local, state and federal plans are seeking to dramatically reduce GHG emissions overall. Many of the communities along the San Francisco Peninsula have adopted local Climate Action Plans to reduce GHG emissions under their control and AB 32 mandated GHG emission reductions at a state level. According to the state's latest inventory data, the state is on track to reduce GHG emissions by 2020 to 1990 levels.

Proposed Project Cumulative Contribution

As discussed in Section 3.7, *Greenhouse Gas Emissions and Climate Change*, the Proposed Project would switch Caltrain from diesel to electrically powered trains, and, thus, decrease the amount of GHG emissions during Caltrain operation. In addition, by increasing service, the Proposed Project would provide increased alternatives to vehicle travel and thus reduce vehicle GHG emissions as well. While the Proposed Project would result in GHG emissions during construction, it is expected that the operational reduction of GHG emissions would offset the construction GHG emissions within less than one year and the Proposed Project would result in a net reduction of GHG emissions. As a result, the Proposed Project's contribution to cumulative GHG emissions would be beneficial.

Exposure of People or Structures to Reasonably Foreseeable Impacts of Climate Change (other than Sea Level Rise)

As discussed in Section 3.7, *Greenhouse Gas Emissions and Climate Change*, even with the efforts of the municipalities along the San Francisco Peninsula, in the greater San Francisco Bay Area, and in California as a whole, a certain amount of climate change is unavoidable due to existing and unavoidable future GHG emissions. With respect to central western California, including the project site, climate change effects could be substantial including, but not limited to hotter and drier climates, more frequent and intense wildfires, changes in water supplies, and a number of other effects.

All of the cumulative projects would be subject to some of the potential impacts related to climate change in the future whether it is temperature increases, changes in storm characteristics, or wildfire potential though individual effects will depend on the nature of project, use by people, location and vulnerability to climate change effects.

As described in Section 3.7, *Greenhouse Gas Emissions and Climate Change*, with the exception of sea level rise, the Proposed Project is not expected to result in increased risk to people or structures from foreseeable climate change effects.

Risks due to flooding associated with sea level rise are addressed separately in discussion of Hydrology and Water Quality below.

4.1.4.9 Hazards and Hazardous Materials

Impact CUMUL-8-HAZ: Cumulative effects related to hazards and hazardous materials

Potential hazard impacts are generally site specific and thus the geographic context for the analysis of cumulative hazards impacts includes the Caltrain ROW and the adjacent area. Hazards relative to hazardous materials and emergency response/evacuation are analyzed for both construction and operations. Hazards relative to airports and wildand fire are only analyzed for operations. Past, present, and probable future cumulative projects within this geographic context consist of all cumulative projects listed in Table 4-3 that are adjacent to the Caltrain ROW.

Construction

Hazardous Materials

During construction of cumulative projects, people could be exposed to a risk to human health and spillage of hazardous materials such as gasoline, oil paint and solvents could. Water quality contamination could occur from accidental spillage of hazardous materials and mixture of contaminated water with non-contaminated water. Excavation activities could expose construction crew members to hazardous materials that could pose a risk to health and safety.

Some of the cumulative projects are proposed in areas with known existing contamination. Several examples are described below (not a comprehensive list of sites with known contamination):

- The previously considered location for a HSR maintenance yard at the Brisbane/Bayshore location is a former landfill with known contamination.
- The Brisbane Baylands Specific Plan which is proposed in part at the same location previously considered for a HSR maintenance yard also contains known contamination from a former landfill, railroad yard, and industrial activity.
- The 395 Page Mill Road Project in the City of Palo Alto is proposed on a contaminated site undergoing remediation for contaminated soil and groundwater.

These are only a few examples; other project may also encounter contamination issues. Thus, the construction of cumulative projects would have cumulative significant impact related to hazardous conditions and exposure to hazardous materials.

The construction of HSR San Jose to Merced and Blended Service improvements would encounter similar hazardous materials conditions as that described for the Proposed Project for the Caltrain ROW, however hazardous material conditions could be different for the maintenance yard, depending on location. The previously considered maintenance yard site in Brisbane has contamination issues due to its former industrial use. The greatest amounts of excavation for the Blended Service improvements (when hazardous material is more likely to be encountered) would be for station improvements, passing tracks and the maintenance yard.

As discussed in Section 3.8 *Hazards and Hazardous Material*, contaminated soil and groundwater may be encountered during Proposed Project construction. In addition, construction would involve use of petroleum and other hazardous materials. Compliance with local, state and federal regulations for handling of materials and implementation of the mandatory Stormwater Pollution prevention Plan will address impacts associated with construction handling of petroleum and other materials. For encountered contamination, the Proposed Project would require implementation of

Mitigation Measures HAZ-2a and HAZ-2b, which require preconstruction investigation of potentially contaminated areas and appropriate containment, handling and disposal of any encountered contaminated soil and groundwater. While multiple cumulative projects will handle petroleum and hazardous materials and are likely to encounter existing soil and groundwater contamination present in and adjacent to the Caltrain ROW, the existing regulatory requirements place strict controls on how such materials are handled and how contamination is to be addressed. Thus, the Proposed Project's contribution to any potential cumulative impact related to hazardous materials during construction would be reduced to a less-than-considerable level with the implementation Mitigation Measures HAZ-2a and HAZ-2b.

Emergency Response/Evacuation

During cumulative project construction, there may be temporary obstruction of access and egress from construction sites and on adjacent roads due to construction. Such obstruction would affect the ability of emergency responders to timely reach their destinations and impede the ability to evacuate constrained areas in the event of an emergency. Where one or more cumulative projects would be in construction at the same time in the same area, there could be cumulative impacts on emergency response or evacuation capacity.

As discussed in Section 3.8, *Hazards and Hazardous Materials*, the Proposed Project could have such effects if an emergency occurs at the time when the Proposed Project construction limits access to the Caltrain ROW or at at-grade crossings. As described in Section 3.14, *Transportation and Traffic*, 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 would coordinate with local public works departments, local emergency providers, and Caltrans in the development of the traffic control plan to specifically address emergency response concerns. Potential issues associated with multiple projects in construction at the same time may be addressed through development of the traffic control plan. Thus, with mitigation, the Proposed Project's contribution to a potential cumulative impact related to emergency response or evacuation would be less than considerable.

Operation

Hazardous Materials

Release of and exposure to hazardous materials during operation of cumulative projects could result in a cumulative significant impact. Because both HSR service and the Proposed Project would involve electrically powered trains, spills of diesel petroleum products would not occur during operation. However, operation of HSR service and the Proposed Project would involve handling of hazardous materials including batteries in EMUs, fluids in transformers and other electrical equipment, and maintenance materials and cleaning fluids.

Operation of the other cumulative projects would also involve the use and handlings of petroleum and other hazardous materials including during maintenance. The use and handling of such materials is highly regulated by local, state, and federal requirements that are applicable universally. Therefore, routine operation and maintenance of the cumulative projects is not likely to have a significant cumulative impact from the release of or exposure to hazardous materials. There is always the possibility of an unforeseen accident involving petroleum or other hazardous materials, but local, state, and federal regulations also specify operating procedures to minimize the potential

for such accidents and remedial response necessary in the event of such accidents or spills to contain and cleanup hazardous material releases.

As discussed in Section 3.8, *Hazards and Hazardous Materials,* the Proposed Project would comply with all applicable regulations concerning use, handling, storage, and disposal of petroleum and hazardous materials. Further, with the substantial reduction in diesel fuel use, the potential for diesel spills with the Proposed Project would be far lower than the existing potential for spills during current operations and maintenance. Although the Proposed Project would increase the amount of trains on the Caltrain corridor, conflicts with freight trains would be managed through temporal separation (pursuant to the current FRA waiver requirements), through train scheduling and dispatch, and with the use of Positive Train Control enabled by the CBOSS PTC project to minimize the potential for conflicts (if the FRA waiver is modified to allow blending of EMUs and freight traffic).

Thus, Proposed Project operations would result in a less-than-considerable contribution to any potential cumulative impacts related to hazardous materials.

Locations Relative to an Airport Land Use Plan

There are a number of airports along the Caltrain corridor, specifically, San Francisco International, Mineta San Jose International, the federal airfield at Moffett Field, and municipal airports at San Carlos and Palo Alto. Cumulative projects could result in potential hazards if they propose elevated structures within the safety prism for landing and departing aircraft or if they place substantial numbers of people within safety zones around the airports that might be subject to injury or death in the event of a near-airport plane emergency landing or crash. Blended Service improvements may include elevated structures north of the San Jose Diridon Station (if an aerial station is selected) that will need to be designed to avoid encroachment in safety zones of the San Jose International Airport. Blended Service improvements at the Diridon Station, Millbrae Station and possibly at the Redwood City Station would be sufficiently far from nearby airports that they are unlikely to result in any safety zone encroachments. While the location of a potential HSR maintenance yard is unknown, it is not likely to have substantially elevated structures that would be likely to conflict with safety zone requirements.

As discussed in Section 3.8, *Hazards and Hazardous Materials*, the Proposed Project's TPFs and the OCS would not conflict with any airport land use plan or airport safety zones. Thus, the Proposed Project would result in a less-than-considerable contribution to any potential cumulative impacts on airport land use plans or airport safety zones.

Emergency Response/Evacuation

Cumulative projects would affect existing emergency response times or evacuation capacity if they result in constrictions on the ability for emergency responders to reach their destinations or the egress ability from constrained areas in the event of an emergency. This could occur due to physical constraints and/or generation of traffic congestion which could impede emergency vehicles.

As discussed below in the analysis of cumulative transportation and traffic impacts, the increase of cumulative rail traffic along the Caltrain ROW from HSR, ACE, Capitol Corridor, Amtrak and freight could result in increased gate-down times at the at-grade crossings along the Caltrain ROW. Because of cumulative growth in traffic over time due to the land development projects included in Table 4-3 and general growth in the region, traffic conditions are expected to substantially decline over the

next few decades at the at-grade crossings of the Caltrain ROW and generally throughout the region (in spite of substantial investments in transit). With this cumulative growth in traffic, emergency response times during peak hours may be adversely affected, as could the ability to evacuate areas via vehicles.

An additional cumulative concern with cumulative travel demand growth over time and increased transit service for HSR, BART, VTA, Muni, SamTrans, and Caltrain is that transit stations, especially underground stations, will exceed their currently designed capacity to allow for safe egress in the event of an emergency. BART, for example, in its scoping comment letter on the Proposed Project, specifically noted that several segments of the BART system, especially downtown San Francisco stations, are currently near capacity. Thus cumulative travel demand could result in significant impacts on evacuation plans for transit stations with constrained egress conditions, especially underground transit stations.

As discussed in Section 3.14, *Transportation and Traffic*, the Proposed Project would result in significant increases in traffic delays at a number of at-grade crossings along the Peninsula corridor due to increased gate-down time during peak hours. The Proposed Project would also impact traffic near some of the Caltrain stations. Project mitigation measure (described in Section 3.14, *Transportation and Traffic*) would reduce traffic impacts at many locations and would include requirements for coordination with local emergency providers to minimize increase in response times as feasible but would not reduce all traffic delays to a less-than-significant level.

Emergency response times are function of the conditions between the responder base location and the incident location overall, not only a function of conditions at any one point along the response path. As discussed in Section 3.14, *Transportation and Traffic*, the Proposed Project overall would substantially reduce overall vehicle miles traveled (VMT) in the Peninsula corridor by approximately 235,000 miles/day in 2020 and 619,000 miles/day in 2040 (compared with No Project conditions), 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 on at-grade crossings and near Caltrain stations and result in a net improvement (compared with No Project conditions) in the emergency response times and in the ability to evacuate constrained areas by vehicle. Thus, the impact on emergency response times would be less than significant.

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.

Regarding transit stations emergency evacuation, as discussed in Section 3.14, *Transportation and Traffic*, the Proposed Project is not expected to substantially increase the ridership of other transit systems on the Peninsula. In specific, relative to No Project conditions, the Proposed Project is expected to result in a slight decrease in BART ridership, a slight increase in Muni Metro (rail) ridership in 2020 but a slight decline in 2040, and a slight increase in VTA light rail ridership. As a result, station evacuation would be primarily a concern for controlled access BART stations and underground Muni Metro stations. There is less concern for evacuation from at-grade Muni Metro and VTA light-rail stations and all bus stations and stops given the open architecture of such facilities. While some BART and underground Muni Metro stations may reach capacity because of cumulative transit ridership, the Proposed Project would not contribute considerably to potential

cumulative impacts related to evacuation capacity at these locations because the Proposed Project's long-term effect on these systems (e.g., in 2040) would be a slight reduction in ridership.

Wildland Fires

The Caltrain ROW and adjacent areas are highly developed urban and suburban areas with very few areas of adjacent wildlands. The only areas of wildlands along the Caltrain ROW are San Bruno Mountain and Communications Hill in San Jose. Cumulative projects adjacent to wildland areas might result in increased wildland fire risk by either placing activities with greater potential to ignite wildfires or by placing increased numbers of people and structures adjacent to wildland areas that might be subject to wildland fires. As discussed in Section 3.8, *Hazards and Hazardous Materials*, the Proposed Project is not located in any high fire risk areas and the Proposed Project would maintain an electrical safety zone around all its electrical equipment to minimize the risk of fires due to contact with live electrical wires. While cumulative projects might increase the risk or consequence of wildland fires, the Proposed Project's contribution to any potential cumulative impact regarding wildlife fires would be less than considerable.

4.1.4.10 Hydrology and Water Quality

Impact CUMUL-9-HYD: Cumulative impacts related to hydrology and water quality

The geographic context for the analysis of cumulative construction and operation-related hydrology and water quality impacts consists of the Caltrain ROW and adjacent areas, and downstream areas. Past, present, and probable future cumulative projects within this geographic context consist of all projects listed in Table 4-3. The focus of the construction analysis is on water quality. The operational analysis of impacts includes water quality, groundwater recharge, drainage patterns and flooding.

Construction

Earth moving activities from cumulative projects such as grading and excavating could degrade water quality from an increase in sediment-load, alteration to drainage patterns and increased surface runoff. During construction, earth moving activities could degrade the water quality of streams that cross the Caltrain ROW as well as San Francisco Bay downstream. In addition, during excavation activities, shallow groundwater could be degraded from the introduction of sedimentation and spillage of construction hydraulic fluid and there is also the potential of release of contaminated groundwater during dewatering activities. Construction activities for many of cumulative projects listed in Table 4-3 would each involve earth moving activities that collectively would impact on water quality. All major projects (with disturbance of more than 1 acre) are required to comply with the Construction General NPDES Permit which mandated preparation of a Stormwater Pollution Prevention Plan (SWPPP) to address all of the above water quality concerns. While smaller projects are not required to comply with the Construction General NPDES Permit, it is routine practice for local jurisdictions to require erosion and sedimentation at all projects with grading or excavation and thus most projects implement some form of stormwater pollution prevention controls during construction.

As described in Section 3.9, *Hydrology and Water Quality*, the Proposed Project would comply with the Construction General NPDES permit and prepare and implement a SWPPP. In addition, because the Proposed Project has the potential to encounter contaminated groundwater during OCS pole

foundation excavation and other project excavation, Mitigation Measure HYD-1 would be implemented to control dewatering discharges appropriately. With compliance with the Construction General NPDES permit and mitigation measure, the Proposed Project's contribution to any cumulative impacts on water quality during construction would be reduced to a less-than-considerable level.

Operation

Water Quality and Runoff

Operation of the cumulative projects could impact water quality from an increase in impervious surfaces, increased handling of petroleum or other hazardous materials, and other activities (such as maintenance) that might result in contaminated stormwater runoff. HSR San Jose to Merced and Blended Service improvements would increase the total imperviousness in the area from proposed station improvements, passing track additions, and a new maintenance yard. Other cumulative projects would also increase the impervious surfaces in the area where developed on areas that currently allow for infiltration, thus increasing stormwater runoff. An increase in stormwater runoff can cause erosion and increases turbidity in downstream depending on local stream condition and can also result in increased pollutant loading due to contact with petroleum and other materials. In addition to these changes, the cumulative increase in diesel locomotive rail traffic (all cumulative rail services other than HSR, Proposed Project, and light rail) would increase the potential for leakage of diesel that could degrade surface water quality.

As described in Section 3.9, *Hydrology and Water Quality*, the Proposed Project would have a beneficial water quality impact by substantially reducing the use of diesel fuel for the Caltrain system and the potential for spills as well as diesel exhaust deposition into water systems. While the Proposed Project would add limited amount of new impervious surface, these additions are in areas where additional impervious surface is not likely to result in additional sediment loading in streams. Routine housekeeping practices and maintenance would control the potential for polluted runoff from new facilities. As a result, the Proposed Project's contribution to any potential cumulative water quality effects.

Groundwater Recharge

Cumulative increase in impervious surface could hinder groundwater recharge across the Peninsula. However, as described in Section 3.9, *Hydrology and Water Quality*, groundwater along the Caltrain ROW is not a substantial source of water supply. Nevertheless, cumulative increases impervious surfaces might affect local groundwater supplies. As described in Section 3.9, *Hydrology and Water Quality*, the Proposed Project would have limited effects on groundwater recharge. Considering the limited effect, and given the limited importance of local groundwater supplies, the Proposed Project's contribution to any potential cumulative impacts on groundwater recharge would be less than considerable.

Change in Drainage Patterns

Cumulative projects could result in changes to drainage patterns that might affect erosion or downstream sedimentation, polluted runoff, or affect stormwater drainage systems. However, in most cases, local planning requirements include analysis of project impacts on drainage systems and require fair-share contributions toward facility improvements over time. In addition, countywide stormwater pollution prevention programs focus on addressing substantial sources of increased

runoff and require such projects to provide for both retention of water on-site and treatment of stormwater runoff.

As described in Section 3.9, *Hydrology and Water Quality*, the Proposed Project would not alter drainage patterns of existing drainage channels or streams. The additional impervious surface areas at TPFs would not significantly increase the rate or volume of surface runoff, particularly given the location of the two TPSs (which are the largest Proposed Project TPFs) in areas that are not of concern for runoff affecting water quality due to erosion of downstream channels. Thus, the Proposed Project's contribution to any potential cumulative drainage pattern impacts would be less considerable.

Flooding, including Flooding Resultant from Predicted Sea Level Rise

As shown in Figure 3.9-4 in Section 3.9, *Hydrology and Water Quality*, areas of the Peninsula close to San Francisco Bay are subject to coastal flooding at present and some areas along certain creeks and rivers, particularly in San Jose, are subject to flooding under 100-year event conditions.

HSR San Jose to Merced and Blended Service improvements, where located in the Caltrain ROW or adjacent, would be subject to similar flooding impacts as the Proposed Project both now and in the future. The Diridon, Millbrae and Redwood City Stations are not in current 100-year flood zones, but limited portions of the passing tracks (depending on location) might be. Flooding impacts for the maintenance yard would depend on location. Other cumulative projects could also be affected by flooding particularly if close to San Francisco Bay or along riverine flooding zones. All projects take into account flooding impacts when going through project review and approvals and in most cases take action to protect their facilities from substantial flooding. Where projects encroach on the 100-year floodplain, most projects implement project-level mitigation where necessary to avoid substantial increases in upstream or downstream flooding.

As described in Section 3.9, *Hydrology and Water Quality*, the Proposed Project could have some effect on flooding due to proposed locations of some of the TPFs in current floodplains. Mitigation Measure HYD-4 would require minimization of new impervious space for any TPFs proposed in floodplain areas, relocation of facilities, and/or use of TPF site locations outside the 100-year floodplain. With this mitigation, the Proposed Project would not contribute considerably to potential cumulative flooding impacts of cumulative projects.

As described in Section 3.9, *Hydrology and Water Quality*, sea level rise is a particular concern in areas near San Francisco Bay as sea level rise is expected to rise up to 2 feet by 2050 and up to 5.5 feet by 2100. Parts of the Caltrain corridor are subject to coastal flooding at present and, with expected sea level rise in the future, this risk of coastal flooding will increase. As shown in Figure 3.9-5 in Section 3.9, *Hydrology and Water Quality*, with future sea level rise, more areas of the Peninsula close to San Francisco Bay will be subject to coastal flooding than at present and flooding along tidal channels will increase. Relative to areas near the Caltrain ROW, flood areas will expand from San Francisco to Redwood City. South of Redwood City, coastal flooding will also increase but the area of flooding is further away from the Caltrain ROW. Cumulative projects located in areas of potential increased coastal flooding in the future shown in Figure 3.9-5 could be subject to inundation causing risk to people and structures.

For future coastal flooding resultant from increased sea level rise, additional portions of the Caltrain ROW could be affected by flooding. Mitigation Measure HYD-7 requires Caltrain to adopt and implement a sea level rise vulnerability assessment and adaptation plan and work with other local

partners to identify and implement adaptation measures to protect people and structures. However, as noted in Section 3.9, *Hydrology and Water Quality*, at this time, the feasibility of implementing all measures necessary to avoid future inundation associated with 100-year floods influenced by sea level rise is not known given that assessment of such solutions will be an ongoing, long-term, and multi-agency process. Consequently, because the Proposed Project would place additional people and structures in areas that could be affected by coastal flooding influenced by sea level rise and definitive mitigation to protect all parts of the Caltrain ROW and facilities is infeasible, the Proposed Project's contribution to potential cumulative risks of flooding would be considerable.

4.1.4.11 Land Use and Recreation

Impact CUMUL-10-LUR: Cumulative effects related to land use and recreation

The geographic context for the analysis of land use and recreation cumulative impacts consists of the areas within and adjacent to the Caltrain ROW. Physical division of an established community, conflict with applicable land use policies or plan adopted for the purpose of avoiding or mitigation an environmental effect, increase in the demand for or degradation of recreational facilities requiring construction or expansion of recreational facilities that would have an adverse effect on the environment would result in a significant cumulative impact.

Cumulative construction impact analysis focused on temporary impacts on existing land uses and recreation. Operational impact analysis addressed potential division of communities, land use policy/plan consistency, and direct/indirect changes in recreational facilities.

Cumulative projects included within this geographic context are all projects listed in Table 4-3. For analysis of recreation demand, cumulative growth in the three counties was also considered.

Construction

Construction of HSR San Jose to Merced and Blended Service improvements could impact land use and recreational facilities because of temporary disruptions on or adjacent to existing other land uses. Where construction occurs at or near the Tamien, Diridon, Millbrae (and possibly at the Redwood City) Station, this would only be a concern for station use itself and would not impede adjacent land uses. Construction of passing tracks, if inside the Caltrain ROW would not disrupt adjacent uses. For construction of San Jose to Merced segment construction or Blended Service passing track locations outside the ROW, this could result in disruption of existing land uses as well as possibly adjacent uses, depending on access and staging. Construction of the maintenance yard would depend on locations; at the previously considered location in Brisbane, it presently consists of previously industrial land that is not in present use. Staging and access could also disrupt existing land uses temporarily, although staging and access are usually conducted on areas with open land (such as vacant lots and parking lots) wherein temporary disruption of existing use can be minimized.

Construction of other cumulative projects could also temporarily impact existing land uses adjacent to the Caltrain ROW, although most projects will either occur on vacant land or will displace the existing land uses prior to construction of the new use by limiting use and demolishing existing structures. Most projects would not displace adjacent existing uses during construction, except in the case of needs for substantial off-site staging or access.

The Proposed Project would be constructed within the Caltrain ROW, with the exception of the two TPSs (except for TPS2, Option 3 which is in the ROW), limited areas where the OCS alignment would be outside the Caltrain ROW, and areas where the ESZ would extend outside the Caltrain ROW and require vegetation clearance. Construction within the Caltrain ROW would not displace other land uses outside the ROW. As discussed in Section 3.10, *Land Use and Recreation*, the TPS location options, with the exception of TPS2 Option 2 and TPS2 Option 3, are vacant parcels surrounded by industrial or commercial areas. TPS2 Option 2 would displace existing industrial use and parking currently on the site; however, there are numerous alternative locations for industrial use in the vicinity. TPS3 Option 3 would be in a parking lot/open area at the CEMOF that is used for parking and as a laydown area. The construction of the OCS poles would primarily occur within the Caltrain ROW; however, in some locations the OCS poles would be erected on adjacent commercial, industrial and residential land. Some tree removal or pruning may be necessary on areas outside the Caltrain ROW, which could disrupt existing land uses. Temporary staging and access could also result in use of vacant lots inside and outside of the Caltrain ROW, but would not result in new land uses that might be inconsistent with adjacent land uses.

As discussed in Section 3.1, *Aesthetics*, construction activity in residential and park areas would be anomalous, and the visual character of such areas would be partially degraded during construction. The duration of OCS construction at any one location would be limited to the time necessary to install pole foundations and then later to install poles and string wires. The change in visual character would only occur for a limited period and the perception of the visual quality of such areas would not be altered once construction is complete. To ensure that the duration of construction disruption and activities are limited in areas of greater visual sensitivity, Mitigation Measure AES-2a would be implemented to avoid using residential or park areas for access or staging areas, to minimize the duration of construction activity in such areas (to the extent feasible) and to remove all construction equipment and materials immediately following completion of construction on such sites. Because the disruption of existing land uses during construction would be temporary, would not ultimately result in a conversion of land use (except at TPS2 Option 2, for which there are ample industrial sites for the displaced use and TPS3 Option 3 for which alternative sites can be identified for parking and laydown areas within the Caltrain ROW) and because Mitigation Measure AES-2a would ensure that disruption to individual residential areas or park areas is minimal, the contribution of Proposed Project's construction to the cumulative significant impact on land use and recreation would be less than considerable.

Operation

Physically Divide a Community

Blended Service and other cumulative train service increases would occur along the existing Caltrain Corridor between San Jose and San Francisco. As such, operation of additional train service would not physically divide communities. The San Jose to Merced HSR segment would include new aerial and at-grade segments in San Jose along the Caltrain ROW from south of Tamien Station to the San Jose Diridon Station. This segment would not physically divide communities due to overhead aerial structures and the at-grade segments in the San Jose approach section are all along existing roads or rail rights of way and thus would not introduce new community divisions.

The Blended Service improvements at the Diridon, Millbrae and, potentially, Redwood City Stations would be an expansion of existing facilities given the existing railroad line at each location. A new maintenance yard would not likely physically divide a community given that feasible locations for

such a yard are likely to be in commercial or industrial locations. If the new passing tracks are located in the Caltrain ROW at-grade, they would not change existing divisions of the community. Where passing tracks might encroach outside the Caltrain ROW, they would expand the width of the existing railroad ROW but would not prevent access from east to west at existing crossings. Where grade separations are proposed as part of Blended Service improvements, connections across the Caltrain ROW would be improved over existing conditions.

Most of the other cumulative projects are not likely to result in physical division of communities as they consist of residential, commercial and mixed use projects that are integrated into existing communities. However, large, elevated land development projects that are much higher than adjacent development can be perceived by some as dividing a community by creating a vertical separation, even though there may be no physical barriers between development at the ground level. Most transportation projects are proposed along existing transportation corridors, but if new large transportation facilities are proposed at-grade or elevated in new locations, they could physically divide communities and affect access between communities.

As described in Section 3.10, *Land Use and Recreation*, the Proposed Project would not physically divide existing communities. The OCS poles and wires would add additional infrastructure in the Caltrain ROW but would not physically impede access across the Caltrain ROW. There may be increased delays at some at-grade crossings, but the delays would be temporary and would not physically divide communities on either side of the Caltrain ROW. Thus, the contribution of the Proposed Project's operation to any potential cumulative impacts related to physically dividing a community would be less than considerable.

Land Use Plan and Policy Consistency

Conflicts of a project with land use policies do not, in and of themselves, constitute significant environmental impacts. Policy conflicts are considered environmental impacts only when they would result in direct environmental effects.

The Blended Service improvements at the Diridon, Millbrae and, potentially, Redwood City Stations would be consistent with long-term planning for transit uses at these locations. The consistency of a new maintenance yard with existing land use plans and policies would depend on the proposed location. If the new passing tracks are located in the Caltrain ROW at-grade, they would be consistent with existing land use planning.

If HSR San Jose to Merced facilities or Blended Service passing tracks are placed outside the Caltrain ROW, they may or may not be consistent with local land use planning. If passing tracks are proposed outside the Caltrain ROW, they would likely be inconsistent with land use plans and policies of jurisdictions where land is designated for residential, commercial, open space or recreational uses. All of the five preliminarily identified passing track locations are adjacent to a mixture of residential, commercial, industrial, roadway, park and open space land uses. Because industrial use often includes railroad access tracks, the use of such areas for passing tracks may not result in significant environmental impacts different from those possible with allowed industrial uses.

Grade separations can often require large footprints and may require additional ROW acquisition and displacement of land uses as well as changing the land use character adjacent to existing land uses.

In addition to the inconsistency with local land use plans, passing tracks placed outside the Caltrain ROW may result in additional noise and aesthetic impacts during operation on land uses that are not

presently adjacent to the Caltrain ROW. These impacts would represent additional inconsistencies with local land uses and policies. Further, passing track improvements that result in displacement of existing residential, commercial, or industrial land uses may increase pressure for residential, commercial, or industrial development at alternative locations, which may result in secondary physical environmental impacts. Given that the design and location of the passing tracks, the maintenance yard, and any other necessary improvements (which may include grade separations) are unknown at present, a definitive conclusion regarding the consistency of Blended Service improvement with land use plans and policies cannot be made. In the event that substantial Blended Service improvements are placed outside the ROW in non-industrial areas, the inconsistency with plans and policies could be a significant and unavoidable impact.

Other cumulative projects may or may not be consistent with local land use policies and plans. Many projects are proposed consistent with current local land use planning; some projects seek general plan and zoning amendments to allow uses that are not consistent with current local planning. All local land use projects must be approved by land use jurisdictions. Thus, if projects are inconsistent with local land use plans and policies and the city or county decides to approve them, the city or county is required by law to amend local land use plans and policies or make the appropriate findings prior to approving inconsistent uses. Most other cumulative transportation projects are proposed along existing transportation corridors. However, as with potential Blended Service passing tracks outside the Caltrain ROW, large transportation facilities in new locations outside transportation corridors could result in significant conflicts with local land use plans and policies.

As described in Section 3.10, *Land Use and Recreation*, the Proposed Project would generally be consistent with the local plans and policies, including land use designations and zoning, except at some of the TPF sites. The majority of the Proposed Project, including OCS poles and wires, the paralleling stations, and the switching station would be located within the existing Caltrain ROW and would, therefore, not impact adjacent land use plans. The Proposed Project would result in several inconsistencies with local plans and policies, specifically, at the location of TPS1 Option 2, and at locations where the OCS alignment and ESZ would be outside rail or road ROW. However, the Proposed Project would not displace existing or potential future development (except the existing industrial/warehouse use, which can be readily absorbed at other San Jose industrial sites, at the TPS2 Option 2 site) and, thus, would not result in significant secondary environmental impacts as a result of the inconsistencies with local land use plans and policies. Thus, contribution of the Proposed Project operation to any potential cumulative impacts related to land use policy or plan conflicts (and resultant secondary physical impacts on the environment) would be less than considerable.

Damage to or Demand for Recreational Facilities

The San Jose to Merced HSR segment (where along the Caltrain ROW in San Jose) would avoid Fuller Park but may affect Kurte Park as this park is directly adjacent to the Caltrain Row.

The Blended Service improvements at the Diridon, Millbrae and, potentially, Redwood City Stations would have no impacts on parks or recreation facilities. The new maintenance yard's impact on parks or recreation facilities would depend on location, although it is highly unlikely that the facility would be proposed at or adjacent to an existing park or open space location (the previously studied Brisbane/Bayshore site is a former landfill site not used for recreation).

Where Blended Service passing tracks are located within the Caltrain ROW, they would not result on encroachment onto park lands. However, if passing tracks are proposed outside the Caltrain ROW,

they could affect park or open space directly adjacent the Caltrain ROW. Based on Table 3.10-2 in Section 3.10, *Land Use and Recreation*, all of the five preliminarily identified passing track locations would be adjacent to parks.

- The North 4 Track (San Francisco to Burlingame): Lions Park and Lomita Park (both in San Bruno).
- The Long-Middle 4 Track (San Mateo to Redwood City): Trinta Park (San Mateo); John S. Roselli Memorial Park (Redwood City): Main Street Park (Redwood City); and Broadway-Arguello Park (Redwood City).
- The Short-Middle 4 Track (San Mateo to San Carlos): Trinta Park (San Mateo).
- The Middle 3 Track (San Mateo to Palo Alto): Trinta Park (San Mateo); John S. Roselli Memorial Park (Redwood City): Main Street Park (Redwood City); Broadway-Arguello Park (Redwood City); Holbrook-Palmer Park (Atherton); El Camino Park (Palo Alto); El Palo Alto Park (Palo Alto); Embarcadero Bike Path (Palo Alto); and Peers Park (Palo Alto).
- The South 4-Track (Mountain View to Santa Clara): Rengstorff Park and Resident Park (Mountain View).

Whether any of these parks would actually be affected would depend on the width of the Caltrain ROW, the feasibility to stay within the ROW, and the alignment of any passing tracks outside the ROW. The design of passing tracks is unknown and, thus, no definitive conclusion can be made about whether any parks would actually be affected or not. However, pursuant to the mandatory requirements of Section 4(f) of the Department of Transportation (DOT) Act of 1966, CHSRA will first consider options for avoiding park impacts in design of any passing tracks. If park impacts cannot be avoided, then Section 4(f) requires mitigation to provide additional park space so that no overall loss of park space and recreational opportunities results.

Most other cumulative transportation projects are proposed along existing transportation corridors, but if new large transportation facilities are proposed outside transportation corridors, this could affect existing park or recreation areas. Large transportation projects are also subject to the requirements of Section 4(f) if they are federally funded or authorized (which is most large transportation projects). Other non-transportation projects are less likely to physically encroach on existing park or recreational areas. Cumulative projects that propose new housing units would increase population and would increase the demand for recreational facilities. While there are many park areas throughout the San Francisco Peninsula, it is possible that continued growth will start to result in overuse of existing park and recreational facilities and create pressure for new park and recreational facilities.

As described in Section 3.10, *Land Use and Recreation*, the Proposed Project may require tree removal at Broadway-Arguello Park (Redwood City), Holbrook-Palmer Park (Atherton) and at Peers Park (Palo Alto). Mitigation Measure BIO-5 requires replacement of removed trees and, as discussed in Section 3.10, *Land Use and Recreation*, it is feasible to replace trees removed at parks at the parks themselves to maintain their visual screening function from the Caltrain ROW without loss of substantial portions of the parks. Given that Blended Service improvements or other cumulative transportation projects would be required to avoid and/or mitigate for park impacts per the Section 4(f) requirements, other cumulative projects are unlikely to affect parks, and the Proposed Project's park impacts would be mitigated, cumulative impacts are likely to be mitigable to a less than

significant level. Given the project-level mitigation described above, the Proposed Project's contribution to any potential cumulative impacts would be less than considerable with mitigation.

4.1.4.12 Noise and Vibration

Impact CUMUL-11-NOI: Cumulative increase in noise or vibration

The geographic context for the analysis of potential cumulative construction- and operation-related noise and vibration impacts consists of the Caltrain ROW, the adjacent areas, and areas adjacent to access and haul routes (i.e., nearby locations with sensitive noise receptors) used by cumulative projects and the Proposed Project. Present and probable future cumulative projects with the potential for cumulative impacts related to noise and vibration are listed in Table 4-3.

Construction

During construction, an increase in noise and vibration levels, could impact the sensitive receptors in the project vicinity. Cumulative noise and vibration impacts would primarily result from simultaneous construction of different projects in the same location at the same time; however where construction occurs in quick succession in the same area, there could also be a cumulative impact due to the extended duration of construction disruption.

Construction of the Proposed Project would occur years before prior to the construction of the HSR San Jose to Merced and Blended Service improvements and thus there would no simultaneous construction noise or vibration effects.

Construction of the Transbay Terminal Center is currently under way, but the TTC is located more than one mile from the San Francisco 4th and King Station, so there would be no cumulative noise effects resulting from simultaneous construction of the TTC and the Proposed Project. Construction of the DTX would occur after completion of the Proposed Project, so there would be no simultaneous construction noise impacts at their overlap at the 4th and King Station and yard.

Construction of the Proposed Project would overlap in time and location with the projects specified as having such overlap in Table 4-3, including the following substantial transportation projects:

- Caltrain South Terminal Improvements (Santa Clara – San Jose).
- BART Silicon Valley Extension, if construction starts by 2019 (Santa Clara – San Jose).
- Other Caltrain Improvements (various locations).
- BART Millbrae Tail Tracks (south of Millbrae Station).
- Central Subway (near San Francisco 4th and King Station).
- Muni 22-Fillmore Electric Trolley Bus Re-Routing (16th Street in San Francisco).
- Other grade separations (Rengstorff, possibly others in San Mateo County).
- Muni T-Line Extension, if construction starts by 2019 (Caltrain Bayshore Station).
- Palo Alto Caltrain Station/Bus Transit Center Expansion, if construction starts by 2019 (Caltrain Palo Alto Station).
- Tasman Express Long T Double-tracking (Mountain View Station).

In addition, as noted in Table 4-3, there are numerous land use development projects that have planned or potential construction periods that could overlap with Proposed Project construction. With multiple cumulative construction projects in close adjacency, there is the potential for significant cumulative construction noise and vibration impacts.

As discussed in Section 3.11, *Noise and Vibration*, the Proposed Project construction would have potentially significant noise and vibration impacts during construction. Mitigation Measure NOI-1a would require development and implementation of a noise control plan to reduce potential construction noise impacts but would not necessarily reduce all noise impacts at all times during construction to a less than significant level, particularly with the likelihood of substantial night-time construction expected with the Proposed Project. Because there will be other cumulative projects in construction adjacent to the Caltrain ROW at the same time, the Proposed Project could result in a cumulatively considerable contribution to cumulative construction noise impacts. Even with mitigation, these cumulative impacts could be significant and unavoidable

Proposed Project construction vibration impacts would be reduced to a less than significant level with Mitigation Measure NOI-2a. Given this mitigation and the fact that vibration levels due not accumulate (like noise levels can), the Proposed Project would not contribute considerably to cumulative construction vibration impacts.

Operational

Operational Noise

Cumulative Rail Projects

As shown in Table 4-8 above, if Blended Service and other cumulative freight and passenger rail service increases all come to fruition as hoped by project proponents, there would be a substantial increase in the number of daily trains using the Caltrain corridor itself by both 2020 and 2040. For example in the segment between Santa Clara and San Jose, which is the most heavily used segment by passenger services other than Caltrain and by freight service today, by 2040 there could be an increase from approximately 116 passenger trains and nine freight trains today to perhaps as many as 176 passenger trains and 19 freight trains daily in 2040. Between Santa Clara and Redwood City, there could be an increase from approximately 94 passenger trains and two freight trains today to perhaps as many as 204 passenger trains and four freight trains daily in 2040. Between Redwood City and San Francisco, there could be an increase from approximately 92 passenger trains and six freight trains today to perhaps as many as 204 passenger trains and 12 freight trains daily in 2040. Increased passenger and freight rail service would increase noise levels along the Caltrain ROW as well as at any maintenance facilities for Caltrain, HSR, freight, or other tenant rail services.

In addition to an increase in train service, Blended Service operations (for both HST and Caltrain) up to 110 mph, up from the present maximum of 79 mph would also increase potential cumulative noise levels.

The HSR San Jose to Merced from San Jose Diridon to south of the Tamien Station would be along the Caltrain ROW on aerial structures to south of the Tamien Station, then at-grade to south of Pullman Way, then on aerial south to just north of Capitol Expressway. While HSR service south of the Diridon Station was not included in the cumulative noise modeling (because it would not be on the same tracks as Caltrain), HSR operations in this segment where parallel to the Caltrain ROW would add additional noise in this part of San Jose.

Modeling of Cumulative Rail Noise Levels

The potential cumulative rail noise using the Caltrain corridor due to the increases levels of service shown in Table 4-8[12] were modeled by WIA for the following cumulative scenarios:

- 2020 Cumulative without project scenario: In this scenario, Caltrain service would include 92 trains between San Jose and San Francisco using diesel locomotives and the cumulative increases of other rail services would be as shown in Table 4-8.
- 2020 Cumulative with project scenario: In this scenario, Caltrain service would include 114 trains between San Jose and San Francisco of which 75 percent would be EMUs and 25 percent would be diesel service and the cumulative increases of other rail services would be as shown in Table 4-8.
- 2040 Cumulative without project scenario: In this scenario, Caltrain service would include 92 trains between San Jose and San Francisco using diesel locomotives and the cumulative increases of other rail services would be as shown in Table 4-8 without High Speed Rail.
- 2040 Cumulative with Full Caltrain Electrification scenario: In this scenario, Caltrain service would include 114 trains between San Jose and San Francisco using EMUs and the cumulative increases of other rail services would be as shown in Table 4-8 without High Speed Rail.
- 2040 Cumulative with Blended Service, 79 mph Scenario: In this scenario, Caltrain service would include114 trains between San Jose and San Francisco using EMUs and the cumulative increases of other rail services would be as shown in Table 4-8 including High Speed Rail Blended Service operating up to 79 mph.
- 2040 Cumulative with Blended Service, 110 mph Scenario: In this scenario, Caltrain service would include 114 trains between San Jose and San Francisco using EMUs and the cumulative increases of other rail services would be as shown in Table 4-8 including High Speed Rail Blended Service operating up to 110 mph.

This noise modelling was done on a worst-case basis assuming that all of the service levels identified in Table 4-8 occur and not assuming any improvements in trackage (such as new track, ties, or trackbed treatments that may lower noise) or any new grade separations (except for those included in the under construction San Bruno Grade Separation Project). As described above, for the Cumulative Blended Service scenarios, there will be Core Capacity projects constructed to accommodate the mixing of Caltrain and HSR service and thus noise levels for the Blended Service scenarios will likely be less than those indicated in Table 4-11.

The cumulative noise change was characterized in comparison with existing noise levels along the Caltrain corridor at 49 study locations (see discussion in Section 3.11, *Noise and Vibration*). The change from existing noise levels with each cumulative scenario was then compared with the FTA moderate and severe impact thresholds.

With cumulative train service increases, under the worst-case assumptions noted above, there could be significant cumulative noise impacts in all 2020 and 2040 scenarios evaluated, compared with existing conditions. As discussed in Appendix C, *Noise and Vibration Technical Report*, the most

[12] As noted above, the *2014 Business Plan: 2014 Service Planning Methodology* (CHSRA 2014c) describes 53 daily round-trip trips to San Francisco. However, this Draft EIR analyzes 40 daily roundtrips (80 trains), based on the adopted *2012 Revised Business Plan* because this level of service is consistent with Caltrain analysis of Blended Service to date. If more round-trips occur, then noise levels may be higher than those identified in this section.

substantial contributor to increases in cumulative noise over existing levels is freight service at most locations. Although the number of additional freight trains is smaller than the cumulative passenger trains included in the various cumulative scenarios, freight trains are heavier and longer than passenger trains and thus for similar speeds, they generally result in greater noise levels.

The summary of results by scenario is presented in Table 4-11 and comparative results by study location are shown in Table 4-12 (2020) and Table 4-13 (2040).

Figure 4-3 shows the average noise levels across the entire Caltrain corridor with different cumulative scenarios and the contribution of different cumulative rail services. Figure 4-4 shows the noise levels at the 49 different study locations comparing existing noise levels, cumulative conditions without the project and cumulative conditions with Caltrain Full Electrification in 2040. As shown, in 2040 Caltrain Full Electrification would reduce cumulative noise levels at 42 locations, while increasing noise levels at one location, with no change at six locations compared with Cumulative No Project Conditions. Figure 4-5 shows the noise levels at the 49 study locations comparing existing noise levels with different cumulative scenarios. As shown, in 2040, for the Cumulative with Blended Service scenarios (both 79 mph and 110 mph), the largest share of increases (approximately 68 to 75 percent) over the FTA severe criteria are due to freight/other rail increases with the remainder (approximately 25 to 32 percent) due to Blended Service.

Noise modeling results are presented in greater detail in Appendix C, *Noise and Vibration Technical Report*.

Table 4-11. Cumulative Rail Noise Impacts, Overview

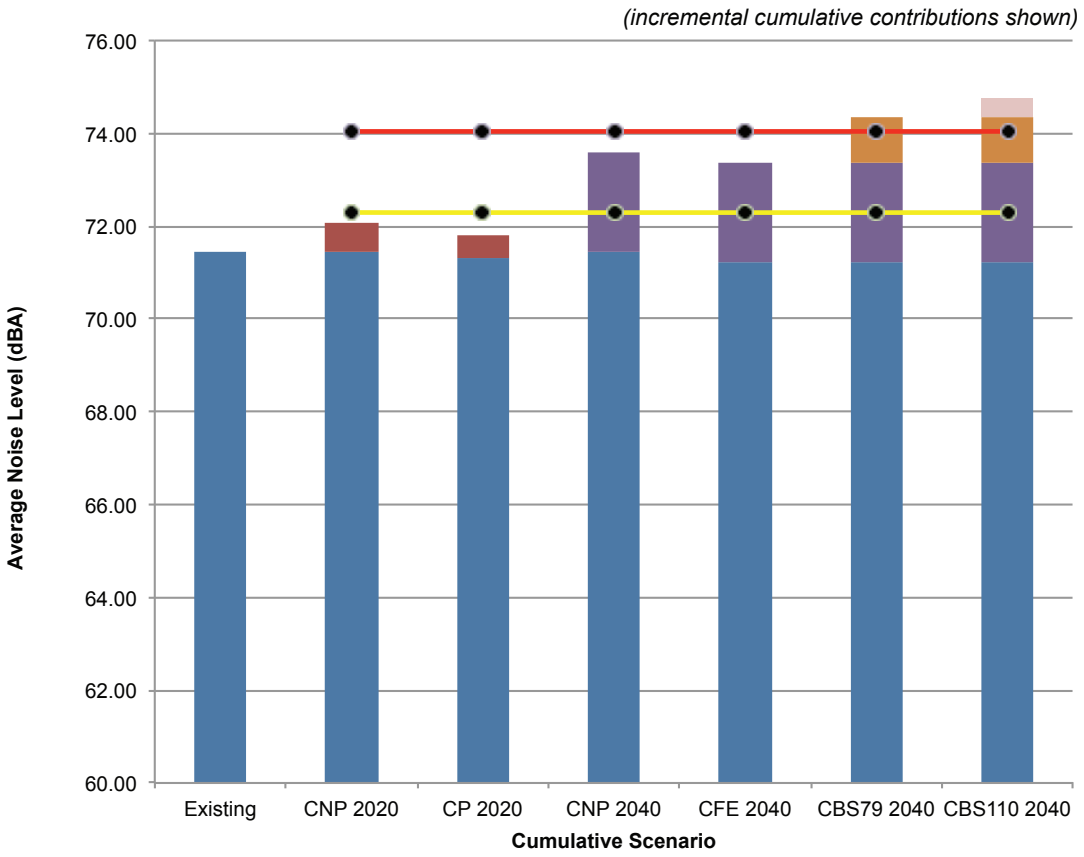
		Impacts per FTA Noise Criteria		
Year	Scenario	No Impact	Moderate Impact	Severe Impact
2020	Cumulative[a] without Project	34	15	0
	Cumulative[a] with Project	36	13	0
2040	Cumulative[b] without Project	1	39	9
	Cumulative[b] with Full Caltrain Electrification[c]	4	37	8
	Cumulative[b] with Blended Service (79 mph scenario)	1	4	44
	Cumulative[b] with Blended Service (110 mph scenario)	1	4	44

Source: Appendix C, *Noise and Vibration Technical Report*

[a] Cumulative 2020 scenarios include freight and other passenger rail service levels noted in Table 4-8 but do not include high speed rail.

[b] Cumulative 2040 scenarios include freight and other passenger rail service levels noted in Table 4-8 and vary based on whether the Proposed Project, Caltrain Full Electrification, or Blended Service is included. San Jose to Merced HSR operations are not included in this analysis but could add additional noise at two locations in San Jose, although the HSR alignment is not parallel to the Caltrain ROW at these study locations.

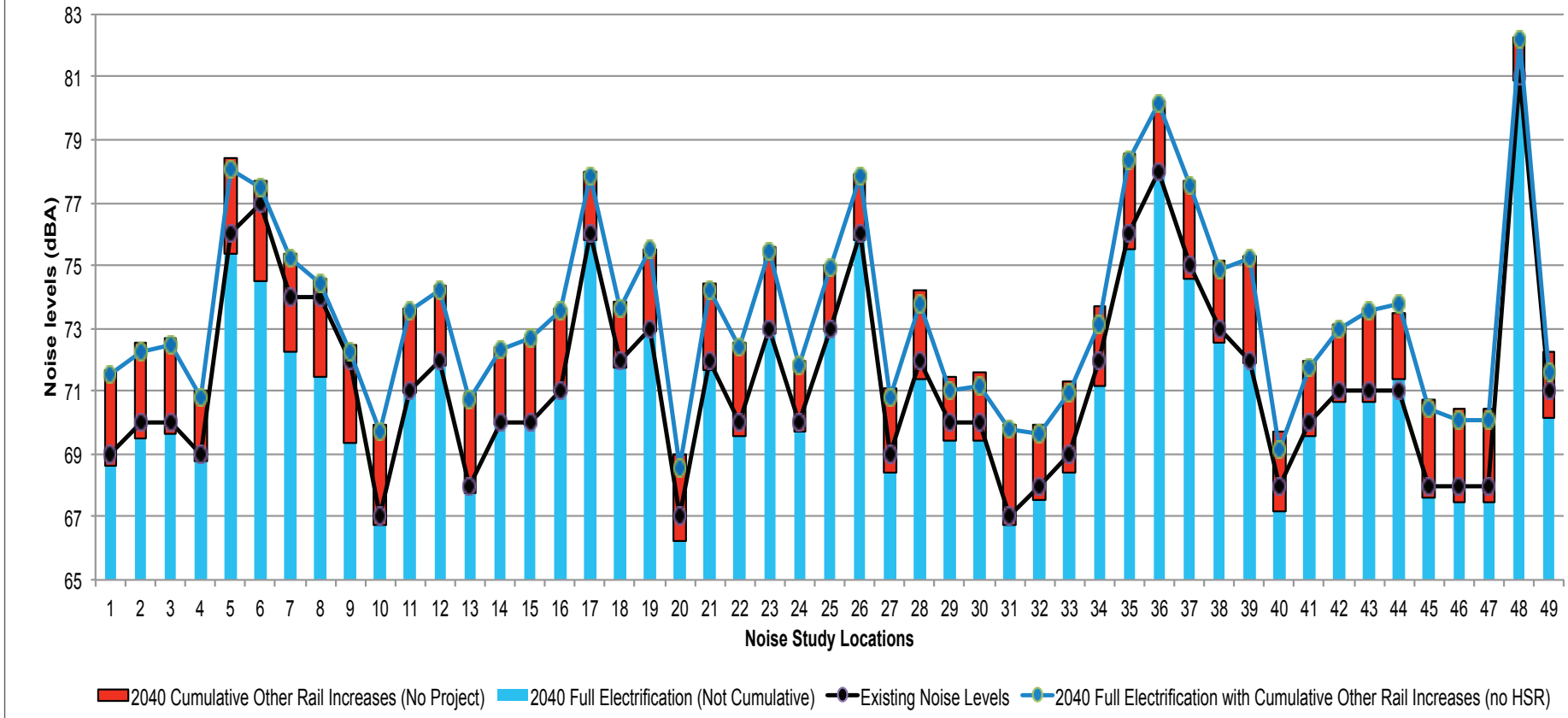
[c] Caltrain Full Electrification is not part of the Proposed Project but is considered the likely situation for 2040.



The effects of the Project in 2020 and Full Electrification in 2040 are not specifically shown because, on average the effect of replacing existing diesel locomotives with EMUs would be to reduce noise levels. In order to include this reducing effect in this graphic, in the 2020 cumulative with project scenario, the existing noise levels shown have been lowered by the average noise reduction of 0.1 dBA for 2020 with the Project compared to No Project conditions. In the 2040 cumulative with project scenarios (including the Blended Service scenarios), the existing noise levels shown have been lowered by the average noise reduction of 0.2 dBA for 2040 with the project compared to No Project conditions.

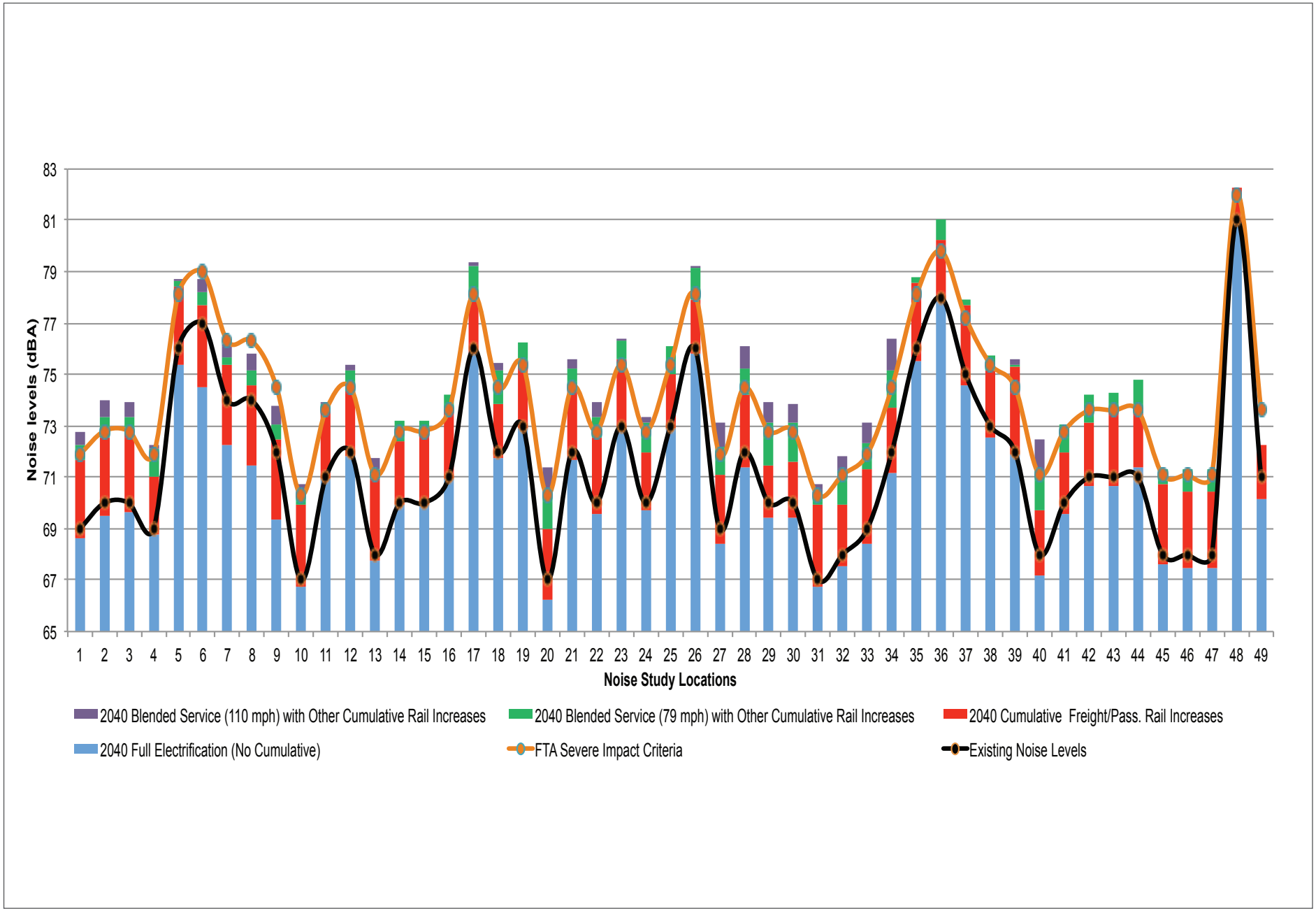
00606.12-001 Caltrain Electrification4-DEIR (01/17/14) SS

Figure 4-3
Average Noise Levels along Caltrain Corridor by Cumulative Scenario (dBA)
Peninsula Corridor Electrification Project



00606.12-001 Caltrain Electrification\4-DEIR (01/17/14) SS

Figure 4-4
2040 Cumulative Noise Levels along Caltrain Corridor
Peninsula Corridor Electrification Project



00606.12-001 Caltrain Electrification4-DEIR (01/17/14) SS

Figure 4-5
2040 Cumulative Noise Levels along Caltrain Corridor
Peninsula Corridor Electrification Project

Table 4-12. 2020 Cumulative Rail Noise Levels, Change over Existing (dBA)

Setting			Change from Existing - 2020		
Site No	Location	City	Cumulative w/o Project[a]	Cumulative w/ Project[a]	*Project Contribution*
1	Oakdale Ave and Quint Ave	San Francisco	0.9	0.7	*-0.2*
2	Reddy St and Williams Ave	San Francisco	0.8	0.6	*-0.2*
3	Carr St and Paul Ave	San Francisco	0.8	0.7	*-0.2*
4	Tunnel Ave and Lathrop Ave	San Francisco	0.6	0.6	*0.0*
5	Herman St and Tanforan Ave	San Bruno	0.8	0.4	*-0.5*
6	Huntington Ave and San Bruno Ave	San Bruno	-1.1	-1.3	*-2.3*
7	Montgomery Ave and Walnut St	San Bruno	-0.4	-0.5	*-1.6*
8	1st Ave and Pine St	San Bruno	-1.1	-1.3	*-2.3*
9	Huntington Ave and Sylvan Ave	San Bruno	-1.2	-1.4	*-2.4*
10	San Antonio Ave and San Benito Ave	San Bruno	0.9	0.8	*-0.1*
11	Monterey St and Santa Paula Ave	Millbrae	0.8	0.8	*0.1*
12	Hemlock Ave and Hemlock Dr	San Mateo County	0.8	0.8	*0.0*
13	California Dr and Dufferin Ave	Burlingame	0.9	0.8	*-0.1*
14	California Dr and Mills Ave	Burlingame	0.9	0.7	*-0.2*
15	California Dr and Palm Dr	Burlingame	0.8	0.6	*-0.2*
16	Park Ave and Carolan Ave	Burlingame	0.8	0.7	*-0.2*
17	Grand Blvd and San Mateo Blvd	San Mateo	0.6	0.6	*0.0*
18	Railroad Ave and Monte Diablo	San Mateo	0.8	0.4	*-0.5*
19	B St and 9th Ave	San Mateo	-1.1	-1.3	*-2.3*
20	South Blvd and 16th Ave	San Mateo	-0.4	-0.5	*-1.6*
21	Pacific Blvd and Otay Ave	San Mateo	-1.1	-1.3	*-2.3*
22	Country Rd and Dale View Ave	San Mateo	-1.2	-1.4	*-2.4*
23	Country Rd and Marine View	Belmont	0.9	0.8	*-0.1*
24	Country Rd and Springfield Ave	San Carlos	0.8	0.8	*0.1*
25	D St and Stafford St	Redwood City	0.8	0.8	*0.0*
26	Cedar St and Main St	Redwood City	0.9	0.8	*-0.1*
27	198 Buckingham Ave	Redwood City	0.7	0.8	*0.1*
28	Arrowhead Lane and 5th Ave	San Mateo County	0.9	0.9	*0.0*
29	Lloyden Dr and Fair Oaks Lane	Atherton	0.8	0.9	*0.1*
30	Felton Dr and Encinal Ave	Atherton	0.7	0.7	*0.0*
31	Burgess Dr and Alma St	Menlo Park	0.6	0.6	*0.0*

Setting			Change from Existing - 2020		
Site No	Location	City	Cumulative w/o Project[a]	Cumulative w/ Project[a]	*Project Contribution*
32	Mitchell Lane and University Ave	Palo Alto	0.8	0.8	*0.1*
33	Alma St and Lincoln Ave	Palo Alto	0.6	0.3	*-0.4*
34	Residences near Peers Park	Palo Alto	0.8	0.7	*-0.1*
35	Alma St and El Dorado Ave	Palo Alto	0.8	0.6	*-0.2*
36	4237 Park Blvd	Palo Alto	0.8	0.8	*0.0*
37	Central Exp and Thompson Ave	Mountain View	0.6	0.6	*0.0*
38	Evelyn Ave and Bryant St	Mountain View	0.7	0.8	*0.1*
39	Central Exp and Whisman Ave	Mountain View	0.6	0.7	*0.1*
40	S. Bernardo Ave and Evelyn Ave	Mountain View	0.9	0.7	*-0.3*
41	Asilomar Ave and Mary Ave	Sunnyvale	1.0	0.7	*-0.3*
42	332 Angel Ave	Sunnyvale	0.8	0.6	*-0.2*
43	Fair Oaks Ave and Evelyn Ave	Sunnyvale	0.9	0.7	*-0.2*
44	Agate St and Lawrence Exp	Santa Clara	1.0	0.9	*-0.1*
45	Agate Dr and Bowers Ave	Santa Clara	0.9	0.8	*-0.2*
46	Alvarado Dr and San Thomas Exp	Santa Clara	0.8	0.6	*-0.3*
47	2109 Main St	Santa Clara	0.8	0.5	*-0.4*
48	782 Auzerais Ave	San Jose	1.0	0.6	*-0.4*
49	456 Jerome St	San Jose	1.1	1.2	*0.1*
Increases			*43*	*43*	*8*
Decreases			*6*	*6*	*33*
No change			*0*	*0*	*8*

Source: Appendix C, *Noise and Vibration Technical Report*

[a] Cumulative 2020 scenarios include freight and other passenger rail service levels noted in Table 4-8 but do not include high speed rail.

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Table 4-13. 2040 Cumulative Rail Noise Levels, Change over Existing (dBA)[a]

	Change from Existing - 2040				
Site No.	2040 Cumulative No Project	2040 Cumulative with Caltrain Full Electrification	*Change with Caltrain Full Electrification*	2040 Cumulative with Blended Service (79 mph)	2040 Cumulative with Blended Service (110 mph)
1	2.7	2.5	*-0.2*	3.3	3.8
2	2.5	2.3	*-0.2*	3.3	4.0
3	2.7	2.5	*-0.2*	3.3	3.9
4	2.0	1.8	*-0.2*	3.1	3.2
5	2.4	2.0	*-0.4*	2.6	2.7
6	0.7	0.5	*-0.2*	1.2	1.7
7	1.4	1.2	*-0.2*	1.7	2.2
8	0.6	0.4	*-0.2*	1.2	1.8
9	0.5	0.3	*-0.2*	1.1	1.8
10	2.9	2.7	*-0.2*	3.3	3.7
11	2.6	2.6	*0.0*	2.8	2.9
12	2.3	2.2	*-0.1*	3.1	3.3
13	2.9	2.8	*-0.1*	3.3	3.7
14	2.4	2.3	*-0.1*	3.2	3.2
15	2.7	2.7	*0.0*	3.2	3.2
16	2.6	2.6	*0.0*	3.2	3.2
17	2.0	1.8	*-0.2*	3.2	3.4
18	1.8	1.6	*-0.2*	3.1	3.4
19	2.5	2.5	*0.0*	3.2	3.2
20	2.0	1.6	*-0.4*	3.3	4.4
21	2.4	2.2	*-0.2*	3.2	3.6
22	2.6	2.4	*-0.2*	3.4	4.0
23	2.6	2.5	*-0.1*	3.3	3.4
24	2.0	1.8	*-0.2*	3.2	3.4
25	2.0	2.0	*0.0*	3.1	3.0
26	1.9	1.8	*-0.1*	3.1	3.2
27	2.1	1.8	*-0.3*	3.2	4.1
28	2.2	1.8	*-0.4*	3.2	4.1
29	1.4	1.0	*-0.4*	3.1	3.9
30	1.6	1.2	*-0.4*	3.1	3.8
31	2.9	2.8	*-0.1*	3.3	3.7
32	1.9	1.6	*-0.3*	3.2	3.8
33	2.3	2.0	*-0.3*	3.3	4.1
34	1.7	1.1	*-0.6*	3.2	4.4
35	2.6	2.4	*-0.2*	2.8	2.8
36	2.2	2.2	*0.0*	3.0	3.0

	Change from Existing - 2040				
Site No.	2040 Cumulative No Project	2040 Cumulative with Caltrain Full Electrification	*Change with Caltrain Full Electrification*	2040 Cumulative with Blended Service (79 mph)	2040 Cumulative with Blended Service (110 mph)
37	2.7	2.5	*-0.2*	2.9	2.8
38	2.1	1.8	*-0.3*	2.7	2.7
39	3.3	3.2	*-0.1*	3.4	3.6
40	1.7	1.2	*-0.5*	3.2	4.4
41	2.0	1.8	*-0.2*	3.1	3.7
42	2.1	1.9	*-0.2*	3.2	3.5
43	2.7	2.5	*-0.2*	3.3	3.9
44	2.5	2.8	*0.3*	3.8	4.0
45	2.7	2.5	*-0.2*	3.3	3.9
46	2.4	2.1	*-0.3*	3.3	4.1
47	2.4	2.1	*-0.3*	3.3	4.1
48	1.3	1.2	*-0.1*	1.2	1.2
49	1.2	0.6	*-0.6*	0.6	0.6
Increases	*49*	*49*	*1*	*49*	*49*
Decreases	*0*	*0*	*42*	*0*	*0*
No Change	*0*	*0*	*6*	*0*	*0*

Source: Appendix C, *Noise and Vibration Technical Report*

[a] Cumulative 2040 scenarios include freight and other passenger rail service levels noted in Table 4-8 and vary based on whether the Proposed Project, Caltrain Full Electrification, or Blended Service is included. San Jose to Merced HSR operations are not included in this analysis but could add additional noise at study locations 48 and 49, although the HSR alignment is not parallel to the Caltrain ROW at these study locations.

[b] Caltrain Full Electrification is not part of the Proposed Project but is considered the likely situation for 2040.

All Other Projects

During operation, the non-rail cumulative projects could also increase noise levels and affect sensitive receptors in the vicinity of the Caltrain ROW. Operation of the land use developments and other regional transportation projects would increase noise levels by introducing more people, activities and traffic into the project vicinity. In addition, land development projects along the Caltrain ROW would also introduce more sensitive receptors that would be subject to the cumulative noise levels from increased passenger and rail service described above.

Proposed Project Cumulative Contribution

As described in Section 3.11, *Noise and Vibration*, the Proposed Project would result in both beneficial and adverse noise effects compared with existing conditions. The Proposed Project would replace diesel locomotives with EMUs, which are quieter. However, the Proposed Project would also increase service, which would increase train horn noise. In 2020, the Proposed Project would lower

existing noise levels at 38 locations, increase noise levels at 8 locations and have no change at 8 study locations. All project level noise increases would be less than the FTA impact thresholds.

Also as described in Section 3.11, *Noise and Vibration*, the Proposed Project would result in significant noise impacts due to noise from TPFs at one location. Mitigation Measure NOI-1b is proposed to require enclosures and site design to control noise at the one TPF location where needed to avoid significant impacts to nearby sensitive receptors. Relative to TPF noise alone, this mitigation would reduce any potential TPF noise contributions to potential cumulative impacts.

Where the Proposed Project would result in lower noise levels or the same noise levels compared with No Project conditions, it would not contribute to cumulative rail noise impacts. As shown in Table 4-12, in 2020, the Proposed Project would contribute to increased noise levels at six different study locations compared with 2020 Cumulative No Project conditions although, as shown in Figure 4-3, the Proposed Project would lower noise levels on average. As shown in Table 4-13, under 2040 conditions, the combined effect of the Proposed Project and Caltrain Full Electrification would result in increased noise levels at only one study location compared with 2040 No Project conditions. As shown in Figure 4-3, on average, the Proposed Project and Caltrain Full Electrification would lower noise levels along the Caltrain corridor. However, Caltrain Full Electrification is not part of the Proposed Project and thus under 2040 conditions, the Proposed Project is assumed to contribute to increased noise levels at the same six study locations identified for 2020 cumulative conditions.

Thus, at the six locations identified in Table 4-12 where the Proposed Project would result in noise increases, the Proposed Project would make a considerable contribution to the significant cumulative noise impacts shown in Table 4-11 and described further in Appendix C, *Noise and Vibration Technical Report*.

There are a number of different methods to reduce the noise impacts of cumulative trains:

- *Wayside horns*: Train horn noise can be reduced through us of a wayside horn, which is an automatically triggered horn located at the at-grade crossing itself that sounds upon approach of a train. Because the horns are located at the crossing itself, the area of effect is smaller than the area of effect due to train horns, but sensitive receptors near the at-grade crossing will still be affected by horn noise. Wayside horns are included as one option in Mitigation Measure NOI-CUMUL-1 described below.
- *Building sound insulation*: Another method of reducing the impact of train horn noise is building sound insulation. Sound insulation of residences and institutional buildings improve the outdoor-to-indoor noise reduction. Although this approach has no effect on noise in exterior areas, it is a feasible method for sites where noise barriers are not feasible or desirable, for buildings where indoor sensitivity is of most concern, or where the horn noise dominates the noise environment. Improvements in building sound insulation can often be achieved by adding an extra layer of glazing to the windows and by sealing any holes in exterior surfaces that act as sound leaks. Building sound insulation is included as one option in Mitigation Measure NOI-CUMUL-1 described below.
- *Quiet zone*: The FRA has established a process by which a local jurisdiction can designate a specific area containing at-grade crossings as a "quiet zone", provided that certain supplemental safety measures (SSM) are used in place of the locomotive horn to provide an equivalent level of safety at the at-grade crossing (FTA 2006).

- The SSMs commonly used for quiet zones include 4-quadrant gates, gates with medians or channelization devices, one-way street with gates, and street closure. By adopting an approved SSM at each of the impacted at-grade crossings, a quiet zone at least 0.5 mile long can be established.
- Only with local implementation of the quiet zone can Caltrain, freight operators and other tenant railroad operations be relieved of the requirement to sound their horns when crossing at-grade crossings. However, following implementation of a quiet zone, if any unsafe conditions were present at the time of train passage (such as a vehicle going around the gates or pedestrians in the crossing), train operators would still have the discretion to sound train horns. Although the quiet zone regulations are silent on the issue of liability, local jurisdictions may perceived that the implementation of a quiet zone includes acceptance of potential liability in the event of related accidents. It is possible that jurisdictions may not wish to risk the potential liability associated with implementing a quiet zone and decline to do so. In such a case, Caltrain, and freight and other rail operators would continue to use train horns as a safety device in compliance with FRA requirements.
- Although funding for quiet zone improvements is not included in the current Proposed Project budget, funding for quiet zone improvements at all remaining 42 at-grade crossings between San Jose and San Francisco is considered feasible. Assuming that quiet zone improvements may range in cost up to $1 million to $2 million per crossing, the cost of implementing quiet zone improvements could range from $42 million to $84 million.
- Where quiet zones are implemented and accepted by local jurisdictions, cumulative noise levels may be reduced to a less than significant level at some but not necessarily all cumulatively affected locations.
- Quiet zones are included as one option in Mitigation Measure NOI-CUMUL-1 described below.

- *Soundwalls*: Soundwalls are not considered a feasible mitigation to address horn noise because train horns are elevated and thus soundwalls would have to be as high or higher than the locomotives themselves to be effective at shielding train horn noise. Along the Caltrain corridor, such high walls would not likely be acceptable to local communities. Soundwalls cannot be placed at the at-grade crossing which also reduces their effectiveness for horn noise reduction. While lower soundwalls would help to reduce engine and wheel noise for adjacent receptors, lower soundwalls are not considered cost-effective given that they would only be partially effective at addressing train noise and would not address train horn noise which is the dominant concern.
- *Grade Separation*: While grade separations are a technically feasible way to avoid the need for train horn use, it is a highly expensive mitigation strategy. Caltrain has supported prior grade separation efforts, such as the San Bruno Grade Separation project, led by Caltrain, which will be completed in 2014. As shown in the analysis in this EIR, the San Bruno Grade Separation would reduce noise levels by approximately 2 dB compared with existing conditions. Caltrain supports future efforts at grade separation where acceptable to local communities and where local, state, and federal funding can be obtained to fund these improvements. Grade separations can cost approximately $50 million to $100 million per crossing (grade separations can cost much more sometimes), grade separating all existing 42 at-grade crossings would cost $2.1 to $4.2 billion. 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. However, as described in

Mitigation Measure NOI-CUMUL-1, Caltrain will work with local jurisdictions, transportation funding agencies, and state and federal agencies to support grade separations over time as funding becomes available.

While the recommended mitigation below, where feasible to implement, would help to reduce noise, it will take time to implement it and it may not be feasible to reduce all cumulative noise impacts to a less than significant level. Therefore, the Proposed Project would make a considerable contribution to cumulative noise impacts, with mitigation.

As to secondary environmental impacts of Mitigation Measure NOI-CUMUL-1, the environmental effects of the different mitigation options would vary. Wayside horns and building sound insulation would have limited to no secondary environmental impacts. Quiet zone improvements would require additional construction, but the likely environmental impacts of such construction are limited given the limited footprint of four-quadrant gates, active warning systems, medians and street work. In general, construction impacts for quiet zone improvements would be similar to the impacts disclosed for Proposed Project construction, would occur in previously developed and disturbed areas, and would be temporary in nature. The applicable Proposed Project mitigation described for construction impacts in this EIR, where relevant, would also be applied to quiet zone improvements.

As to grade separations, the design and feasibility of a select number of future grade separations are unknown and unstudied at this time, and thus the specific environmental impacts cannot be identified. While they are statutorily exempt from CEQA review, grade separations may nevertheless have substantial environmental impacts depending on their design and location, and their construction can be highly disruptive. Therefore, as a conservative assumption, their secondary environmental impacts are assumed to be significant and unavoidable.

Caltrain will work with other parties when implementing this measure to apply the relevant construction mitigation measures identified in this EIR to these the implementation of future noise mitigation improvements. Based on the analysis to date, the Proposed Project and Caltrain Full Electrification are the minor sources of cumulative increases in noise compared with existing conditions; therefore, pursuant to CEQA, Caltrain is only responsible for that portion of the cumulative increases caused by the Proposed Project (or in the future with full electrification). Other sources of cumulative increases including HSR, other passenger rail and freight services as well as non-rail sources near the Caltrain corridor would also bear responsibility for cumulative noise increases.

Mitigation Measure NOI-CUMUL-1 would address Caltrain's contribution to this cumulative impact. However, given the long-term nature of these improvements, the lack of current funding, the shared responsibility for cumulative impacts, and the lack of a collective agreement for a comprehensive noise mitigation program, it may not be possible to implement noise mitigation measures prior to cumulatively significant noise increases. In addition, the secondary environmental effects of some improvements, particularly for any grade separations constructed in the future, may be significant and unavoidable. Thus, the Proposed Project is considered to contribute considerably to a cumulatively significant noise impact, even with mitigation.

Mitigation Measure NOI-CUMUL-1: Implement a phased program to reduce cumulative train noise along the Caltrain corridor as necessary to address future cumulative noise increases over FTA thresholds

The JPB, in cooperation with other rail operators, local jurisdictions, transportation funding agencies, and state and federal agencies, will support incremental noise reduction measures at the locations of cumulative noise impacts over time as funding becomes available. Caltrain will work with local, state, and federal partners to establish priorities for noise reduction measure to be implemented as funding becomes available. Caltrain will also work with other rail operators to seek funding participation from multiple parties on a fair-share basis in proportion to their cumulative noise contributions.

The costs for implementing the phased program shall be borne by all rail operators in proportion to their contributions to cumulative train noise. Given that there are multiple contributors to cumulative rail noise, the JPB is only responsible to fund its fair share for necessary noise mitigation with other rail services responsible to fund their fair share as well. Fair share shall be determined by the noise contribution of each rail service to cumulative noise levels as determined using acceptable FTA noise modeling protocols. As noted above, the Proposed Project would result in increases noise at six of the 49 study locations in the 2020 cumulative scenario, but if Caltrain implements full electrification, then the combined effect of the Proposed Project and full electrification would only result in noise increases at one of the 49 study locations.

This program is expected to be implemented over a period of decades. Improvements will be phased as needed to address changes in cumulative rail service over time and cumulative rail noise.

Wayside horns and residential building sound insulation.

The, JPB, in cooperation with the other parties noted above, shall evaluate the potential to reduce cumulative noise impacts through the installation of wayside horns and building sound insulation improvements at residences projected to have a sound increase greater than the FTA moderate impact criteria. Building sound insulation methods may include extra wall insulation, window glazing and sealing of exterior surfaces.

If this option is selected, a technical study shall be completed to evaluate the effectiveness of reducing cumulative impacts to less than the FTA moderate impact threshold through these methods. If the study shows that it is feasible to reduce the impact to less than the threshold at a cumulatively affected sensitive noise receptor, then no additional mitigation at that location will be required. Building sound insulation measures shall only be installed to the extent necessary to meet the impact threshold at the receptor location and shall only be installed if building owners are willing to accept such measures.

Quiet Zones

The lead agency for a quiet zone designation is the local jurisdiction (typically the City or County) that is responsible for traffic control and law enforcement on the roads at the at-grade crossings.

The JPB, in cooperation with the other parties noted above, and the affected local jurisdictions shall implement a phased program considering the potential establishment of quiet zones along

the Caltrain corridor at all locations where cumulative train noise is predicted to exceed FTA moderate impact thresholds. The JPB and other cooperating railroad operators will work closely with local jurisdictions to prepare the engineering studies and coordination agreements to design, construct, and enforce potential quiet zones.

Options for establishing quiet zones could include implementation of the following FRA pre-approved supplemental safety measures (SSM):

- Four-quadrant gate system. This measure involves the installation of at least one gate for each direction of traffic to fully block vehicles from entering the crossing.
- Gates with medians or channelization devices. This measure keeps traffic in the proper travel lanes as it approaches the crossing, thus denying the driver the option of circumventing the gates by travelling in the opposite lane.
- One-way street with gates. This measure consists of one-way streets with gates installed so that all approaching travel lanes are completely blocked. This option may not be feasible or acceptable to local jurisdictions at all locations.
- Road closure. This measure consists of closing the road to through travel at the at-grade crossing. This option may not be feasible or acceptable to local jurisdictions at all locations.

In addition to these pre-approved SSMs, the FRA also identifies a range of other measures that may be used to establish a quiet zone. These could be modified SSMs or non-engineering measures which might involve law enforcement or public awareness programs. Such alternative safety measures must be approved by the FRA based on the prerequisite that they provide an equivalent level of safety as the sounding of horns.

The lead agency for a quiet zone designation is the local public authority which is the only authority that can implement a quiet zone. Caltrain or the other rail operators cannot on their own designate the quiet zone. However, only with the implementation of the quiet zone can Caltrain, other tenant railroads and freight operators be relieved of the requirement to sound their horns when crossing at-grade crossings. One key aspect of local jurisdiction acceptance of a quiet zone is acceptance of potential liability in the event of accidents related to not sounding a horn at an at-grade crossing after the installation of any required SSMs. Thus, if a local city does not accept the quiet zone, then even if the required SSMs are present, Caltrain, freight and other rail operators would continue to use train horns as a safety device in compliance with FRA requirements.

Grade Separations

Caltrain, in cooperation with other rail operators, local jurisdictions, transportation funding agencies, and state and federal agencies, will support incremental grade separations at locations of cumulative noise impacts over time as funding becomes available. Caltrain will work with local, state, and federal partners to establish priorities for grade separations to be implemented as funding becomes available. Caltrain will also work with other rail providers to seek funding participation from multiple parties on a fair-share basis in proportion to noise contributions.

Operational Vibration

The thresholds used for this analysis are the FTA annoyance thresholds for residential receptors (72 VdB) and institutional buildings (75 VdB) and the structural damage threshold (100 VdB). As

described by the FTA (2006), it is very rare for transportation-generated ground vibration to approach building damage levels. Thus, the primary focus of this cumulative analysis is on the annoyance thresholds.

Unlike noise, which is measured on a 24-hour day-night basis in which noise levels can increase cumulatively, vibration levels do not accumulate. Thus cumulative impacts would not result in higher vibration levels when combining multiple trains along the corridor. However, cumulative impacts can occur when multiple trains, each over the FTA vibration annoyance thresholds, pass a single sensitive receptor, resulting in an increase the number of annoyance events.

As presented in Table 3.11-4 in Section 3.11, *Noise and Vibration*, existing vibration levels for Caltrain's diesel service at 50 feet from the outermost track vary from 72 to 80 VdB, depending on local site conditions and speed. This range would be representative of continued diesel operations for Caltrain as well as predicted increases in cumulative diesel passenger rail operations for other tenant railroads (ACE, Capitol Corridor, etc.). As presented in Table 3.11-5 in Section 3.11, *Noise and Vibration*, existing vibration levels for freight at 100 feet from the outermost track vary from 73 to 81 VdB, which is considered representative for future freight service increases.

These existing levels exceed FTA annoyance thresholds of 72 VdB for immediately adjacent residences and of 75 VdB for immediately adjacent institutional buildings, but none approach structural damage thresholds.

Blended Service Scenario (79 mph scenario)

As described in the Final EIS/EIR for the HSR Merced-Fresno segment, HSR projects typically generate significantly fewer vibration impacts as compared with noise impacts (CHSRA 2012d). Using FRA reference level of 83 VdB for 150 mph high-speed rail trains at 50 feet from track centerlines (FRA 2012) and adjusting to a 79 mph speed, potential vibration levels are generically estimated as 77 VdB which would be within the range of existing train vibration levels along the corridor today. This estimate has not been adjusted for site trackage or soil conditions or any potential track improvements that may come with Blended Service and thus may overestimate actual vibration levels for HST trains. For example, for the HSR Merced – Fresno segment, vibration levels for speeds up to 150 mph at 50 feet from the HSR track centerline were estimated as approximately 72 VdB for (CHSRA 2012d). Based on the HSR Merced-Fresno vibration distance curves and adjusting downward for 79 mph speeds, vibration levels could be 66 VdB instead if similar vibration conditions (soil, trackage, etc.) were present along the Caltrain corridor as that presumed for HSR for the Merced Fresno segment.

The additional cumulative diesel traffic (ACE, DRC, Capitol Corridor, Amtrak and freight) would not increase vibration levels along the Caltrain ROW compared with existing conditions (which already includes diesel freight and passenger rail operations). Over time, these services are likely to replace their older equipment as it reaches the end of its design life and it is possible, but unknown, that new equipment may be somewhat quieter than existing equipment.

As noted in Section 3.11, *Noise and Vibration*, using FTA vibration reference levels (FTA 2006) for rapid transit trains (which FTA guidance recommends for electric commuter trains), vibration levels with Caltrain EMUs could be 73 Vdb at 50 feet from the outermost track at 50 mph. Adjusting to 79 mph level, the vibration levels for the new Caltrain EMUs could be 77 VdB at 79 mph. This level is within the range of existing vibration levels along the Caltrain corridor noted above.

Based on the information presented above, cumulative train service (including HSR, the Proposed Project, Caltrain Full Electrification, ACE, Capitol Corridor, DRC, Amtrak and freight) would not change the overall range of vibration levels along the Caltrain corridor.

According to the FTA Noise and Vibration Manual (FTA 2006), in heavily used corridors, if the existing train vibration exceeds the FTA annoyance impact criteria (as noted above), the project will cause additional impact if the project significantly increases the number of vibration events defined as approximately doubling the number of events. Thus, the analysis then examined whether the increase in the number of cumulative vibration events is or is not significant.

As noted in Table 4-8, if all the cumulative train service increases proposed would come to full fruition, in 2040, the number of trains (including Blended Service) between Santa Clara and San Francisco would more than double. Given the more than doubling of trains along the Santa Clara to San Francisco segment of the Caltrain corridor, a potentially cumulative significant increase in the number of vibration annoyance events for residential and institutional building receptors is identified.

The number of trains between San Jose and Santa Clara using the Caltrain ROW itself would increase by over 50 percent and between Tamien and Diridon by just under 50 percent under cumulative 2040 conditions, but these sections would not include HST operations since the HST would operate on a dedicated separate track south of Santa Clara. Between Santa Clara and San Jose Diridon, HSR would be on an aerial or in a tunnel. South of Diridon, HSR would be on an aerial structure to south of Tamien Station, then on a mix of aerial and at-grade to Capitol Expressway. Where on aerial structures, based on analysis in the HSR Merced-Fresno EIR/EIS (SCHRA 2012d), vibration levels are much less that an at-grade section. Vibration from tunnels depends on soil conditions and tunnel design and thus cannot be assessed at this time, but will be assessed by CHSRA for the Blended Service environmental evaluation if a tunnel is used from San Jose to Santa Clara. For the at-grade HSR segment south of the Tamien Station to Pullman Way where the HSR alignment is along the Caltrain ROW, HSR vibration could also contribute additional vibration.

Although HSR would operate on a separate dedicate track south of Santa Clara, if one includes 80 trains (one-way) per day and given the parallel alignment to the Caltrain ROW in some locations, there is a possible doubling of vibration events, and potential cumulative vibration impacts are also identified south of Santa Clara.[13]

Blended Service Scenario (110 mph scenario)

In addition to train service level increases, HSR and Caltrain EMUs could operate at speeds up to 110 mph with Blended Service.

Using FRA reference level of 83 VdB for 150 mph high-speed rail trains at 50 feet from track centerlines (FRA 2012) and adjusting for 110 mph speeds, potential vibration levels for HSR trains are generically estimated as 80 VdB. As noted above, this generic vibration level estimate has not been adjusted for site trackage or soil conditions or any potential track improvements that may come with Blended Service and thus may overestimate actual vibration levels for HST trains. For

[13] Whether cumulative impacts would actually occur would depend on the specific design of tracks from south of Tamien Station to Santa Clara and the specific vibration characteristics of HSR trains and trackage. The identification of a potential cumulative vibration impact is preliminary and based on worst-case assumptions. As noted above, vibration levels for HST may be much lower than generic FTA reference level derived estimates and aerial structure vibration should be much less than at-grade segments.

example, for the HSR Merced – Fresno segment, vibration levels for speeds up to 150 mph at 50 feet from the HSR track centerline were estimated as approximately 72 VdB for (CHSRA 2012d). Based on the HSR Merced-Fresno vibration distance curves and adjusting downward for 110 mph speeds, vibration levels could be 69 VdB instead if similar vibration conditions (soil, trackage, etc.) were present along the Caltrain corridor as that presumed for HSR in this segment.

Both the Merced to Fresno and Fresno to Bakersfield HST project-level environmental documents identified significant vibration effects (related to exceedance of the annoyance thresholds, not structural damage) to a limited number of adjacent residences (close to the HST corridor) and included mitigation design measures that would be employed (options identified included increased maintenance, special trackwork, vehicle suspension design, track support systems, building modifications, trenches and buffer zones) (CHSRA 2012d, 2012e). However, since these segments are projected to operate at speeds in excess of 200 mph and Blended Service studied in this EIR is studied only up to 110 mph, the conclusions for much higher speeds in these prior studies are not considered representative for conditions for Blended Service for the Caltrain corridor.

Based on the FTA Reference levels for rapid transit trains at 50 mph (FRA 2006) and adjusting for 110 mph speeds, HSR EMUs could have vibration levels of 80 VdB at 50 feet from the outer track centerline which would be the same as the generic estimate for HSR trains described above and would be similarly at the top of the range of existing vibration levels along the corridor. This estimate also has not been adjusted for track improvements that will be necessary to operate at speeds up to 110 mph and thus may overestimate the actual value.

Thus, at this time, it appears likely that Blended Service would not increase overall vibration levels compared with the range of vibration levels along the Caltrain corridor today and it is distinctly possible that vibration levels for Blended Service would be lower than the generic estimates presented above when specific trackage improvements required to allow 110 mph speeds are made and when site-specific considerations are taken into account.

However, as noted above for the Blended Service 79 mph scenario, cumulative train events would more than double between Santa Clara and San Francisco. Cumulative train events would also more than double south of Santa Clara if including HST service on separate dedicated trackage where along the Caltrain ROW. Thus, there is a potentially significant increase in annoyance due to cumulative vibration events for residents and institutional buildings immediately adjacent to the Caltrain ROW for the 2040 Blended Service 110 mph scenario.

Other Non-Rail Projects

Operation of the land developments would not likely have substantial effects on vibration levels due to traffic generation involving light duty and passenger vehicles. Increased vibration along roadways may occur in in locations in very close proximity to heavy-truck traffic but would not otherwise be expected to be a significant impact. In addition, land development projects along the Caltrain ROW would also introduce more sensitive receptors that would be subject to the cumulative vibration levels resulting from increased passenger and rail service described above.

Proposed Project Cumulative Contribution

As discussed in Section 3.11, *Noise and Vibration,* the Proposed Project would not change existing vibration levels along the Caltrain Corridor due to replacement of diesel trains with EMUs which, if anything, would likely have less vibration than existing diesel-locomotive trainsets they replace. As

described in Section 3.11, *Noise and Vibration*, using FTA vibration reference levels (FTA 2006) for rapid transit trains (which FTA guidance recommends for electric commuter trains), vibration levels with EMUs could be 73 Vdb at 50 feet from the outermost track at 50 mph. Adjusting to 79 mph, the vibration levels for the new EMUs could be 77 VdB at 50 feet which is in the middle of the range of existing vibration levels along the Caltrain corridor noted above.

As noted in Section 3.11, *Noise and Vibration*, the TPFs would not generate significant vibrations and thus would not contribute to any cumulative vibration impacts.

Although the Proposed Project would have vibration levels within the range of existing levels, the Proposed Project would add 22 trains per day to the Santa Clara to San Francisco segment, which in combination with cumulative rail increases (described above) would result in a more than doubling of the train vibration events along this segment, which is considered a significant increase per the FTA criteria. South of Santa Clara, cumulative train vibration event increases may also be significant if including HST operations on separate dedicated track. Thus, the Proposed Project would have a considerable contribution to a significant cumulative increase in train vibration effects for the 2040 Blended Service 79 mph scenario.

For the 2040 Blended Service 110 mph scenario, Caltrain EMUs with full electrification would have vibration levels within the range of existing vibration levels along the Caltrain corridor and thus would not increase vibration levels. However, similar to the conclusion for the 2040 Blended Service 110 mph scenario, the Proposed Project and Caltrain Full Electrification would contribute to a significant increase number of train vibration events along the corridor.

Potential vibration reduction measures identified in prior environmental evaluations for the high-speed rail system are noted in Table 4-14.

Table 4-14. Potential Vibration Mitigation Procedures and Descriptions from the CHSRA Merced to Fresno EIS/EIR

Mitigation Procedure	Location of Mitigation	Description
Location and Design of Special Trackwork	Source	Careful review of crossover and turnout locations during the preliminary engineering stage. When feasible, relocate special trackwork to a less vibration-sensitive area. Installation of spring frogs eliminates gaps at crossovers and helps reduce vibration levels.
Vehicle Suspension	Source	Rail vehicle should have low unsprung weight, soft primary suspension, minimum metal-on-metal contact between moving parts of the truck, and smooth wheels that are perfectly round.
Special Track Support Systems	Source	Floating slabs, resiliently supported ties, high resilience fasteners and ballast mats all help reduce vibration levels from track support system (see further discussion of track support options in Appendix C, *Noise and Vibration Technical Report*).
Building Modifications	Receiver	For existing buildings, if vibration-sensitive equipment is affected by train vibration, the floor upon which the vibration-sensitive equipment is located could be stiffened and isolated from the remainder of the building. For new buildings, the building foundation should be supported by elastomer pads similar to bridge bearing pads.

Mitigation Procedure	Location of Mitigation	Description
Trenches	Along Vibration Propagation Path	A trench can be an effective vibration barrier if it changes the propagation characteristics of the soil. It can be open or solid. Open trenches can be filled with materials such as styrofoam. Solid barriers can be constructed with sheet piling, rows of drilled shafts filled with either concrete or a mixture of soil and lime, or concrete poured into a trench.
Buffer Zones	Receiver	Negotiate a vibration easement from the affected property owners or expand rail right-of-way.

Source: CHSRA 2012d

Unlike the proposed Merced-Fresno HSR segment, the Caltrain corridor is an existing rail system and, thus, the applicability of these options to the Caltrain corridor will vary as discussed below:

- Location and Design of Special Trackwork: Relocation of existing special trackwork is not applicable to the Caltrain corridor because the locations of the existing crossovers and turnouts are determined by the existing track configuration.
- Special Track Support Systems: These systems could be applied to the Caltrain corridor if needed, but these options are significant capital projects and funding would need to be secured.
- Vehicle Suspension: The vehicle suspension measure described in Table 4-14 is for high-speed rail vehicles only.
- Building Modifications: The building modification measure is feasible for the Caltrain corridor where needed.
- Trenches: As described in Appendix C, *Noise and Vibration Technical Report*, this is an experimental method and there are several major issues that must be overcome, including structural concerns and the need for up to 60 feet of area adjacent to the tracks that would raise substantial ROW concerns along the constrained Caltrain ROW. Further, as of the time of this Draft EIR (February 2014), WIA is not aware of any successful installations in North America.
- Buffer Zones: The applicability of the buffer zone option will need a site-specific assessment. There is a built environment generally up to the Caltrain ROW and buffer zones could be disruptive to the existing environment in constrained locations.

While some of the measures in Table 4-14 are not applicable to the Caltrain corridor, as discussed above, given the range of options available, there are feasible means to reduce the cumulative vibration impacts. Thus, Mitigation Measure NOI-CUMUL-2 would help to reduce the Proposed Project's contribution to a less-than-significant level.

Given the preliminary state of design for the Blended Service improvements, the specific vibration treatments that may be necessary have not been identified at this time. Depending on the measures actually proposed, there may be secondary physical impacts due to their construction, but these impacts should be limited to the Caltrain ROW and the area of any passing tracks (if outside the Caltrain ROW). Evaluation of potential secondary physical impact of track or other improvements necessary to address significant Blended Service vibration effects should be included in the separate environmental evaluation of Blended Service by CHSRA.

Mitigation Measure NOI-CUMUL-2: Conduct project-level vibration analysis for Blended System operations and implement vibration reduction measures as necessary and appropriate for the Caltrain corridor

As noted above, the vibration analysis in this document uses worst-case assumptions. A project-level vibration analysis will be completed by CHSRA for both the San Jose to Merced segment and the Blended Service segment north of San Jose. If subsequent environmental evaluation by CHSRA shows that significant cumulative increases in vibration would not occur along the Caltrain ROW when considering the specific track improvements and HSR and Caltrain EMU design, then this mitigation would not be required or may only be required in certain locations.

A significant cumulative impact would only occur when the number of vibration events approaches a doubling of existing conditions. These measures are only necessary to be in place by the time Blended Service operates on the Caltrain corridor north of Santa Clara or when HSR operates on dedicated track south of Santa Clara (to 2 miles south of Tamien Station).

If necessary, the JPB, in cooperation with CHSRA and other rail operators will support incremental train vibration reduction measures along the Caltrain ROW. Caltrain will work with CHSRA and other rail operators to establish priorities for vibration reduction measure to be implemented as funding becomes available.

Potential vibration reduction measures could include, but are not limited to, special track support systems, vehicle suspension (HSR vehicles only), building modifications, trenches (if feasible), and buffer zones.

The costs for implementing the phased program should be borne by all rail operators in proportion to their contributions to increased vibration events and/or levels. Given that there are multiple contributors to cumulative rail vibration events, the JPB is only responsible to fund its fair share for necessary vibration reduction measures with other rail services responsible to fund their fair share as well. However, if there is no governmental approval that triggers an obligation to share such costs, it may be impossible to require other railroads to pay their fair-share. Fair-share shall be determined by the vibration train event increases over existing conditions (2013).

4.1.4.13 Population and Housing

Impact CUMUL-12-POP: Cumulative impact to population and housing

As discussed in Section 3.12, *Population and Housing*, the Proposed Project would not have any impacts on population or housing during construction or operations; therefore, the Proposed Project would not contribute to housing and population impacts in the three counties.

4.1.4.14 Public Services and Utilities

Impact CUMUL-13-PSU: Cumulative impacts related public services and utilities

The geographic context for the analysis of cumulative construction impacts to public services and utilities is the Caltrain ROW and adjacent areas. The geographic context for the cumulative analysis of operation-related public services and utilities impacts includes the service areas of regional utilities and service providers to the project sites. For construction disruption to utilities and public

services, only the cumulative projects in Table 4-3 are included in the analysis. For operational impacts to utilities and public services, the general growth projections summarized in Table 4-2 were used.

Public services are defined to include schools, fire protection, police protection, wastewater treatment or other such public facilities. Utilities are defined to include water supply, electrical supply, and natural gas supply which are typically provided by utility agencies or companies. Landfill capacity is separately addressed.

For construction, the analysis addressed potential for utility disruption, temporary public service demands and impacts to landfill capacity. For operations, the analysis addresses operational public service and utility demands relative to the potential need for new public service facilities and utility infrastructure as well as operational impacts to landfill capacity.

Impacts regarding emergency response times are addressed separately above in the discussion of Hazards and Hazardous Materials.

Construction

Disruption to utilities

During construction, cumulative projects could disrupt utility service systems in a planned or unplanned manner. Standard construction practices and regulations require construction contractors to identify and avoid unplanned disruptions to utilities and to work with utility owners to coordinate construction to avoid damage and utility outages. However, there would remain a small potential for multiple utility disruptions due to construction activities resultant from cumulative projects that occur at the same time.

As discussed in Section 3.13, *Public Services and Utilities*, earth moving activities for the installation of the OCS poles, and TPFs could temporarily disrupt utility service systems. However, with the implementation of Mitigation Measures PSU-8a, PSU-8b, and PSU-8c, which require JPB coordination with all utility providers, adjustment of OCS pole locations (as necessary to minimize utility conflicts), and scheduling and notification requirements, the Proposed Project would minimize potential disruptions to utilities and thus would make a less than considerable contribution to any potential cumulative impacts during construction.

Public Services

During the construction of cumulative projects, there could be a temporary distributed increased demand for public services across the San Francisco Peninsula. However, the region already accommodates substantial construction projects across the entire Peninsula and the overall level of construction, considered on a regional scale, is not expected to substantially change with the cumulative projects compared with existing conditions. Therefore, the overall change in demand in public services is not expected to result in the need for new or physically altered public facilities and, thus, result in any potential secondary environmental impacts associated with construction of new public facilities.

As discussed in Section 3.13, *Public Services and Utilities*, because the Proposed Project would neither directly displace public facilities nor result in substantial changes in local population and demand for public services, construction of the Proposed Project would make a less-than-

considerable contribution to any potential cumulative impacts on public services and facilities during construction.

Landfill Capacity

Construction of the cumulative projects would generate solid waste. Construction waste would include soils from grading and excavating activities, construction and demolition material, and other solid waste. Cumulative growth in the region will also result in increased solid waste generation. As explained in the EIR for *Plan Bay Area* (MTC/ABAG 2013b), all but four of the 17 landfills in the San Francisco Bay Area have an estimated closure date before the year 2040 and it is unlikely the four remaining landfills can handle the region's solid waste disposal. As a result, construction of cumulative projects would contribute to the reducing capacity of regional landfills over time.

As described in Section 3.13, *Public Service and Utilities*, the only solid waste expected to result from project construction would be soil resulting from grading and excavation associated with construction of TPFs and OCS foundations as well as general packaging and other materials associated with construction materials and construction workers. Any uncontaminated soil that is not reused onsite would be recycled in accordance with the various state and local ordinances governing recycling. Contaminated soil would be disposed at facilities approved to receive such soil, as discussed in Section 3.8, *Hazards and Hazardous Materials*. While there are long-term concerns for landfill capacity by 2040, as explained in the EIR for *Plan Bay Area* (MTC/ABAG 2013b), 12 of the current 17 major landfills in the Bay Area will still be open through 2019, including the Guadalupe Sanitary landfill and Kirby Canyon Landfill (both in Santa Clara County). Other construction waste is expected to minimal and readily handled by existing landfill facilities in the region, which have ample remaining capacity for such material in the aggregate. Thus, while long-term growth in the region will require the construction of additional landfill by 2040 to accommodate future solid waste, the Proposed Project's contribution to any cumulative impacts on landfill capacity would be less than considerable.

Operation

Demand for Additional Utility Infrastructure

Operation of cumulative projects could increase demands for additional utility infrastructure including water supply, electrical supply and natural gas supply. New transportation projects, including Blended Service, BART Silicon Valley extension, and extension of light-rail systems would increase cumulative demand for electricity. Land use projects and general regional growth will increase water, electricity, and natural gas demands. The cumulative demands for utility service could result in the need for additional utility infrastructure including electricity generation plants and transmission facilities, development of additional water supplies and distribution infrastructure as well as additional natural gas supply and transmission. Depending on where the new infrastructure is required, this could result in significant impacts on the environment during construction of such new facilities.

As discussed in Section 3.13, *Public Services and Utilities*, the Proposed Project will require the relocation of some existing utilities crossing the Caltrain ROW or along the location of the ductbanks connecting the TPSs to the Caltrain ROW and will also require construction of electrical transmission connections from PG&E substations to the two TPSs. The relocation of these utilities or the construction of electrical transmission connections could result in secondary environmental impacts. At this time, the Proposed Project is not expected to result in the need for additional PG&E

power generation or transmission facilities upstream of the local substations that would connect to the TPSs. Thus, the Proposed Project could contribute to cumulative demands for new utility infrastructure relative to the local utility relocations and the local transmission facility extensions. Under Mitigation Measure PSU-9, the JPB will work with utility owners and local jurisdictions to apply the relevant applicable mitigation identified for construction of the Proposed Project when conducting local utility relocations or local transmission line extensions made necessary by the Proposed Project. With this mitigation, the Proposed Project would make a less-than-considerable contribution to any potential cumulatively significant utility infrastructure demands.

Public Services

Operation of cumulative projects could increase demands for additional public services including fire, police, schools and other public facilities. New transportation projects, including Blended Service, BART Silicon Valley extension, and extension of light-rail systems would increase cumulative demand for electricity. Land use projects and general regional growth will increase demands for fire, police, schools and other local public community facilities. The cumulative demands for public service could result in the need for additional public service facilities including new police stations, fire stations, schools, or other public community facilities. Depending on where the new facilities are proposed, this could result in significant impacts on the environment during construction and operation of new public facilities.

As discussed in Section 3.13, *Public Services and Utilities*, the Proposed Project is not expected to result in increased demand for police, fire, school, or other public facilities compared with existing conditions because the Proposed Project would not result in population growth and would not fundamentally change conditions of the Caltrain ROW in a way that increases demand for public services. For these reasons, the contribution of the Proposed Project to any potential cumulatively significant on public service demands that might result in the need for construction of additional public service facilities would be less than considerable.

Landfill Capacity

General growth in the region would generate additional solid waste. As noted above, only a few (four) of the existing landfills have a closure before 2040 and it is unlikely these four can handle the region's solid waste disposal in 2040. As a result, cumulative project operations would contribute to reducing capacity of regional landfills over time.

Operation of cumulative transportation projects would have a limited increase in the demand for landfill capacity because they generally do not generate large amount of solid waste overall. However, operation of the cumulative land use developments would generate solid waste. Over time, combined with general regional growth, there will be a need for new landfills, the construction of which might result in significant environmental impacts.

As discussed in Section 3.13, *Public Services and Utilities*, with the Proposed Project, normal EMU operations would not result in substantial new generation of solid waste above that associated with servicing of diesel locomotives today. Similarly, maintenance of the OCS and TPFs would not involve the generation of large amounts of solid waste. There would be a minor increase in solid waste production associated with the Proposed Project from increased ridership (e.g., disposable coffee cups, newspaper) but the volumes of waste would not be substantial relative to landfill capacity. Therefore, Proposed Project operations would result in a less-than-significant solid waste

generation and would make a less-than-considerable contribution to any potential cumulatively impacts on landfill capacity.

4.1.4.15 Transportation/Traffic

Impact CUMUL-14-TRA: Cumulative effects to transportation and traffic

The geographic context for the analysis of cumulative construction and operation-related public varies by subject area. For construction disruption, the geographic area is the Caltrain ROW and vicinity. For operational impacts to traffic level of service, and bicycle and pedestrian facilities, the geographic focus of the analysis is the roadways/intersections at the at-grade crossings and near Caltrain stations. For regional impacts to traffic and transit systems, the geographic area is the San Francisco Peninsula.

For construction disruption to transportation and traffic, only the cumulative projects in Table 4-3 are included in the analysis. For operational impacts to transportation and traffic, the general growth projections summarized in Table 4-2 were used in combination with assumptions about cumulative transportation improvements (see Appendix I, *Ridership Technical Memorandum*) to drive ridership, traffic modeling analysis, and other operational impact analysis.

Construction

Disruption of transportation facilities and systems

During construction, cumulative projects could disrupt roadway, transit, pedestrian, bicycle, parking or access facilities in a planned or unplanned manner. Standard construction practices and regulations require construction contractors to identify, avoid, and minimize unplanned disruptions to transportation facilities and system and work with public works departments, transportation agencies, and system operators to coordinate construction to avoid substantial delays or disruption in access, service and travel.

Rail, transit, and vehicle access and movement could be disrupted during construction of Blended Service station improvements, passing tracks, and other facilities (such as grade separations, if proposed). Construction of the maintenance yard may also result in such disruption, although disruptions at the previously studied Bayshore/Brisbane location would likely be minimal given the lack of active use at the site at present (this would change if the site or the environs are developed as proposed in the Brisbane Baylands project). Disruption will depend on the location. Construction of the passing tracks could have the most substantial temporary disruptions to roadways, pedestrian, and bike lanes that cross the Caltrain ROW.

Construction of other transportation projects could also result in disruptions to existing roadway, bicycle, pedestrian facilities as well as access depending on their routing and present transportation facilities. For other non-transportation cumulative projects, there is usually less potential for substantial disruption to transportation systems and facilities, except when existing facilities are proposed for temporary closure or rerouting during construction although temporary delays are always possible during delivery of large materials and construction of utility connections in local roadways.

As discussed in Section 3.14, *Transportation and Traffic,* with the Proposed Project, installation of the OCS poles and construction of the TPFs would not generally disrupt existing transportation

systems or transit operations except in limited circumstances. However, construction at the at-grade crossings to install OCS infrastructure and to update grade crossing warning devices would result in temporary roadway closures (as well as bike and pedestrian crossings where present). Where OCS infrastructure needs to be installed near other transit systems, such as at the Millbrae Station shared by Caltrain and BART or in San Francisco at 16th Street where Muni plans to install Muni OCS infrastructure for the re-routing of the 22-Fillmore Trolley Bus[14], there is the potential for temporary disruption of other transit systems. There is also the potential to disrupt freight service operations during construction. Caltrain will coordinate with all affected transit operations to avoid and minimize the duration and extent of any potential disruption. With the implementation of mitigation measures identified in Section 3.14, *Transportation and Traffic*, the Proposed Project would minimize potential disruptions to transportation facilities and transit services. Thus, with mitigation, Proposed Project construction would make a less-than-considerable contribution to any potential cumulative impacts on transportation facilities and systems.

Emergency Vehicle Access

During cumulative project construction, there may be temporary obstruction of access and egress from construction sites and on adjacent roads due to construction. Such obstruction would affect the ability of emergency responders to timely reach their response destinations and/or impede the ability to evacuate constrained areas in the event of an emergency. Where one or more cumulative projects would be in construction at the same time in the same area, it is possible there could be cumulative impacts on emergency response or evacuation capacity.

As discussed in Section 3.8, *Hazards and Hazardous Materials*, the Proposed Project could have also have such effects if emergency occurs at the time when the Proposed Project construction may involve temporary access or egress limitations from the Caltrain ROW or at at-grade crossings along the Caltrain ROW (when changing grade-crossing warning devices). As described in Section 3.14, *Transportation and Traffic*, project mitigation measures 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. Any potential issues associated with multiple projects in construction at the same time can be addressed through development of the traffic control plan. Thus, with mitigation, the Proposed Project's contribution to a potential cumulative impact related to emergency response or evacuation would be less than considerable).

Operation

Roadway Traffic Operations

Regional and City Vehicle Miles Traveled

As presented in Appendix I, Ridership Technical Memorandum, regional growth will result in a substantial increase in VMT even with the improvements in transit systems currently programmed for the future, including the Proposed Project. However, compared with No Project conditions, the Proposed Project will result in a substantial reduction in regional VMT of 235,000 miles per day in 2020. With full electrification and the Downtown Extension, the reduction in regional VMT in 2040

[14] See discussion below under Operations about proposed mitigation to allow simultaneous operations of the Caltrain 25 KVA AC OCS and the Muni 600 V DC OCS at the 16th Street crossing.

would be 619,000 miles per day as shown in Table 4-15. Thus, the Proposed Project would have a beneficial regional effect on vehicle traffic by providing such a substantial reduction in regional traffic.

Table 4-15. Average Regional Daily Vehicle Miles of Traveled

	Vehicle Miles of Traveled		
Scenario	Peak Hours	Off-Peak Hours	Daily Total
Existing Condition	96,261,904	82,400,965	178,662,869
2040 No Project	120,676,523	105,846,294	226,522,817
2040 Project	120,159,222	105,744,688	225,903,910

Table 4-16 displays daily VMT within each city in the project area for 2040 No Project and Project scenarios. City-level VMT is calculated by accounting for the total mileage of all vehicle trips that occur within each city's boundaries, which known as the "boundary method" calculation.

In 2040, daily VMT in nearly cities would also be lower under the 2040 Project scenario than 2040 No Project scenario. The only exception is the City of San Mateo which would experience a very small increase in VMT due to the Proposed Project, likely attributable to slight increases in automobile traffic coming to and from San Mateo, Hayward Park and Hillsdale Stations. Total daily VMT under the 2040 Project scenario is projected to decrease by an average of 0.7 percent in all cities along the corridor compared with the 2040 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 vehicle miles in all cities other than San Mateo would decrease due to the Proposed Project.

Table 4-16. Weekday Daily Regional Vehicle Miles Traveled Within Each City, 2040 Scenario

	2040 No Project			2040 Project		
City	Peak[a]	Off-Peak[b]	All	Peak[a]	Off-Peak[b]	All
San Francisco	4,676,000	3,931,000	8,607,000	4,625,000	3,919,000	8,544,000
South San Francisco	824,000	662,000	1,487,000	813,000	659,000	1,472,000
San Bruno	587,000	415,000	1,003,000	576,000	414,000	989,000
Millbrae	248,000	183,000	431,000	242,000	182,000	424,000
Burlingame	609,000	529,000	1,138,000	596,000	526,000	1,122,000
San Mateo	1,476,000	1,298,000	2,774,000	1,482,000	1,293,000	2,775,000
Belmont	185,000	126,000	311,000	182,000	125,000	307,000
San Carlos	383,000	315,000	698,000	377,000	314,000	690,000
Redwood City	866,000	779,000	1,645,000	853,000	776,000	1,630,000
Atherton	90,000	49,000	139,000	87,000	49,000	136,000
Menlo Park	716,000	660,000	1,376,000	705,000	658,000	1,362,000
Palo Alto	947,000	751,000	1,698,000	926,000	749,000	1,675,000
Mountain View	1,157,000	953,000	2,110,000	1,137,000	951,000	2,088,000
Sunnyvale	1,601,000	1,226,000	2,827,000	1,577,000	1,223,000	2,800,000
Santa Clara	1,545,000	928,000	2,473,000	1,526,000	927,000	2,454,000
San Jose	11,024,000	8,814,000	19,838,000	10,953,000	8,812,000	19,765,000
TOTAL	26,934,000	21,619,000	48,555,000	26,657,000	21,577,000	48,233,000

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..

Intersection level of Service - 2040

As discussed in Section 3.14, *Transportation and Traffic*, the Proposed Project would result in an adverse effect at some localized intersections near at-grade crossings and Caltrain stations. The cumulative effect of growth in the area combined with cumulative transportation improvements included in the ridership model (see Appendix I), and the Proposed Project on traffic near at-grade crossings and Caltrain stations was evaluated using traffic modeling (see Appendix D). As shown in Table 4-17, compared with existing conditions, there are 39 study locations (out of 82 total study locations) where there will be significant cumulative increase in local traffic delays.

The results in Table 4-17 do not include the localized effects of increased HSR ridership at HSR stations for 2040 or the effects of potential increases in gate down time on intersections near at-grade crossings due to Blended Service and other non-project increases in passenger and freight rail traffic indicated in Table 4-8 above. As discussed in Appendix D, the effect of increased rail service on gate-down time is highly site specific and is dependent on very specific assumptions about train schedules. Given the current level of planning for Blended Service, any assumptions about schedule and service would be speculative. Similarly, there are no published schedule analyses or draft environmental documents for other service improvement plans, such as for ACE, Capitol Corridor, Amtrak, and DRC or freight increases, and it would also be speculative to make assumptions about their schedules at this time as well. Nevertheless, given the substantial service increases shown in Table 4-8, it would be reasonable to assume that the impacts around HSR stations and at at-grade

crossings shown in Table 4-17 may underestimate the potential cumulative traffic delays, perhaps substantially.

Table 4-17. Intersection Delay and Levels of Service, 2040 Cumulative Conditions with and Without the Project Alternatives

Int. ID	Intersection	Jurisdiction	Peak Hour	Intersection Control	2040 No Project Delay	2040 No Project LOS	2040 Project Delay	2040 Project LOS	Change In Delay
	ZONE 1								
1	4th Street & King Street	SF	AM	Signal	**>120**	**F**	**>120**	**F**	**36.7**
			PM		**>120**	**F**	**>120**	**F**	-10.3
2	4th Street & Townsend Street	SF	AM	Signal	**>120**	**F**	**>120**	**F**	-20.3
			PM		**>120**	**F**	**>120**	**F**	-0.3
3	Mission Bay Drive & 7th Street	SF	AM	Signal	12.5	B	16.6	B	4.1
			PM		16.2	B	17.0	B	0.8
4	Mission Bay Drive & Berry Street	SF	AM	Signal	3.7	A	2.1	A	-1.6
			PM		8.8	A	8.6	A	-0.2
5	7th Street & 16th Street	SF	AM	Signal	**>120**	**F**	**>120**	**F**	**14.2**
			PM		**119.9**	**F**	**>120**	**F**	**14.4**
6	16th Street & Owens Street	SF	AM	Signal	11.3	B	10.6	B	-0.7
			PM		40.2	D	**55.8**	**E**	**15.6**
7	22nd Street & Pennsylvania Street	SF	AM	All-way Stop	13.5	B	14.2	B	0.7
			PM		9.6	A	11.2	B	1.6
8	22nd Street & Indiana Street	SF	AM	All-way Stop	7.4	A	7.1	A	-0.3
			PM		6.4	A	6.4	A	0.0
9	Tunnel Avenue & Blanken Avenue	SF	AM	All-way Stop	**>120**	**F**	**>120**	**F**	**>60**
			PM		**>120**	**F**	**>120**	**F**	**>60**
10	Linden Avenue & Dollar Avenue	SSF	AM	Signal	**81.8**	**F**	**>120**	**F**	**>60**
			PM		41.6	D	46.1	D	4.5
11	East Gr & Avenue & Dubuque Way	SSF	AM	Signal	12.4	B	13.2	B	0.8
			PM		13.8	B	15.1	B	1.3
12	S Linden Avenue & San Mateo Avenue	SSF	AM	Signal	27.9	C	**74.9**	**E**	**47.0**
			PM		10.6	B	13.4	B	2.8
13	Scott Street & Herman Street	SB	AM	Side-Street Stop	26.3	D	**45.9**	**E**	19.6[a]
			PM		18.2	C	18.4	C	0.2
14	Scott Street & Montgomery Avenue	SB	AM	Side-Street Stop	7.2	A	8.8	A	1.6
			PM		7.1	A	6.8	A	-0.3
15	San Mateo Avenue & San Bruno Avenue	SB	AM	Signal	33.3	C	40.7	D	7.4
			PM		24.6	C	32.5	C	7.9

Int. ID	Intersection	Jurisdiction	Peak Hour	Intersection Control	2040 No Project Delay	2040 No Project LOS	2040 Project Delay	2040 Project LOS	Change In Delay
	ZONE 2								
16	El Camino Real & Millbrae Avenue	MB	AM	Signal	**112.0**	**F**	**>120**	**F**	**11.1**
			PM		**68.5**	**E**	**84.7**	**F**	**16.2**
17	Millbrae Avenue & Rollins Road	MB	AM	Signal	**74.9**	**E**	**84.4**	**F**	**9.5**
			PM		**110.2**	**F**	**>120**	**F**	**29.3**
18	California Drive & Broadway	BG	AM	Signal	**89.0**	**F**	**71.9**	**E**	-17.1
			PM		**60.8**	**E**	**63.0**	**E**	2.2
19	Carolan Avenue & Broadway	BG	AM	Signal	**72.9**	**E**	**90.8**	**F**	**17.9**
			PM		**67.2**	**E**	**60.0**	**E**	-7.2
20	California Drive & Oak Grove Avenue	BG	AM	Signal	**>120**	**F**	**91.2**	**F**	-34.1
			PM		**76.9**	**E**	**99.1**	**F**	**22.2**
21	Carolan Avenue & Oak Grove Avenue	BG	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	**>60**
			PM		**>120**	**F**	**>120**	**F**	**>60**
22	California Drive & North Lane	BG	AM	Side-Street Stop	28.4	D	20.4	C	-8.0
			PM		18.4	C	21.4	C	3.0
23	Carolan Avenue & North Lane	BG	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	>-60
			PM		43.7	E	**69.4**	**F**	25.7[a]
24	Anita Road & Peninsula Avenue	BG	AM	Side-Street Stop	29.1	D	31.9	D	28
			PM		**67.6**	**F**	**36.1**	**E**	-31.5
25	Woodside Way & Villa Terrace	SM	AM	Side-Street Stop	5.1	A	5.0	A	-0.1
			PM		5.5	A	5.3	A	-0.2
26	North San Mateo Drive & Villa Terrace	SM	AM	Side-Street Stop	12.2	B	11.8	B	-0.4
			PM		17.2	C	10.2	B	-7.0
27	Railroad Avenue & 1st Avenue	SM	AM	Side-Street Stop	**>120**	**F**	15.0	B	>-60
			PM		**>120**	**F**	**>120**	**F**	>-60
28	S B Street & 1st Avenue	SM	AM	Signal	48.4	D	20.7	C	-27.7
			PM		**66.9**	**F**	**>120**	**F**	**193.2**
29	9th Avenue & S Railroad Avenue	SM	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	**>60**
			PM		**>120**	**F**	**91.6**	**F**	-37.7
30	S B Street & 9th Avenue	SM	AM	Signal	34.3	C	**67.7**	**E**	**33.4**
			PM		51.5	D	**69.3**	**E**	**17.8**
31	Transit Center Way & 1st Avenue	SM	AM	Uncontrolled	**49.0**	**E**	9.2	A	-39.8
			PM		**88.2**	**F**	**69.3**	**F**	-18.9
32	Concar Drive & SR 92 Westbound Ramps	SM	AM	Signal	20.8	C	35.3	D	14.5
			PM		13.4	B	12.3	B	-1.1
33	S Delaware Street & E 25th Avenue	SM	AM	Signal	**55.7**	**E**	25.6	C	-30.1
			PM		**>120**	**F**	**>120**	**F**	-5.3
34	E 25th Avenue & El Camino Real	SM	AM	Signal	**84.4**	**F**	**63.4**	**E**	-21.0
			PM		**>120**	**F**	**>120**	**F**	-0.3
35	31st Avenue & El Camino Real	SM	AM	Signal	**77.7**	**E**	32.6	C	-45.1
			PM		**117.7**	**F**	**>120**	**F**	**19.0**

Int. ID	Intersection	Jurisdiction	Peak Hour	Intersection Control	2040 No Project Delay	2040 No Project LOS	2040 Project Delay	2040 Project LOS	Change In Delay
36	E Hillsdale Boulevard & El Camino Real	SM	AM	Signal	**>120**	**F**	45.6	D	>-60
			PM		**92.0**	**F**	**>120**	**F**	**>60**
37	E Hillsdale Blvd. & Curtiss Street	SM	AM	Signal	**55.6**	**E**	22.5	C	-33.1
			PM		**66.7**	**E**	**>120**	**F**	**48.5**
38	Peninsula Avenue & Arundel Road & Woodside Way	SM	AM	Side-Street Stop	22.0	C	24.3	C	2.3
			PM		47.4	E	30.2	D	-17.2
39	El Camino Real & Ralston Avenue	BL	AM	Signal	**>120**	**F**	**>120**	**F**	**41.4**
			PM		**>120**	**F**	**>120**	**F**	0.2
40	El Camino Real & San Carlos Avenue	SC	AM	Signal	20.0	B	24.5	C	4.5
			PM		46.1	D	46.9	D	0.8
41	Maple Street & Main Street[b]	RC	AM	Side-Street Stop	42.7	E	22.2	C	-20.5
			PM		>120	F	>120	F	>60
42	Main Street & Beech Street	RC	AM	Side-Street Stop	19.7	C	15.0	B	4.7
			PM		**>120**	**F**	**>120**	**F**	>-60
43	Main Street & Middlefield Road[b]	RC	AM	Signal	30.3	C	>120	F	>60.0
			PM		>120	F	>120	F	-1.6
44	Broadway Street & California Street[b]	RC	AM	Side-Street Stop	>120	F	>120	F	>-60.0
			PM		>120	F	>120	F	>-60.0
45	El Camino Real & Whipple Avenue	RC	AM	Signal	**71.7**	**E**	**109.2**	**F**	**37.5**
			PM		**85.0**	**F**	**88.3**	**F**	3.3
46	Arguello Street & Brewster Avenue[b]	RC	AM	Signal	>120	F	83.4	F	>-60.0
			PM		115.9	F	112.1	F	-3.8
47	El Camino Real & Broadway Street[b]	RC	AM	Signal	>120	F	>120	F	-41
			PM		>120	F	>120	F	1.3
48	Arguello Street & Marshall Street[b]	RC	AM	Signal	>120	F	>120	F	>-60.0
			PM		>120	F	>120	F	14.1
49	El Camino Real & James Avenue[b]	RC	AM	Signal	>120	F	>120	F	-22.8
			PM		>120	F	>120	F	4.6
	ZONE 3								
50	El Camino Real & Fair Oaks Lane	AT	AM	Signal	**>120**	**F**	**>120**	**F**	**46.1**
			PM		**104.2**	**F**	**103.5**	**F**	-0.7
51	El Camino Real & Watkins Avenue	AT	AM	Side-street stop	**>120**	**F**	**>120**	**F**	>-60.0
			PM		**>120**	**F**	**>120**	**F**	>-60.0
52	Fair Oaks Lane & Middlefield Road	AT	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	**>60**
			PM		**>120**	**F**	**>120**	**F**	>-60
53	Watkins Avenue & Middlefield Road	AT	AM	Side-Street Stop	**75.4**	**F**	**>120**	**F**	>-60
			PM		**>120**	**F**	**>120**	**F**	>-60
54	Glenwood Avenue & Middlefield Road	AT	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	>-60
			PM		**>120**	**F**	**>120**	**F**	>-60

Int. ID	Intersection	Jurisdiction	Peak Hour	Intersection Control	2040 No Project Delay	2040 No Project LOS	2040 Project Delay	2040 Project LOS	Change In Delay
55	El Camino Real & Glenwood Avenue	MP	AM	Signal	**93.9**	**F**	**>120**	**F**	**>60**
			PM		**>120**	**F**	**>120**	**F**	>-60
56	El Camino Real & Oak Grove Avenue	MP	AM	Signal	**81.3**	**F**	**96.9**	**F**	**15.6**
			PM		**94.6**	**F**	**84.0**	**F**	-10.6
57	El Camino Real & Santa Cruz Avenue	MP	AM	Signal	46.9	D	37.7	D	-9.2
			PM		**78.4**	**E**	**>120**	**F**	**>60**
58	Merrill St & Santa Cruz Avenue	MP	AM	All-way Stop	14.5	B	9.8	A	-4.7
			PM		**>120**	**F**	**>120**	**F**	**45.9**
59	Ravenswood Avenue & Alma Street	MP	AM	Side-Street Stop	**75.8**	**F**	**66.4**	**F**	-9.4
			PM		**>120**	**F**	**>120**	**F**	>-60
60	El Camino Real & Ravenswood Avenue	MP	AM	Signal	**>120**	**F**	**99.1**	**F**	-21.0
			PM		**>120**	**F**	**>120**	**F**	-4.9
61	Ravenswood Avenue & Laurel Street	MP	AM	Signal	**89.2**	**F**	**83.4**	**F**	-5.8
			PM		**>120**	**F**	**>120**	**F**	>-60
62	Alma Street & Palo Alto Avenue	PA	AM	Side-Street Stop	39.5	E	21.9	C	-17.6
			PM		24.3	C	28.5	D	4.2
63	Meadow Drive & Alma Street	PA	AM	Signal	**>120**	**F**	**>120**	**F**	**43.3**
			PM		**>120**	**F**	**>120**	**F**	**8.5**
64	El Camino Real & Alma & Sand Hill Road	PA	AM	Signal	**62.1**	**E**	**85.8**	**F**	**23.7**
			PM		**>119.2**	**F**	**>120**	**F**	**28.0**
65	High Street & University Avenue	PA	AM	Signal	10.1	B	13.6	B	3.5
			PM		24.5	C	24.5	C	0
66	Alma Street & Churchill Avenue	PA	AM	Signal	**>120**	**F**	**>120**	**F**	**10.5**
			PM		**>120**	**F**	**>120**	**F**	-0.7
67	W Meadow Drive & Park Blvd.	PA	AM	Side-Street Stop	**>120**	**F**	**>120**	**F**	≥60[a]
			PM		**>120**	**F**	**>120**	**F**	22.6[a]
68	Alma Street & Charleston Road	PA	AM	Signal	**>120**	**F**	**>120**	**F**	**>60**
			PM		**>120**	**F**	**>120**	**F**	-30.4
69	Showers Drive & Pacchetti Way	MV	AM	Signal	5.2	A	5.2	A	0.0
			PM		4.9	A	6.4	A	1.5
70	Central Expressway & N Rengstorff Avenue	MV	AM	Signal	**>120**	**F**	**>120**	**F**	**11.1**
			PM		**>120**	**F**	**>120**	**F**	**2.8**
71	Central Expressway & Moffett Boulevard & Castro Street	MV	AM	Signal	**>120**	**F**	**>120**	**F**	**7.7**
			PM		**>120**	**F**	**>120**	**F**	**>60**
72	W Evelyn Avenue & Hope Street	MV	AM	Signal	2.8	A	2.6	A	-0.2
			PM		4.7	A	4.9	A	0.2
73	Rengstorff Avenue & California Street	MV	AM	Signal	**>120**	**F**	**>120**	**F**	**28.3**
			PM		**>120**	**F**	**>120**	**F**	**>60**
74	Castro Street & Villa Street	MV	AM	Signal	41.6	D	**71.4**	**E**	**29.8**
			PM		**112.5**	**F**	**116.8**	**F**	**4.3**

Int. ID	Intersection	Jurisdiction	Peak Hour	Intersection Control	2040 No Project Delay	2040 No Project LOS	2040 Project Delay	2040 Project LOS	Change In Delay
75	W Evelyn Avenue & S Mary Avenue	SV	AM	Signal	**92.1**	**F**	**110.2**	**F**	**18.8**
			PM		**88.8**	**F**	**96.8**	**F**	**8.0**
76	W Evelyn Avenue & Frances Street	SV	AM	Signal	47.5	D	**287.9**	**F**	**>60**
			PM		51.7	D	**98.1**	**F**	**46.4**
	ZONE 4								
77	Kifer Road & Lawrence Expressway[c]	SCL	AM	Signal	>120	F	**>120**	**F**	**55.4**
			PM		>120	F	>120	F	-47.4
78	Reed Avenue & Lawrence Expressway	SCL	AM	Signal	**>120**	**F**	**>120**	**F**	**9.1**
			PM		**>120**	**F**	**>120**	**F**	>-60
79	El Camino Real & Railroad Avenue	SCL	AM	Signal	20.4	C	**69.5**	**E**	**49.1**
			PM		35.5	D	39.2	D	3.7
80	W Santa Clara Street & Cahill Street	SJ	AM	Signal	**89.4**	**F**	**84.5**	**F**	-4.9
			PM		**92.2**	**F**	54.7	D	-37.5
81	S Montgomery Street and W San Fernando Street	SJ	AM	Signal	31.3	C	51.6	D	20.3
			PM		**>120**	**F**	**86.3**	**F**	>-60
82	Lick Avenue and W Alma Avenue	SJ	AM	Signal	24.6	C	**62.1**	**E**	**37.5**
			PM		**65.5**	**E**	**63.0**	**E**	-2.5

Source: Appendix D, *Transportation Analysis*

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		
MP	Menlo Park	PA	Palo Alto	SJ	San Jose

AM = morning peak hour, PM = afternoon peak hour

LOS designation as per 2010 Highway Capacity Manual

Delay measured in seconds

Bold font represents an LOS that is below the established threshold of significance as per the Significance Criteria compared with existing conditions.

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

[a] Although the Proposed Project would increase delay at LOS F conditions, the intersection would not meet a signal warrant and thus per the significance criteria would not have a significant impact.

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

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

1

Based on the impact criteria from Section 3.14, *Transportation and Traffic*, in 2040 the Proposed Project will have a significant impact at 39 study intersections during the AM and/or PM peak hours compared with the 2040 No Project conditions as shown in Table 4-17. Mitigation options were evaluated for all of these intersections. The following criteria were used to determine if the identified mitigation option would reduce the Proposed Project's impact to a less-than-significant level.

- If the intersection operates at LOS A–D under the No Project conditions, the mitigation measures must allow the intersection to continue operating at LOS A–D under the project alternative.
- If the intersection operates at LOS E or F under the No Project conditions, the mitigation measures must ensure that the delay under the project alternative does not increase by 4 seconds or more.

Mitigation Measure TRA-CUMUL-1 below provides feasible mitigation measures for a number of these intersections. Of the 39 intersections noted as significantly affected, as shown in Table 4-18, 17 would have significant and unavoidable impacts under 2040 Project conditions either because, there is no feasible mitigation available to reduce the impact to a less-than-significant level or because the identified mitigation is insufficient to reduce the impact to a less-than-significant level.

Table 4-18. Summary of 2040 Cumulative Intersection Impacts and Mitigation Measures

Int. ID	Intersection	Impacted Peak Hour(s)	Mitigation Strategies	Impact Significance after Mitigation
Signalized Intersections				
1	4th Street and King Street	AM	Adjust signal timings to better serve traffic after project implementation	Significant and unavoidable (SU)
5	7th Street and 16th Street	AM and PM	Widen northbound approach to lengthen left turn pocket Revise signal timing and phasing to better coordinate with 16th Street and Owens Street	Less-than-significant after mitigation (LTS)
6	16th Street and Owens Street	PM	Revise signal timing and phasing to better coordinate with 7th Street and 16th Street	Less-than-significant after mitigation (LTS)
10	Linden Avenue and Dollar Avenue	AM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
12	S Linden Avenue and San Mateo Avenue	AM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
16	El Camino Real and Millbrae Avenue	AM and PM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS) in AM Significant and unavoidable (SU) in PM
17	Millbrae Avenue and Rollins Road	AM and PM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
19	Carolan Avenue and Broadway	AM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)

Int. ID	Intersection	Impacted Peak Hour(s)	Mitigation Strategies	Impact Significance after Mitigation
20	California Drive and Oak Grove Avenue	PM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
28	S B Street and 1st Avenue	PM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
30	S B Street and 9th Avenue	AM and PM	Extend southbound left-turn pocket Remove parking to add eastbound left-turn pocket Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS) in AM Significant and unavoidable[a] (SU) in PM
35	31st Avenue and El Camino Real	PM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
36	E Hillsdale Boulevard and El Camino Real	PM	Reconfigure westbound to two through lanes and one shared through/right-turn lane Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
37	E Hillsdale Boulevard and Curtiss Street	PM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
39	El Camino Real and Ralston Avenue	AM	Restripe westbound shared through/left-turn lane into a through lane Revise signal timing and phasing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
45	El Camino Real and Whipple Avenue	AM	Adjust signal timing to better serve traffic after project implementation	Significant and unavoidable (SU)
50	El Camino Real and Fair Oaks Lane	AM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
55	El Camino Real and Glenwood Avenue	AM	Widen westbound approach to provide right-turn pocket Adjust signal timing to better serve traffic after project implementation	Significant and unavoidable (SU)
56	El Camino Real and Oak Grove Avenue	AM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
57	El Camino Real and Santa Cruz Avenue	PM	Adjust signal timing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
63	Meadow Drive and Alma Street	AM and PM	No feasible mitigations exist[b]	Significant and unavoidable (SU)
64	El Camino Real and Alma Street and Sand Hill Road	AM and PM	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	Significant and unavoidable (SU) in AM Less-than-significant after mitigation (LTS) in PM

Int. ID	Intersection	Impacted Peak Hour(s)	Mitigation Strategies	Impact Significance after Mitigation
66	Alma Street and Churchill Avenue	AM	No feasible mitigations exist[b]	Significant and unavoidable (SU)
68	Alma Street and Charleston Road	AM	No feasible mitigations exist[b]	Significant and unavoidable (SU)
70	Central Expressway and N Rengstorff Avenue	AM	No feasible mitigations exist[b]	Significant and unavoidable (SU)
71	Central Expressway and Moffett Boulevard and Castro Street	AM and PM	No feasible mitigations exist[b]	Significant and unavoidable (SU)
73	Rengstorff Avenue and California Street	AM and PM	Revise signal timing and phasing to better serve traffic after project implementation	Significant and unavoidable (SU)
74	Castro Street and Villa Street	AM and PM	Remove parking to stripe one left-turn pocket and one through lane for the eastbound and westbound directions Revise signal timing and phasing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
75	W Evelyn Avenue and S Mary Avenue	AM and PM	No feasible mitigations exist[c]	Significant and unavoidable (SU)
76	W Evelyn Avenue and Frances Street	AM and PM	Stripe westbound as one through lane and one shared through/right-turn lane Revise signal timing and phasing to better serve traffic after project implementation	Significant and unavoidable (SU)
77	Kifer Road and Lawrence Expressway	AM	No feasible mitigations exist[d]	Significant and unavoidable (SU)
78	Reed Avenue and Lawrence Expressway	AM	No feasible mitigations exist[d]	Significant and unavoidable (SU)
79	El Camino Real and Railroad Avenue	AM	Revise signal timing and phasing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
82	Lick Avenue and W Alma Avenue	AM	Revise signal timing and phasing to better serve traffic after project implementation	Less-than-significant after mitigation (LTS)
Unsignalized Intersections				
9	Tunnel Avenue and Blanken Avenue	AM and PM	Signalize intersection	Less-than-significant after mitigation (LTS)
21	Carolan Avenue and Oak Grove Avenue	AM and PM	Signalize intersection	Significant and unavoidable[e] (SU) in AM Less-than-significant after mitigation (LTS) in PM

Int. ID	Intersection	Impacted Peak Hour(s)	Mitigation Strategies	Impact Significance after Mitigation
52	Fair Oaks Lane and Middlefield Road	AM	Signalize intersection	Less-than-significant after mitigation (LTS)
53	Watkins Avenue and Middlefield Road	AM and PM	Signalize intersection	Less-than-significant after mitigation (LTS)
58	Merrill Street and Santa Cruz Avenue	PM	Signalize intersection	Less-than-significant after mitigation (LTS)

Source: Appendix D, *Transportation Analysis*

[a] Less-than-significant after mitigation but a secondary impact is produced at Intersection #29 (9th Avenue and S Railroad Avenue). After mitigation, the delay increases by more than four seconds at Intersection #29.

[b] Addition of through lanes along Central Expressway and Alma Street may reduce the impact, but the addition of through lanes is subject to right-of-way constraints and is therefore infeasible.

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

[d] Grade separated interchanges are under study but have yet to be approved or funded.

[e] Less-than-significant after mitigation but a secondary impact is produced at Intersection #20 (California Drive and Oak Grove Avenue). After mitigation, the delay increases by more than four seconds at Intersection #20.

While the Proposed Project would have an adverse contribution to cumulative traffic delays at certain locations, the Proposed Project is only a small overall contributor compared with the effects of general growth along the Peninsula. This is shown by the 2040 No Project conditions which in many cases indicate a substantial decline in traffic level of service from 2013 conditions with a lesser contribution to delays above the 2040 No Project conditions shown by the 2040 Project conditions. Further as noted above, the net effect of the Proposed Project is to reduce regional daily VMT which produces benefits at many intersections, roadways, and freeways away from the at-grade crossings and Caltrain stations. Thus, any mitigation to address cumulative traffic impacts is the responsibility of all cumulative contributors to the future conditions, including local jurisdictions, future development, as well as other rail services that plan increases in the Caltrain corridor, in addition to Caltrain.

As described in Mitigation Measure TRA-CUMUL-1, Caltrain will work with local jurisdictions, transportation funding agencies, and state and federal agencies to support traffic improvements over time as funding becomes available. While the recommended mitigation below, where feasible to implement, would help to reduce cumulative traffic impacts, it will take time to implement it, is funding limited and may only be partially implementable in the future, and it may not be feasible to reduce all cumulative traffic impacts to a less than significant level, thus the Proposed Project is considered to make a fair-share contribution to cumulative traffic impacts, with mitigation.

As to secondary environmental impacts of Mitigation Measure TRA-CUMUL-1, the environmental effects of the minor roadway improvements such as traffic signal optimization and roadway geometry changes would likely be limited in scale and nature. Caltrain will work with other parties when implementing this measure to apply the relevant construction mitigation measures identified in this EIR to these minor improvements. As to roadway major widenings or grade separations, the design and feasibility of such potential future mitigations are unknown and unstudied at this time,

and, thus, the specific environmental impacts cannot be identified. Such major improvements will need to have their own environmental review as appropriate[15], as they can have substantial environmental impacts depending on their design and location and their construction can be highly disruptive and, thus, as a conservative assumption, their secondary environmental impacts are considered significant and unavoidable.

Mitigation Measure TRA-CUMUL-1: Implement a phased program to provide traffic improvements to reduce traffic delays near at-grade crossings and Caltrain stations

Caltrain, in cooperation with local agencies and other parties, will support a phased program seeking to improve local roadway conditions along the Caltrain corridor near at-grade crossings and Caltrain stations where cumulative impacts have been identified and where the Proposed Project makes an adverse contribution to traffic delays. Given that there are multiple contributors to cumulative traffic conditions, Caltrain is only responsible to fund its fair share for necessary improvements with local jurisdictions, future land use development as well as other rail services responsible to fund their fair share as well. Fair share shall be determined by cumulative contributions to future traffic levels at identified significant cumulatively affected intersections and roadways determined using traffic modelling

In the long run, where adequate funding is available, there are a variety of technically feasible traffic improvements that would help to reduce cumulative traffic delays at intersections near at-grade crossings and Caltrain stations including, but not limited to the following options:

- Traffic signal optimization: Signal timing optimization can be performed to reduce delay at grade crossings. This can include optimizing the cycle time, splits, and phasing. In addition, for closely spaced intersections, optimizing the offset and better signal coordination can also reduce delay. Signal optimization was considered as a mitigation measure at a number of study intersections as shown in Table 4-17.
- Roadway Geometry Changes: Changing the roadway geometry can also help reduce intersection delay. This can include changing the roadway width by widening the street or changing the existing geometry configuration through restriping. Intersection #43 (Main Street and Middlefield Road) and Intersection #64 (El Camino Real and Alma Street and Sand Hill Road) are examples of where roadway geometry could be altered as a mitigation measure to reduce intersection delay. More detailed information can be found in Table 4-17.
- Grade Separations: Given the costs and disruption of major roadway widenings and grade separations[16], Caltrain cannot commit at this time to a comprehensive program of improvements that would address all cumulative impacts in the future, because it does not have the identified funding and does not expect to receive sufficient funding in the foreseeable future. However, Caltrain, in cooperation with local jurisdictions, transportation

[15] As noted above, grade separations are statutorily exempt from CEQA.

[16] While grade separations are a technically feasible way to reduce cumulative traffic impacts at the at-grade locations, it is a highly expensive mitigation strategy. As discussed above, Caltrain supports 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 to $100 million per crossing (grade separations can cost much more sometimes), grade separating all existing 42 at-grade crossings would cost $2.1 to $4.2 billion. Grade separating only 17 locations that are nearest the 17 significant unavoidably impacted intersections noted above could cost $850 million to $1.7 billion. 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.

funding agencies, and state and federal agencies, will support incremental grade separations at locations of cumulative traffic impacts over time as funding becomes available. Caltrain will work with local, state, and federal partners to establish priorities for roadway improvements grade separations to be implemented as funding becomes available. Caltrain will also work with other rail parties to seek funding participation from multiple parties on a fair-share basis in proportion to traffic contributions.

- Road Closures: One option for managing local traffic is to close roadways at grade crossings and reroute traffic via alternative roadways. This option may not be feasible or acceptable to local jurisdictions at many, if not all locations.

This mitigation is funding limited and will likely take many decades to implement.

Transit Services

As described in Section 3.14, *Transportation and Traffic*, the Proposed Project would not conflict or create inconsistences with adopted transit plans, guidelines, policies or standards adopted by project area cities, counties, the MTC, or the State of California. The Proposed Project has a beneficial effect on transit plans as it implements a long-planned for increase in Caltrain service and modernization. Below, potential cumulative effects on transit infrastructure and other cumulative transit projects are discussed.

Need for Transit Infrastructure due to Ridership Increase

Cumulative growth in the region will increase demand for increased transit service. The Proposed Project is one of many projects in the planning phase to address that increased demand. Table 4-3 includes a number of key other transit projects as well, but there are many other regionally significant transit improvement efforts not included in Table 4-3 because they are in locations more distant from the Caltrain ROW.

One concern is that the Proposed Project, might result in increased ridership not only for Caltrain but also for other transit systems. The increase in ridership on other systems alone is not a concern for the CEQA evaluation, unless that increase in induced ridership would result in changes in physical conditions such as through the construction of additional transportation infrastructure to address the increased ridership. As discussed in Section 3.14, *Transportation and Traffic*, the Proposed Project is not expected to result in a significant change in ridership for other transit services that would result in the need for new transportation infrastructure. As shown in Appendix I, *Ridership Technical Memorandum*, compared with 2040 No Project conditions, the Proposed Project is expected to slightly lower ridership on BART, SamTrans, and Muni Metro and slightly increase ridership on VTA light rail (0.5 percent), VTA bus (0.4 percent) and Muni bus (0.5 percent). 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. Where the Proposed Project would result in increased bus ridership (VTA, Muni, and shuttles), it is not expected to require substantial new facilities to support the increase, although it would contribute to the need for bus shelters, stops, and maintenance facilities. Where the Proposed Project would contribute to VTA light-rail ridership, it may contribute to the need for additional light-rail infrastructure, which might result in environmental impacts during construction.

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 cumulative 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 resultant from the Proposed Project would result in the construction of additional transit infrastructure that might have significant physical impacts on the environment and thus the Proposed Project's contribution to cumulative need for transit infrastructure is less than considerable.

Potential Conflicts between Proposed Project and Other Transit Systems

Caltrain routinely coordinates with other transit system providers to facilitate Caltrain and other system transit projects and to avoid conflicts between planning for different systems. Caltrain has coordinated and is continuing to coordinate with CHSRA on the HSR project, TJPA on the DTX project, BART on the Silicon Valley Extension and other projects and has not identified any conflicts between the Proposed Project and these projects that would hinder their completion as proposed. Similarly, Caltrain is taking into account the future service plans of other passenger rail operators when planning for the South Terminal improvements.

At this time, only three potential conflicts between the Proposed Project and other proposed transit projects have been identified. If conflicts could not be resolved, there is the potential for significant impacts in the loss of transit service which could then result in increased vehicle traffic and resultant traffic congestion and air quality impacts (as well as possibly other environmental effects). However, as discussed below, each of the potential conflicts appears manageable without impeding other transit projects/service and/or the creation of substantial new environmental effects.

DTX

As described above, the DTX project proposes a reconfiguration of the San Francisco 4th and King yard from six at-grade platforms (12 tracks) to three at-grade platforms (six tracks) at 4th and King and an underground station at 4th and Townsend. If the DTX project could have been completed before the Proposed Project, then electrification would only need to be applied to the six tracks at the station itself. However given funding constraints, it appears likely that the DTX project will be completed sometime after 2019 and, thus, that the Proposed Project will electrify the 12 existing tracks at the station. This will likely mean that the DTX project will have additional construction effort to remove and relocate electrical infrastructure at the 4th and King Station/Yard to match the new configuration sometime after 2019. Given the scale of the DTX project, the additional effort will be an additional cost, but a limited one by comparison to the cost of DTX overall. Given the uncertainty as to DTX funding and timing, the electrification of the 4th and King Station as is will allow for the commencement of electrified service with all of its identified benefits without an uncertain delay that might occur if funding for DTX takes some time to secure. Environmentally, the

additional effort to remove and relocate the poles and wires at the station would be a minor increase in DTX construction effort overall given the need for DTX to construction substantial tunneling, underground station infrastructure, and platform reconfiguration.

Caltrain would prefer to electrify the 4th and King Station after reconfiguration to help avoid additional cost as well as disruption to its riders, but at this time due to funding limitations that does not appear likely.[17] Caltrain will continue to coordinate with TJPA to examine if there is an opportunity to coordinate construction of the Proposed Project and station reconfiguration to minimize the need for additional work.

SFMTA 22-Fillmore Electric Trolley Bus Re-Routing to 16th Street

SFMTA is proposing to re-route the 22-Fillmore electric trolley bus (ETB) from its current route crossing over the Caltrain ROW at 18th Street to an at-grade crossing at 16th Street. The installation of the direct current 600-volt OCS for the electric trolley bus at 16th Street creates a conflict with the proposed installation of the 25 kVA alternative current OCS as part of the Proposed Project.

The ETBs have an auxiliary power unit (APU) that can operate the bus without electrical power for short distances. While it would be technically feasible for the ETB to pull down the collector poles prior to driving through the 16th street rail crossing (to avoid contacting the Caltrain 25 kVA OCS wire), this is considered unacceptable from both a safety and an operational standpoint. A bus stopping to disconnect and re-attach the collector poles while on a railroad crossing is not safe and a bus stopping before and after the railroad crossing would delay bus service times and create traffic safety issues.

In order to manage the conflict to allow the SFMTA project and the Proposed Project to both go forward, Mitigation Measure TRA-CUMUL-2 is proposed. With implementation of this mitigation, both projects would be able to proceed and provide their improved transit benefits.

Mitigation Measure TRA-CUMUL-2: Implement technical solution to allow electric trolley bus transit across 16th Street without OCS conflicts in cooperation with SFMTA

The JPB, in cooperation with SFMTA, will implement a technical solution to allow operation of the ETB at the 16th street crossing as well as the Caltrain electrification.

Two feasible options for the SFMTA at-grade trolley crossing at 16th Street underneath the I-280 viaduct have been identified, both of which would involve a short phase break of the Caltrain OCS. Both options would include a short gap in the Caltrain OCS to allow the ETB OCS to be installed through the intersection. The short section of the ETB OCS would not be energized to avoid any potential for contact between energized parts of the Caltrain OCS and the ETB OCS. The options for equipment to facilitate Caltrain operations through the Caltrain OCS gap are as follows:

- Option #1: Installation of a track-mounted transponder that automatically communicates with special on-board equipment to open the main circuit breaker and preclude current from reaching the car.
    - As a Caltrain consist approaches the 16th street crossing, the engineer would reduce the power draw and the track-mounted transponder would instruct the individual car to

[17] The Proposed Project does not include adequate funding for any station improvements or reconfiguration other than installation of electrification infrastructure.

open its main breaker. Power drawn from pantographs outside the "zero-power zone" will allow the train to move through the crossing without slowing down. After clearing the crossing, the main breaker will close, and the power draw can be ramped up again.

- Electric Trolley Buses will operate normally at the crossing, as the collector poles glide along the contact wires up to6" above the 25kV Caltrain OCS wires. Buses will encounter a roughly 6-foot-long (the width of the Caltrain pantograph) non-energized portion of contact wire at the crossing of each track, but can coast through that gap on a continuous wire structure. This type of movement is a part of normal operations in San Francisco.
- This type of OCS wire structure has been used previously in Seattle and in Europe.

- Option #2: Installation of a vacuum circuit breaker (VCB), which removes the requirement for special on-board equipment.
  - The VCB solution has only been available for about 15 years and has not been implemented on a large scale yet. This solution has been utilized in newer installations in China.

Caltrain will need to obtain regulatory clearance from the CPUC for either of these solutions. The CPUC has not yet released regulations for 25kV traction power systems. The rulemaking process is ongoing. Caltrain, in cooperation with SFMTA will work with the CPUC to obtain approval of a technical solution for the 16th Street crossing.

The placement of the ETB overhead wires needs to be identified by SFMTA in coordination with Caltrain as the ETB needs to cross in the lane with the overhead wires in order to avoid any power interruption for the bus while crossing the rail line.

In addition, Caltrain will work with SFMTA to identify any design, maintenance, or emergency contingency considerations important to the design of the crossing system to minimize additional maintenance effort or materials for SFMTA during operations and to identify emergency response actions in the event of any wire entanglement at the crossing.

BART Millbrae Tail Tracks

As described above, the BART Millbrae Tail Track project would extend the existing tail tracks at the BART Millbrae Station 200 to 300 feet southward on BART property. In this area, the OCS would be installed within the Caltrain ROW so there should be no conflicts with the BART extension project.[18]

Pedestrian Facilities

Cumulative projects could also affect pedestrian walkways and bike paths that cross the Caltrain ROW or are directly adjacent to the Caltrain ROW. Blended Service improvements would have the greatest potential to affect such facilities if passing tracks are proposed outside the Caltrain ROW. For example, the Embarcadero bike path is parallel to the Caltrain ROW and in Palo Alto and the Middle 3 passing track option would include this portion of Palo Alto. Whether or not passing tracks affect bicycle and pedestrian facilities would depend on location and design, which are unknown at this time.

[18] As discussed in Section 3.5, *Electromagnetic Fields and Electromagnetic Interference*, during final design Caltrain will assess the potential for EMI between the Caltrain OCS and BART signal and communication systems and address it through design features such as s filters, capacitors, and inductors.

As discussed in Section 3.14, *Transportation and Traffic*, the Proposed Project would add increased pedestrian volume to existing pedestrian facilities due to increased ridership. The existing pedestrian facilities have been evaluated and are capable of accommodating an increase in pedestrian traffic with the exception of pedestrian facilities around the San Francisco 4th and King Station. Future planned pedestrian facilities are designed around the Proposed Project's existing alignment. Planned pedestrian facilities will be constructed to accommodate Caltrain's existing alignment. Therefore the Proposed Project would not contribute to cumulative impacts on pedestrian facilities at locations other than the 4th and King Station.

At the 4th and King Station, due to increased Caltrain ridership (with or without the Proposed Project) in combination with increased transit ridership on connecting services including the Central Subway and the proposed Embarcadero Streetcar extension, as well as general growth in the 4th and King Station vicinity, the capacity of some of the pedestrian facilities will be exceeded, resulting in congested walkways and crosswalks around the station and queuing to cross local streets. Because the Proposed Project would increase Caltrain ridership compared with No Project conditions, the Proposed Project would contribute considerably to pedestrian usage of the 4th and King Station area. Thus, the Proposed Project will contribute considerably to a cumulative pedestrian facility impact at 4th and King Station.

As discussed in Section 3.14, *Transportation and Traffic*, the Proposed Project would only contribute to this impact between when the Proposed Project begins operations in 2019 and when DTX/TTC becomes operational. At that point, with ridership shifting to TTC, the Proposed Project would no longer have a considerable contribution to pedestrian usage because the Proposed Project's contribution would be less than under No Project conditions.

Mitigation Measure TRA-3b (discussed in Section 3.14, *Transportation and Traffic*) would require the JPB and the City and County to plan for and implement necessary pedestrian facility improvements to the 4th and King Station and adjacent pedestrian facilities in City street rights-of-way. Implementation of this mitigation measure would reduce the Proposed Project's contribution to a cumulative impact to a less than significant level.

Bicycle Facilities

The Proposed Project, in combination with other cumulative projects may also increase future demand for bicycle facilities however, most plans in the project area account for increased bicycle volumes through added bicycle infrastructure. The Proposed Project does 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).

For the Caltrain system itself, the increase in ridership over time will likely increase the demand for bicycle facilities at Caltrain stations. Given that bike trains often operate at capacity during peak periods under existing conditions, it is possible that capacity issues may continue in future years. 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 or travel by another mode.

As explained in Section 3.14, *Transportation and Traffic*, Caltrain's *Bicycle Access and Parking Plan,* includes a long-term plan to increase bicycle parking supply for a variety of user needs, improving

station access for bicyclists, working with cities to improve station bike access, as well as considering other station-side concepts.

Mitigation Measure TRA-4b, in Section 3.14, *Transportation and Traffic*, would require Caltrain to continue implementation of its current planning to improve bicycle facilities at Caltrain stations over time to meet potential increased demand for such facilities. Thus, with mitigation, the Proposed Project would not contribute considerably to any significant cumulative impacts on bicycle facilities.

Emergency Vehicle Access

Cumulative projects would affect existing emergency vehicle access if they result in constrictions on the ability for emergency responders to reach their destinations. This could occur due to physical constraints and/or generation of traffic congestion which could impede emergency vehicles. However, peak period traffic congestion generally does not result in delay for emergency vehicles, which have right-of-way 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.

The increase of cumulative rail traffic along the Caltrain ROW including HSR, ACE, Capitol Corridor, DRC, the Coast Daylight and freight could result in increased gate down times at the at-grade crossings along the Caltrain ROW. As discussed above, due to cumulative growth in traffic over time due to both the land use projects (included in Table 4-3) as well as general growth in the region (as shown by projections in Table 4-2), traffic conditions are expected to substantially decline over the next few decades both at the at-grade crossings of the Caltrain ROW but also generally throughout the region (in spite of substantial investments in transit). With this cumulative growth in traffic, emergency response times during peak hours may be adversely affected.

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 and 619,000 miles/day in 2040 (compared with No Project Conditions) 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 No Project Conditions) in the emergency response times.

As discussed in Section 3.8, *Hazards and Hazardous Materials*, the Proposed Project's new OCS would not pose an impediment to routine emergency vehicle access.

Station Parking/Access

As described in Section 3.14, *Transportation and Traffic*, The Proposed Project does not interfere with the implementation of Caltrain's *Comprehensive Access Program Policy Statement* or *Bicycle Access and Parking Plan*. The Proposed Project would also increase both vehicular and pedestrian 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. Under cumulative conditions, there would be a further increase in traffic and pedestrian volumes by 2040, but a similar conclusion

applies and the Proposed Project would not contribute considerably to any cumulative access safety impacts.

The remainder of this section concerns station parking and access facilities.

Modeling of potential parking demand was completed for informational purposes based on behavioral forecasts by Fehr & Peers (see Appendix D, *Transportation Analysis*). Actual parking demand will fluctuate based on day and month based on peoples changing mode of access to Caltrain. The parking supply and demand forecasted for 2040 is shown in Table 4-19. Parking supply remains the same with and without the project while parking demand increases.

Without the Proposed Project, 2040 ridership will still increases, causing parking demand that will exceed Caltrain supply at 11 stations. At some stations, this parking deficit will likely be absorbed by existing non-Caltrain lots and on-street parking at stations such as San Mateo, Hillsdale and San Jose Diridon. Four stations will have demand that exceeds both Caltrain and nearby non-Caltrain parking supply. At the Mountain View and Sunnyvale Stations, the demand will exceed the Caltrain and non-Caltrain parking supply by more than 100 spaces.

The cumulative parking demand presented in this analysis does not take into account parking demand from High-Speed Rail or proposed TOD developments. TOD development could increase or decrease local parking demand depending on their specific design and approach to shared parking. HSR parking impacts will need to be assessed as part of subsequent environmental evaluation by CHSRA as parking demand is highly tied to the specific timing, mode of access and schedule for HSR service, all of which are not known in sufficient detail at this time.

Table 4-19. Existing and Future 2040 Cumulative Parking Supply at Caltrain Stations

	Existing		2040 without Project			2040 with Project		
Station	Caltrain Lot Utilization	Caltrain Lot Parking Supply	Parking Demand	Parking Surplus & Deficit[a]	Excess Parking Demand[b]	Parking Demand	Parking Surplus & Deficit[a]	Excess Parking Demand[b]
4th and King	-	0	169	-169	39	77	-77	0
22nd Street	-	0	514	-514	0	779	-779	157
Bayshore	13%	38	54	-16	0	114	-76	0
South SF	51%	74	75	-1	1	113	-39	39
San Bruno	22%	201	215	-14	0	304	-103	0
Millbrae[c]	79%	490	332	158	0	455	35	0
Broadway[d]	8%	122	-	-	-	35	87	0
Burlingame	30%	69	55	14	0	74	-5	0
San Mateo	20%	42	190	-148	0	359	-317	0
Hayward Park	3%	210	28	182	0	37	173	0
Hillsdale	86%	513	615	-102	0	1,112	-609[e]	503
Belmont	20%	375	82	293	0	135	240	0
San Carlos	32%	207	210	-3	0	243	-36	0
Redwood City	46%	553	331	222	0	588	-35	0
Atherton[d]	-	96	-	-	-	44	52	0
Menlo Park	33%	155	82	73	0	118	37	0
Palo Alto	87%	350	232	118	0	393	-43	43

Station	Existing		2040 without Project			2040 with Project		
	Caltrain Lot Utilization	Caltrain Lot Parking Supply	Parking Demand	Parking Surplus & Deficit[a]	Excess Parking Demand[b]	Parking Demand	Parking Surplus & Deficit[a]	Excess Parking Demand[b]
California Avenue	31%	169	52	117	0	59	110	0
San Antonio	33%	193	47	146	0	115	78	0
Mountain View	97%	336	811	-475	119	1,379	-1,043	687
Sunnyvale	103%	391	750	-359	296	1,291	-910[f]	847
Lawrence	30%	122	105	17	0	143	-21	0
Santa Clara	62%	190	33	157	0	32	158	0
College Park[g]	--	--	--	--	--	--	--	--
San Jose Diridon	99%	576	239	337	0	380	196	0
Tamien	98%	275	853	-578	0	1,205	-930	301
Total Excess Demand					**455**			**2,578**

Source: Appendix D, *Transportation Analysis*

[a] High parking surplus can be attributed to changes in land use where parking currently exists in some cases

[b] Excess Park and Ride demand beyond non-Caltrain lot and on-street parking

[c] Includes shared parking with BART.

[d] No weekday service at present. Weekday service would be restored with Proposed Project but not with No Project.

[e] Includes potential loss of 10 spaces due to PS-4, Option 1.

[f] Includes potential loss of 10 spaces due to PS-6, Option 2.

[g] 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.

The increase is greater with the Proposed Project due to increased ridership. As shown in Table 4-19, the majority of parking deficits could be absorbed by on-street parking and/or non-Caltrain lots where space is available.[19] In 2040 with the Proposed Project, parking demand will exceed the Caltrain and Non-Caltrain parking supply at seven stations, five of which will have demands that exceed the supply by more than 100.

At the 4th and King, Hayward Park, Santa Clara, San Jose Diridon and Tamien Stations, parking demand decreases from the 2020 to 2040. This demand decrease can be attributed to planned cumulative future transit-oriented development, contributing to increasing riders who access Caltrain via transit, walking and bicycling. It should be noted that land use changes in the station area contributing to parking demand decrease may decrease the parking supply as well. Subsequently, this planned development may result in lower parking surplus.

At most stations where impacts occur with the Proposed Project, they also occur without the project, 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 bicycle. At intermodal connectivity and

[19] There could be competition for excess parking locations with future residential or commercial development.

neighborhood circulator stations, auto access is not a priority. At auto-oriented stations, auto access is the primary priority access mode followed by biking.

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. 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 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[20] 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[21], 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 2,100 spaces in excess of the Proposed Project were to mean 2,100 fewer Caltrain riders, then 2040 ridership would be 2 percent less than predicted. However, given that the Proposed Project would still result in a substantial ridership increases (approximately 25,000 in 2040 compared with the No Project conditions) even in this worst-case situation, the environmental consequences would be less than significant as the Proposed Project 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 the 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, such as they actually occur, will be behavioral change on the

[20] 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.

[21] 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 2040.

part of the commuting public, rather than the speculative construction of new off-site parking facilities.

Thus, while the Proposed Project may contribute to a cumulative parking deficit, even with implementation of its access program, as described above this is not considered to result in a significant environmental impact and thus the Proposed Project would not contribute considerably to a cumulatively significant impact related to air quality, noise, traffic or greenhouse gas emissions or the secondary impacts of construction of parking facilities.

Impact to Freight Service

Cumulative rail service increases along the Caltrain corridor 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, if applicable[22]; and 2) through potential height restrictions due to OCS installation.

The existing levels of freight are approximately 3 round-trip trains per day in the Caltrain corridor north of Santa Clara. On an average day there are an estimated 150 loaded cars per day hauled on the Caltrain corridor and tonnage per loaded car ranges from 85 to 115 tons with an average of 100 tons of cargo per railcar (Greenway pers. comm.). This is only a rough estimate and daily averages can vary substantially based on economic conditions, customer needs, type of freight cargo being handled, equipment available and other factors. Based on these assumptions, on average approximately 15,000 tons of freight is being hauled on the Caltrain corridor per day. Assuming truckloads of 20 to 25 tons, this amount of rail freight is equivalent to that which could be carried by 600 to 750 trucks loads.

Local daily freight moves along the Caltrain corridor in length vary from approximately 5 to 7 miles ("South City Local" from the Port of San Francisco to South San Francisco[23]) to 16 to 18 miles ("Broadway" from South San Francisco to the Port of Redwood City) to 35 to 38 miles ("Mission Bay" from South San Francisco to San Jose Newhall Yard) in length. Freight hauling from more distant locations would have much larger hauling length. While the exact ton-miles per day hauled along the Caltrain corridor on average each day is not known if the daily average of 150 loaded rail cars is evenly divided between the three daily moves, then the average freight service could be estimated as approximately 300,000 ton-miles.

[22] FRA is currently in the process of rule-making for alternatively compliant vehicles and one consideration is whether or not temporal separation will be required in light of Positive Train Control and other factors.

[23] The San Francisco to South San Francisco round trip is not presently completed in a single night. The long-haul trains used on the Caltrain corridor are six-axle trains and the Quint Street Lead can only handle four-axle trains. As a result, the trains making this trip must make an equipment change in mid-trip (from a six-axle locomotive to a four-axle locomotive and vice versa). This change involves many hours related to charging the brake system with air, brake testing and a crew change. Thus, the round-trip takes 24 hours at present.

Cumulative Impacts on Freight Service due to Cumulative Increase of Rail Service and Constrained Operational Windows

The Proposed Project would result in restriction of freight to midnight to 5 a.m. (compared with approximately 8 p.m. to 5 a.m. at present[24]) along the portion of the Caltrain corridor north of Santa Clara (north of CP Coast) due to the temporal separation requirements of the FRA waiver. As discussed in Section 3.14, *Transportation and Traffic*, 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) at existing levels of freight service.

The FRA waiver requirements cannot be altered by the JPB on its own; only FRA can decide if temporal separation should be required or not for alternately compliant light-weight EMUs. If FRA decides that temporal separation is not required in the current rule-making, then it would likely be feasible to accommodate the moderate increases in freight included in this analysis without diversion to truck or other modes.

Operations of Amtrak, ACE, DRC and Capitol Corridor would not constrain freight as these services operate FRA-compliant vehicles and primarily operate during the day (ACE and Capitol Corridor only operate south of Santa Clara where there are dedicated freight tracks). The FRA–compliant vehicles are heavier and have the structural strength to operate on the same tracks as freight without the temporal separation (BART 2008).

Blended Service is proposed to operate between 5 a.m. and 12:30 a.m. This would further constrain freight operating hours by an additional 30 minutes north of CP coast compared with the Proposed Project, given the temporal separation requirements of the FRA waiver, if applicable. With Blended Service, freight would be limited to 4.5 hours between 12:30 a.m. to 5:00 a.m. between Santa Clara and San Francisco.

At present, approximately three round-trip trains operate in this part of the Caltrain corridor and this could increase to perhaps six round-trip trains by 2040. For this analysis it was assumed that the daily number of freight trains would double and the increase in service would mirror the pattern of daily moves at present. Thus, instead of 1 train daily making the moves discussed above, there would be two.

If freight round trips could not be completed in a single night using a single train consists, 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 be completed in the same night. Another potential response could be routing of freight via rail other Bay Area ports (such as at Richmond or Oakland). Such operational changes could affect scheduling convenience, cost, and/or competitiveness for freight operators.

[24] As explained in Section 3.14, *Transportation and Traffic,* the Trackage Rights Agreement (TRA) provides that between midnight and 5 a.m., at least one main track will always be in service for freight. It also provides at least one 30-minute headway window between 10 a.m. and 3 p.m. for freight service. 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). The FRA waiver requirements would not apply on the UPRR-owned MT-1.

Given the low levels of current freight operations on the corridor, the existing freight levels can be accommodated even with a more constrained operational window and thus a significant cumulative effect on existing freight service due to Blended Service is not considered likely. However, if freight rail demand along the San Francisco Peninsula substantially increases in the future, the additional freight rail service may be more challenging to accommodate with the small operational window and, thus, some freight may be diverted to truck or other modes or diverted to other ports.

A smaller operational window is more likely to affect the longer freight moves. The South City Local already operates over a two 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. For this analysis, a base case was analyzed consisting of diverting the freight of a daily round trip train from South San Francisco to San Jose to trucks and a more extreme case of diverting all new freight (three daily round trips over existing freight levels).

Cumulative Impacts on Freight Service due to Changes in Freight Heights and Vertical Clearances

The Proposed Project would lower the effective vertical clearance at a number of locations (such as tunnels and overhead structures such as bridges) along the Caltrain corridor by up to several feet due to installation of the OCS. The Proposed Project would include minor modifications at three of the San Francisco tunnels and at four roadway overpasses to ensure that adequate vertical clearance is provided to accommodate existing freight heights.

As discussed above, there is a potential that freight service in the future may desire to use higher freight vehicles than are currently operating on the Caltrain corridor. While the Proposed Project would provide adequate vertical clearance for existing freight vehicles (see discussion in Section 3.14, *Transportation and Traffic*), it may not accommodate potential future freight vehicles that could otherwise operate today if the OCS were not installed. Because existing freight would be accommodated, this would not be an impact over baseline. However, there is a potential for a cumulative impact when combining the effect of lowered vertical clearance with the OCS with a change in potential freight train height in the future.

The potential restriction of the ability to utilize higher freight trains would most likely result in the continued use of freight equipment similar to that used at present which would conform to the clearances provided with the Proposed Project. This could potentially mean reliance on longer trains using lower cars for future expanded freight service. Alternatively, freight could be diverted to other modes (such as truck) or to other destinations (such as the Port of Oakland or Port of Richmond).

At present, approximately three round-trip trains operate in this part of the Caltrain corridor and this could increase to perhaps six round-trip trains by 2040. Since the existing freight can be accommodated by the Proposed Project, the maximum potential diversion to other modes would be three round-trip trains. It is probable that the additional trains would just use lower train cars similar to existing freight trains and no diversion would occur due to changes in height. The South City Local would likely not be affected because tunnel heights already heavily constrain potential equipment and the Proposed Project would accommodate existing freight heights. It is also likely that any additional mid-Peninsula freight moves could also be accommodated by using freight equipment similar to existing freight equipment. Thus, a base case was analyzed assuming that the freight associated with one future daily round-trip train from South San Francisco to San Jose might be diverted to trucks because of Proposed Project height changes with the OCS. A more extreme

case of diverting all new freight (three daily round trips over existing freight levels) to trucks was also analyzed.

Analysis of Environmental Effects due to Potential Diversion of Small Amounts of Freight from Rail to Trucks

Business effects by themselves would not be considered environmental impacts, unless somehow the change in train operations would result in secondary physical environmental impacts. Such effects would only occur if there was a diversion of freight from rail to trucks (or other modes) which would then result in secondary environmental impacts such as additional traffic, noise, criteria pollutant emissions or GHG emissions compared with rail freight operations, which are discussed below.

Traffic

If the freight associated with one additional South San Francisco–San Jose freight train with 50 loaded cars were diverted to trucks (assuming 100 tons of cargo per railcar), then the approximately 5,000 tons of freight would need to be carried by 200 to 250 trucks. Assuming an 80 mile round trip for trucks, the additional regional miles would be 16,000 to 20,000 miles.

As discussed in Section 3.14, *Transportation and Traffic,* and this section, the Proposed Project would lower Regional VMT by 235,000 miles in 2020 and 619,000 miles in 2040 (with Caltrain Full Electrification) compared with No Project conditions. The VMT reduction would particularly benefit traffic congestion on major arterials and freeways used for longer-distance commutes. The resulting reduction in regional VMT emissions would be vastly larger than the potential increased truck traffic if the freight from the one example daily freight train from South San Francisco to San Jose were diverted to trucks. This conclusion would hold even if the amount of diverted freight daily consisted of all three new daily trains. As a result, the diversion of limited amounts of freight from train to truck is not identified as a significant cumulative regional traffic impact as the positive regional traffic benefits of the Proposed Project would vastly outweigh the likely regional traffic effects of potential diversion of small amounts of freight traffic.

However, the diversion of freight from one round trip train to truck could result in 200 to 250 additional truck trips per weekday along the congested San Francisco Peninsula. Diversion of freight from three round trip trains would add 600 to 750 truck trips per weekday. Without knowing specific routing and timing, it is difficult to make conclusions about the impact on traffic congestion. Where truck routing is during peak hours on localized intersections with failing conditions that the Proposed Project does not benefit, additional truck traffic potentially diverted from the Caltrain corridor could contribute to significant cumulative localized traffic impacts.

Noise

For noise, there is a tradeoff between freight train noise along the Caltrain ROW and truck noise along truck haul routes. While train noise would be lowered along the Caltrain corridor, truck noise would be increased along haul routes. Existing freight train noise crosses through a mix of residential, commercial, and industrial areas along the Caltrain corridor between San Jose and San Francisco. Without knowing specific truck routing and timing (day or night), it is difficult to make site-specific conclusions about the sensitive receptors affected by potentially increased truck traffic. Regionally, the diversion of freight to trucks is unlikely to result in substantial increase in the number of sensitive receptors along truck haul routes compared with the relatively high number of

sensitive receptors affected by freight noise along the Caltrain corridor already. However, it is possible that there may be localized noise increased due to diverted freight truck traffic and, thus, that diverted truck hauling could contribute to potential cumulative noise along new truck haul routes.

Air Quality

Freight trains are considered more efficient than trucks for long-hauling of materials and thus result in less overall criteria pollutant emissions on a ton-mile basis. For example, a recent study of increasing freight rail transport for goods from the Salinas Valley concluded that criteria pollutants could be reduced by 12 to 45 percent (depending on the pollutant) compared with current hauling by truck (Transystems 2011). The EPA has noted that, on a ton-mile basis, trains are 2 to 4 times more fuel efficient and have one-half to one-third the NOx emissions compared with trucks (USEPA 2010). One comparison of trains vs. trucks described that railroads carry 455 ton-miles/gallon of diesel vs. 105 ton-miles/gallon of diesel for trucks (Brown and Hatch 2002).

As an example, the additional freight train trip per day carrying 5,000 tons (50 loaded cars) one-way from San Francisco to San Jose (distance of 37 miles/185,000 ton-miles) could not be accommodated, the daily increase due to truck emissions was estimated as approximately 101 to 202 pounds (lbs) of NO_X (using EPA assumptions noted above) which would easily exceed the BAAQMD's daily threshold of 54 lbs/day for NOx. [25]

As discussed in Section 3.2, *Air Quality*, the Proposed Project would lower NOx emissions by 2,400 lbs/day in 2020 and 1,600 lbs/day in 2040 (with Caltrain Full Electrification) compared with No Project conditions. This reduction in NOx emissions would be vastly larger than the potential increased NOx emissions if the example daily freight trip from South San Francisco to San Jose were diverted to trucks. This conclusion would hold even if the amount of freight diverted daily were two to three times larger than estimated above for the single daily trip. As a result, no significant cumulative impact to air quality is identified due to the potential diversion of limited amounts of train freight to trucks.

Greenhouse Gas Emissions

As noted above, freight trains are considered more efficient than trucks for long-hauling of materials and thus result in less overall greenhouse gas emissions on a ton-mile basis. For example, the recent study of increasing freight rail transport for goods from the Salinas Valley cited above also concluded that greenhouse gas emissions could be reduced by 59 percent compared with current hauling by truck (Transystems 2011). The EPA has also noted that, on a ton-mile basis, trains emit one-third the GHG emissions of trucks (USEPA 2010).

If the example daily haul trip (described above for the air quality analysis) was diverted daily for a period of over one year, annual GHG emissions (using EPA estimate of one-third GHG emissions for freight rail vs. trucks and assuming 260 days/year) would increase by approximately 2,500 metric tons of CO2e (MT CO2e) per year due to diversion from freight rail to trucks.[26]

As discussed in Section 3.6, *Greenhouse Gas Emissions and Climate Change*, the Proposed Project would lower annual GHG emissions by approximately 68,000 MT CO2e /year in 2020 and 177,000

[25] Calculations are provided in Appendix B, *Air Quality and Greenhouse Gas Analysis Technical Data*.

[26] Calculations are provided in Appendix B, *Air Quality and Greenhouse Gas Analysis Technical Data*.

MT CO2e/year in 2040 (with full Caltrain electrification) compared with No Project conditions. This reduction in GHG emissions would be vastly larger than the potential increased GHG emissions if the example daily trip from South San Francisco to San Jose were diverted to trucks. This conclusion would hold even if the amount of freight diverted daily were two to three times larger than estimated above. As a result, although adverse, no significant cumulative impact to greenhouse gas emissions is identified due to the potential diversion of limited amounts of train freight to trucks.

Conclusion

As described above, the actual potential for diversion of freight is considered low and the low levels of existing and future freight can likely be accommodated even with more constrained operational windows and the changes in heights due to the Proposed Project OCS. Even if limited diversion of freight from trains occurs, it is not likely to result in significant secondary regional traffic, air quality or greenhouse gas emissions impacts because of the positive effects of the Proposed Project.

However, there is the potential for localized noise and traffic effects as a result of diverting some future increases in freight carried by rail to trucks because of changes in the operational window or lowered vertical height due to the OCS. This is considered a potentially significant cumulative impact on localized noise and localized traffic.

Relative to operational windows, the FRA waiver requirements for temporal separation are not under the control of Caltrain. Constraining operational windows for Caltrain and other passenger railroads to allow for untrammeled freight access from 8 p.m. to 5 a.m. would be counterproductive to the Proposed Project's purpose of expanding passenger rail service and would only result in additional air quality and greenhouse gas emissions and regional traffic. Thus, impacts associated with smaller operational windows relative to future potential freight increases is considered cumulatively significant and unavoidable.

To manage the potential constraint on future freight hauling along the Caltrain corridor due to lowered vertical clearances, Mitigation Measure TRA-CUMUL-3 is proposed. With implementation of this mitigation, freight hauling heights would not be limited by installation of the OCS.

As noted in Mitigation Measure TRA-CUMUL-3, additional site improvements may be necessary in the future to accommodate higher freight heights. Potential additional track lowering and minor notching improvements would likely have similar effects to the Proposed Project's minor notching/track lowering activities at three tunnel and bridge locations. However, potential modifications for this mitigation could be more extensive than those included in the Proposed Project and may or may not be feasible. For example, while track lowering and complete rebuild of the tunnel portals are technically feasible to rectify potential tunnel impediments, these solutions are costly and would results in major disruptions to existing operations and to the character of the San Francisco tunnels, which are historic resources. Similarly, modification at other historic bridges or underpasses, such as the San Francisquito Creek bridge, could result in greater impacts related to cultural resources than under the Proposed Project. Given that potential future modifications are not defined at this time, secondary physical impacts are considered potentially significant and unavoidable.

Mitigation Measure TRA-CUMUL-3: As warranted, Caltrain and freight operators will partner to provide site improvements to restore existing effective vertical height clearances along the Caltrain corridor.

Caltrain and freight operators share responsibility for the potential constraints that may occur due to the combination of a change in freight operating equipment and the installation of the OCS. If freight operators identify a plan to operate freight railcars along the Caltrain corridor that would be hindered by the OCS installation compared with existing conditions, then Caltrain and freight operators shall implement site improvements to restore effective vertical height clearances where needed along the Caltrain corridor.

Possible solutions to rectify the reduction in existing clearance at the tunnels can include deeper notching, track lowering, combination of notching and track lowering, or a complete rebuild of the tunnel portal. Probing of tunnel lining will determine the existing condition of tunnel linings and the necessary solution to rectify the impediments.

Track lowering is a possible solution to rectify the reduction in clearance at constrained bridge overcrossings, but further study will be required to determine the condition of track subgrade in each specific area and to locate existing utilities that may impact the track lowering. If it is determined existing utilities are in the way of potential track lowering, the existing utilities will have to be relocated in order to achieve the desired clearance.

This mitigation is limited to site improvements designed to restore existing effective vertical clearance only. The effective vertical clearance shall be defined not only by the individual vertical clearance at a particular constraint point, but also by the constraints along the corridor leading to that constraint point. For example, Tunnel 4 today has lower clearances than Tunnel 2 or Tunnel 3 and effectively limits the height of trains that can transit through Tunnels 2 through 4. This mitigation is limited to restoring effective vertical clearance that can actually be used taking into account all constraints along the corridor.

Caltrain and the freight operators shall apportion any cost pursuant to the existing agreement between the parties.

Presuming that any identified improvements will be implemented by an entity that is subject to CEQA, those improvements would need to be analyzed for their environmental impacts, as warranted, to determine if any additional significant impacts beyond those disclosed in this EIR for clearance improvements (e.g., those described in Chapter 2, *Project Description*). Environmental clearance shall be obtained, if necessary and required, prior to construction of any additional site improvements.

All relevant mitigation included in this EIR would apply to any additional construction necessary to implement this mitigation measure.

4.2 Significant and Unavoidable Environmental Impacts

Impacts related to the following topics would remain significant and unavoidable with the implementation of mitigation.

- Construction
  - Cultural Resources – As described in Section 3.2, *Cultural Resources*, due to tunnel modifications necessary to provide heights for Caltrain and freight rail cars, the modifications to historic San Francisco Tunnel 4 may be significant and unavoidable even with mitigation.
  - Noise—As described in Section 3.11*, Noise and Vibration*, although project mitigation would reduce noise in many locations, given nighttime construction it may not always be possible to reduce construction noise to a less-than-significant level.
- Operations
  - Aesthetics—As described in Section 3.1*, Aesthetics,* although project mitigation would reduce tree removal/trimming effects in many locations, it may not always be possible to replace trees in locations that would avoid significant changes in localized visual character at individual parcels affected by tree removal/pruning. As described in Section 4.1, *Cumulative Impacts*, the Proposed Project would also contribute considerably to cumulative effects on local visual character, relative to tree removals/pruning.
  - Hydrology and Water Quality - As described in Section 3.9, *Hydrology and Water Quality*, the Caltrain ROW, including new Proposed Project facilities may be subject to future flooding associated with sea level rise. Although project mitigation may be able to reduce the potential impacts of future flooding on the Proposed Project, given that effective coastal flooding mitigation requires the involvement of multiple parties beyond Caltrain, at this time it cannot be concluded that future flooding impacts to the Caltrain system will be fully avoided. As described in Section 4.1, *Cumulative Impacts*, this would also be considered a potential considerable contribution to a significant cumulative impact. As described in Section 3.9, *Hydrology and Water Quality,* given the *Ballona Wetlands* decision, it is unknown whether or not the impacts of sea level rise on a project are properly considered significant impacts under CEQA and thus this EIR discloses this impact for disclosure purposes in case they are.
  - Noise—As described in Section 4.1, *Cumulative Impacts*, with cumulative passenger and freight rail increases along the Caltrain corridor there would be significant noise increases affecting sensitive receptors. Where mitigation is not feasible to reduce the Proposed Project's noise contribution, the Proposed Project would also contribute to cumulative noise impacts at a number of locations.
  - Transportation and Traffic: As described in Section 3.14, *Transportation and Traffic*, although project mitigation would reduce localized traffic impacts at a number of affected locations, it would not be feasible to reduce all localized traffic impacts with mitigation. As described in Section 4.1, *Cumulative Impacts*, the Proposed Project would also have a considerable contribution to a significant cumulative impact on localized traffic conditions, even with mitigation, and a potentially significant cumulative impact related to localized

traffic and noise resulting from the diversion of limited amounts of freight from rail to truck modes.

4.3 Significant and Irreversible Environmental Changes

The Proposed Project would involve installation of OCS and TPFs along the 51-mile project corridor, which would require the use of materials such as steel and copper, as well as fossil fuels, during construction. The source metals used, unless they come from recycled materials, would represent an irreversible use of resources. Fossil fuels used during construction would also represent an irreversible use of oil and natural gas.

The Proposed Project would require electrical energy to power new EMUs. While the Proposed Project would use far more electricity than the present Caltrain system uses, the Proposed Project would use far less diesel fuel. When calculating the overall energy consumption (on a British Thermal Unit - BTU basis), the Proposed Project would consume far less energy directly than the current system does (see Table 4-20 below). The difference in energy consumption can be attributed to the relative efficiency of electric-powered vehicles and the relative inefficiency of diesel-powered vehicles. The continued diesel use, albeit substantially lower with the Proposed Project, would continue use of non-renewable fossil fuels. To the extent that electricity supplying the Proposed Project comes from renewable sources (hydropower, sun, wind, geothermal), it would not represent an irreversible use of resources. To the extent that electricity supplying the Proposed Project comes from non-renewable sources (natural gas, coal, nuclear), it would represent an irreversible use of those resources.

Table 4-20. Annual Direct Energy Consumption

Scenario	Fuel Use	Diesel (gallons)[a]	Electricity (kwh)	Direct Energy Use (million BTUs)[b]
Existing	All diesel	4,452,984	3,945,021	632,425
Proposed Project (2020)	SF – SJ: 75% Electrified/25% Diesel Gilroy – SJ: 100% Diesel	1,124,048	83,131,139	439,886
Fully Electrified (2040)	SF – SJ: Electrified Gilroy – SJ: Diesel	146,615	104,855,697	378,147

[a] Fuel use from Appendix B, *Air Quality and Greenhouse Gas Analysis Technical Data*.
[b] BTU factors from USEPA 2004: Diesel—139,000 BTU/gallon; Electricity—3,412 BTU/kwh.

Permanent visual alterations would result from the Proposed Project, comprising the introduction of poles and wires, and TPFs. Additionally, trees and mature vegetation would be removed and pruned. Some trees and vegetation would not be replaced on-site, resulting in a physical and aesthetic permanent change in certain locations. As documented in Section 3.1, *Aesthetics*, these physical changes would alter views from residential or business areas in various locations along the corridor, but they would not significantly obscure a scenic view or vista. However, even with mitigation, some local visual character would be permanently altered.

The Proposed Project would also introduce a new source of EMF along the project alignment. As detailed in Section 3.5, *Electromagnetic Fields and Electromagnetic Interference*, the Proposed Project would likely increase the level of EMF along the perimeter of the Caltrain ROW and at locations that passengers and workers frequent, such as passenger stations, on-board passenger coaches and locomotives, and at the perimeter of electrical substations. The EMF environment resulting from the Proposed Project would have field levels similar to those in the vicinity of moderate voltage utility transmission and distribution lines, but unlike the utility environment, the EMF fields from electrified Caltrain operations would be highest only during peak revenue operations, lessening during lower volume periods to become nominal during the late night when train service is discontinued and/or only line maintenance is proceeding. The field strengths are below ranges identified as levels of concern for human health effects. While the Proposed Project would permanently change the EMF field levels along the corridor as long as electrified trains utilized the corridor, this change is not irreversible. If a new preferable power source were identified in the future that replaced electrified service, then the EMF fields from the electrified service would be removed.

4.4 Growth-Inducing Impacts

CEQA requires a consideration of a project's capacity to induce growth.

Growth inducement would occur if the amount of population or employment growth projected to occur as a result of the Proposed Project would exceed planned levels. Increased development and growth in an area are dependent on a variety of factors, including employment and other opportunities, availability of developable land, and availability of infrastructure, water, and power resources.

A growth inducement analysis was conducted for the Proposed Project, as described in Section 3.12, *Population and Housing*. This analysis determined that the Proposed Project's changes in travel time savings would have little to no effect on the overall growth pressures in the project corridor because Caltrain serves only developed areas within a well-established rail corridor and the Proposed Project would not extend this corridor or provide access to undeveloped areas.