2 ALTERNATIVES

Since publication of the Draft Environmental Impact Report (EIR)/Environmental Impact Statement (EIS), the following substantive changes have been made to this chapter:

- In Section 2.1, Introduction, the electronic format of the Final EIR/EIS available from the California High-Speed Rail Authority (Authority) was clarified, and a footnote was added noting that repositories that received the Final EIR/EIS for public review may have reduced open days/hours to comply with coronavirus public health and safety directives.
- Information to clarify lighting and glare associated with high-speed rail (HSR) system infrastructure was added throughout Section 2.4, HSR System Infrastructure.
- Section 2.5, Alternatives Considered during Alternatives Screening Process, was revised to include discussion of vertical alternatives considered for the San Joaquin Valley Subsection.
- A footnote was added to Section 2.6.1, No Project Alternative—Planned Improvements, regarding the updated Council on Environmental Quality (CEQ) regulations issued after release of the Draft EIR/EIS.
- Section 2.6.1.2, Planned Land Use, was updated to remove references to the baseball stadium, outdoor performing arts pavilion, and proposed underground parking garage; to reflect that the Google campus is 85 acres within the 250-acre Diridon Station Area Plan area; to reflect that the Stockton Avenue seven-story development is under construction and nearly completed; and to reflect that a multifamily (not single-family) residential project is moving forward on Communications Hill adjacent to the proposed project alignment.
- Park Avenue, St. John Street, and Autumn Street widening projects were removed from Table 2-5, as they were constructed in 2018.
- Section 2.6.1.4, Planned Aviation Improvements, was revised to reflect the current name of the airport and the planned projects included in the *Airports Business Plan* (County of Santa Clara 2018).
- Section 2.6.1.5, Planned Intercity Transit Improvements, was updated with information about Caltrain, specifically the Peninsula Corridor Joint Powers Board (PCJPB) and its agreements.
- Analysis about the Diridon design variant (DDV) and tunnel design variant (TDV), which was included in Section 3.20 in the Draft EIR/EIS, was incorporated into Section 2.6.2, San Jose to Central Valley Wye Project Alternatives, including figures illustrating the extents of the TDV and DDV (Figures 2-56 and 2-67, respectively).
- Section 2.6.2.4, Alternative 1, was updated to clarify replacement parking locations and state highway and local road modifications.
- Section 2.6.2.7, Alternative 4, was updated to clarify replacement parking locations, to add reference to Tunnel 2 in the Pacheco Pass Subsection section, and to update Figure 2-66 to show the Diridon Station design to match the preliminary engineering drawings in Volume 3.
- Section 2.7.1, Travel Demand and Ridership Forecasts, was updated to reference ridership forecasts for 2040 in the 2020 Business Plan (Authority 2021).
- Section 2.7.4, Ridership and Station Parking, was updated to clarify that no new parking is proposed at the San Jose Diridon Station to meet new HSR parking demand and that new parking demand would be met through existing public and private parking taking into consideration reduced demand overall due to planned Caltrain and BART transit service to the Diridon Station.
- A footnote was added to Table 2-14 to clarify that no revenue trains would operate between midnight and 6am.
- A footnote to Table 2-15 was clarified as referring to Skyway Drive design variants.

- Table 2-17 was revised to reflect the correct jurisdiction for the staging area east of Lafayette Street, the location for two 1.7-acre, one 2.3-acre, and one 1.8-acre sites was corrected to Blossom Hill Road, and references to Church Avenue were corrected to Church Street.
- Text has been added in Section 2.10, Construction Plan, to indicate that no construction within the Grasslands Ecological Area would occur at night.
- A footnote was added to Section 2.6.2.2, Summary of Design Features, to reflect that the 2020 Business Plan refined the Valley-to-Valley service operational date from 2029 to 2031.
- Text has been added to Section 2.11, Permits, to clarify that local permits may include but are not limited to major encroachment permits, grading and drainage permits, and major improvement permits.
- In Table 2-18, the U.S. Department of the Interior, Bureau of Reclamation's agency name was corrected. West Branch Llagas Creek (Alternatives 1, 2, and 4) was added to Table 2-18, and the permits required by the California Department of Transportation were updated.
- A new Appendix 2-M, Gilroy LMF Option Consideration and Elimination, was added to provide a history of planning for the Light Maintenance Facility (LMF) and the reasons for eliminating a Gilroy LMF from consideration.

2.1 Introduction

This chapter describes the four end-to-end alternatives and the No Project Alternative that the Authority is considering in this Final EIR/EIS. The chapter addresses the following topics:

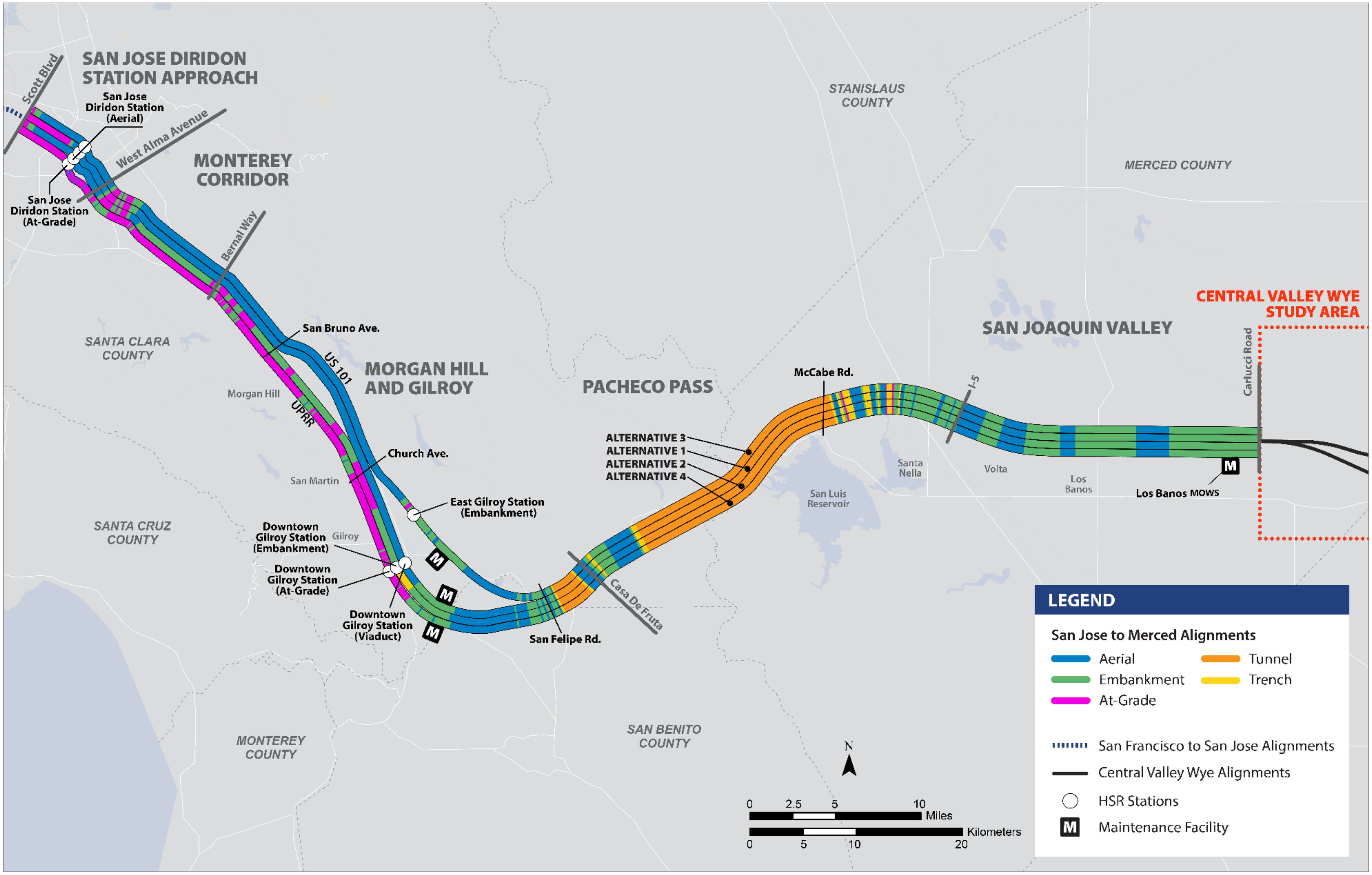
- The background and development of the California HSR System and the San Jose to Merced Project Section (Project Section)
- A general description of HSR system infrastructure
- Potential alternatives considered during the alternatives screening process and not carried forward for full evaluation in this Final EIR/EIS
- The No Action (No Project) Alternative and the San Jose to Central Valley Wye Project Extent (project) alternatives
- Travel demand and ridership forecasts
- Operations and service plan
- Construction plan
- Permits and approvals required

More detailed information on characteristics of the project is provided in the following appendices:

- Appendix 2-A, Roadway Crossings, Modifications, and Closures
- Appendix 2-B, Railroad Crossings
- Appendix 2-C, Operations and Service Plan Summary
- Appendix 2-D, Applicable Design Standards
- Appendix 2-E, Project Impact Avoidance and Minimization Features
- Appendix 2-F, PG&E Network Upgrades
- Appendix 2-G, Maintenance Plan or Summary of Requirements for Operations and Maintenance Facilities
- Appendix 2-H, Emergency and Safety Plans
- Appendix 2-I, Interim Use/Phased Implementation

- Appendix 2-J, Regional and Local Plans and Policies
- Appendix 2-K, Policy Consistency Analysis
- Appendix 2-L, Constructability Report

The four project alternatives discussed in this chapter are consistent with and build from the train technology, alignment corridor, and station locations selected by the Authority and the Federal Railroad Administration (FRA) at the conclusion of the Tier 1 EIR/EIS processes for the HSR system (see Section 1.1.2, The Decision to Develop a Statewide High-Speed Rail System). The four alternatives are the result of the Authority's consideration of an extensive array of potential alternatives and sub-alternatives, all with the benefit of extensive public, stakeholder, and agency input. The design drawings that support the descriptions of the alternatives are provided in Volume 3, Preliminary Engineering for Project Design Record, of this Final EIR/EIS. Figure 2-1 illustrates the alternatives considered in this Final EIR/EIS. These alternatives are designed to a preliminary level of engineering sufficient to identify and analyze potential environmental impacts. Alternative 4 is the California Environmental Quality Act (CEQA)-proposed project pursuant to CEQA Guidelines Section 15124.



Source: Authority 2019a

JANUARY 2019

Figure 2-1 HSR Alternatives with Vertical Profile

The following terms are defined as follows for purposes of this report:

- **Project Section:** This signifies the San Jose to Merced project with the station termini.
- **Project extents:** *Project extent* is used to refer to the three portions of the Project Section—San Jose to Central Valley Wye (Scott Boulevard to Carlucci Road), Central Valley Wye (Carlucci Road to Ranch Road in the north and Avenue 19 in the south), and Merced North (Ranch Road in the south to the Merced Station)—that collectively form the project section connecting San Jose and Merced.
- **Project subsections:** *Project subsections* are the constituent parts of a given project section or project extent. The San Jose to Central Valley Wye project extent consists of five subsections: San Jose Diridon Station Approach, Monterey Corridor, Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley.
- **Design options**: *Design options* are the different alignment and vertical profile options considered within each subsection.
- **Alternative**: *Alternatives* are the end-to-end alternatives assembled from design options under consideration in the Final EIR/EIS.

This Final EIR/EIS analyzes the environmental impacts—direct, indirect, and cumulative—of implementing the San Jose to Central Valley Wye Project Extent (see definition in sidebar) of the HSR system, and mitigation measures to reduce those impacts. Visit the Authority website (www.hsr.ca.gov) to access the Final EIR/EIS, request an electronic copy of the Final EIR/EIS, or locate a library to review a printed copy of the Final EIR/EIS. Printed copies of the Final EIR/EIS have been placed in public libraries in the following cities and communities: Sacramento, San Jose, Morgan Hill, Gilroy, Los Banos, and Merced.[1]

The following documents can be accessed via the Authority's website: alternatives analyses preceding preparation of the EIR/EIS, materials prepared for coordination with the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (USEPA) in compliance with Clean Water Act (CWA) Section 404(b)(1) requirements, and technical reports developed for the environmental analyses presented in Chapter 3.

The Project Section comprises three extents: (1) from Scott Boulevard in Santa Clara to Carlucci Road in Merced County, the western terminus of the Central Valley Wye (i.e., the San Jose to Central Valley Wye Project Extent [project extent, or project]; (2) the Central Valley Wye, which connects the east-west portion of HSR from the San Francisco Bay Area (Bay Area) to the Central Valley with the north-south portion from Merced to Fresno; and (3) the northernmost portion of the Merced to Fresno Project Section, from the northern limit of the Central Valley Wye (Ranch Road) to the Merced Station (Figure 2-2).

Because the portion of the Project Section between Merced and Carlucci Road has been analyzed in the *Final California High-Speed Train Project Environmental Impact Report/Environmental Impact Statement and Final Section 4(f) Statement and Draft General Conformity Determination—Merced to Fresno Section* (Merced to Fresno Section Final EIR/EIS) (Authority and FRA 2012) and the *Merced to Fresno Section: Central Valley Wye Final Supplemental EIR/EIS* (Authority 2020a), the analysis in this document focuses on the project extent between Scott Boulevard in Santa Clara and Carlucci Road in Merced County (the project). While the northern service limit of the project would be the San Jose Diridon Station, the engineering design and evaluation includes infrastructure and train operations north to Scott Boulevard to serve the San Jose Diridon Station.

The project extent is a 90-mile portion of the entire 145-mile-long San Jose to Merced Project Section. For three of the four project alternatives, the project is comprised of a blended system[2] north of the San Jose Diridon Station, transitioning to a fully dedicated system from the San Jose Diridon Station south to Gilroy, then proceeding east through the Pacheco Pass to Carlucci Road, the western limit of the Central Valley Wye. Alternative 4 is a blended system to the Downtown Gilroy Station, where it transitions to a dedicated system. The project comprises five subsections (Table 2-1).

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[1] The COVID-19 pandemic has resulted in widespread closure of government and public facilities, including local libraries the Authority identified as repositories where the public would have the opportunity to review the Draft EIR/EIS, Revised Draft EIR/Supplemental Draft EIS, and Final EIR/EIS. These facilities received the Final EIR/EIS for public review; however, open days/hours may be reduced for compliance with coronavirus public health and safety directives.

[2] The California HSR System will operate with regional and local train (Caltrain) operations primarily on shared tracks and substantially within the existing Caltrain corridor (blended system).

Source: Authority 2019a JUNE 2019

Figure 2-2 San Jose to Merced Project Section Geographic Context

Table 2-1 San Jose to Central Valley Wye Project Extent Subsections

Subsection	Start	End
San Jose Diridon Station Approach (overlaps southern portion of San Francisco to San Jose Project Section)	Scott Boulevard (city of Santa Clara)	West Alma Avenue (city of San Jose)
Monterey Corridor	West Alma Avenue (city of San Jose)	Bernal Way/Kittery Court (community of South San Jose, city of San Jose)
Morgan Hill and Gilroy (includes Gilroy Station)	Bernal Way (community of South San Jose, City of San Jose)	Casa de Fruta Parkway (community of Casa de Fruta, Santa Clara County)
Pacheco Pass	Casa de Fruta Parkway (community of Casa de Fruta, Santa Clara County)	Interstate 5/Santa Nella Boulevard (community of Santa Nella, Merced County)
San Joaquin Valley	Interstate 5/Santa Nella Boulevard (community of Santa Nella, Merced County)	Carlucci Road (unincorporated Merced County)

Source: Authority 2019a

Portions of the Project Section with blended Caltrain and HSR operations will be implemented on Caltrain-owned facilities including from north of the Santa Clara Station to Scott Boulevard under Alternative 1 and from north of Capitol Station to Scott Boulevard under Alternative 4. The alternative descriptions have been developed based on planning assumptions and preliminary engineering conducted by the Authority for the purposes of environmental analysis and the ultimate implementation of the project (both physical and operation of services) on Caltrain-owned facilities will be subject to further joint Blended System planning and agreement with Caltrain as governed through existing and future inter-agency agreements. The ongoing multi-agency Diridon Integrated Station Concept (DISC) planning process is a separate planning process and decisions about future changes to the Diridon station and the surrounding, Caltrain-owned rail infrastructure and corridor are the subject of multiple planning and agreement processes that are proceeding independently from this environmental process.

2.2 Independent Utility

As discussed in Chapter 1, Project Purpose, Need, and Objectives, the Authority and FRA divided the HSR system originally established through the Tier 1 process into individual project sections for Tier 2 planning, environmental review, and decision-making (Figure 1-2). The FRA, consistent with regulations issued by the Federal Highway Administration (FHWA), considers three criteria when determining the scope of a project to be considered in an EIS: (1) whether it connects “logical termini” and has “sufficient length to address environmental matters on a broad scope”; (2) whether it has “independent utility or independent significance,” meaning that it will “be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made”; and (3) whether it will “restrict consideration of alternatives for other reasonably foreseeable transportation improvements” (23 Code of Federal Regulations [C.F.R.] 771.111(f)). The FHWA defines *logical termini* as the rational starting and ending points for a transportation improvement project and for review of the environmental impacts of the project (FHWA 1993).[3] The San Jose to Merced Project Section connects logical termini at planned passenger stations in Merced and San Jose, with a connection to a station in Fresno via the Central Valley Wye. If other sections of the HSR system are not completed, the infrastructure could be used by regional and intercity services to improve their capacity, reliability, and performance (Authority 2009).

2.3 Background

This Project Section would be a critical link in the Phase 1 HSR system connecting San Francisco and the Bay Area to Los Angeles and Anaheim. The Authority relied on program EIR/EIS documents (see Section 1.1.2) to select the alternatives for further study between San Jose and Merced. The project-level environmental review process and alternatives considered in this document are consistent with the decisions made during the Tier 1 review process and are discussed further in Section 2.5, Alternatives Considered during Alternatives Screening Process.

2.4 HSR System Infrastructure

This section provides general information about the performance criteria, infrastructure components and systems, and function of the proposed HSR system as a whole. Detailed information on the project alternatives, including alignment, station locations, and locations for maintenance facilities, is provided in Section 2.6, Alignments, Station Sites, and Maintenance Facilities Evaluated in this Final EIR/EIS.

The project’s alignment, design options, and operational facilities, such as traction power distribution facilities and maintenance facilities, are presented in this Final EIR/EIS geographically from Scott Boulevard in Santa Clara to Carlucci Road in Merced County. The Preliminary Engineering for Project Definition design drawings—showing track alignments, vertical profiles, typical sections, construction use areas, and other preliminary design information—are provided in Volume 3 of this Final EIR/EIS, which can be accessed on the Authority’s website (www.hsr.ca.gov) or by request in electronic format.

[3] The FHWA criteria for determining project scope, as established in 23 C.F.R. Section 771.111(f), do not specifically address the scope of individual projects considered in the second tier of a tiered NEPA process. With the tiered NEPA process, the same general principles apply, but they are applied in the context of the decisions made in Tier 1—in this case, the decision to build the HSR system as a whole. Therefore, in determining the scope of individual project sections for Tier 2 studies, the Authority and FRA focused primarily on determining whether each project section could serve a useful transportation purpose on its own such that a decision in one project section does not limit consideration of reasonable alternatives for completing the HSR system in an adjacent section for which the NEPA process has not yet been completed.

What does "blended" mean?

Blended refers to operating HSR trains with existing intercity, commuter, and regional trains on shared infrastructure.

The infrastructure and systems of the HSR system consist of HSR trains, tracks, stations, automatic train control (ATC) and communication sites, overhead contact system (OCS) (a series of wires strung above the tracks) and traction power distribution systems, and infrastructure and vehicle maintenance facilities. The design of each HSR alternative includes a double-track rail system to accommodate operational needs for high-capacity rail movement. Additionally, the HSR safety criteria require avoidance of at-grade intersections on dedicated HSR alignments; accordingly, the system must be grade-separated from any other transportation system when operating at or above 125 miles per hour (mph). This criterion means that the HSR system would require grade-separated overcrossings or undercrossings for roadways that intersect the planned right-of-way; roadway closures and modifications to such facilities may be necessary. In some situations, it may be more efficient for the HSR guideway to be elevated over existing facilities. The HSR safety criteria allow at-grade intersections on blended sections such as those proposed under Alternative 4, in the San Francisco to San Jose Project Section, where HSR would operate alongside Caltrain, and in the Los Angeles to Anaheim Project Section, where HSR would operate alongside Metrolink.

2.4.1 System Design Performance, Safety, and Security

The proposed HSR system is designed for optimal performance in conformance with industry standards and federal and state safety regulations (Table 2-2). The HSR right-of-way would be fully grade-separated and access-controlled with intrusion detection and monitoring systems. In areas where HSR would operate at speeds of 125 mph or more and would be adjacent to existing freight railroads, intrusion protection barriers may be required to prevent encroachment into the HSR guideway. Where blended operations are necessary or otherwise identified, speeds would be limited to less than 125 mph, at-grade roadway crossings would be controlled by four-quadrant gates and roadway channelization, and unauthorized access would be deterred using intrusion detection and monitoring systems.[4]

Table 2-2 HSR Performance Criteria

Category	Criteria
System design criteria	▪ Electric propulsion system ▪ Fully grade-separated guideway (except in the blended system) ▪ Fully access-controlled guideway with intrusion monitoring systems ▪ Track geometry to maintain passenger comfort criteria (smoothness of ride, lateral or vertical acceleration less than 0.1 g [i.e., acceleration due to gravity])
System capabilities	▪ Capable of traveling from San Francisco to Los Angeles in approximately 2 hours 40 minutes ▪ All-weather/all-season operation ▪ Capable of sustained vertical gradient of 2.5 percent without considerable degradation in performance ▪ Capable of operating parcel and special freight service as a secondary use ▪ Capable of safe, comfortable, and efficient operation at speeds greater than 200 mph ▪ Capable of maintaining operations at 3-minute headways ▪ Equipped with high-capacity and redundant communications systems capable of supporting fully automatic train control

[4] The Project Section design criteria dictate 250-mph design speeds on dedicated guideway sections to allow trains to operate at up to 220 mph where necessary to meet overall travel time specifications. The Authority is designing the San Joaquin Valley and Pacheco Pass Subsections to allow this operating speed, but tunnels in the Morgan Hill/Gilroy Subsection and the Pacheco Pass Subsection have been designed to a 200-mph operating speed, with a design variant identified that would allow for 220-mph operating speeds. Between Gilroy and San Jose, the design speeds would be less than the maximum design speeds as necessitated by practical design requirements in a heavily built environment. Where HSR would operate in blended service with Caltrain, HSR would operate at a maximum speed of 110 mph.

Category	Criteria
System capacity	▪ Fully dual track mainline with dedicated station tracks ▪ Capable of accommodating a wide range of passenger demand (up to 20,000 passengers per hour per direction) ▪ Capable of accommodating normal maintenance activities without disruption to daily operations
Level of service	▪ Capable of accommodating a wide range of service types (express, semi-express/limited stop, and local)

Source: Authority 2016a

HSR design and operations would include appropriate barriers (fences and walls) and state-of-the-art communication, access control, and monitoring and detection systems to keep people, animals, and obstructions off the tracks. The ends of the HSR trainsets would include a collision response management system to minimize the effects of a collision. All aspects of the HSR system would conform to the latest federal requirements regarding transportation security. The HSR trainsets (train cars) would be pressure-sealed to maintain passenger comfort regardless of aerodynamic change, much like an airplane body. Additional information regarding system safety and security is provided in Section 3.11, Safety and Security, of this Final EIR/EIS.

HSR operations would follow safety and security plans developed by the Authority in cooperation with FRA to include the following:

- A Safety and Security Management Plan (SSMP) (Authority 2016b), including a Safety and Security Certification Program, has been developed to address safety, security, and emergency response as they relate to the day-to-day operation of the system.
- A Threat and Vulnerability Assessment for security, a Preliminary Hazard Analysis, and a Vehicle Hazard Analysis generated comprehensive design criteria for safety and security requirements mandated by local, state, and federal regulations and industry best practices.
- A Fire and Life Safety and Security Program TM 500.4 (Authority 2012a) has been developed and a System Security Plan is in development. Under federal and state guidelines and criteria, the Fire Life Safety Plan would address the safety of passengers and employees as it relates to emergency response. The System Security Plan would address HSR design features intended to maintain security at stations, within the trackwork right-of-way, and onboard trains.

Design criteria address FRA safety standards and requirements as well as a possible Petition for Rule of Particular Applicability that addresses specifications for key design elements for the system. The FRA is currently developing safety requirements for HSR systems for use in the United States. The FRA will require that the HSR safety regulations be met prior to revenue service operations. The following sections describe those system components pertinent to the project.

2.4.2 Vehicles

Although the exact vehicle type has not yet been selected, the environmental analyses considered the impacts associated with any of the HSR vehicles produced in the world that meet the Authority's criteria. All the HSR systems in operation today use electric propulsion with power supplied by an OCS. These include, among many others, the Train à Grande Vitesse in France, the Shinkansen in Japan and Taiwan, and the InterCity Express in Germany. Figure 2-3 illustrates examples of typical HSR trains.

Source: Authority and FRA 2017a FEBRUARY 2017

Figure 2-3 Examples of Japanese Shinkansen High-Speed Trains

The Authority is considering an electric multiple-unit concept, in which several train cars (including both end cars) would contain traction motors, rather than a locomotive-hauled train (i.e., one engine in the front and one in the rear). Each train car would have an active suspension, and each powered car would have an independent regenerative braking system (which returns power to the power system). The body would be made of strong but lightweight materials and would have an aerodynamic shape to minimize air resistance, much like a curved airplane body.

A typical train would be 9 to 11 feet wide and approximately 660 feet long and would seat up to 1,000 passengers. The power would be distributed to each train car via the OCS through a pair of pantographs that extend like antennae above the train (Figure 2-4). Each trainset would have a train control system that could be independently monitored with override control, while also communicating with the systemwide Operations Control Center. Phase 1 HSR service is expected to need up to 78 trainsets in 2040, depending on the HSR fares charged and ridership levels (Authority and FRA 2017b). Vehicle lighting would comply with applicable rail safety, security, and operational requirements.

Source: Authority and FRA 2017a FEBRUARY 2017

Figure 2-4 Example of an At-Grade Profile Showing Overhead Contact System and Vertical Arms of the Pantograph Power Pickups

Trainset windows would be provided with tinted glazing. All windows in the passenger seating areas would be equipped with passenger-operated blinds or side curtains to provide protection against the glare of the sun. The trainset exterior, including front end and skirting, would be painted in accordance with the color schemes developed by the contractor and approved by the Authority. The exterior of the trainset would be coated with a gloss finish. The coating systems would be selected based on ability to withstand deterioration due to abrasion of particulates while operating at high speeds, ultraviolet light damage, and weather and the ability to be cleaned. For trainset exterior lighting, two white headlights (also known as headlamps), each producing a peak intensity of no less than 200,000 candelas, would be provided at the front end of each cab vehicle. Two white auxiliary lights, each producing a peak intensity of no less than 200,000 candelas, would be provided at the front end of each cab vehicle to form the points of a triangle with the headlights. The auxiliary lights would be arranged to burn steadily or flash. The flashing feature would be activated automatically but would also accommodate manual activation and deactivation by the operator.

2.4.3 Stations

Stations would be sized for projected HSR ridership and designed to provide flexibility to accommodate future growth. Station facilities include public and nonpublic areas, station site improvements to facilitate intermodal connectivity and station accessibility, and ancillary facilities. At existing stations modified for HSR service, public areas and station site improvements would be shared with other rail operators serving the station.

Station design has been developed at a concept level—Preliminary Engineering for Project Definition—for project-level environmental analysis and documentation, sufficient for disclosing the environmental impacts of building and operating a station. Figure 2-5 illustrates an example of station components from an existing overseas system and the Anaheim Regional Transportation Center in Anaheim.[5] The functional station is a basic design that could be more elaborate with cooperation from the local jurisdiction; accordingly, each actual station has the potential to be an iconic building that would enhance the identity of the city and the surrounding downtown environment in which it is located. Final station design would involve Authority collaboration with rail operators, local stakeholders, and land partners to complement transit-oriented and other station-supportive development.

Source: Authority and FRA 2017a FEBRUARY 2017

Figure 2-5 Examples of Existing Stations

Preliminary station planning and design are based on Chapter 14, Stations, of the *Design Criteria Manual* (Authority 2016a) and principles from the Authority's *Draft HST Station Area Development: General Principles and Guidelines* (Authority 2011). The Project Section stations would be designed in accordance with Americans with Disabilities Act accessibility guidelines. The Project Section would

[5] The Anaheim Regional Transportation Center would serve as the HSR station in Anaheim.

include stations in San Jose, Gilroy, and Merced. The Merced Station was environmentally cleared in the Merced to Fresno Project Section EIR/EIS.

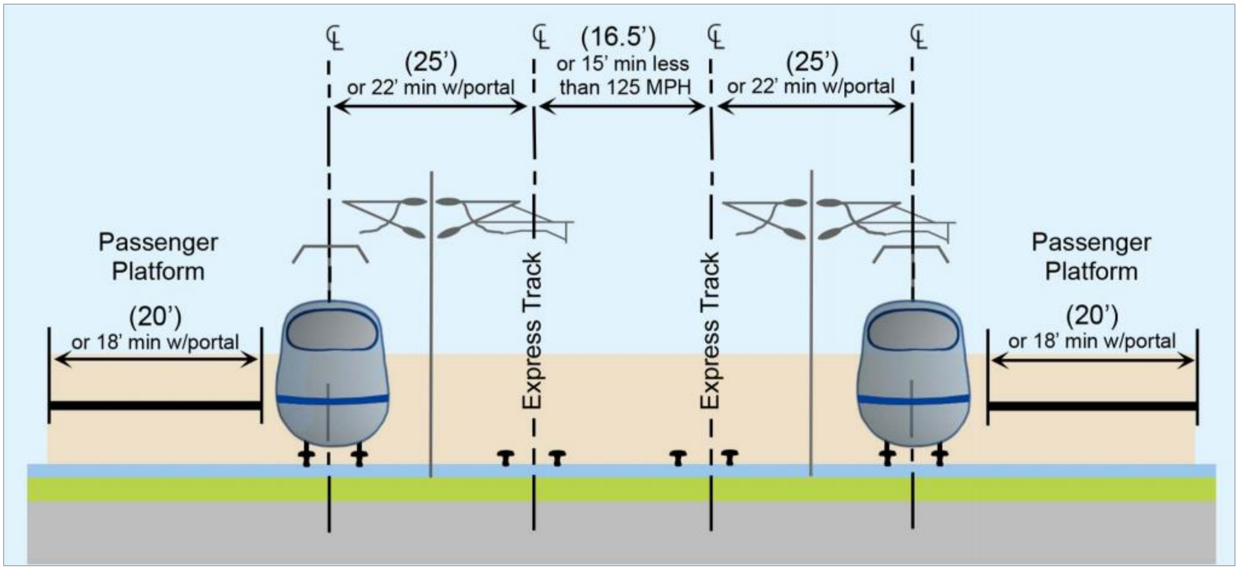
2.4.3.1 Station Platforms and Trackway (Station Box)

The station would provide a sheltered area and platforms for passenger waiting as well as circulation elements (stairs, elevators, escalators). Of the four tracks passing through the station, two express tracks (for trains that do not stop at the station) would be separated from those that stop at the station and platforms. To allow enough distance for safe deceleration of trains, the platform track would diverge from each mainline track 1,375 feet from the center of the station platform (the length of which may vary from 800 to 1,410 feet depending on the station). The acceleration track from platform to mainline requires a shorter distance. An additional stub-end 900-foot refuge track may be provided to temporarily store HSR trains in case of mechanical difficulty, for special scheduling purposes, and for daytime storage of maintenance-of-way work trains during periods when structure and track maintenance is being performed along the line near the station. The combination of deceleration, acceleration, and refuge track extends the wider footprint of the four-track section up to a total length of 2,750 feet. Figure 2-6 and Figure 2-7 illustrate cross sections of two- and four-train station platforms.

2.4.3.2 Station Facilities Building

Station public areas include entry plazas and building entrances; ticketing; wayfinding/signage; publicly accessible restrooms; concessionaire-provided amenities such as food service, rental car counters, and retail; vertical circulation; concourse or mezzanine areas with passenger waiting areas; fare gates; controlled paid areas; and platforms. Pedestrian over-track bridges and under-track passageways enable public access across the rail right-of-way at stations. Station nonpublic areas include administrative, maintenance, operations, safety/security, loading, and back-of-house circulation areas. Stations and station sites, including parking facilities, roadways, and walkways, would have interior and exterior lighting. Fixed lighting sources at HSR stations would be designed to direct lighting downward, minimizing light spillover. Flood lighting of public HSR station facilities would generally be limited to hours of HSR operation at the station but may be required for maintenance during off-hours. Continuous lighting may be provided at emergency access and egress points and for security.

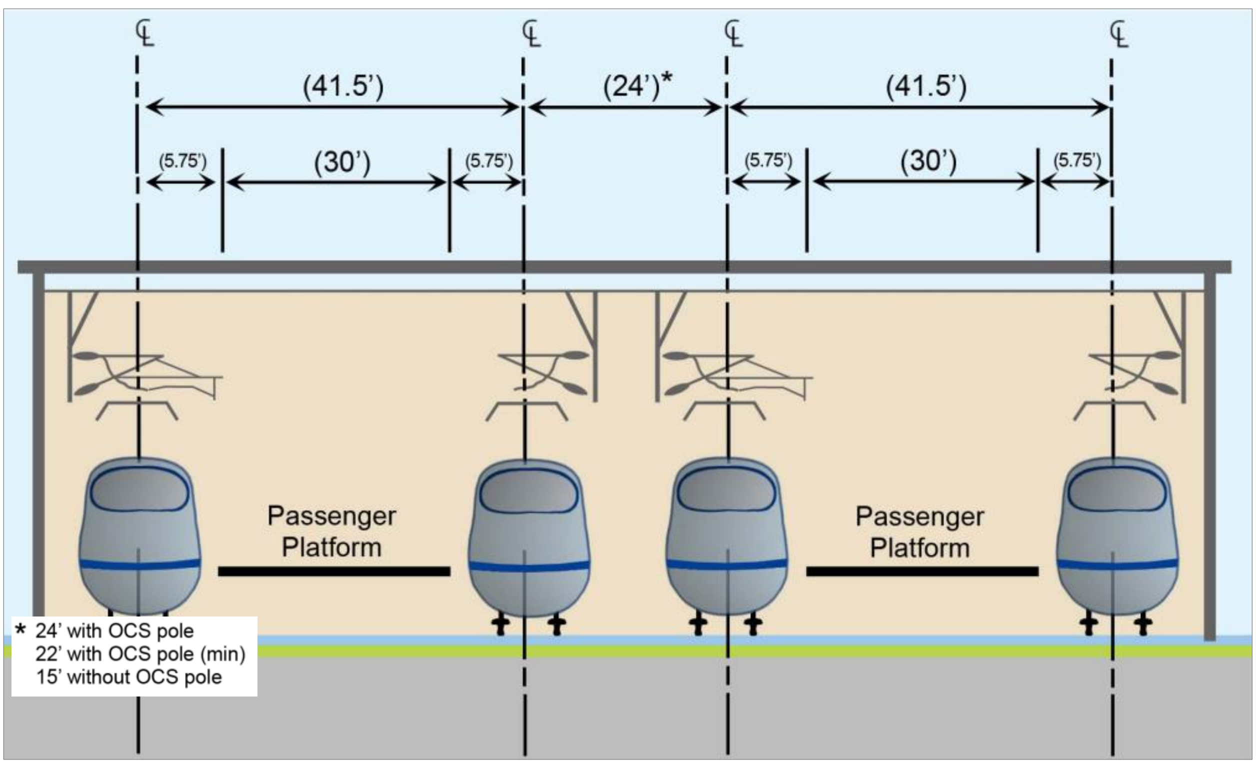
Station site improvements provide safe and efficient access for pedestrians, bicycles, transit, and vehicles to and from the station. Pick-up and drop-off zones offer direct and convenient access for taxis, ride hailing/sharing services, shuttles, transit, and private and commercial vehicles. Parking supply estimates are based on projected parking demand and local conditions. Station site plans are configured to support transit-oriented development (TOD). Ancillary facilities are unoccupied back-of-house spaces required for station operations and maintenance, including normal, back-up, and emergency power systems.



Source: Authority 2016a

FEBRUARY 2017

Figure 2-6 Two-Train Station Platform Cross Section



Source: Authority 2016a

FEBRUARY 2017

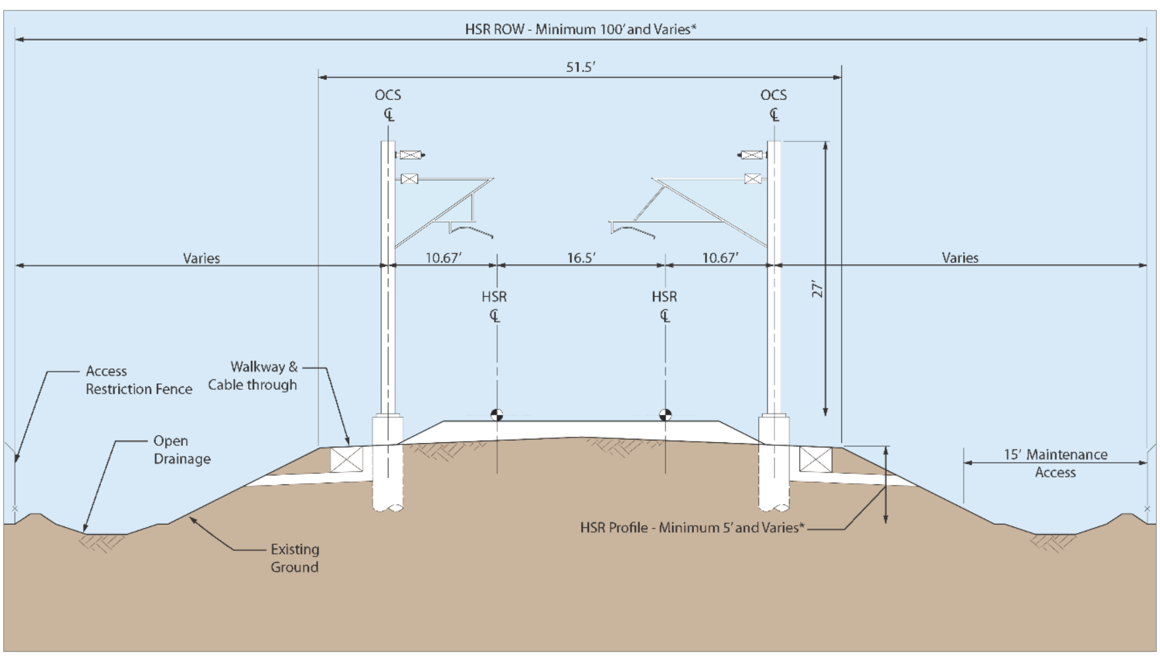
Figure 2-7 Four-Train Station Platform Cross Section

2.4.4 Infrastructure Components

The fully grade-separated, dedicated track infrastructure needed to operate HSR trains at speeds greater than 125 mph has more stringent alignment requirements than infrastructure for conventional trains. The project would use multiple track support types, or profiles: low, near-the-ground tracks would be at grade; higher tracks would be elevated on structure (viaduct) or on embankment; and below-grade tracks would be in open cut, retained cut, trench, or tunnel. Types of bridges that might be built include full channel spans, large box culverts, and, for wider river crossings, limited piers below the ordinary high-water mark of the established channel. Two tunnels would be constructed: one in the Morgan Hill to Gilroy Subsection and one in the Pacheco Pass Subsection. Flood lighting or night lighting would not be installed along the HSR guideway for track operations or maintenance, except for specific sited facilities such as maintenance and systems sites. Lighting would be used with closed-circuit televisions (CCTV). In spaces where lighting would be inappropriate due to environmental impacts, infrared receptors with infrared cameras or other appropriate technologies may be used. Temporary, portable lighting would be used at all locations when maintenance work is being undertaken to ensure sufficient light levels to undertake the work safely. The various track profiles are described below.

2.4.4.1 At-Grade Profile

An at-grade profile for both dedicated tracks and blended operations (Figure 2-8 and Figure 2-9) is best suited for areas where the ground is relatively flat, as in the Central Valley, and in rural areas where interference with local roadways is infrequent. The at-grade track would be built on compacted soil and ballast material (a thick bed of angular rock) to prevent subsidence or changes in the track surface from soil movement. To avoid potential disruption of service from floodwater, the rail would be constructed above the 100-year floodplain. The at-grade track profile would be 5 feet high to accommodate slight changes in topography, provide clearance for stormwater culverts and structures to allow water flow, and sometimes to provide safe crossings for wildlife movement.



DECEMBER 2017

Figure 2-8 Typical At-Grade Cross Section

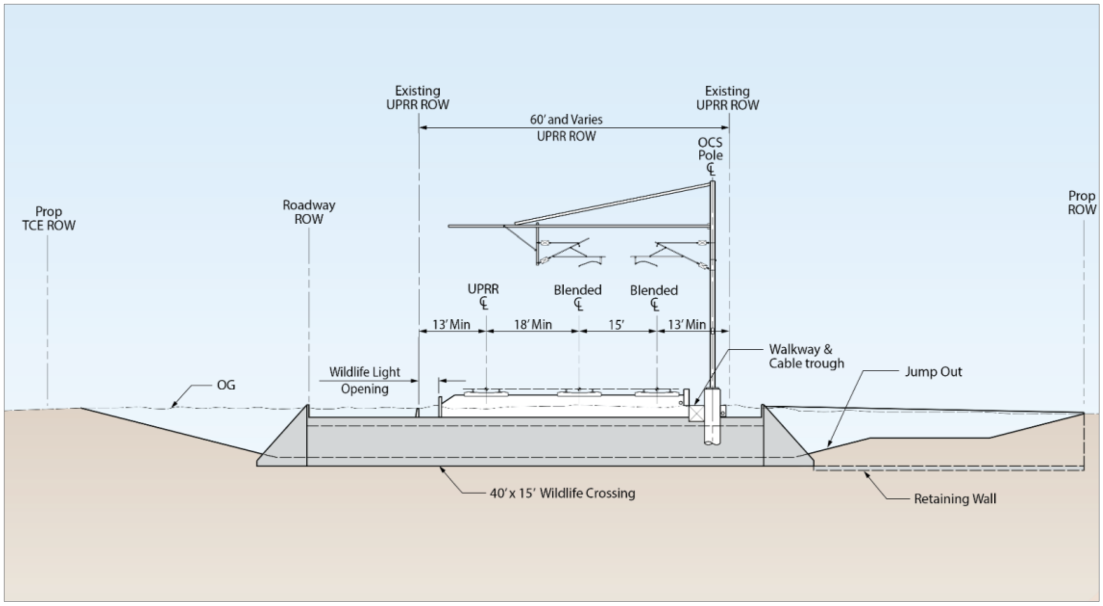


Figure 2-9 Typical At-Grade Cross Section for Blended System

2.4.4.2 Embankment Profile

Where the profile on earthen fill exceeds 5 feet in height, the profile is on embankment. Embankment of earthen fill is built with or without fill-retaining structures, depending on native ground stability and space available to place the HSR guideway. Retained-fill track profiles (Figure 2-10) are used where it is necessary to maintain a narrow right-of-way within a constrained corridor to minimize property acquisition. The guideway would be raised off the existing ground on a retained-fill platform made of reinforced walls, much like a freeway ramp.

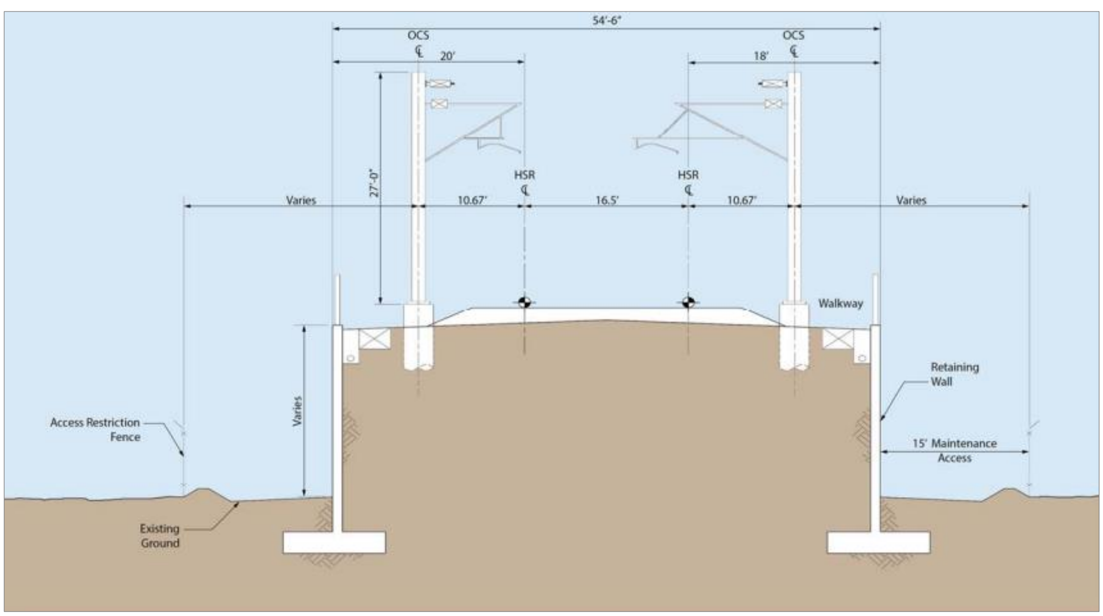
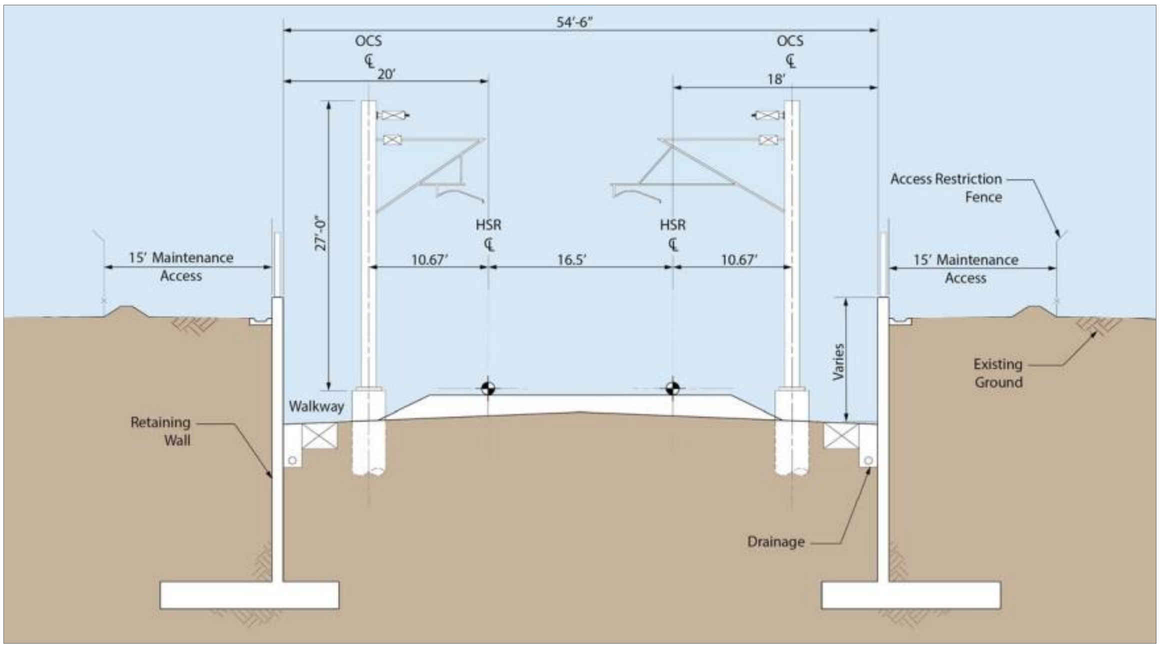


Figure 2-10 Typical Retained-Fill Cross Section

2.4.4.3 Retained-Cut Profile

Retained-cut track sections (Figure 2-11) are used where the rail alignment crosses under existing rail tracks, roads, or highways that are at grade. This profile type is used only for short distances in highly urbanized and constrained situations. In some cases, it is less disruptive to the existing traffic network to depress the rail under these crossing roadways. Retaining walls would typically be needed to protect adjacent properties from extensive cut slopes. Retained-cut engineering is also used for roads or highways where it is more desirable to depress the roadway under an at-grade HSR alignment.



FEBRUARY 2017

Figure 2-11 Typical Retained-Cut Cross Section

2.4.4.4 Covered Trench Profile

Covered trench track profiles (Figure 2-12) are used when the rail alignment crosses under existing railroad tracks, roads, or highways that are at grade. This profile type is used in highly urbanized and constrained situations. In some cases, it is less disruptive to the existing traffic network to depress the HSR alignment under these crossing roadways. Covered trench engineering is also used for roads or highways where it is more desirable to depress the roadway underneath an at-grade HSR alignment.

2.4.4.5 Tunnel Profile

Tunnel track profiles are used when the rail alignment traverses highly variable topography or highly constrained, densely developed urban situations. Tunnels reduce track distance and curvature needed to maintain acceptable vertical and horizontal grades in mountainous terrain. Tunnels may be used in dense urban settings to avoid land use or traffic disruptions. Figure 2-13 illustrates a typical twin-bored tunnel design, and Figure 2-14 illustrates the appearance of a typical tunnel portal. The tunnels east of Gilroy and through the Pacheco Pass would have long, flared portals and low blockage ratios and may also utilize in-tunnel cross-passages and vents to reduce noise pressure magnitudes and rates of rise to attenuate noise associated with the train entering or exiting the tunnels.

Tunnel portals and facilities would not be staffed. As specified in Technical Memorandum 2.4.6, *Tunnel Portal Facilities* (Authority 2010), lighting systems would be provided so that, during a train evacuation, illumination levels at the ground surface of the portal site area can be maintained at no less than 1.5 foot-candles (16 lux) in the following areas:

- Passenger assembly/rescue area
- Evacuation route from portal to rescue area
- Evacuation route from the train in the surface evacuation zone to the rescue area
- Emergency vehicle assembly and turnaround area
- Access road within the fenced portal site area

The emergency command post location (comprised of an emergency telephone, OCS motorized disconnect switch, portal lighting controls, and sufficient elements of a public address system to adequately support emergency responders) would be well lighted using site area lighting. Lighting layouts at tunnel portals would be as shown in Technical Memorandum 2.4.6, Appendix A, Infrastructure for Single Track Tunnel Portals, Typical Tunnel Portal Facilities (Authority 2010). Essential lighting would incorporate motion sensors, height limits, shielding, and downward-facing orientation where feasible.

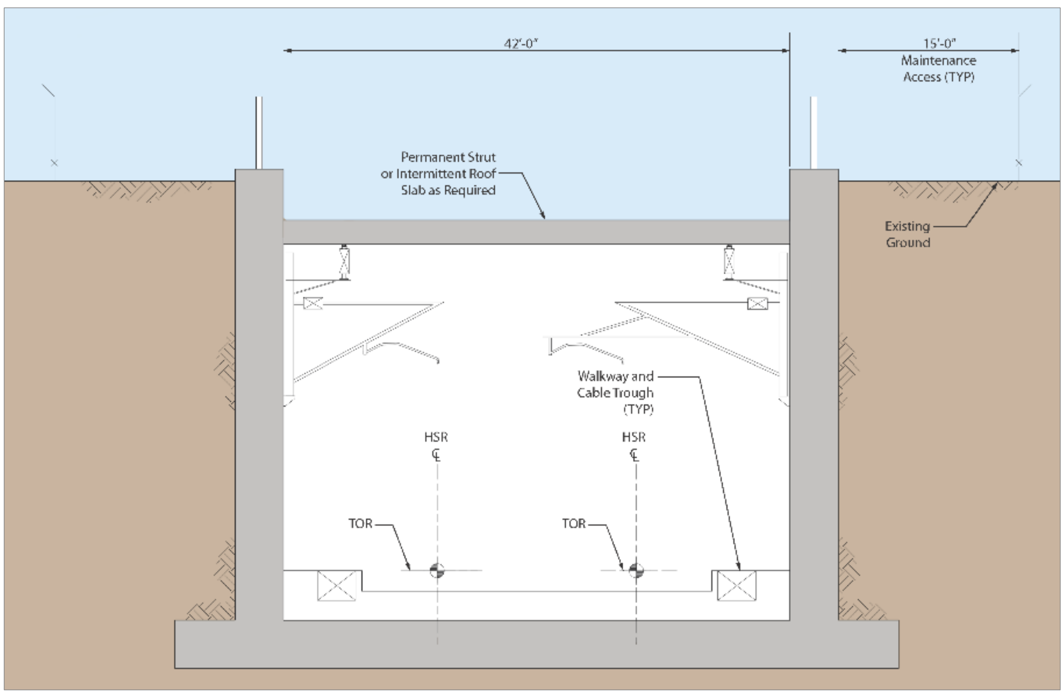


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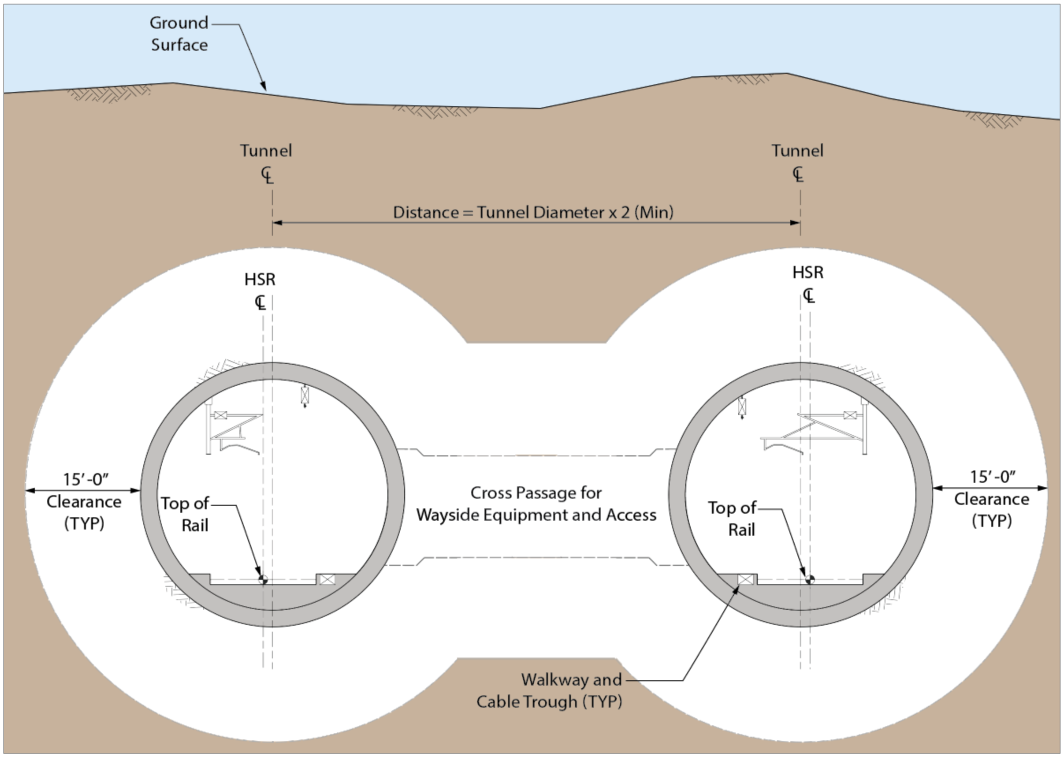
Figure 2-12 Typical Covered Trench Cross Section



APRIL 2017

Figure 2-13 Typical Tunnel Cross Section

Source: Authority and FRA 2017a

FEBRUARY 2017

Figure 2-14 Tunnel Portal

2.4.4.6 Elevated Profile

Elevated guideway track profiles (or viaducts) (Figure 2-15 and Figure 2-16) can be used in urban areas where extensive road networks must be maintained or to accommodate wildlife movement. An elevated guideway must have a minimum clearance of approximately 16.5 feet over roadways and approximately 24 feet over railroads. Pier supports are typically approximately 10 feet in diameter at the ground. Such structures could also be used to cross waterbodies; even though the trackway might be at grade on either side, the width of the water channel could require that a bridge be constructed to support a track contiguous with the at-grade guideway on either bank. Viaducts and bridge structures would only include lighting where needed for public safety, such as for street crossings, bicycle/pedestrian paths, and in urban areas.

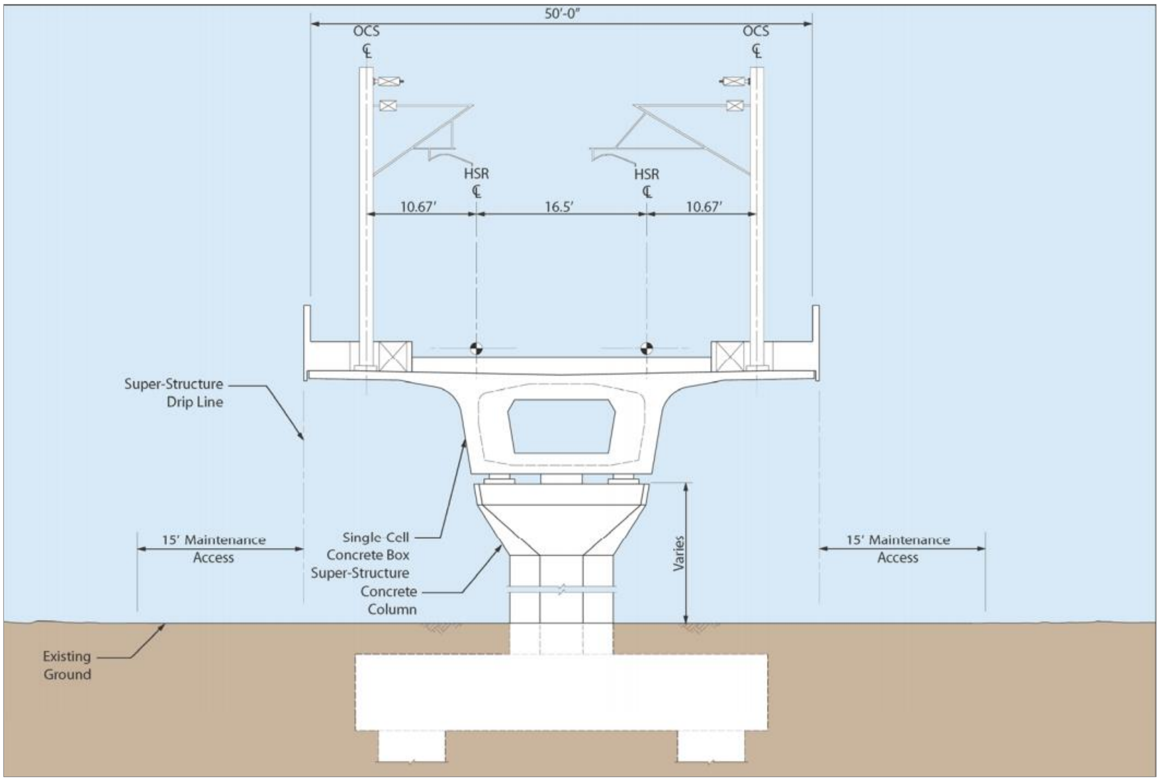


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Figure 2-15 Two-Track Viaduct

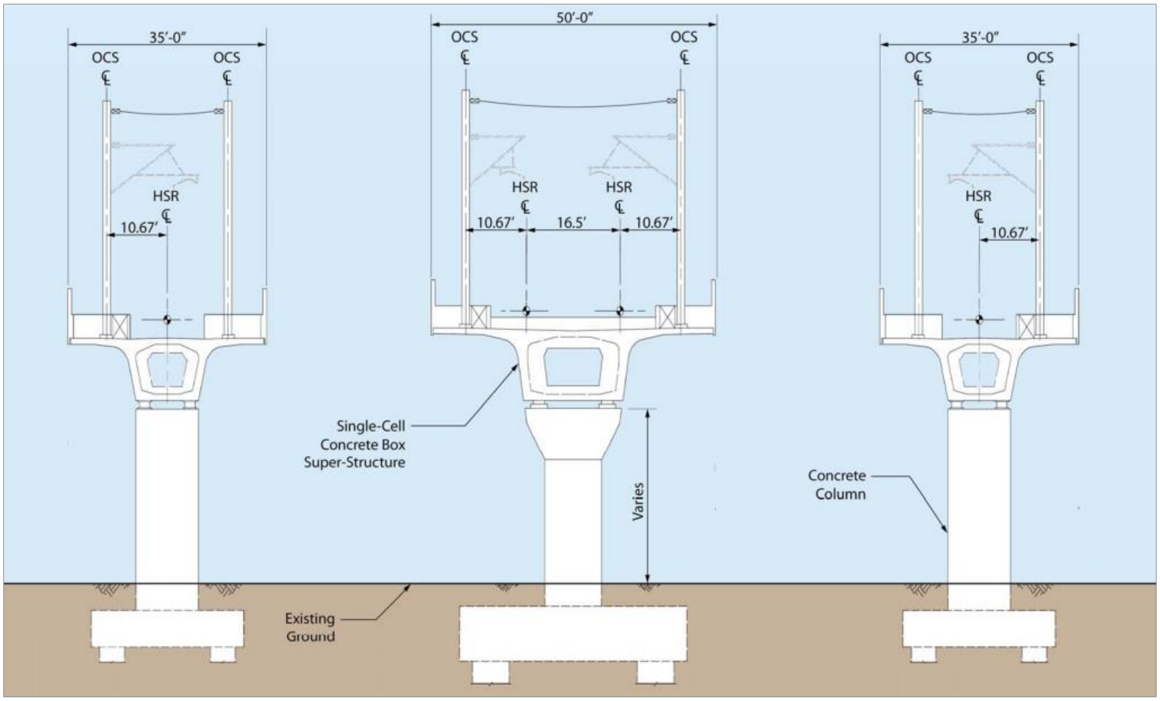

Figure 2-16 Four-Track Viaduct

2.4.4.7 Straddle Bents

Where an HSR elevated track profile crosses over a roadway or railway on a very sharp skew (degree of difference from the perpendicular), a straddle bent is used to place the piers outside the functional or operational limit of the roadway or railway.

As illustrated on Figure 2-17, a straddle bent is a pier structure that spans (or *straddles*) the functional or operational limit of a roadway, highway, or railway. Typical roadway and highway crossings that have a smaller skew angle (i.e., approaching the perpendicular) generally use intermediate piers in medians and span the functional right-of-way. However, for larger skew-angle crossing conditions, median piers would result in excessively long spans that are not feasible. Straddle bents that clear the functional right-of-way can be spaced as needed (typically 110 feet apart) to provide feasible span lengths for bridge crossings at larger skew angles. Straddle bents would only include lighting where needed for public safety, such as for street crossings, bicycle/pedestrian paths, and in urban areas.

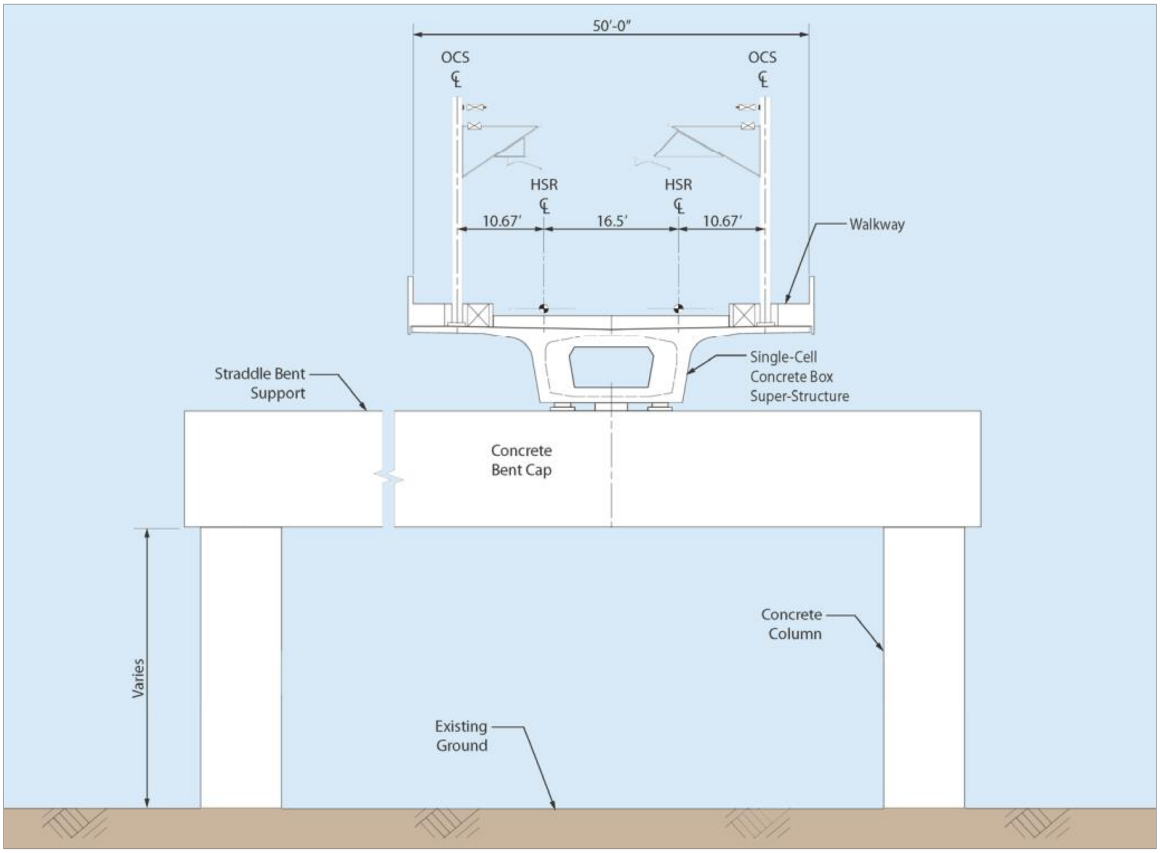

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Figure 2-17 Typical Straddle Bent Cross Section

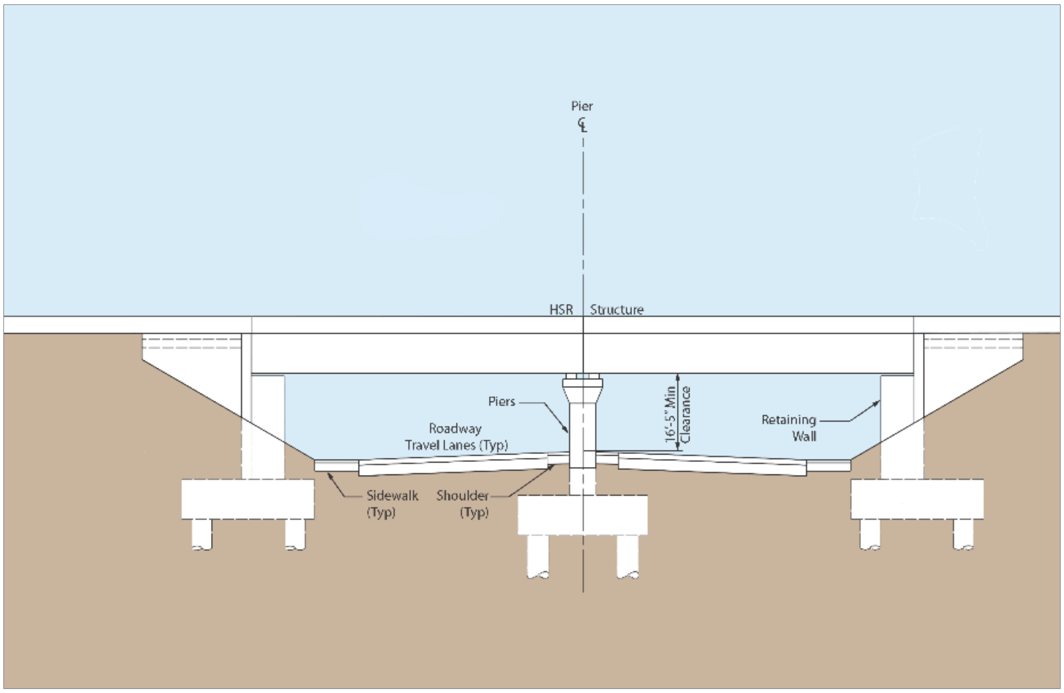
2.4.5 Grade Separations

Except in blended system areas (i.e., Alternative 4 or San Francisco to San Jose Project Section), the HSR system would consist of a fully grade-separated and access-controlled guideway. Unlike existing passenger service in the RSA (e.g., Caltrain), HSR would not share its rails with freight trains. Instead, HSR would operate in a shared right-of-way with two electrified tracks alongside one conventional freight track. For grade separations, the following would apply where consistent with safety, security, and operational requirements:

- Flood lighting or night lighting would not typically be installed for track operations or maintenance.
- Temporary, portable lighting would be used for maintenance.
- Essential lighting (for security or worker safety) would incorporate motion sensors, height limits, shielding, and downward-facing orientation where feasible.
- Roadway lighting would be provided based on roadway standards.

The following list describes possible scenarios for HSR grade separations at roadways, irrigation and drainage facilities, and wildlife crossings.

Elevated HSR road crossings—In urban areas, it may be more feasible to raise the HSR as illustrated on Figure 2-18. This is especially relevant in downtown urban areas where an elevated HSR guideway would minimize impacts on the existing roadway system. In instances where it is necessary to keep the profile of the elevated HSR guideway beneath certain height requirements, existing roadways would be moderately depressed (15 to 20 feet) to maintain vertical clearance requirements for vehicles.



APRIL 2017

Figure 2-18 Elevated HSR Road Crossing

Roadway overcrossings—Many local roadways and state routes (SR) currently cross Union Pacific Railroad (UPRR) tracks at grade. Where such roadways intersect the proposed HSR alignment, they would be realigned and reconstructed to maintain their function. Figure 2-19 illustrates how a roadway would be grade-separated over both the HSR and the existing railroad. Similar conditions occur where an at-grade HSR alignment crosses rural roads used by small communities and farm operations. Where roads are perpendicular to the proposed HSR, overcrossings are planned every 2 miles to provide continued mobility for local residents and farm operations, but overcrossings may be provided at shorter intervals as warranted by existing roadway infrastructure. Some roads may be closed in the intervals between grade-separated crossings. These modifications are identified on project maps, and detailed lists are provided in Appendix 2-A. Roadway overcrossings would have two 12-foot-wide lanes. The shoulders would be 4 to 10 feet wide, depending on average daily traffic volumes. The paved surface for vehicles would therefore be 32 to 44 feet wide. Minimum clearance would be 27 feet above the HSR guideway. Specifications are based on the appropriate county or city road standards.

Roadway undercrossings—HSR alignments may require undercrossings for the HSR to travel over roadways. Figure 2-20 illustrates how a roadway would be grade-separated below the HSR guideway.

Irrigation and drainage facilities—The HSR guideway would affect some existing drainage and irrigation facilities. Depending on the extent of the effect, existing facilities would be modified, improved, or replaced as needed to maintain existing drainage, irrigation, and operational access functions and to support HSR drainage requirements.

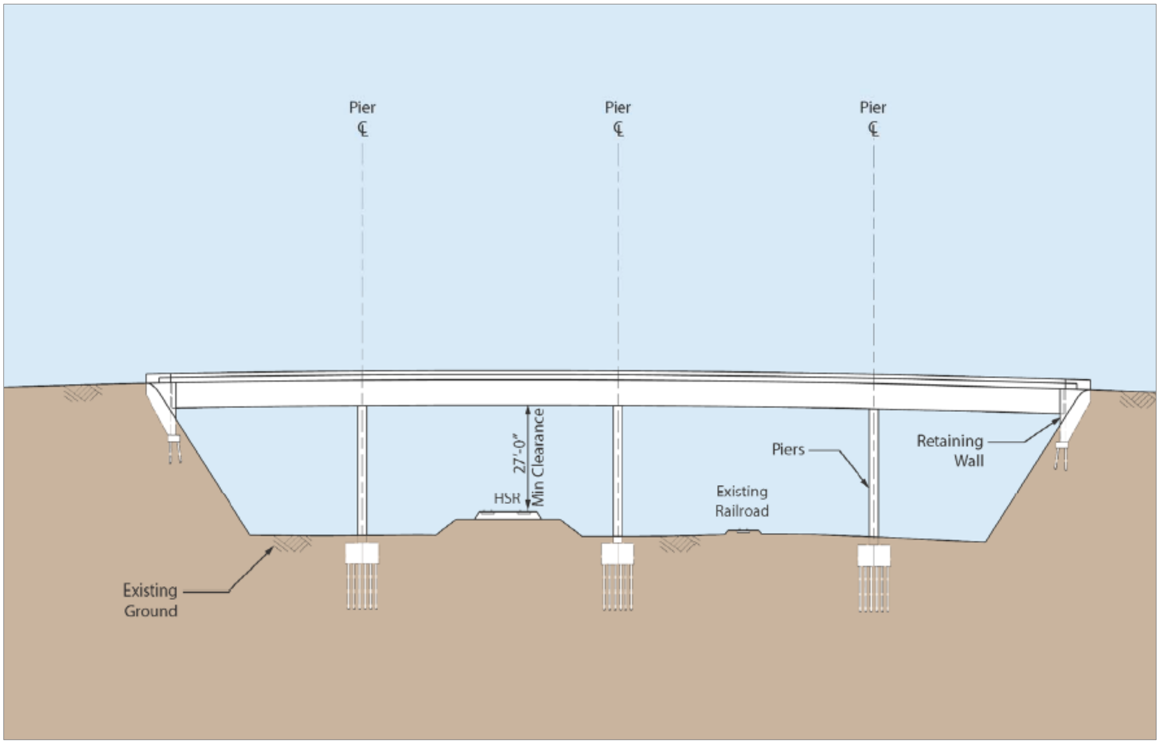


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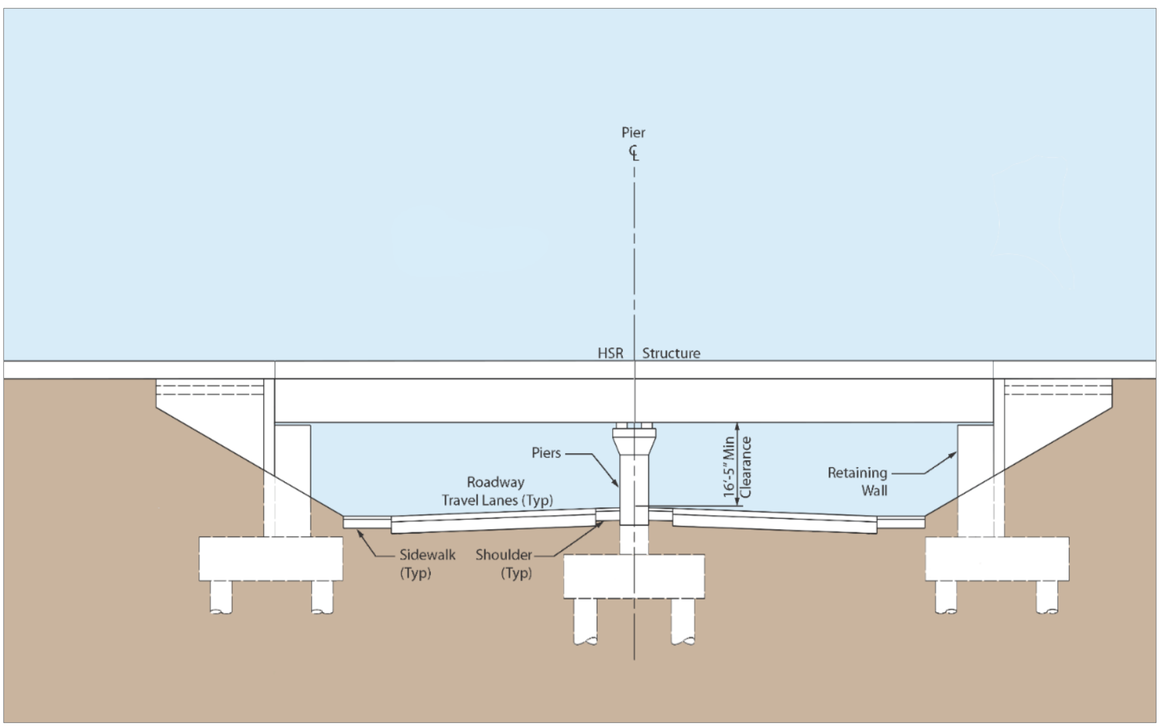
Figure 2-19 Road Overcrossing



FEBRUARY 2017

Figure 2-20 Typical Cross Section of Roadway Grade-Separated beneath HSR Guideway

Wildlife undercrossing structures—Wildlife undercrossings are modified culverts, perpendicular to the alignment, in the embankment that supports the HSR tracks. These features are illustrated on Figure 2-21 and Figure 2-22. The preliminary project design includes 96 wildlife undercrossing structures at roughly equal spacing along the embankment where the alignment is near ecologically sensitive areas.

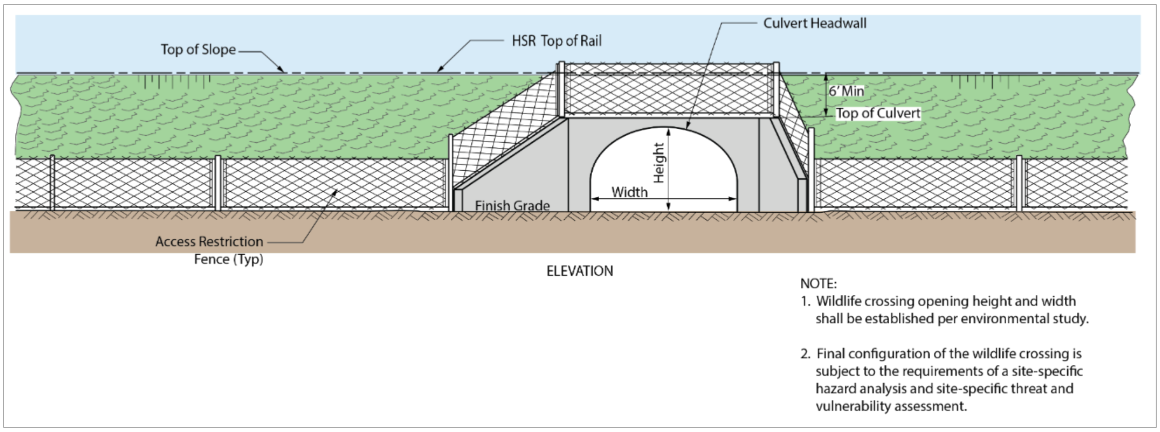


Figure 2-21 Typical Cross Section of Wildlife Crossing Structure

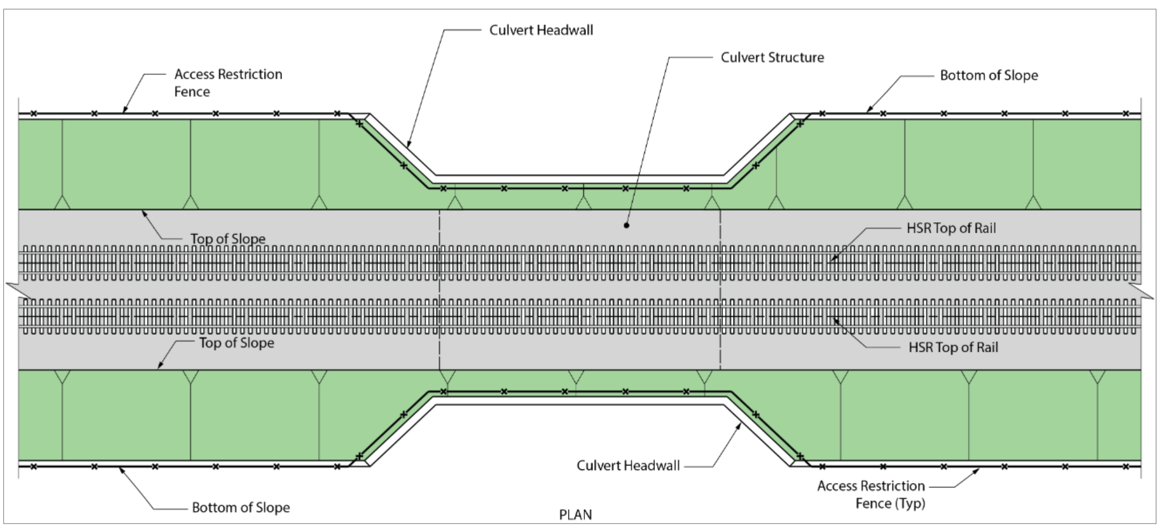


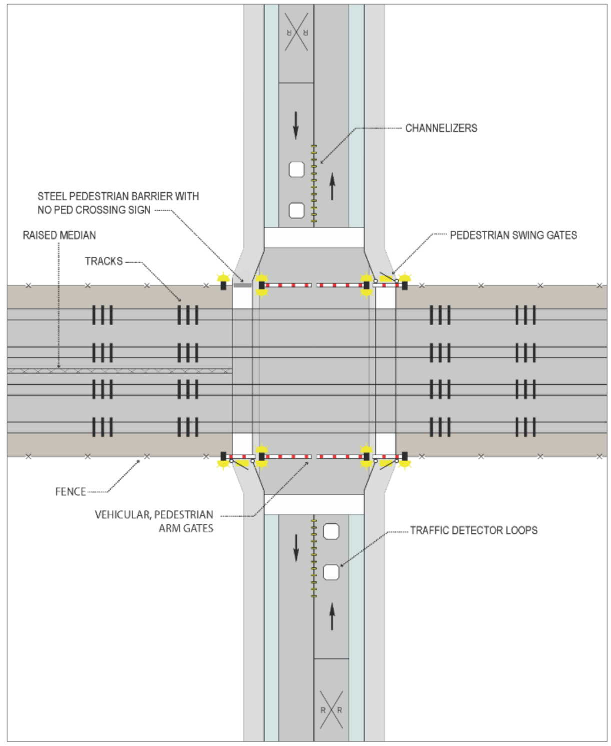
Figure 2-22 Typical Plan View of Wildlife Crossing Structure

The wildlife undercrossing structures differ in dimensions (width, height, and length) by location. Wildlife crossings are proposed in three subsections: Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley. Standard HSR wildlife crossing structures in the Morgan Hill and Gilroy Subsection are 30 to 40 feet wide, 8 to 11 feet high, and 180 to 220 feet long. Wildlife crossings proposed in Pacheco Pass and the San Joaquin Valley Subsections must be a minimum of 10 feet wide and 3 feet high with an openness factor no less than 0.41 and no more than 1.5 feet below grade (half of the minimum vertical clearance). An *openness factor*, or *openness index*, is determined by multiplying the width and height of the crossing structure, then dividing the product by the length of the crossing. Generally, wildlife undercrossings are known to function best the greater the width and height and the shorter the length. For example, the Authority has incorporated viaducts (elevated sections of the rail with a very high openness factor) into the project in ecologically sensitive areas, such as the Grasslands Ecological Area (GEA) in Merced County and the Soap Lake floodplain in southern Santa Clara and northern San Benito Counties. In some instances, viaduct structure is necessary to meet the requirements of wildlife crossing. Other structure designs (e.g., wildlife bridges, tunnels through berms) were deemed ineffective by both the Authority and wildlife stakeholders.

The analysis that determined the number, location, and design of wildlife undercrossings is described in the *San Jose to Merced Project Section: Wildlife Corridor Assessment Report* (WCA) (Appendix C of the *Biological and Aquatic Resources Technical Report* [Authority 2019b]). The WCA analyzes impacts on local movement corridors and recommends design refinements, including wildlife undercrossings, as necessary and as feasible to minimize impacts on wildlife movement. The WCA was informed by consultation with stakeholders and agency staff. The assessment identified ecologically sensitive areas for wildlife movement; locations where wildlife movement may be constrained for representative species; the appropriate location and sizes of dedicated crossings; and measures to avoid, minimize, or mitigate the effects of construction and operations. Section 3.7 of this Final EIR/EIS summarizes the findings of the WCA, describes modifications to the standard wildlife crossing structures where necessary, and proposes additional mitigation measures necessary to facilitate wildlife movement, to the extent such measures are feasible. These measures include additional design considerations, dedicated wildlife crossing structures, and compensatory mitigation.

2.4.6 At-Grade Crossings

Consistent with FRA safety guidelines for HSR systems with operating speeds of up to 110 mph, the blended, at-grade system would implement safety improvements at the at-grade crossings to create a “sealed corridor” that would reduce conflicts with automobiles, bicyclists, and pedestrians. Safety improvements would include installing four-quadrant gates extending across all lanes of travel and median separators to channelize and regulate paths of travel. These gates would prevent drivers from traveling in opposing lanes to avoid the lowered gate arms. Pedestrian crossing gates would be constructed aligned with the vehicular gates (i.e., parallel to the tracks) on both sides of the roadway. A total of 29 such four-quadrant gates are contemplated under Alternative 4. Details of these crossings are provided in Appendix 2-A. A representative schematic of a four-quadrant gate at-grade crossing is illustrated on Figure 2-23. Lighting at at-grade intersections would comply with roadway standards as well as safety standards for the quad gates.



Note: Location of proposed four-quadrant gate at-grade crossings can be found in Appendix 2-A, Table 3

JULY 2019

Figure 2-23 Typical Four-Quadrant Gate At-Grade Crossing

At four crossings (Blanchard Road, Palm Avenue, and Live Oak Avenue in Coyote Valley and Bloomfield Avenue south of Gilroy) within identified wildlife crossing corridors, additional features would be added at the grade crossings to deter wildlife from encroaching into the fenced guideway. These features would be placed across the guideway between the access control fencing and between the tracks as a deterrent to wildlife entering the track bed.

For at-grade crossings from south of Tamien Station in San Jose to south of Gilroy, the HSR project would add the following additional signal improvements:

- Addition of railroad preemption connected to adjacent traffic signals where not currently present (6): San Jose (Blanchard Road); Coyote Valley (Palm Avenue); Gilroy (Lewis Street, 6th Street, 7th Street, Luchessa Avenue)
- Addition of new traffic signals where not currently present and railroad preemption connected to the new signals (4): San Martin (Church Avenue), Gilroy (Rucker Avenue, Buena Vista Avenue, Cohansey Avenue)

Control of road traffic signals would be integrated with the HSR ATC system at those grade crossings where there are road traffic control systems that regulate the flow of traffic across rail/road crossings. This can be carried out through a one-way data exchange from the rail ATC system to road traffic control system. When the crossing barriers are triggered to operate, information is sent to the road system to ensure traffic signals are set to red prohibiting any road traffic from being directed towards or across the rail crossing. Once the barriers are released following the passage of a train a signal is sent to the road traffic system allowing it to enable the flow traffic across the crossing again. Data is not sent from the road system to the rail ATC system because the road traffic signals should never trigger the lowering or raising of rail crossing barriers.

A further safety improvement for at-grade crossings from south of Tamien Station to south of Gilroy would be the addition of obstacle detection. Obstacle detection usually takes the form of local radar and sometimes light detection and ranging (LIDAR) (i.e., low-level radar detection using lasers) installed at each crossing. The detection system uses radio waves (radar) and LIDAR to scan the area of the crossing road/rail interface to detect the presence or absence of road vehicles, people, animals, and other objects, which could otherwise obstruct the crossing and cause a potential collision with an oncoming train. Obstacle detection would be integrated into the ATC system so that when an approaching train is requesting movement authority from the ATC system to proceed along the railroad through a section containing crossings, the obstacle detection at each crossing in the section reports back through the ATC system that the crossing is clear of obstacles. Only when each crossing in that section has positively confirmed that (a) the barriers are down and (b) the crossing is clear of obstacles, is the train given movement authority by the ATC system to proceed.

For the portion of the alignment within the Caltrain corridor from south of Tamien Station to Scott Boulevard, as part of Alternative 4, the Authority would include the following features at the at-grade crossings at West Virginia Street and Auzerais Avenue:

- Installation of four-quadrant gates with new train detection and control equipment
- Addition of railroad preemption connected to adjacent traffic signals and integration with Caltrain signal operations, if feasible

Because these two at-grade crossings are within the Caltrain corridor, it is possible that railroad preemption (if feasible) may be installed by PCJPB as part of its other work; in this case, the Authority would fund the improvement and PCJPB would install and operate.

2.4.7 Traction Power Distribution

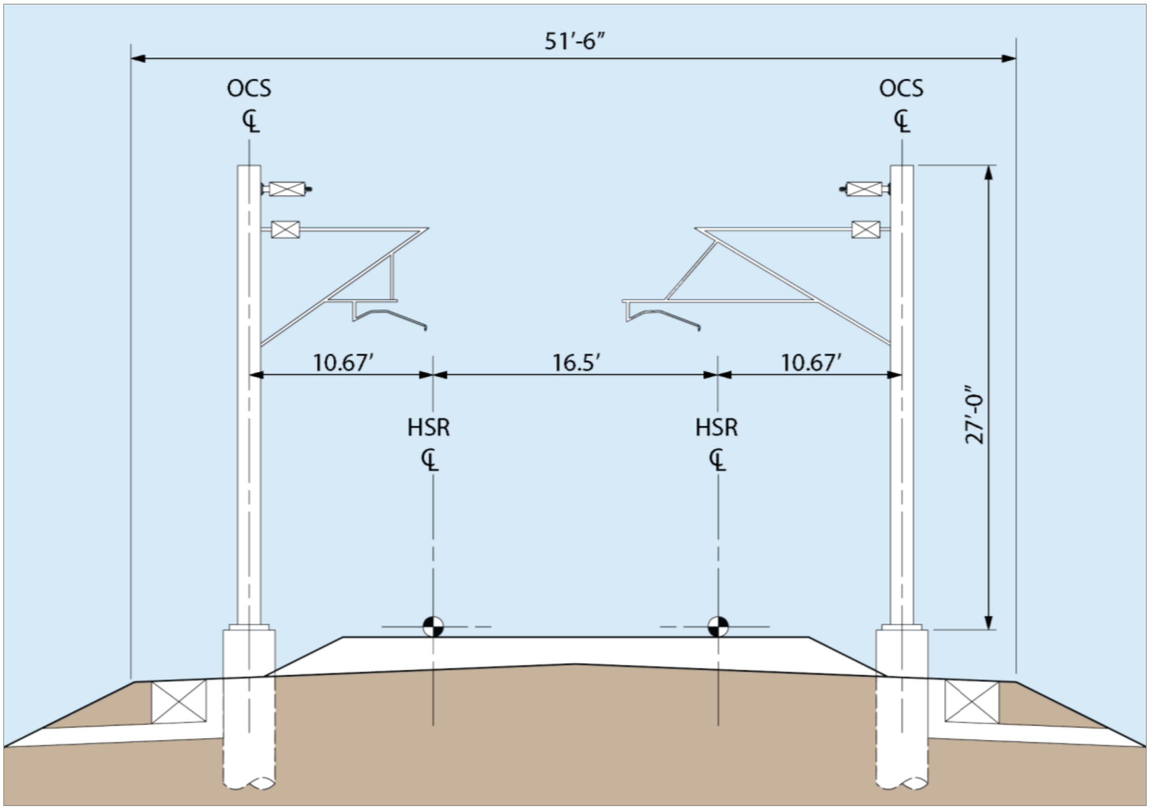
The HSR system would not entail construction of a separate power source, although it would require the extension of underground or overhead power transmission lines to a series of traction power substations (TPSS) positioned along the HSR corridor. These TPSSs are needed to even out the power feed from the power supply company to the train system. Working in coordination with power supply companies and in accordance with design requirements, the Authority has identified frequency and right-of-way requirements for these facilities. Trains would draw electric power from either an OCS (Figure 2-24) or an OCS strain gantry (Figure 2-25).

The OCS would consist of a series of mast poles approximately 23.5 feet higher than the top of the rail, with contact wires suspended from the mast poles, 17 to 19 feet above the top of the rail. The train would have an arm, called a pantograph, to maintain contact with this wire, providing power to the train. The mast poles would be spaced approximately every 200 feet along straight portions of the track, and as close as every 70 feet in tight-turn track areas. The OCS would be connected to the TPSSs. The power supply would consist of a 2- by 25-kilovolt (kV) OCS for all electrified portions of the statewide system. In some instances, a strain gantry would be used. A *strain gantry* involves a cantilevered OCS in areas where the right-of-way is narrow and only one mast pole can be accommodated.

For all power facilities, the following would apply where consistent with safety, security, and operational requirements:

- Traction power facilities sites would not be staffed but would be lit 24 hours a day for security.
- Lighting would incorporate motion sensors, height limits, shielding, and downward-facing orientation where feasible.

Lighting would be used with CCTVs. In spaces where lighting is inappropriate due to environmental impacts, infrared receptors with infrared cameras or other appropriate technologies may be used.



FEBRUARY 2017

Figure 2-24 Typical Cross Section of Overhead Contact System

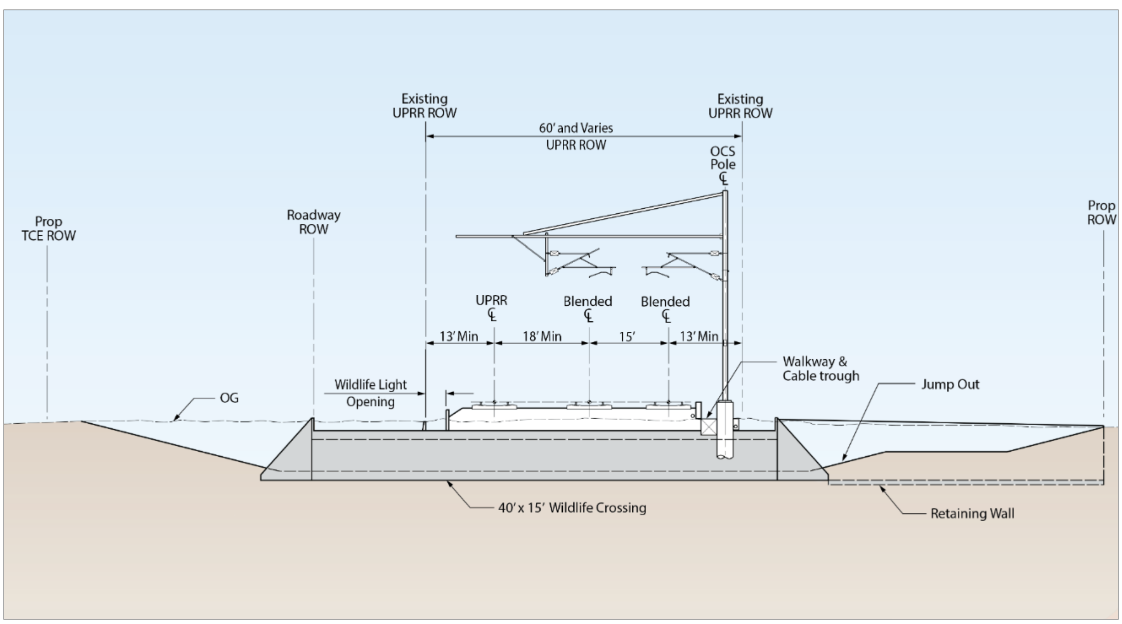


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Figure 2-25 Typical Cross Section of OCS Strain Gantry

2.4.7.1 Traction Power Substations

Based on the HSR system's estimated power needs, TPSSs would each encompass approximately 32,000 square feet (200 feet by 160 feet) at approximately 30-mile intervals. Figure 2-26 illustrates a typical TPSS.

Source: Authority and FRA 2017a FEBRUARY 2017

Figure 2-26 Traction Power Substation

The project would entail construction of three TPSSs, referred to as Site 3-San Jose, Site 4–tGilroy, and Site 5–O'Neill, at locations where high-voltage power lines cross the HSR alignment. Under Alternative 4, the Site 3–San Jose TPSS would not be required because equipment installed as part of the Peninsula Corridor Electrification Project (PCEP) would be used. Each TPSS would have two 115/50-kV or 230/50-kV single-phase transformers, both of which would be rated at 60 megavolt amperes. The autotransformer feed system would step down the transmission voltage to 50 kV (phase-to-phase), with 25 kV (phase-to-ground) to power the traction power distribution system. TPSSs would require a buffer area for safety purposes. The TPSS and associated feeder gantry (Figure 2-26) could be screened from view with a perimeter wall or fence. Each TPSS site would have a 20-foot-wide access road (or easement) from the street access point to the protective fence perimeter. Each site would require a parcel of up to 2 acres. Each TPSS would include an approximately 450-square-foot (18 by 25 feet) control room.

2.4.7.2 Traction Power Switching and Paralleling Stations

Traction power switching and paralleling stations work together to balance the electrical load between tracks and to switch power off or on to either track in the event of an emergency. Traction power switching stations (Figure 2-27) would be required at approximately 15-mile intervals, midway between the TPSSs. Each traction power switching station would encompass approximately 14,400 square feet (160 by 90 feet).

Traction power paralleling stations (Figure 2-28) would be required at approximately 5-mile intervals between the traction power switching stations and the TPSSs. Each traction power paralleling station would encompass approximately 9,600 square feet (120 by 80 feet), and each would include an approximately 450-square-foot (18 by 25 feet) control room. The traction power switching and paralleling stations and associated feeder gantries could be screened from view with perimeter walls or fences.

Source: Authority and FRA 2017a FEBRUARY 2017

Figure 2-27 Traction Power Switching Station

Source: Authority and FRA 2017a FEBRUARY 2017

Figure 2-28 Traction Power Paralleling Station

2.4.7.3 Backup and Emergency Power Supply Sources for Stations and Facilities

During normal system operations, the local utility would provide power service through the TPSSs. Should the flow of power be interrupted, the system would automatically switch to a backup power source through use of an emergency standby generator, an uninterruptable power supply, or a direct current battery system.

Permanent emergency standby generators for the project would be located at passenger stations and at terminal layup or storage and maintenance facilities. These standby generators must be tested (typically once a month) in accordance with National Fire Protection Association 110/111 to ensure their readiness for backup and emergency use. If needed, portable generators could also be transported to other trackside facilities to reduce the potential impacts of power failures on system operations.

2.4.7.4 Electrical Interconnection

As previously described, each TPSS would have two 115/50-kV or 230/50-kV single-phase transformers. These transformers would interconnect the TPSS to two breaker-and-a-half bays[6] constructed at a new utility switching station or within the fence line of an existing Pacific Gas and Electric Company (PG&E) facility via a short section of 230-kV transmission or 115-kV power lines (tie-line). Per Authority requirements, the proposed interconnection points would need redundant transmission (i.e., double-circuit electrical lines) from the point of interconnection, with each interconnection connected only to two phases of the transmission source. A new utility switching station would encompass approximately 35,200 square feet (160 by 220 feet) and include an approximately 975-square-foot (15 by 65 feet) control building, 525-square-foot (15 by 35 feet) battery building and, if required, a retention basin. The utility switching station could be screened from view with perimeter walls or fences. Communication facilities (i.e., redundant [two underground or one underground and one overhead on existing power structures] fiber optic lines) would also be required to support the electrical interconnections connecting TPSSs to new utility switching stations or to existing PG&E facilities, typically within tie-line/utility corridors.

2.4.8 Network Upgrades

A 2016 technical study report completed by PG&E determined what network upgrades of existing infrastructure would be required to meet the projected power demands of the 345-mile portion of the HSR system within PG&E's service territory. The report (PG&E 2016) assumed maximum load during commercial operation at each TPSS location and normal system operation of all substations and transformers in its service area. The Authority is reviewing study results and planning to undertake only those upgrades that are required for operation of the HSR system as specified. These upgrades would not result in any unnecessary betterment of PG&E infrastructure. According to the PG&E report, the network upgrades required to support this project include the reconductoring of two existing 115-kV power lines co-located on the same structures and collocation of new power lines either on existing poles or underground where no poles exist. Lighting of network upgrades would comply with PG&E and Federal Aviation Administration (FAA) standards, for example for high power lines and towers. FAA requires structures above 200 feet above ground level to be marked with lights or paint. FAA-approved obstruction lighting may be red or white, flashing or steady-burning (FAA 2018). Other lighting would be temporary, portable, and as needed for maintenance. All network upgrades would be implemented pursuant to California Public Utilities Commission General Order 131-D. Appendix 2-F provides background information and a more detailed description of required components.

2.4.9 Signaling and Train-Control Elements

A computer-based, enhanced ATC system would control the trains. The enhanced ATC system would comply with the FRA-mandated positive train control (PTC) requirements, including safe separation of trains, over-speed prevention, and work zone protection. This system would use a wireless-based communications network that would include a fiber optical backbone and communications towers at intervals of approximately 1.5 to 3 miles, depending on the terrain and selected radio frequency. Signaling and train control elements within the right-of-way would include 10- by 8-foot communications shelters or signal huts/bungalows that house signal relay components and microprocessor components, cabling to the field hardware and track, signals, and switch machines on the track. Communications radio towers in these facilities would use a 6- to 8-foot-diameter 100-foot-tall pole. The communications facilities would be sited in the vicinity of track switches and would be grouped with other traction power, maintenance, station, and similar HSR facilities where possible. Where communications towers cannot be co-located with TPSSs or other HSR facilities, the communications facilities would be sited near the HSR corridor in a fenced area approximately 20 by 15 feet. ATC and standalone radio sites would not be staffed. Lighting would incorporate motion sensors, height limits, shielding, and downward-facing orientation where feasible while still meeting safety, security, and operational criteria. Fencing

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[6] A *breaker and a half* is a common design of overlapping circuits and circuit breakers to provide system reliability.

around signaling and train control facilities may be screened. Lighting would be used with CCTVs. In spaces where lighting is inappropriate due to environmental impacts, infrared receptors with infrared cameras or other appropriate technologies may be used. Figure 2-29 illustrates a radio tower site.

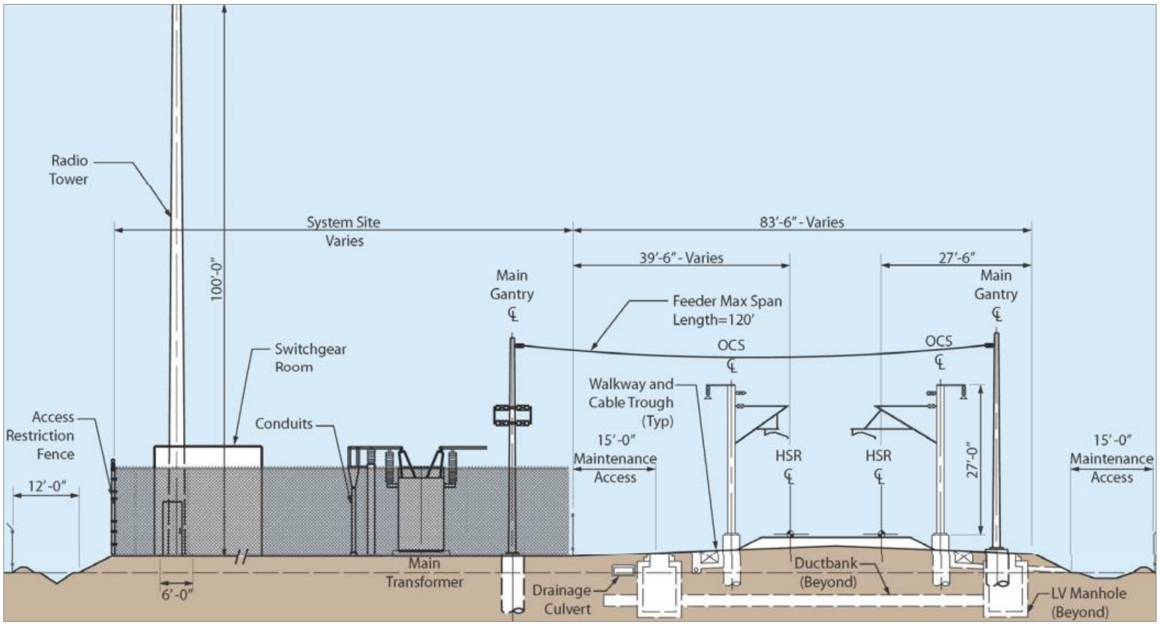


Figure 2-29 Typical Cross Section of At-Grade Profile with Traction Power, Signaling, and Train-Control Features

2.4.10 Track Structure

The track structure would consist of either a direct fixation system (with track, rail fasteners, and slab) or ballasted track, depending on local conditions and decisions to be made later in the design process. Ballasted track requires more frequent maintenance than slab track, as described below, but is less expensive to install.

The analyses in the environmental review documents assume that direct fixation would be used for track supported by structures longer than 1,000 feet and ballast for track supported by earthwork or structures shorter than 1,000 feet. A subsequent environmental review would be conducted if there is a significant change in the type of track structure following additional design and technical review.

2.4.11 Maintenance Facilities

The HSR system includes four types of maintenance facilities; this project section would have a maintenance of way facility (MOWF) and a maintenance of way siding (MOWS). A number of overnight layover and servicing facilities (MOWS) would be distributed throughout the system. In addition, the system would have a single heavy maintenance facility (HMF), which would be in the Central Valley outside of this project, as well as two light maintenance facilities (LMF). More information on the HMF sites considered can be found in the Merced to Fresno Section Final EIR/EIS and Fresno to Bakersfield Section Final EIR/EIS (Authority and FRA 2012, 2014).

2.4.11.1 Maintenance of Way Facility

MOWFs provide for equipment, materials, and replacement parts storage as well as support quarters and staging areas for the HSR system subdivision maintenance personnel. Each subdivision would cover about 150 miles; the MOWF would be centrally located in the subdivision.

The MOWF would occupy a linear site adjacent to the HSR mainline tracks with a maximum width of seven tracks and would encompass approximately 50 to 75 acres (including tracks entering and exiting the facility). One MOWF would be constructed for the project at a location south or east of Gilroy. For lengths of mainline track that are relatively distant from stations with refuge tracks or MOWFs, an MOWS would be sited to provide temporary storage of work trains as they perform maintenance in the vicinity of the track. The track would be approximately 1,600 feet long and would be connected to the main line. Access by road for work crews would be required, along with enough space to park work crew vans while working from the site and to drive the length of the track. The track and access area would be within the fenced and secure area of the HSR line. Pole-mounted floodlights 50 to 100 feet tall would provide lighting for buildings, pathways, and trackwork. Fixed lighting sources would be designed to direct lighting downward, minimizing light spillover, but the 24-hour operation of the facilities would require a minimum level of lighting for work safety and security. Lighting would incorporate motion sensors, height limits, shielding, and downward-facing orientation where feasible while still meeting safety, security, and operational criteria. Lighting would be used with CCTVs. In spaces where lighting is inappropriate due to environmental impacts, infrared receptors with infrared cameras or other appropriate technologies may be used. Fencing around the MOWF would be screened.

2.4.11.2 Maintenance of Way Siding

MOWSs support maintenance activities by providing a location for layover of equipment and temporary storage of materials such as ballast and other bulk materials as well as secured storage for non-bulk materials. The goal is to reduce travel time required to arrive at the maintenance location by providing access via rail, thereby enhancing the efficiency and productivity of these activities. The project would include an MOWS near Turner Island Road in the San Joaquin Valley Subsection. Lighting at the MOWS would only be used when work is being undertaken at the siding; it is not expected that these would be in use all day every day. Pole-mounted floodlights 50 to 100 feet tall would provide lighting for buildings, pathways, and trackwork. Fixed lighting sources would be designed to direct lighting downward, minimizing light spillover, but the 24-hour operation of the facilities would require a minimum level of lighting for work safety and security. Lighting would incorporate motion sensors, height limits, shielding, and downward-facing orientation where feasible while still meeting safety, security, and operational criteria. Lighting would be used with CCTVs. In spaces where lighting would be inappropriate due to environmental impacts, infrared receptors with infrared cameras or other appropriate technologies may be used. Fencing around the MOWS would be screened. The MOWS is described in Section 2.6.2.2, Summary of Design Features.

2.5 Alternatives Considered during Alternatives Screening Process

The Authority has conducted the environmental review process for the project consistent with the programmatic decisions described in Section 1.1.2. A detailed presentation regarding the alternatives screening process is presented in Appendix 2-I.

The design options that are evaluated in this Final EIR/EIS were selected through the alternatives development and evaluation (screening) process described in Appendix 2-I. Table 2-3 shows the overall results of the alternatives screening process, and Figure 2-30 illustrates the process graphically.

Table 2-3 San Jose to Carlucci Road: Design Options Considered

Design Option	Decision		Reasons for Elimination (P = Primary; S = Secondary)							Environmental or Other Concerns
	Carried Forward	Withdrawn	Constructability	Cost	Community Effects (e.g., displacement, noise, visual)	Waters/Wetlands	Park Resources (Section 4f)	Other Natural or Cultural Resources	Incompatibility with Other Rail	
San Jose Diridon Approach Subsection										
1. Viaduct to Scott Blvd	X									Business displacement; biological, cultural, and parkland resources; visual effects
2. Viaduct to I-880	X									Business displacement; biological, cultural, and parkland resources; visual effects
3. RPA		X			P	S	S	S		Community effects: residential displacement, nonprofit (house of worship) displacement; noise; biological, cultural, visual, and park resources
4. Three Track		X			P				P	Inconsistent with Caltrain Operating Plan
5. South of Caltrain Tracks		X			P	S	S	S		Property effects; community effects; residential displacement; nonprofit (house of worship) displacement; noise/vibration; biological, cultural, visual, and park resources
6. Downtown Aerial		X	P		S			S		Residential/ business displacement; biological, cultural, and visual resources; community concerns; constructability issues
7. Deep Tunnel/Underground Station		X	P	S				S		Major constructability issues (poor soils, high groundwater, potential settlement); business displacement; cultural resources; construction effects; substantial costs
8. Shallow Tunnel/ Underground Station		X	P	S		S		S	S	Relocation (lowering) of proposed BART station under HSR Station in poor soils/high groundwater; lowering of BART tunnels; impacts on Los Gatos Creek from cut-and-cover construction; business displacement; cultural resources; construction effects; substantial costs.
9. Blended, At-Grade	X									Disruption and noise effects; biological, cultural, and parkland resources

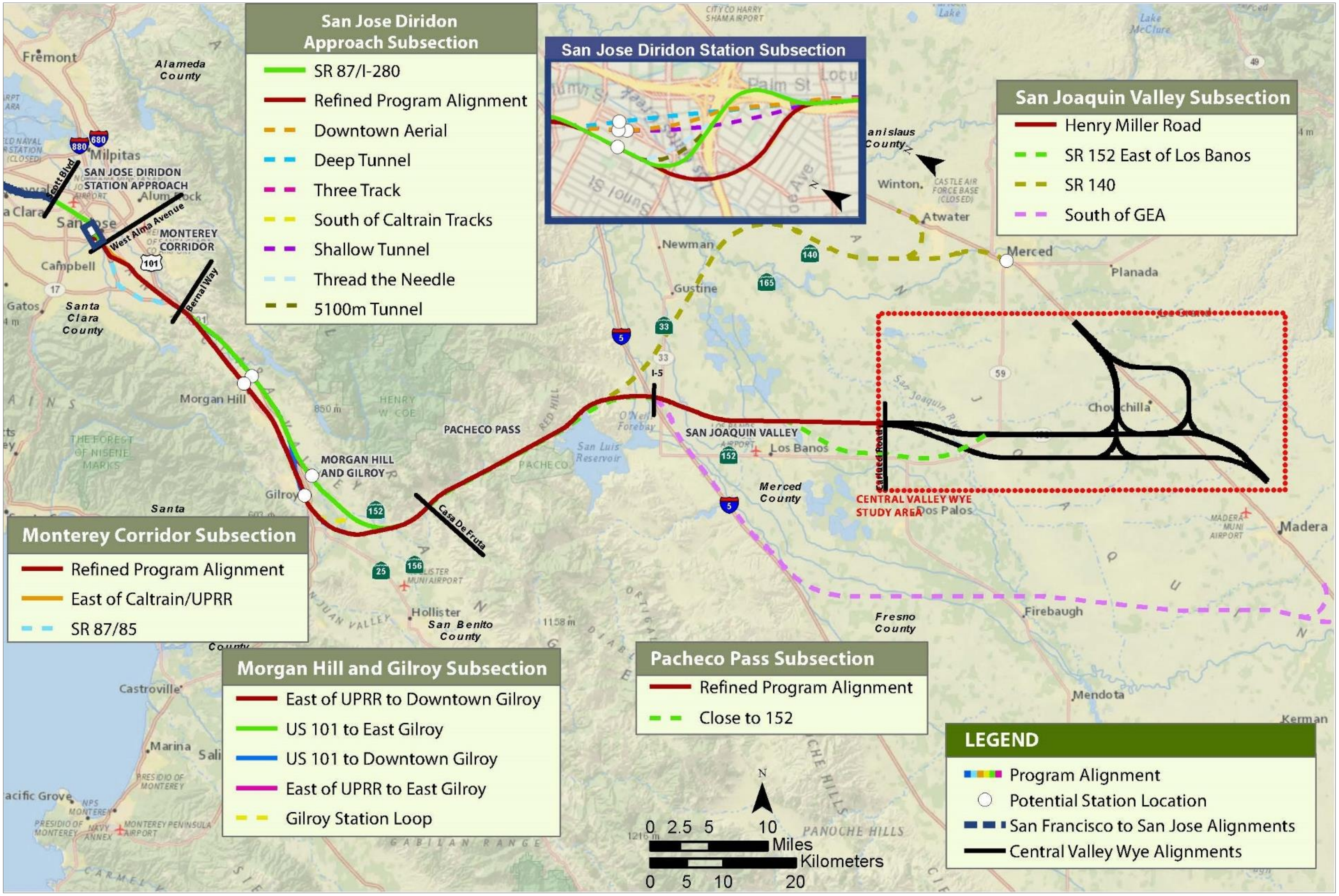
Design Option	Decision: Carried Forward	Decision: Withdrawn	Reasons for Elimination (P = Primary; S = Secondary): Constructability	Cost	Community Effects (e.g., displacement, noise, visual)	Waters/Wetlands	Park Resources (Section 4f)	Other Natural or Cultural Resources	Incompatibility with Other Rail	Environmental or Other Concerns
Monterey Corridor Subsection										
1. Median Viaduct	X									Visual effects, traffic effects during construction and operation, noise, property acquisition
2. At-Grade (RPA)	X									Visual effects, traffic effects during construction and operation, noise, property acquisition
3. SR 87/SR 85		X			P				P	Community effects and displacements in areas outside road ROW, displacement of VTA light rail line, substantial costs due to relocation
4. US 101/I-280		X			P		P			Community effects and displacements in areas outside road ROW, effects on parkland south of SR 85
5. US 101 to Monterey Rd via SR 85		X			P		P			Community effects and displacements in areas outside road ROW, effects on parkland south of SR 85
6. US 101 to Monterey Rd via Blossom Hill Road		X			P		P			Community effects and displacements in areas outside road ROW, effects on parkland south of SR 85
7. Cut-and-Cover Tunnel on Monterey Rd		X		P				S		Prohibitive cost (approximately twice the cost of median viaduct option), groundwater hydrology and supply effects
8. Bored Tunnel on Monterey Rd		X		P				S		Prohibitive cost (approximately 2.5 times the cost of median viaduct option), groundwater hydrology and supply effects
9. Blended, At-Grade	X									Traffic effects during construction and operation, noise

Design Option	Decision		Reasons for Elimination (P = Primary; S = Secondary)							Environmental or Other Concerns
	Carried Forward	Withdrawn	Constructability	Cost	Community Effects (e.g., displacement, noise, visual)	Waters/Wetlands	Park Resources (Section 4f)	Other Natural or Cultural Resources	Incompatibility with Other Rail	
Morgan Hill and Gilroy Subsection										
1. Viaduct to Downtown Gilroy via Morgan Hill Bypass (including MOWF Site D)	X									Visual effects, traffic effects during construction and operation, noise, property acquisition and displacement, cultural resources, floodplain
2. Embankment to Downtown Gilroy (including MOWF Site D)	X									Traffic effects during construction and operation, noise, property acquisition and displacement, cultural resources farmland, floodplain
3. Viaduct to East Gilroy via Morgan Hill Bypass (including MOWF Site C)	X									Visual effects, traffic effects during construction and operation, noise, property acquisition, cultural resources, floodplain
4. US 101 Alignment to Downtown Gilroy		X				P	P	P		Aquatic resources, threatened and endangered species habitat, floodplains, farmlands, parks (4f resources), land use disruption from tunnel/trench near airport
5. US 101 Alignment to East Gilroy		X				P	P	P		Aquatic resources, threatened and endangered species habitat, farmlands, parks (4f resources)
6. East of UPRR to East Gilroy		X			P			P		Threatened and endangered species habitat, built environment cultural resources, residential displacements, floodplains, farmlands, land use disruption from US 101 crossover
7. West of Coyote Creek to Downtown Gilroy		X				P	P	P		Aquatic resources, threatened and endangered species habitat, built environment cultural resources, parks (4f resources), floodplains, farmlands, land use disruption from tunnel/trench near airport
8. West of Coyote Creek to East Gilroy		X				P	P	P		Aquatic resources, threatened and endangered species habitat, built environmental cultural resources, parks (4f resources), floodplains, farmlands, land use disruption

Design Option	Decision		Reasons for Elimination (P = Primary; S = Secondary)							Environmental or Other Concerns
	Carried Forward	Withdrawn	Constructability	Cost	Community Effects (e.g., displacement, noise, visual)	Waters/Wetlands	Park Resources (Section 4f)	Other Natural or Cultural Resources	Incompatibility with Other Rail	
9. Gilroy Station Loop		X		P	P					Substantially higher cost of multiple alignments, visual effects of multiple alignments.
10. Foothills		X						P		Threatened and endangered species habitat, poor connectivity of potential station
11. Downtown Gilroy Tunnel		X		P				S		Prohibitive cost (approximately 2 to 2.5 times the cost of median viaduct option), groundwater hydrology and supply effects
12. Morgan Hill to Gilroy Tunnel		X		P				S		Prohibitive cost (approximately 2 to 2.5 times the cost of median viaduct option), groundwater hydrology and supply effects
13. Gilroy US 101 Alignment		X		P	P					Higher cost and no benefits compared to downtown alignments. Would also be inconsistent with TOD policies of Authority.
14. Blended, At-Grade (including South Gilroy MOWF)	X									Traffic effects during construction and operation, noise, property acquisition and displacement, cultural resources, farmland, floodplain
▪ Maintenance Facility "A"		X					P	P		Coyote Creek Regional Park, wildlife movement, farmland
▪ Maintenance Facility "B"		X					P	P		Coyote Creek Regional Park, wildlife movement, farmland
Pacheco Pass Subsection										
1. Tunnel	X									Threatened and endangered species habitat, water quality (dewatering), spoils placement
2. Proximity to SR 152		X				P	P	P		San Luis Reservoir, Cottonwood Creek Wildlife Area, threatened and endangered species habitat, waters/wetlands, floodplains
3. RPA		X				P	P	P		San Luis Reservoir, Cottonwood Creek Wildlife Area, threatened and endangered species habitat, waters/wetlands, floodplains

Design Option	Decision: Carried Forward	Decision: Withdrawn	Reasons for Elimination (P = Primary; S = Secondary): Constructability	Cost	Community Effects (e.g., displacement, noise, visual)	Waters/Wetlands	Park Resources (Section 4f)	Other Natural or Cultural Resources	Incompatibility with Other Rail	Environmental or Other Concerns
San Joaquin Valley Subsection										
1. Henry Miller Rd to Carlucci Rd	X									Farmlands and dairies, wetlands/waters, traffic effects during construction and operation, noise, residential and commercial displacement
2. GEA North/Merced		X				P	P			Aquatic resources, North Grasslands Wildlife Area, state park crossing
3. South of GEA		X	S	S		P				Aquatic resources, high cost, and logistical issues because of longer alignment
4. GEA Tunnel		X		P						Substantially more expensive than aboveground embankment or viaduct approaches, even when including aboveground mitigation in the form of noise barriers or enclosures
5. Viaduct Crossing of the Whitworth Road overcrossing of I-5/Viaduct west of I-5		X			P					Reconstruction and realignment of the Whitworth Road interchange, resulting in additional impacts on prime farmland The viaduct alignment to the west of I-5 would not provide any environmental advantages.

BART = Bay Area Rapid Transit; GEA = Grasslands Ecological Area; HSR = high-speed rail; MOWF = maintenance of way facility; P = Primary; ROW = right-of-way; RPA = Refined Program Alignment; S = Secondary; SR = State Route; TOD = transit-oriented development; US = U.S. Highway; VTA = (Santa Clara) Valley Transportation Authority



Source: Authority and FRA 2010

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Figure 2-30 Alignment Alternatives Carried Forward into EIR/EIS as Identified in the Preliminary Alternatives Analysis Report

2.6 Alignments, Station Sites, and Maintenance Facilities Evaluated in this Final EIR/EIS

This section describes the No Project Alternative and the four end-to-end project alternatives.

2.6.1 No Project Alternative—Planned Improvements

The National Environmental Policy Act (NEPA) requires the evaluation of a No Action Alternative in an EIS (CEQ Regulations § 1502.14(d))[7]. Similarly, CEQA requires that an EIR include the evaluation of a No Project Alternative (CEQA Guidelines § 15126.6(e)). The No Project Alternative (synonymous with the NEPA No Action Alternative) considers the effects of conditions forecast by current plans for land use and transportation in the project vicinity, including planned improvements to the highway, aviation, conventional passenger rail, freight rail, and port systems through the 2040 planning horizon for the environmental analysis if the proposed project is not built.

2.6.1.1 Projections Used in Planning

The project alignment crosses Santa Clara, San Benito, and Merced Counties. Over the next 25 years, population is projected to increase in these counties by more than 22 percent, about 47 percent, and about 45 percent, respectively (Table 2-4). Table 2-4 also shows the projected 2040 total employment; most of the region's job growth is anticipated in Santa Clara County, consistent with the region's current distribution of jobs. The projections show that employment in San Benito County would grow at the highest rate of the three counties, while Merced County would experience the slowest job growth over the next 25 years. The region overall is expected to experience a job growth rate that is lower than the statewide average over the next 25 years. Despite the economic downturn of a decade ago, which temporarily slowed growth, 2040 projections show 575,091 new inhabitants and 261,459 new jobs in this region, primarily in Santa Clara County.

Table 2-4 Regional Projected Population and Employment Projections, 2015 and 2040

	2015	2040 Projections	Percent Change
Population[1]			
State of California	38,907,642	47,233,240	21.4
Santa Clara County	1,903,974	2,331,887	22.5
San Benito County	56,445	82,969	47.0
Merced County	269,280	389,934	44.8
Regional Total	**2,229,699**	**2,804,790**	**25.8**
Employment[2]			
State of California	16,474,800	20,895,900	26.84
Santa Clara County	1,032,200	1,273,516	23.38
San Benito County	16,200	20,190	24.63
Merced County	77,500	93,653	20.84
Regional Total	**1,125,900**	**1,387,359**	**23.22**

[7] The Council on Environmental Quality issued new regulations on July 14, 2020, effective September 14, 2020, updating the NEPA implementing procedures at 40 C.F.R. Parts 1500-1508. However, this project initiated NEPA before the effective date and is not subject to the new regulations, relying on the 1978 regulations as they existed prior to September 14, 2020. All subsequent citations to Council on Environmental Quality regulations in this environmental document refer to the 1978 regulations, pursuant to 40 C.F.R. 1506.13 (2020) and the preamble at 85 Fed. Reg. 43340.

[1] CDOF 2014, 2016
[2] CEDD 2016; Caltrans 2015

2.6.1.2 Planned Land Use

The evaluation of the No Project Alternative considers planned transportation, housing, commercial, and other development projects through the planning horizon year 2040. Appendices 3.19-A and 3.19-B describe foreseeable future development projects—shopping centers, large residential developments, and planned transportation projects defined in the various regional transportation plans for each of the three counties. The discussion that follows highlights the larger projects along the project extent during the 20-year planning horizon, but it is not an exhaustive description of all planned development in the three counties.

Planned projects in the San Jose Diridon Station Approach and Monterey Corridor Subsections within the city of San Jose include medical office, hotel, residential, and mixed-use development; an office/data center; and shopping center expansion. The City of San Jose entered into an exclusive negotiating agreement with Google for 16 city-owned parcels in June 2017. Google is proposing an 85-acre downtown campus (the Downtown West project) with 6 million to 8 million square feet of tech office and research and development; additional amenities would include open space, entertainment, and retail with housing within the 250-acre Diridon Station Area Plan area; the project was approved by the City of San Jose in May 2021. Subsequent to the agreement with the City of San Jose, Google and its development partners are continuing to acquire public and private properties, further expanding their land holdings in the station area, including commercial, industrial, government, parking, and retail sites. North of San Jose Diridon Station, a seven-story mixed-use development is under construction and nearly completed on Stockton Avenue. Other pending development projects include 785–807 Alameda, City Place Project in Santa Clara, and the (Santa Clara) Valley Transportation Authority's (VTA) Transit-Oriented Joint Development at the San Jose, Santa Clara, and Tamien stations. A four- to five-story mixed-use development is planned at the intersection of Delmas and Park Avenues, and 120 condominiums are proposed for Delmas Avenue between West San Carlos Street and Auzerais Avenue, south of the station. A substantial amount of development is proposed east and north of the junction of SR 87 and Interstate (I-) 280 as well as south of I-280. Development is planned south of Cottle Street on the west side of Monterey Road consisting of 2,728 dwelling units, 506,000 square feet of commercial uses, and 1.7 million square feet of industrial uses. A phased multifamily residential project is moving forward on Communications Hill adjacent to the proposed project alignment.

Pending major transit-related projects in San Jose include the Capitol Corridor Joint Powers Authority Oakland to San Jose Phase 2 Double Track (Segment 2A), Bay Area Rapid Transit (BART) Silicon Valley Extension from Warm Springs to Santa Clara, Caltrain Modernization Program, Capitol Expressway Light Rail Transit (LRT) Extension Phase 2, LRT Extension Winchester Station to Vasona Junction, El Camino Real bus rapid transit (BRT) improvements, Stevens Creek Corridor BRT improvements, and various improvements to light rail structures and switches. Various improvements to state highways within the city, including conversion to high-occupancy vehicle (HOV) lanes and interchange modifications, are also planned, in addition to Caltrain double-tracking between San Jose and Gilroy and widening of Almaden and Lawrence Expressway.

In the Morgan Hill and Gilroy Subsection, a 517,000-square-foot industrial project is planned on the west side of Monterey Road. Commercial and industrial development, including a recreation center and medical offices, is planned or underway along U.S. Highway (US) 101 in Morgan Hill, as well as a 657,000-square-foot retail center at US 101 and Cochrane Road. Several single- and multifamily residential projects are also under construction or approved, including eight units of affordable housing at the southwest corner of Monterey Road and Ciolino Avenue; a 14-unit, multifamily, affordable apartment complex on East Dunne Avenue; and 19 affordable, below market rate, multifamily apartments on the west side of Monterey Road. A mixed-use development is planned for the southwestern side of Monterey Road northwest of Watsonville Road. US 101/Tennant Avenue Interchange Improvements are also planned. A major sports complex—the Southeast Quadrant Ball Fields—is planned for a 26-acre site east of and adjacent to the northbound US 101/Tennant Avenue off-ramp.

In Gilroy, a residential subdivision is planned on 2.67 acres for six single-family residential units south of Santa Teresa Boulevard in the Eagle Ridge Planned Unit Development. Other planned residential projects in Gilroy include the Wren Avenue Gilroy Unified School District Residential Project (70 single-family dwelling units) and the Santa Teresa Boulevard Townhouse Project (205 multifamily residential units). Affordable senior units (75 dwelling units) are planned on a 1.86-acre site in the downtown district. A four-story, 65,120-square-foot 100-room hotel with an outdoor pool and an adjacent property (5955 Travel Park Circle) is planned east of US 101 and southeast of the Monterey Road and Travel Park Circle intersection in south Gilroy. Other planned development includes a four-story apartment complex in the Cannery District, a mixed multifamily residential and commercial use development along Monterey Road, two new single-family subdivisions, a new fire station, a 350,000-square-foot distribution center, and new office and self-storage uses. Various intersection improvements are planned throughout Gilroy, as well as a new overcrossing at Las Animas Avenue.

In San Benito County, planned development includes a proposed solar energy generation facility on 2,506 acres and an age-restricted retirement development including 1,084 homes, up to 65,000 square feet of neighborhood commercial, a 200-room resort hotel, a 4-acre assisted living/skilled nursing/memory care facility with up to 100 beds, 6.6 acres of neighborhood parks, a 16.8-acre community park, 114 acres of open space, 41 acres of agricultural preserve, and a 1,243-acre permanent wildlife habitat preserve. This retirement community would be located 3 miles southwest of the city of Hollister, 3.5 miles southeast of the city of San Juan Bautista, and 1 mile south of SR 156 in San Benito County. Approximately 0.5 mile south of Hollister, a 200-unit residential community was approved in 2016. SR 156 is proposed as a four-lane expressway and widening of Fairview Road and SR 25 is also proposed.

In Merced County, expansion of the existing Liberty Packing Company, a tomato processing facility, is planned. Additional development includes the George Reed, Inc. Merced Quarry Project and Reclamation Plan to modify its Conditional Use Permit to allow for mining to a depth of approximately 25 feet below grade level, into the perched-water zone; to operate an asphalt batch plant and a Portland cement concrete batch plant; and to change the current reclamation plan's end use from agricultural to open space with wildlife and naturally occurring vegetation. The proposed project would also amend the County General Plan land use designation of an approximately 70-acre portion of the property from Snelling RRC No. 1, Residential to Agricultural and would rezone the property from Agricultural Residential (A-R) to General Agricultural (A-1). A 211-unit residential subdivision on 45.7 acres is also planned in the county, including a 2.21-acre park and a 14.3-acre business park, east of the city of Merced in southeastern Merced County. At Volta Road and Ingomar Grade, a minor subdivision (26.9 acres) to be sold for future industrial and commercial development and construction of a batch plant, bulk cement storage silos, portable cement silo, storage and fuel tanks, casting area, pump house, truck wash area, related collection facilities, and parking area, is in the pipeline. A new four-lane construction/extension is planned for Memorial Drive between Santa Ana and Flynn Road, a new four-lane expressway bypassing the city of Los Banos is planned from west of Volta Road to SR 165 south of Henry Miller Road, and freeway conversion from the Santa Clara County line to the Madera County line is planned to include three new interchanges at West SR 152, SR 165, and East SR 152.

In the San Joaquin Valley Subsection, a large recreation-oriented residential community is planned southeast of the I-5/SR 152 interchange. The Fox Hills Community Specific Plan, approved in 2006, includes a 402-lot single-family residential development, an 18-hole championship golf course and clubhouse, restaurant, parks, trails, wildlife conservation, and utility infrastructure improvements (Merced County Planning and Community Development Department 2006). Planned development in the Santa Nella area includes the Villages at Laguna San Luis, a 6,200-acre mixed-use development that has been approved but not yet constructed west of I-5 along SR 152 and SR 33 in western Merced County. The Santa Nella Community Specific Plan was adopted by Merced County in May 2000 and development is ongoing within the Specific Plan area. The Specific Plan proposes 5,181 low-density residential units, 74 golf course residential units, 878 medium-density residential units (of which 20 acres may be high density—400 dwelling units/acre maximum), and 350 existing residential units; 2,160,600 square feet of commercial retail uses; 396,396 square feet of office commercial units; 3,027,418 square feet of industrial uses; and expansion of the existing golf course. The Los Banos General Plan 2030 covers a planning area extending south from Henry Miller Road, east approximately 2.7 miles from just west of the Ingomar Grade; at that point the planning area is farther south and does not abut Henry Miller Road. Based on average buildout densities for new residential uses, the general plan accommodates 17,000 new households at an average household size of 3.44 through infill development as well as new development. In total, general plan buildout would result in approximately 27,000 households and an additional 41,900 jobs in Los Banos. Most areas that are planned for new development would be residential. Infill development is expected to continue within city limits; however, new residential, commercial, and industrial development is also anticipated to occur farther from the downtown core within the Urban Growth Boundary, although not abutting Henry Miller Road.

2.6.1.3 Planned Highway Improvements

The highway component of the No Project Alternative includes the planned efforts of Caltrans and the three study area counties (Santa Clara, San Benito, and Merced) to address the anticipated growth in vehicle miles traveled (VMT) and resulting congestion on the roadway system. VMT is expected to increase significantly in all counties by 2040 (Caltrans 2016).

Analysis of the No Project Alternative considers the funded and programmed improvements on the intercity highway network based on financially constrained regional transportation plans developed by regional transportation planning agencies. SR 237 express lanes and Central, Montague, and San Tomas Expressway improvements are planned in Santa Clara County. The improvements in Santa Clara County primarily entail construction of an express lane network on the highway system—individual interchange upgrades, conversion of HOV lanes to express lanes, and construction of new express lanes (Table 2-5). These improvements will not cumulatively add substantial capacity to the existing highway system, but they will provide enhanced efficiency of existing highways. Plans have been approved (but not yet funded) to construct a new alignment of SR 152 from SR 156 to US 101 in Santa Clara and San Benito Counties. Other Merced County improvements provide additional capacity in the Los Banos area.

Table 2-5 shows planned highway, pedestrian, parking, and bicycle improvements in the three-county area.

Table 2-5 Planned Transportation Improvements

Project	Type of Project
Santa Clara County/San Jose	
SR 85 HOV conversion, South San Jose to Mountain View	Conversion of HOV lanes to express lanes
SR 87 HOV conversion, SR 85 to US 101	Conversion of HOV lanes to express lanes with interchange modifications
US 101 express lane conversion, San Mateo/ Santa Clara County Line to SR 25	Conversion of HOV lanes to express lanes and construction of express lanes with interchange modifications
SR 237 express lanes, North First St to Mathilda Ave	Conversion of HOV lanes to express lanes and construction of express lanes with interchange modifications
I-280 express lanes, Leland Ave to US 101	Conversion of HOV lanes to express lanes and construction of express lanes with interchange modifications
I-680 express lanes, Alameda County line to US 101	Conversion of HOV lanes to express lanes and construction of express lanes with interchange modifications

Project	Type of Project
I-880 express lanes, Alameda County line to US 101	Conversion of HOV lanes to express lanes and construction of express lanes with interchange modifications
Widen Coleman Ave from four to six lanes from I-880 to Taylor St	Road widening
Diridon Area parking and multimodal improvements	Parking and transit improvements
Morgan Hill	
Widen southbound US 101 off-ramp at Cochrane Rd from 2 to 3 lanes	Road widening
Hale Ave extension, Main St to Dunne Ave	Road extension
US 101/Tennant Ave interchange improvements	Interchange expansion and reconfiguration and road widening
US 101 widening, Cochrane Rd to SR 25	Road widening to add an express lane in each direction
Gilroy	
Construct interchange at US 101 and Buena Vista Ave	Construction of new interchange
US 101 widening, Monterey Rd to SR 25, and US 101/SR 25 interchange construction	Road widening and construction of a new interchange
SR 152 widening from SR 156 to US 101	Road widening
Improve ramp/intersection on SR 152 eastbound at Frazier Lake Rd	Road reconfiguration
Luchessa Ave, Monterey to Jamieson	Road extension
Luchessa Ave, Jamieson to Rossi	Road extension
Las Animas Ave overcrossing at US 101	Construction of new overcrossing
Merced County	
SR 152: Pacheco Pass median barrier	Demolition and construction of bridge
Pacheco Pass median barrier	Construct median barrier
SR 152	Road widening to four-lane arterial through Los Banos
SR 152 bypass	Bypass over the north of Los Banos
Pioneer Rd	Construct as four-lane arterial to Ortigalita Rd, Los Banos
Volta Road	Construct grade-separated crossing with SR 152
Ingomar Grade Rd/H St	Widen to four-lane arterial
Mercy Springs Road SR 165	Widen to four-lane arterial

Sources: City of Los Banos 2009; VTA 2014

2.6.1.4 Planned Aviation Improvements

There are five airports in the project vicinity.

Mineta San Jose International Airport

The Norman Y. Mineta San Jose International Airport (SJC) is served by 12 commercial airlines with approximately 130 daily departures to 30 nonstop destinations. In November 2005, the San

Jose City Council approved a comprehensive plan for replacing and upgrading the terminal facilities at SJC. The Terminal Area Improvement Program (TAIP) is planned in two phases. Phase 1 was completed in 2010. Phase 2, expansion to add 12 more aircraft gates, would begin when the airport reaches specific levels of passenger activity or flights in the future (City of San Jose 2015).

The first phase of the TAIP included the comprehensive modernization of the airport. Elements included a new Terminal B and Concourse, upgrades for Terminal A, expanded restaurant and retail concessions, expanded roadway capacity, a convenient consolidated rental car center and public parking garage, and public art. Construction of Terminal B and the new Terminal B Concourse began in 2004 as the first major element of the new airport facilities. Located between Terminal A and Terminal B, the new concourse has 12 aircraft gates, waiting lounges, and new shops and restaurants. Southwest Airlines activated the first six gates in the new concourse for interim service in July 2009. The remainder of the concourse opened with the completion of Terminal B facilities in June 2010.

Phase 2 includes the second half of Terminal B with a South Concourse mirroring the North Concourse, adding 12 new aircraft gates. This addition would bring the total number of gates to the 40 allowed under the 2011 Airport Master Plan Update to serve 17 million annual passengers (City of San Jose 2011).

Merced Regional Airport

The Merced Regional Airport is a general aviation airport. It offers facilities for general aviation aircraft, car rental agencies, a restaurant, Gateway Air Center for private aircraft, offices for government agencies, concessionaires, and corporate hangars. The Regional Airport Authority prepared a Capital Improvement Plan for 2015–2020 (Regional Airport Authority 2014), identifying plans for pavement assessments and remarking. No major aviation improvements are planned at this time.

San Martin Airport (Santa Clara County)

This is a general aviation facility in San Martin, adjacent to US 101. It is owned by Santa Clara County and has one 3,100-foot runway. Planned improvements included in the Santa Clara County *Airports Business Plan* (County of Santa Clara 2018) are constructing an access road between the transient apron and the County-owned hangar area, installing a backup generator for the runway lighting and fire protection systems, and acquiring property at the south end of the airport for safety zones for the proposed runway extension.

Frazier Lake Airpark

Frazier Lake Airpark is a privately owned airport 8 miles northwest of Hollister. It has one 2,500-foot turf runway and one 3,000-foot water runway. No major improvements are planned.

Los Banos Municipal Airport

The Los Banos Municipal Airport is a general aviation airport used primarily by private aircraft. No major improvements are planned.

2.6.1.5 Planned Intercity Transit Improvements

The 2040 No Project Alternative transit service levels include all planned bus and rail service upgrades to accommodate regional growth, including Caltrain electrification between San Francisco and Tamien Station (i.e., PCEP), new BART service at Diridon Station, as well as new BRT service at San Jose Diridon Station and express bus service from Gilroy Station to Hollister and Monterey County. All of these services have generally been planned assuming the potential for future integration with HSR, but they would provide increased transit service levels without the introduction of HSR.

Conventional Passenger Rail

Several conventional passenger rail systems serve portions of the project extent. BART does not currently serve Santa Clara County, but plans an extension of service from Warm Springs in Fremont initially to a Berryessa Station in San Jose beginning in 2019, and ultimately through downtown San Jose to Santa Clara by 2026. A stop would be provided at the San Jose Diridon Station.

Amtrak—Amtrak provides intercity passenger rail service in California on four principal corridors covering more than 1,300 linear route miles and spanning most of the state. The existing passenger rail network in the San Jose to Merced corridor includes portions of three of these corridors: the Coast Starlight follows the UPRR coast route between San Jose and Gilroy; the San Joaquin route follows the BNSF Railway (BNSF) corridor in Madera and Merced Counties; and the Capitol Corridor, which terminates in San Jose, provides service north to Oakland and eventually to Sacramento and Auburn.

Caltrain—The PCJPB Caltrain service provides regional service between San Francisco and San Jose, with three peak hour/peak direction weekday trips extending to Gilroy. In 2018, there were 46 daily weekday roundtrips between San Francisco and San Jose Diridon Station, with 17 roundtrips extending to Tamien Station and three to Gilroy (Caltrain 2019). Stations served in the study area between Diridon San Jose and Gilroy Stations are Tamien, Capitol, Blossom Hill, Morgan Hill, and San Martin. The PCJPB is a joint exercise of powers agency formed by means of a Joint Powers Agreement among three entities: the City and County of San Francisco, the San Mateo County Transit District, and the VTA. The San Mateo County Transit District is the Managing Agency of the PCJPB pursuant to the Joint Powers Agreement. The PCJPB owns the rail right-of-way from Tamien Station (CP Lick) to San Francisco 4th and King Station, sharing that ownership within San Mateo County with the San Mateo County Transit District. For its operations south of Tamien, Caltrain uses trackage rights it holds over the UPRR-owned right-of-way and stations owned by VTA at Capitol, Blossom Hill, Morgan Hill, San Martin, and Gilroy. The PCJPB has trackage rights agreements in place with the UPRR regarding freight operations over the PCJPB-owned right-of-way from Tamien Station to San Francisco. On a portion of that right-of-way, between CP Coast (near Santa Clara) and Tamien/CP Lick, UPRR owns its own track, known as Main Track 1. PCJPB also has agreements in place for tenant railroads Altamont Corridor Express (ACE), Capitol Corridor, and Amtrak. These agreements govern their usage of the PCJPB-owned tracks and stations.

ACE—The ACE provides four daily round-trip trains from Stockton to San Jose Diridon Station via Tracy and Livermore, with intermediate stops. ACE is working with the Authority to study an enhanced regional rail service between Stockton, Modesto, and San Jose and plans to expand service to 6 round trips in the short term and 10 round trips in the long term.

VTA—The VTA provides bus, light rail, and paratransit within Santa Clara County. The VTA operates a light rail system (Line 901, the Alum Rock—Santa Teresa line) serving San Jose and surrounding suburban areas south and east of San Jose Diridon Station. The VTA also manages BART Silicon Valley extending from Fremont through the cities of Milpitas, San Jose, and Santa Clara (VTA 2016a). The program’s first phase would connect the Warm Springs BART Station in Fremont to the Berryessa BART Station in San Jose. The second phase would construct a subway tunnel from the Berryessa Station through downtown San Jose and the San Jose Diridon Station, terminating service at the Santa Clara Caltrain Station and continuing to a maintenance facility at the Newhall Maintenance Yard (VTA 2016b). The project would connect with BART at the San Jose Diridon Station.

Various passenger rail improvements that would affect service in the San Jose to Merced corridor are planned through 2040 (Table 2-6). Planned improvements include track and signal improvements, bridges, maintenance and layover facilities, and station improvements.

Table 2-6 Planned Passenger Rail Projects (Forecast Year 2040)

Project	Jurisdiction	Description
Peninsula Corridor Electrification Project	Multicounty	Caltrain service improvements (six peak trains, electrification, CBOSS, PTC)
Transbay Center/Caltrain DTX Phase 2	Multicounty	2019 opening year (not funded)
BART Extension to Berryessa	Santa Clara	2019 opening year
BART Extension to Santa Clara (Phase 2)	Santa Clara	2025/26 opening year
Mineta San Jose APM Connector	Santa Clara	
Capitol Expressway Light Rail Project	Santa Clara	2022 opening year
Caltrain South Terminal Project, Phase II	Santa Clara	2020 completion
Tasman Express Long-T Alum Rock to MTV	Santa Clara	2019 opening year
Gilroy station improvements	Santa Clara	
Capitol Corridor Extension to Salinas	Multicounty	2020 opening year
ACE*forward*	Multicounty	2023 opening year
Caltrain systemwide station access improvements	Multicounty	Initiated in 2015
South County track improvements; second mainline track and crossing improvements (Coyote to Gilroy)	Santa Clara	2020 opening year
At-grade crossing improvements	Multicounty	2020 completion year

Source: Caltrans 2013b; TAMC 2014; VTA 2017a
CBOSS = communications-based overlay signal system
DTX = Downtown Extension
PTC = positive train control

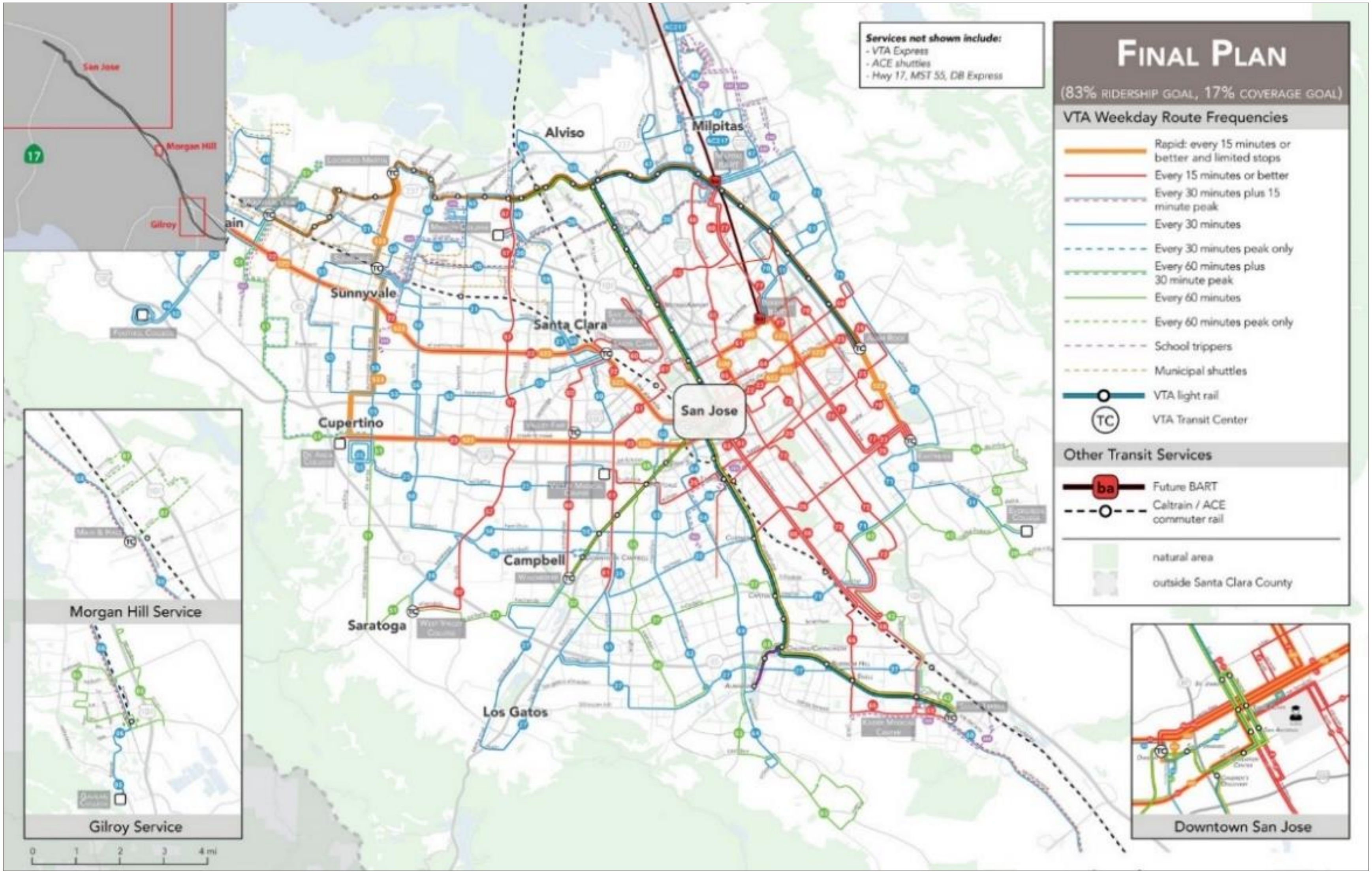
Intercity Passenger Bus Service

In the project vicinity, VTA buses provide transit connectivity between San Jose and neighboring communities (Figure 2-31). Merced County Transit provides commuter service between Merced and Los Banos, approximately 2 miles south of the HSR alignment on Henry Miller Road (Figure 2-32). There are no direct transit connections linking either San Jose or Gilroy to Merced. Traveling from Merced to San Jose currently requires using a combination of transit modes, including the Amtrak San Joaquin line, BART, bus, and Caltrain, to reach San Jose, a journey of approximately 5 hours. By comparison, auto travel time between San Jose and Merced is approximately 2 hours.

Gilroy Transit Center provides transit connectivity among VTA bus lines, San Benito County Transit shuttles, Monterey-Salinas Transit buses, Amtrak Thruway buses, and Caltrain commuter trains.

Two BRT projects are planned in Santa Clara County in the vicinity of the HSR. The El Camino Real BRT, intended to provide service between Palo Alto Transit Center and downtown San Jose, is currently on hold; the Stevens Creek BRT (Rapid 523) is expected to open in fall 2019 providing service between the Berryessa BART station and De Anza College near Cupertino (VTA 2018a).

The VTA operates an active fleet of 493 buses on 73 routes throughout the urbanized area of Santa Clara County. Total ridership in fiscal year 2016 was 32,195,504, with an average weekday ridership of 104,009 (VTA 2016b).



Source: VTA 2017b

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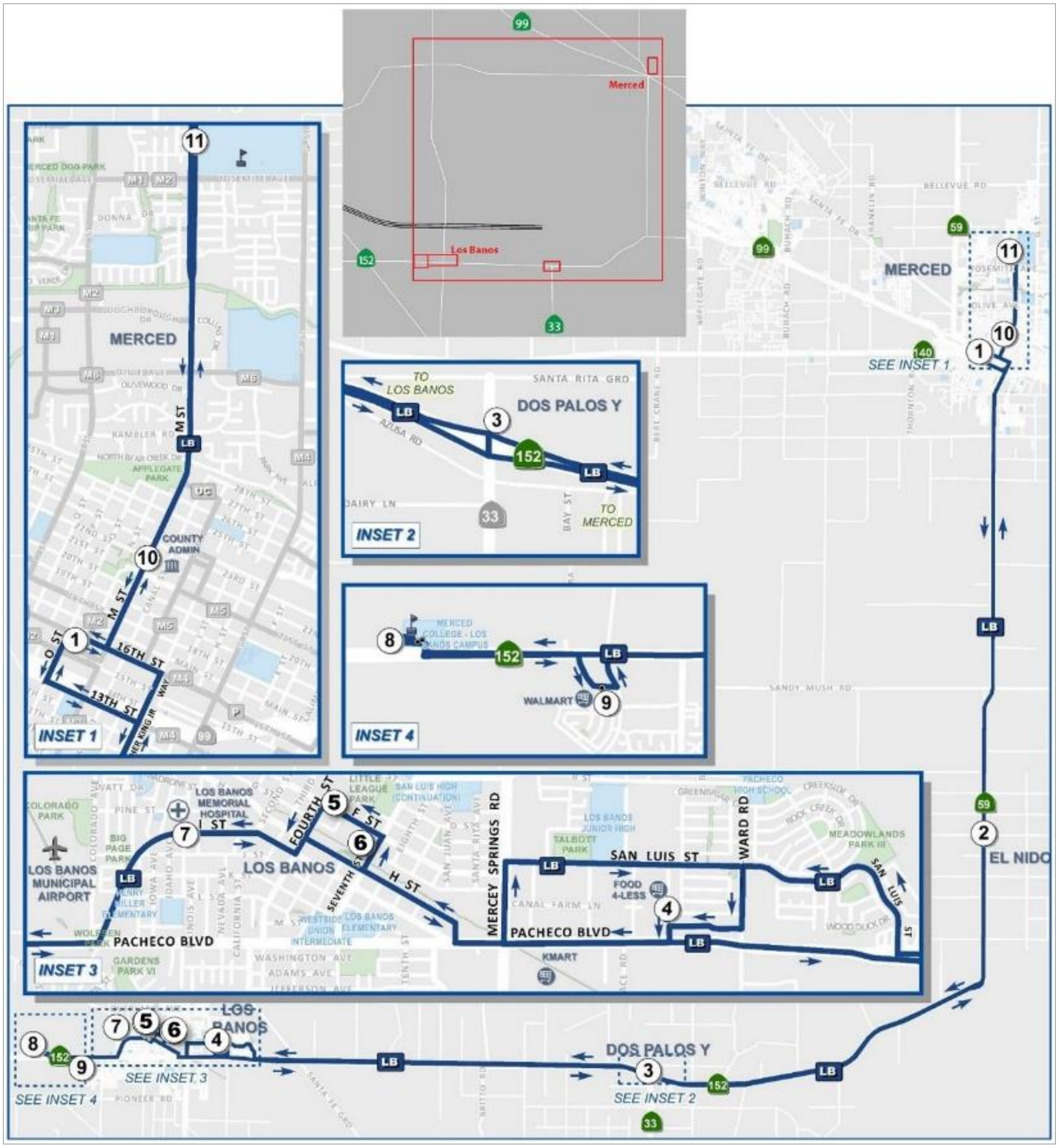
Figure 2-31 VTA's FY18-19 Transit Service Plan Proposed Service in San Jose, Morgan Hill, and Gilroy



Source: Transit Joint Powers Authority for Merced County 2017

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Figure 2-32 Weekday Commuter Service between Merced and Los Banos

The VTA operates 10 bus lines at San Jose Diridon Station and serves the downtown Gilroy Caltrain station with four regular bus lines. The VTA also operates its light rail network and shuttle network and cosponsors three intercounty bus services through cooperative arrangements with other transit systems.

Greyhound provides daily service from the San Jose Diridon Station as well as service from the Caltrain station in downtown Gilroy.

The VTA plans to consolidate intercity bus service with an 83 percent ridership goal and a 17 percent coverage goal. Implementation of the 2018/2019 plan would coincide with opening of the connection between BART's Berryessa and Diridon stations in fall 2019 (VTA 2017c). Continued intercity bus service is an element of the No Project Alternative, but it represents only a small portion of the greater intercity travel market.

2.6.1.6 Planned Freight Rail Improvements

The San Jose to Gilroy corridor and the Port of Oakland through the Altamont Pass to Sacramento are the southern portions of a northern California goods movement mega-region. This mega-region serves 19 counties and 147 cities, employs more than 1.7 million workers, and contributes more than $10 billion to the mega-region's economic output. The mega-region can be defined as the economically and geographically linked regions of the Bay Area, Sacramento, the northern San Joaquin Valley, and the Monterey Bay Area. Alameda County—and the Port of Oakland especially—is the heart of the Bay Area's freight activity. In northern California, the Martinez Subdivision, Feather River Canyon, and Donner Pass routes serve the Port of Oakland and Port of Stockton. Freight rail traffic in the project extent is expected to increase at a compound annual growth rate of 3.5 percent to 2040 because of increased intermodal rail shipments (e.g., shipping containers that can be single- or double-stacked on railcars, stacked in a container ship, and placed on a truck trailer chassis) coming from the Port of Oakland (Caltrans 2014).

In Alameda County, UPRR owns and runs trains on multiple tracks, whereas BNSF operates on one of UPRR's mainlines between Oakland and the county boundary. UPRR's northern route into and out of the Port of Oakland uses the Martinez subdivision traversing Emeryville and Richmond. This is the busiest rail line in northern California as it mixes UPRR trains in and out of the Port of Oakland, BNSF trains, San Joaquin trains, and Capitol Corridor trains. The Coast Line is UPRR's southern route into and out of the Port of Oakland toward San Jose, supporting a similar mix of trains and traffic.

UPRR operates the freight rail system in the Santa Clara to Madera corridor (via Niles Canyon and the Altamont Pass), while BNSF provides freight movement in and through Merced County. In Santa Clara County, freight trains operate daily on the UPRR Coast Line between San Jose and Gilroy; the Coast Line is also traveled by Caltrain, Amtrak, and ACE passenger services. The current combined freight and passenger train volume along this shared corridor is 11 to 25 trains per day, predominantly Caltrain passenger service (Caltrans 2013a). UPRR freight train operations do not follow a set schedule, varying in response to freight customer needs and activity. In Merced County, rail freight service is used by several industrial/manufacturing and agricultural companies, with the largest users in the cities of Merced, Atwater, and Los Banos. BNSF is the primary owner of the railroad right-of-way used by freight and Amtrak San Joaquin trains along the SR 99 corridor. BNSF's ongoing track maintenance program in California involves surfacing and/or undercutting about 2,300 miles of track, replacing more than 100 miles of rail and 300,000 ties, and upgrading signals for PTC implementation.

2.6.1.7 Planned Port Improvements

There are no existing ports in the project vicinity.

2.6.2 San Jose to Central Valley Wye Project Alternatives

This section presents detailed descriptions of the four end-to-end project alternatives, identified as Alternative 1, Alternative 2, Alternative 3, and Alternative 4. Since the four alternatives contain many common elements, these are described briefly first, followed by a more detailed description of each alternative by subsection. Volume 3 of this Final EIR/EIS contains the preliminary design drawings. Figure 2-1 illustrates the four project alternatives.

2.6.2.1 Preferred Alternative (CEQA Proposed Project)

On September 17, 2019, the Authority Board of Directors reviewed a staff recommendation on the Preferred Alternative and a summary of key identified outreach concerns. The Board confirmed that Alternative 4 was the Preferred Alternative for purposes of the Draft EIR/EIS and serves as the CEQA proposed project for purposes of CEQA Guidelines Section 15124.

The process for considering and the rationale for selecting the Preferred Alternative are presented in Chapter 8, Preferred Alternative, of this Final EIR/EIS. The Authority identified

Alternative 4, with the inclusion of the Diridon design variant (DDV) and the tunnel design variant (TDV), as the Preferred Alternative in this Final EIR/EIS.

2.6.2.2 Summary of Design Features

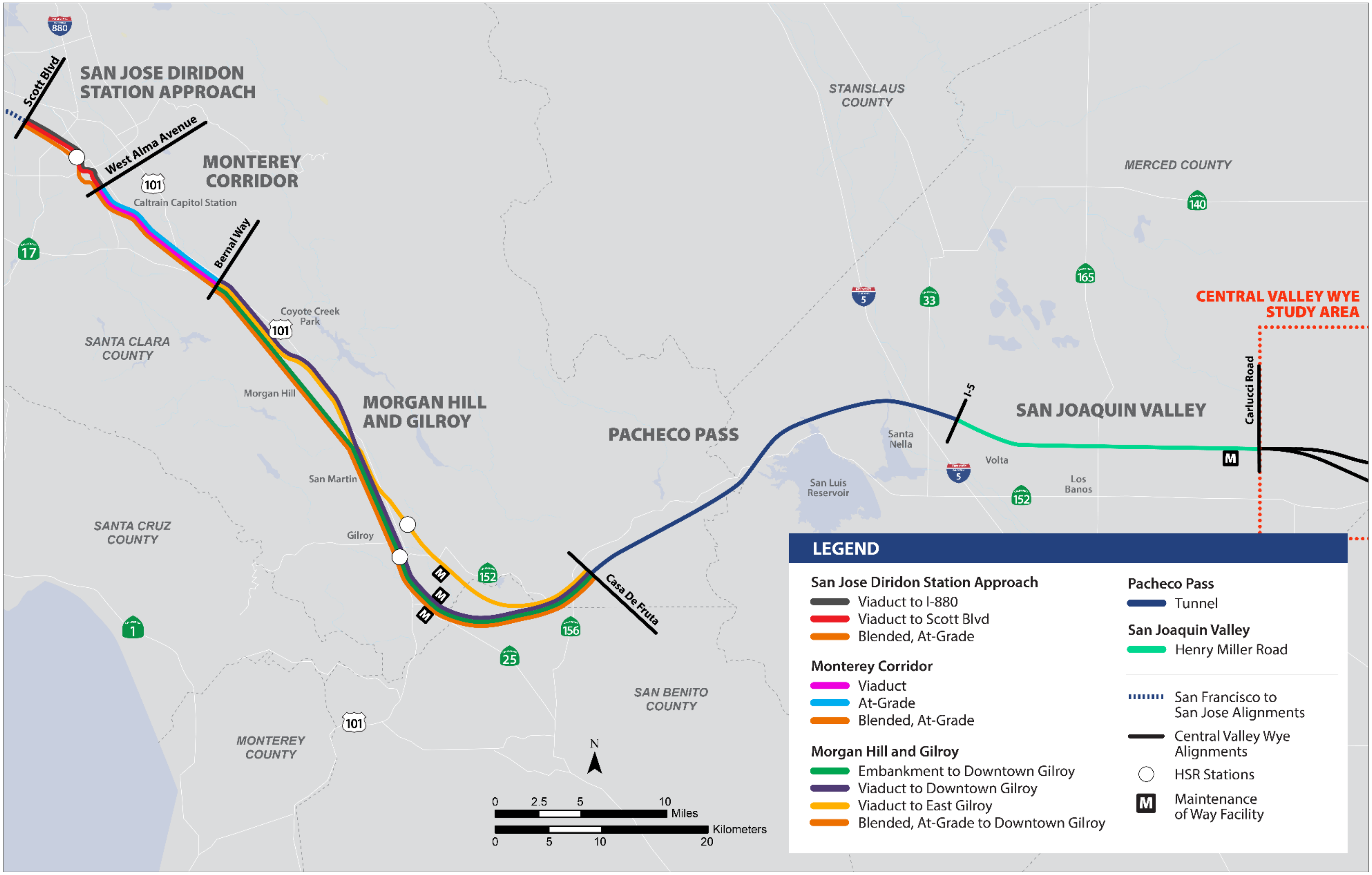
Subsections and Design Options

The project is an approximately 90-mile portion of the 145-mile-long Project Section. It comprises mostly dedicated HSR system infrastructure, HSR station locations at San Jose Diridon and Gilroy, an MOWF in the Gilroy area, and an MOWS near Turner Island Road in the Central Valley. HSR stations at San Jose Diridon and Gilroy would support TOD, provide an interface with regional and local mass transit services, and provide connectivity to the South Bay and Central Valley highway network.[8] The project begins at Scott Boulevard in Santa Clara. The HSR infrastructure and operations transition from the blended system between San Francisco and Santa Clara to a fully dedicated system north of the San Jose Diridon Station, either at Scott Boulevard in Santa Clara or near I-880; or, in the case of Alternative 4, the blended system extends to downtown Gilroy. The project continues south and east from Gilroy, continuing east through the Pacheco Pass to the Central Valley to its end at Carlucci Road, the western limit of the Central Valley Wye. The project comprises the following five subsections as illustrated on Figure 2-33:

- **San Jose Diridon Station Approach**—Extends approximately 6 miles from north of San Jose Diridon at Scott Boulevard in Santa Clara to West Alma Avenue in San Jose. This subsection includes San Jose Diridon Station and overlaps the southern portion of the San Francisco to San Jose Project Section.
- **Monterey Corridor**—Extends approximately 9 miles from West Alma Avenue to Bernal Way in the community of South San Jose. This subsection is entirely within the city of San Jose.
- **Morgan Hill and Gilroy**—Extends approximately 30 to 32 miles from Bernal Way in the community of South San Jose to Casa de Fruta Parkway/SR 152 in the community of Casa de Fruta in Santa Clara County.
- **Pacheco Pass**—Extends approximately 25 miles from Casa de Fruta Parkway/SR 152 to I-5 in Merced County.
- **San Joaquin Valley**—Extends approximately 18 miles from I-5 to Carlucci Road in unincorporated Merced County.

The Authority has developed four end-to-end alternatives for the project: Alternative 1, Alternative 2, Alternative 3, and Alternative 4. Table 2-7 shows the distinguishing features of the design options for each alternative by subsection; Figure 2-34 through Figure 2-38 illustrate the features of the four alternatives for each subsection. Table 2-8 shows the details of each design option by alternative.

[8] *South Bay* refers to Santa Clara County.



Source: Authority 2019a

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Figure 2-33 Overview Map of Design Options by Subsection

Table 2-7 San Jose to Central Valley Wye Design Options by Subsection

Subsection/Design Option	Alternative 1	Alternative 2	Alternative 3	Alternative 4[1]
San Jose Diridon Station Approach				
Viaduct to Scott Blvd	–	X	X	–
Viaduct to I-880	X	–	–	–
Blended, at-grade	–	–	–	X
Monterey Corridor				
Viaduct	X	–	X	–
At-grade	–	X	–	
Blended, at-grade	–	–	–	X
Morgan Hill and Gilroy				
Embankment to downtown Gilroy	–	X	–	–
Viaduct to downtown Gilroy	X	–	–	–
Viaduct to east Gilroy	–	–	X	–
Blended, at-grade[1]	–	–	–	X
Pacheco Pass				
Tunnel	X	X	X	X
San Joaquin Valley				
Henry Miller Rd	X	X	X	X

Source: Authority 2019a
X = present; – = absent; 1 Alternative 4 is blended, at-grade to the Downtown Gilroy station.
[1]The Authority has identified Alternative 4 as the preferred alternative as described in Chapter 8, Preferred Alternative.

The Authority has included two design variants under Alternative 2 to address different configurations of Monterey Road and access to and from San Jose Fire Station #18; referred to as the Skyway Drive variants. The Authority has developed two design variants intended to optimize train speed: referred to as the Diridon design variant (DDV) and tunnel design variant (TDV). The first (DDV) is located north and south of Diridon Station and at the station platforms and, if adopted, would apply only to Alternative 4. The second (TDV) is located at the two tunnels east of Gilroy and through the Pacheco Pass and would apply to all four alternatives. The Alternative 4 design variants were presented in Section 3.20 of the Draft EIR/EIS. The content from Section 3.20 has been fully integrated into the relevant resource sections in this Final EIR/EIS. The differences in impacts associated with both sets of design variants are shown in parentheses.

The Authority's 2016 and 2018 Business Plans confirmed the phased implementation of the HSR system in California (Authority 2016c, 2018). The Authority's initial operation would be Valley-to-Valley service in 2029[9], operating between San Francisco and Bakersfield. This service could also branch to Merced from the Bay Area (Valley-to-Valley Extension). Full Phase 1 service is planned for 2033, with operations extending from San Francisco to Los Angeles and Anaheim in Southern California.

9 The Authority's 2020 Business Plan assumes a similar phased implementation strategy for Phase 1 of the HSR system, although the Valley-to-Valley service operational date was refined from 2029 to 2031 (Authority 2021).

Source: Authority 2019a

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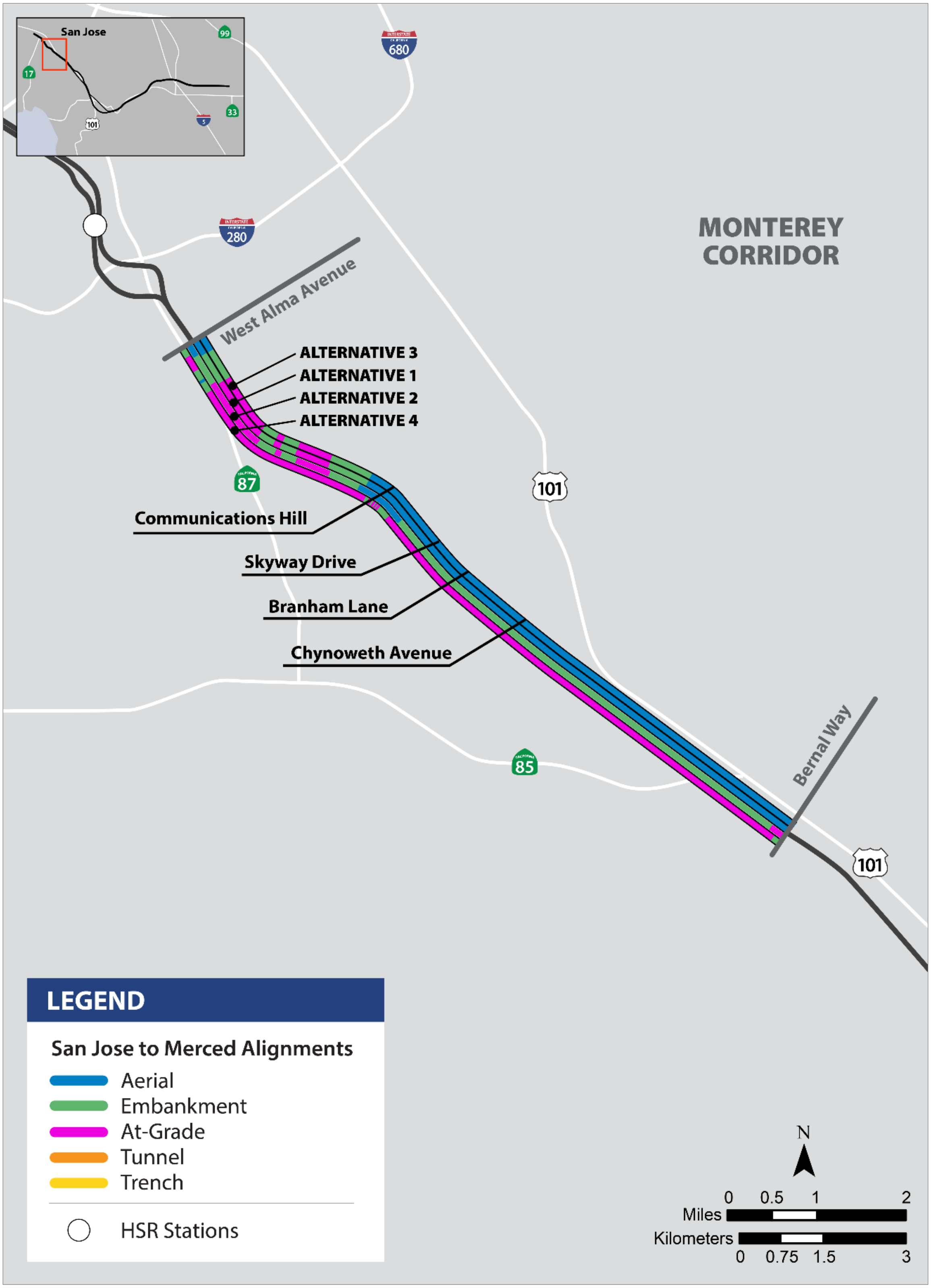
CEMOF = Centralized Equipment Maintenance and Operation Facility

Figure 2-34 San Jose Diridon Station Approach Subsection



Source: Authority 2019a

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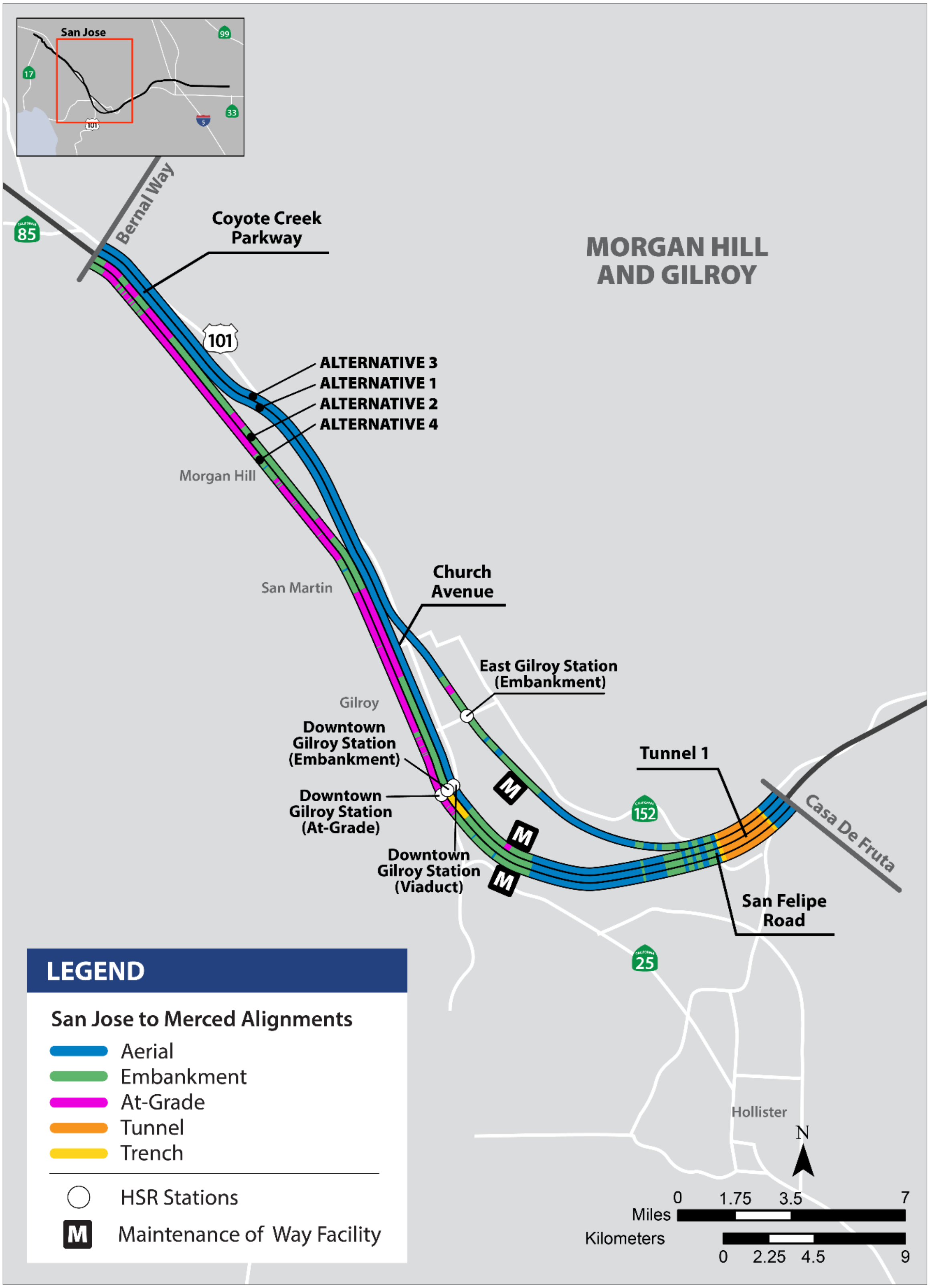
Figure 2-35 Monterey Corridor Subsection



Source: Authority 2019a

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Figure 2-36 Morgan Hill and Gilroy Subsection

Source: Authority 2019a

JUNE 2019

Figure 2-37 Pacheco Pass Subsection

Source: Authority 2019a

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Figure 2-38 San Joaquin Valley Subsection

Table 2-8 Design Features of the HSR Build Alternatives

Subsection	Design Option	Total Length (linear miles)	Aerial (linear miles)	Embankment and At-Grade (linear miles)	Trench (linear miles)	Underground Easement (linear miles)	Number of Straddle Bents	Number of Railroad Crossings	Number of Water Crossings	Number of At-Grade Roadway Crossings	Number of Roadway Closures[1]	Number of Roadway Grade Separations
Alternative 1												
San Jose Diridon Station Approach	Viaduct to I-880	6.0	3.1	2.9	0.0	0.0	25	8	2	0	4	1
Monterey Corridor	Viaduct	8.8	6.4	2.4	0.0	0.0	5	1	0	0	0	0
Morgan Hill and Gilroy	Viaduct to downtown Gilroy	32.4	26.6	4	0.2	1.6	6	2	32	0	6	0
Pacheco Pass	Tunnel	24.5	4.0	4.9	2.1	13.5	0	0	51	0	0	0
San Joaquin Valley	Henry Miller Rd	17.5	5.3	12.2	0.0	0.0	0	1	69	0	8	5
TOTALS		88.9	45.4	26.2	2.3	15.0	36	12	154	0	18	6
Alternative 2												
San Jose Diridon Station Approach	Viaduct to Scott Blvd	5.9	5.3	0.6	0.0	0.0	44	11	2	0	4	2
Monterey Corridor	At-Grade	8.7	0.9	7.9	0.0	0.0	3	1	0	0	2	3
Morgan Hill and Gilroy	Embankment to downtown Gilroy	32.0	5.3	24.0	1.1	1.6	0	1	32	0	15	22
Pacheco Pass	Tunnel	24.4	4.0	4.9	2.1	13.5	0	0	51	0	0	0

Subsection	Design Option	Total Length (linear miles)	Aerial (linear miles)	Embankment and At-Grade (linear miles)	Trench (linear miles)	Underground Easement (linear miles)	Number of Straddle Bents	Number of Railroad Crossings	Number of Water Crossings	Number of At-Grade Roadway Crossings	Number of Roadway Closures[1]	Number of Roadway Grade Separations
San Joaquin Valley	Henry Miller Rd	17.6	5.3	12.2	0.0	0.0	0	1	69	0	8	5
TOTALS		88.6	20.9	49.5	3.2	15.0	47	14	154	0	29	32
Alternative 3												
San Jose Station Diridon Approach	Viaduct to Scott Blvd	5.9	5.3	0.6	0.0	0.0	44	11	2	0	4	2
Monterey Corridor	Viaduct	8.7	6.4	2.4	0.0	0.0	5	1	0	0	0	0
Morgan Hill and Gilroy	Viaduct to east Gilroy	30.8	22.2	6.7	0.3	1.6	6	0	27	0	5	3
Pacheco Pass	Tunnel	24.4	4.0	4.9	2.1	13.5	0	0	51	0	0	0
San Joaquin Valley	Henry Miller Rd	17.6	5.3	12.2	0.0	0.0	0	1	69	0	8	5
TOTALS		87.4	43.2	26.7	2.4	15.0	55	13	149	0	17	10
Alternative 4												
San Jose Station Diridon Approach	Blended, At Grade	6.0	0.3	5.6	0.0	0.0	0	2	2	2	0	1
Monterey Corridor	Blended, At Grade	8.8	0.03	8.7	0.0	0.0	0	0	0	3	0	0
Morgan Hill and Gilroy	Blended, At Grade	32.0	5.5	24.7	0.2	1.6	0	1	25	24	7	0
Pacheco Pass	Tunnel	24.4	4.0	4.9	2.1	13.5	0	0	51	0	0	0

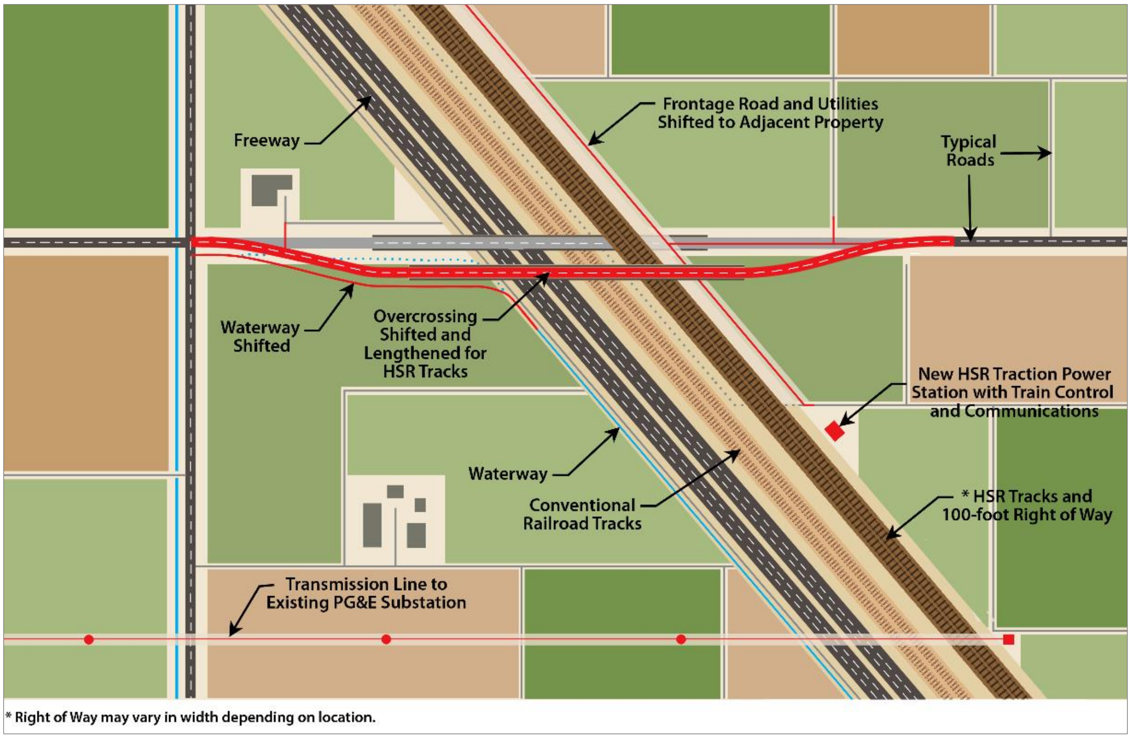
Subsection	Design	Total Length (linear miles)	Aerial (linear miles)	Embankment and At-Grade (linear miles)	Trench (linear miles)	Underground Easement (linear miles)	Number of Straddle Bents	Number of Railroad Crossings	Number of Water Crossings	Number of At-Grade Roadway Crossings	Number of Roadway Closures[1]	Number of Roadway Grade Separations
San Joaquin Valley	Henry Miller Rd	17.6	5.3	12.2	0.0	0.0	0	1	69	0	8	5
TOTALS		88.7	15.2	56.2	2.3	15.0	0	4	147	29	15	6

Source: Authority 2019a
[1] Roadway closures comprise HSR crossings of roads, highways, and ramps, but they do not include left turn lane closures or road modifications such as realignments and merges.
Some numbers may not total due to rounding.

Requirements Common to All Alternatives

Infrastructure Considerations

Because all four alternatives follow the same general corridor, they must address many of the same concerns regarding local infrastructure. The common requirements to address these concerns are as follows (Figure 2-39):



Source: Authority and FRA 2017a MAY 2017

Figure 2-39 Representative HSR Infrastructure Considerations

- **Frontage road and local roadway crossings**—Where the corridor passes through rural regions, it would affect existing local frontage roads used by small communities and farm operations. Where these frontage roads parallel the HSR alignment, they would be shifted and reconstructed to maintain their function. Where roads are perpendicular to the proposed HSR, over- or undercrossings are planned approximately every 2 miles. Between these crossings, some roads may be closed. These modifications and closures are identified on project maps and in Appendix 2-A. Additionally, the blended, at-grade system would implement continuous access restriction fencing of the railroad right-of-way, four-quadrant gates extending across all lanes of travel and crosswalks, median separators to channelize and regulate paths of vehicular travel, pedestrian crossing gates, and wildlife entry deterrents in heavy wildlife corridors.
- **Irrigation and drainage facilities**—The project would affect existing drainage and irrigation facilities. Depending on the severity of the impact, existing facilities would be modified, improved, or replaced as necessary to maintain existing drainage and irrigation functions, allow operations and maintenance access for facility owners, and support HSR drainage requirements.

- **Operational facilities**—HSR operational requirements include traction power distribution, ATC, communications and maintenance facilities, and underground or overhead power transmission lines. Working in coordination with power supply companies and in accordance with design requirements, the Authority has identified frequency and right-of-way requirements for traction power distribution facilities.
- **SR 87, SR 89, SR 101, SR 152, I-5, and I-880 adjacency**—The project follows or traverses SR 87, SR 89, SR 101, SR 152, I-5, and I-880, crossing over these routes in some locations and under them in others. In some instances, the at-grade HSR guideway may cross the roadway approaches of these highway overcrossings and interchange elements. Construction of the project could entail replacement of some major state facilities, overcrossings, and interchanges to maintain horizontal and vertical clearances over the highway right-of-way or to avoid traffic impacts during construction. These project components are discussed for each alternative in State Highway and Local Roadway Modifications later in this section.
- **UPRR adjacency**—The project in the Monterey Corridor and the Morgan Hill and Gilroy Subsections is designed to follow the existing UPRR corridor adjacent to the UPRR mainline right-of-way under Alternative 2, and to follow some portions of it under Alternative 1. Alternative 3 is designed to further minimize interaction with the UPRR right-of-way. Alternative 4 is designed to maximize use of existing Caltrain and UPRR right-of-way to reduce additional right-of-way impacts.

  From Tamien Station to Bloomfield Avenue in Gilroy, the UPRR and proposed HSR tracks run parallel for 24.4 miles under Alternative 1, 31.4 miles under Alternative 2, and 16.4 miles under Alternative 3. Under Alternative 4, UPRR and HSR would run in parallel for 37.4 miles—from De La Cruz Boulevard to Bloomfield Avenue. In several locations, the HSR would be elevated to cross over the UPRR operational right-of-way. In these instances, the HSR would maintain required horizontal and vertical clearance over the UPRR's operational right-of-way to avoid or minimize impacts on other UPRR rights-of-way, spurs, and facilities. Alternatives 1, 2, and 3 are designed to avoid the existing UPRR operations right-of-way and active rail spurs to the greatest extent practicable, and to maximize use of existing transportation corridors. Figure 2-40 and Figure 2-41 illustrate different cross-section configurations that provide vertical and horizontal separation of the HSR track from the adjacent UPRR right-of-way boundary. Figure 2-9 illustrates the blended, at-grade cross-section that would be deployed for Alternative 4. The interaction with the UPRR right-of-way would vary by alternative as follows:

  - Alternative 1 would limit longitudinal encroachments into the UPRR right-of-way, but would require acquisition of 28 acres of UPRR right-of-way and another 34 acres for temporary construction easements (TCE) for UPRR relocations or crossings and the Downtown Gilroy Station.
  - Alternative 2 would raise the UPRR tracks onto embankment for the southbound approach into downtown Gilroy and at the HSR station, and would require 36 acres of UPRR right-of-way and 257 acres for TCEs for UPRR relocations or crossings, roadway grade separations, and the Downtown Gilroy Station.
  - Alternative 3 would entail the least amount of longitudinal encroachments or acquisition of other UPRR right-of-way for the East Gilroy Station, but it would require 8 acres of UPRR right-of-way and 13 acres for TCEs.

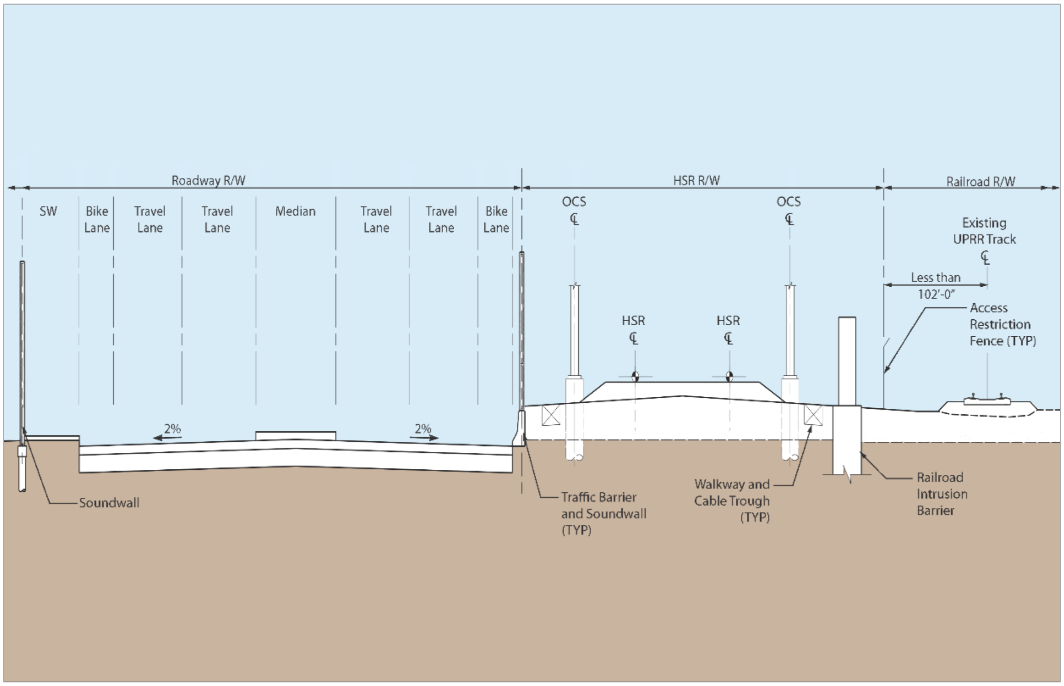


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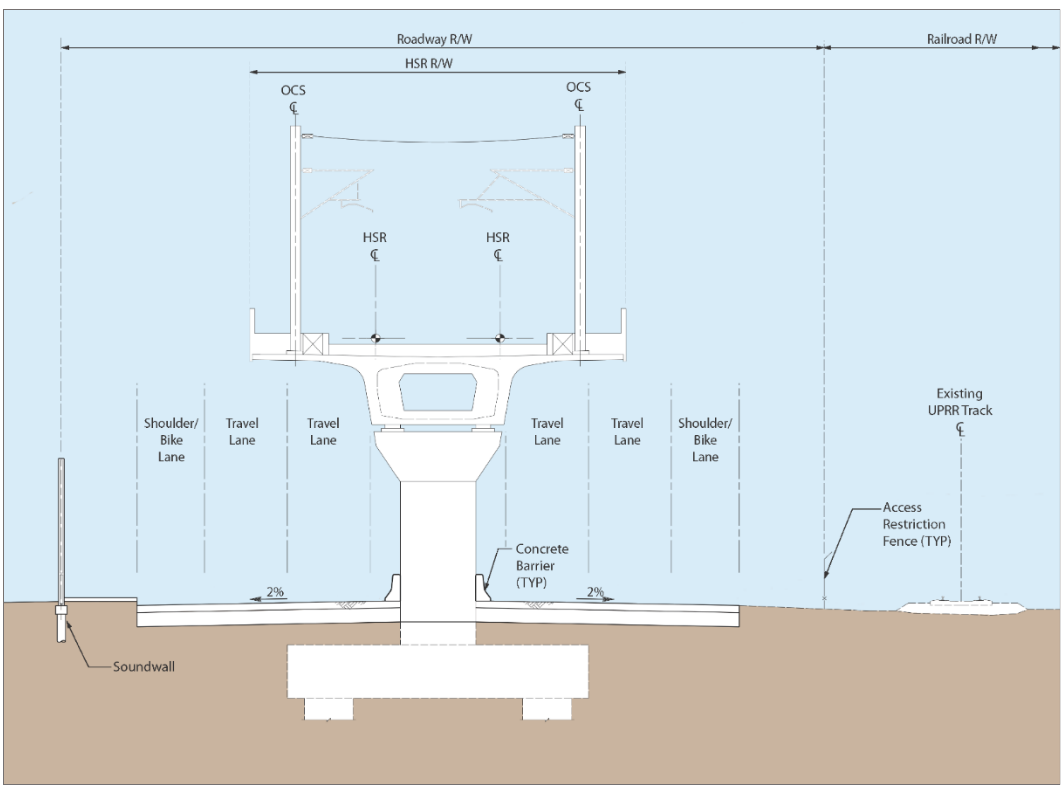
Figure 2-40 At-Grade Cross-Section Configuration for UPRR Adjacency



AUGUST 2017

Figure 2-41 Viaduct Cross-Section Configuration for UPRR Adjacency

- Alternative 4 would require the most longitudinal encroachments or acquisition of UPRR right-of-way. From Communications Hill to the MOWF south of Gilroy, HSR would install two electrified blended HSR tracks and one nonelectrified freight track predominantly within the existing UPRR right-of-way. An additional 2,500-foot-long freight siding track would be provided. A dedicated freight track would also be provided from De La Cruz Boulevard to Communications Hill within the Caltrain right-of-way. UPRR spur and industrial tracks would be maintained from De La Cruz Boulevard to the MOWF, and a dedicated freight connection to the South Gilroy MOWF would be provided within the HSR right-of-way. The UPRR Hollister subdivision would be realigned to accommodate the MOWF and associated freight and HSR tracks. Within the UPRR right-of-way (south of Communications Hill) along the Coast line, there would be 37.4 miles of realignment. An additional 1.7 miles of the UPRR Hollister subdivision would be realigned.

- **Temporary construction easements**—TCEs would be required along the length of the proposed alignment ranging from isolated maximum widths of 486 feet for Alternative 1 to 568 feet for Alternative 2. The area of HSR TCEs (compared to TCEs for utilities) varies from 655 acres for Alternative 4 to 1,245 acres for Alternative 2; Alternatives 1 and 3 would require 1,057 and 1,080 acres, respectively.

- **Permanent acquisitions**—Permanent right-of-way acquisitions would be required at alignment crossings.

Stations

Two stations would be constructed for the project: San Jose and Gilroy. The HSR San Jose Diridon Station would be constructed at the existing Caltrain station. The station configuration is the same for Alternatives 1, 2, and 3, while under Alternative 4 it would be built as an at-grade station. A second station—in the Morgan Hill and Gilroy Subsection—would be constructed in either downtown Gilroy or east Gilroy, depending on the alternative selected. Conceptual station plans provide space for a multitude of services, including local and regional transit connectivity, pick-up and drop-off facilities, parking, a station building for ticketing and support services, and an HSR passenger waiting and access area. Station planning incorporates pedestrian and bicyclist connectivity; improved station area roadways to facilitate connectivity; expanded sidewalks, pathways, and plazas; rider pick-up and drop-off areas; and vehicle parking. Table 2-9 shows the features of the San Jose Diridon Station and Table 2-10 shows a comparison of the station alternatives for Gilroy.

Table 2-9 Summary of Diridon Station Features

Feature	Alternatives 1, 2, and 3	Alternative 4
Vertical profile and height (top of rail)	Aerial (62 feet)	At grade (less than 1 foot)
Platform location	Platforms above existing Caltrain rail yard centered between Santa Clara and Park Streets	Existing platforms raised and extended for HSR use
Platform length	1,410 feet	1,385 feet and 1,465 feet
Rail connections	Caltrain, ACE, Amtrak, VTA light rail, future BART	Caltrain, ACE, Amtrak, VTA light rail, future BART
Parking (existing and displaced)	226 (Amtrak 61; Caltrain 165) displaced spaces replaced 1:1 with new parking at Cahill/Park Streets and a second site at Stockton/Alameda Streets	161 (Amtrak 61; Caltrain 100) displaced spaces replaced 1:1 with new parking at Cahill/Crandall Streets and a second site at Stockton/Alameda Streets

Feature	Alternatives 1, 2, and 3	Alternative 4
HSR parking supply	MOA demand of 1,050 spaces would be met by commercially available parking downtown and at airport	MOA demand of 1,050 spaces would be met by commercially available parking downtown and at airport
Bus transit	Existing on-site transit center to be relocated to on-street location on Cahill, Stover, and Crandall Streets	Existing on-site transit center to be relocated to off-street location at Cahill and Crandall Streets
Pick-up/drop-off (curb length)	On-street along Cahill St and Otterson St (1,900 feet meets 1,900-foot demand)	On-street along Cahill St, Stover St, Crandall St, S. Montgomery St, and Otterson St (1,900 feet meets 1,900-foot demand)
Pedestrian	Transit plaza	Transit plaza
Bicycle	4,000-square-foot facility	4,000-square-foot facility
Street access	Cahill St reconfigured and extended from Santa Clara to Park St; Stover and Crandall Streets extended to S. Montgomery St	Cahill St reconfigured and extended from Santa Clara to Otterson St; Stover and Crandall Streets extended to S. Montgomery St
Station access (transit, pick-up/drop-off, bike)	On-street pick-up/drop-off along Cahill St, designed as transit street with 12 to 15 bus stops New two-way cycle tracks on east side of Cahill St; new signals and pedestrian crossings at Cahill St and Park, Otterson, Stover, W San Fernando, and Crandall Streets. Additional pick-up/drop-off along east side of Cahill St between Park and Otterson and along Otterson	On-street pick-up/drop-off along Cahill St, Otterson St, Stover St, Crandall St, and S Montgomery New one-way bike lanes on either side of Cahill St; new signals and pedestrian crossings at Cahill and Stover, and Cahill and Crandall Streets.
Entrance	Three east side entrances: main entrance on east side of tracks, north of the existing Historic Depot next to the future BART alignment; south of the existing historic Diridon station building; and south of PG&E power station. Three west side entrances: north at end of White Street and two on Laurel Grove, one north and one south	Two east side entrances from Cahill, north and south of Historic Depot. Two west side entrances, one from Laurel Grove Ln and one from White St
Program area	99,289-square-footbuilding 4,400-square-foot substation and systems	50,478-square-foot building 4,400-square-foot substation and systems
Concourse configuration	Mezzanine above existing tracks; below HSR platforms, concourse has three east/west connections across tracks at north, south, and middle of concourse	Two concourses above existing tracks with connections to all platforms

ACE = Altamont Corridor Express; BART = Bay Area Rapid Transit; HSR = high-speed rail; MOA = memorandum of agreement; PG&E = Pacific Gas and Electric Company; VTA = (Santa Clara) Valley Transportation Authority

Table 2-10 Comparison of Alternative Gilroy Station Features

Feature	Description			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Vertical profile and height (top of rail)	Low viaduct (32.77 feet)	Embankment (15.75 feet)	Embankment (16.83 feet)	At-grade (2.96 feet)
Platform location	Dedicated HSR tracks east of UPRR between relocated Old Gilroy/7th St and 9th St	Dedicated HSR tracks east of UPRR between relocated Old Gilroy/7th St and 9th St	North of Leavesley Rd	Dedicated HSR tracks west of UPRR between former Old Gilroy/7th St and 9th St
Platform length	800 feet	800 feet	800 feet	800 feet
Rail connections	Caltrain, TAMC (future service)	Caltrain, TAMC (future service)	none	Caltrain, TAMC (future service)
Parking (existing and displaced)	471 displaced Caltrain spaces replaced 1:1 with new parking to the west and east of the station; 269 displaced spaces from the San Ysidro housing development replaced 1:1 with new surface parking at south end of Alexander Street	471 displaced Caltrain spaces replaced 1:1 with new parking to the west and east of the station; 269 displaced spaces from the San Ysidro housing development replaced 1:1 with new surface parking at south end of Alexander Street	No displacement, all new	471 displaced Caltrain spaces replaced 1:1 with new parking to the west and east of the station; 269 displaced spaces from the San Ysidro housing development replaced 1:1 with new surface parking along Automall Parkway with access from the south end of Alexander Street
HSR parking supply	970 (2040) on-site supply meets MOA demand 1,710 planned spaces in 2040 compensates for HSR demand plus displaced existing parking	970 (2040) on-site supply meets MOA demand 1,710 planned spaces in 2040 compensates for HSR demand plus displaced existing parking	1,520 (2040) on-site supply meets MOA demand	970 (2040) on-site supply meets MOA demand 1,710 planned spaces in 2040 compensates for HSR demand plus displaced existing parking
Bus transit	On site total of eight bus bays	On site total of eight bus bays	On site would add seven bus berths	On site total of eight bus bays
Pick-up/drop-off (curb length)	On site, east and west sides of station West side (370 feet) front of historic station East side (900 feet) front and sides of station, access from Alexander St and new station access streets	On site, east and west sides of station West side (370 feet) front of historic station East side (900 feet) front and sides of station, access from Alexander St and new station access streets	On site, east and west sides of station 400 feet west side to south of station 500 feet east side in front of station	On site, east and west sides of station West side (370 feet) front of historic station East side (900 feet) front and sides of station, access from Alexander St and new station access streets

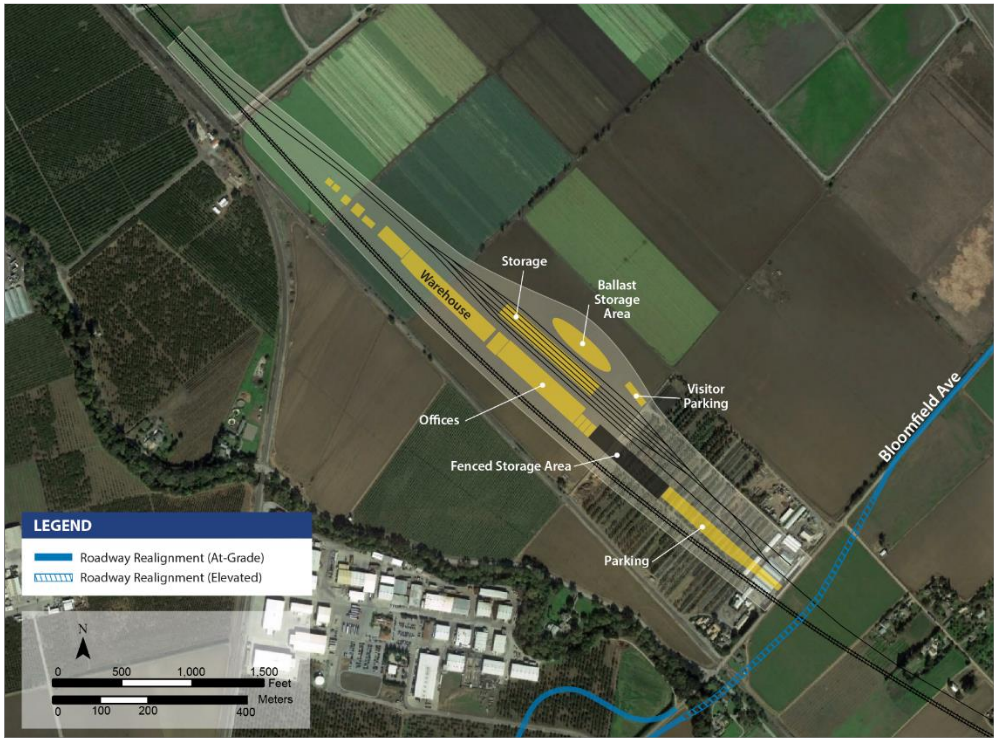
Feature	Description			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Pedestrian	Transit plaza	Transit plaza	Transit plaza	Transit plaza, Overcrossing along 7th Street alignment
Bicycle	4,000-square-foot facility	4,000-square-foot facility	4,000-square-foot facility	4,000-square-foot facility
Off-Site Facilities				
Street access	Existing grade crossings unchanged (except realignment of Old Gilroy/ 7th St)	9th street goes through and station access streets connect to existing grid, realignment of Old Gilroy/7th St	West entrance from Leavesley; east entrance from Marcella; additional road connection on west side to Las Animas and on east side to Marcella	Old Gilroy/7th St. crossing closed
Station access (transit, pick-up/drop-off, bike)	Class II bike lanes on 7th and Alexander	Class II bike lanes on 7th, 10th and Alexander	Bikes: New Class III bike route from outlet mall to site entrance, then Class II lanes from station entrance to parking, Class I bi-directional off-street path adjacent to parking that connects to bike station	Existing bike facilities
Entrance	Main auto and bike entrance on east side; main pedestrian, transit on west side	Main auto and bike entrance on east side; main pedestrian, transit on west side	Main entrance on west side	Main auto and bike entrance on east side; main pedestrian, transit on west side
Program area	60,513-square-foot building 4,400-square-foot substation and systems	60,513-square-foot building 4,400-square-foot substation and systems	58,611-square-foot building 4,400-square-foot substation and systems	57,000-square-foot building 4,400-square-foot substation and systems
Concourse configuration	Below existing UPRR and Caltrain tracks	Below raised UPRR and Caltrain tracks	Under tracks and embankment	Above HSR and realigned UPRR and Caltrain tracks

HSR = high-speed rail; TAMC = Transportation Agency for Monterey County; UPRR = Union Pacific Railroad

Maintenance Facilities

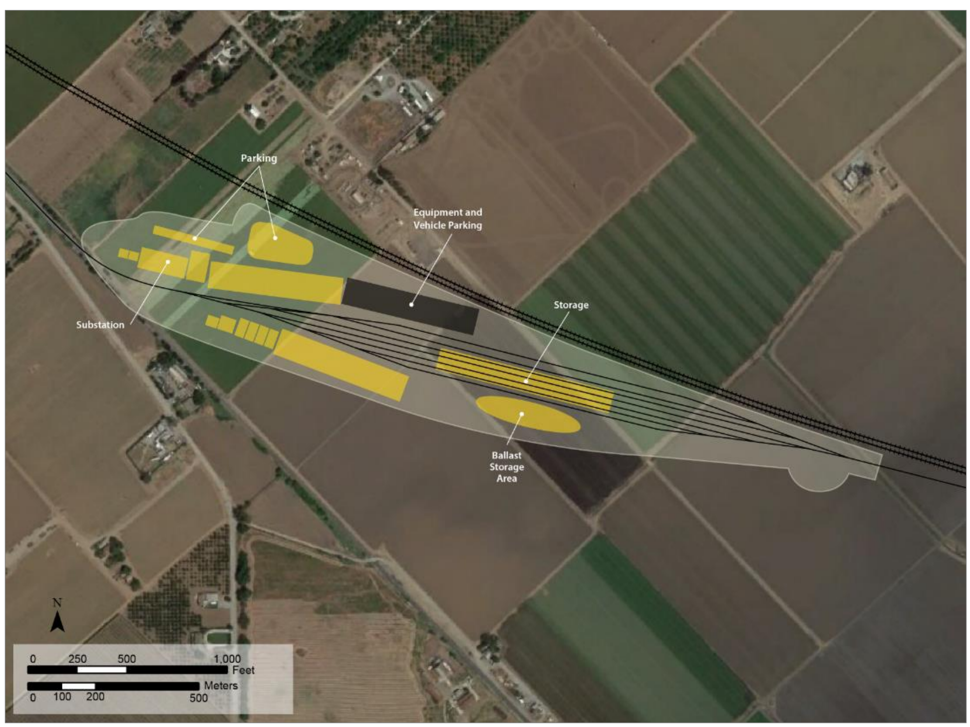
Three sites for the MOWF are under consideration:

- The South Gilroy MOWF would be in one of two locations--between Carnadero Avenue and Bloomfield Avenue on the east side of the HSR alignment under Alternatives 1 and 2 (Figure 2-42) or south of Bloomfield Avenue on the on the west side of the HSR alignment (Figure 2-43) under Alternative 4.
- The East Gilroy MOWF would be west of the HSR mainline, south of the community of Old Gilroy under Alternative 3. The MOWF would extend from north of Pacheco Pass Highway (SR 152) to north of Bloomfield Avenue (Figure 2-44).



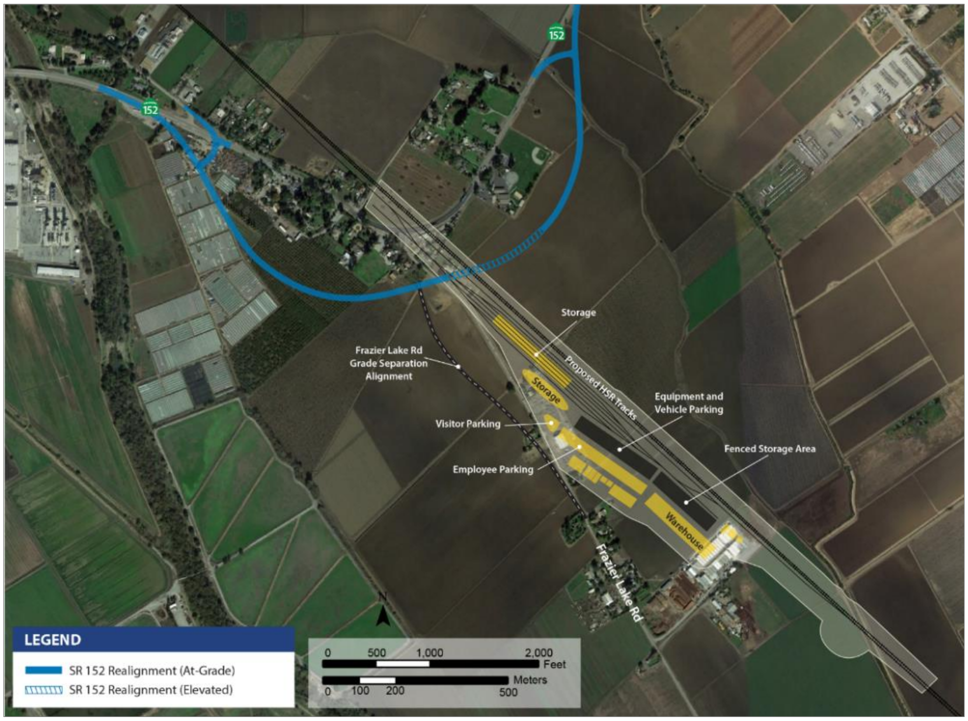
Source: Authority 2019a JUNE 2019

Figure 2-42 South Gilroy Maintenance of Way Facility (Alternatives 1 and 2)



Source: Authority 2019a JUNE 2019

Figure 2-43 South Gilroy Maintenance of Way Facility (Alternative 4)

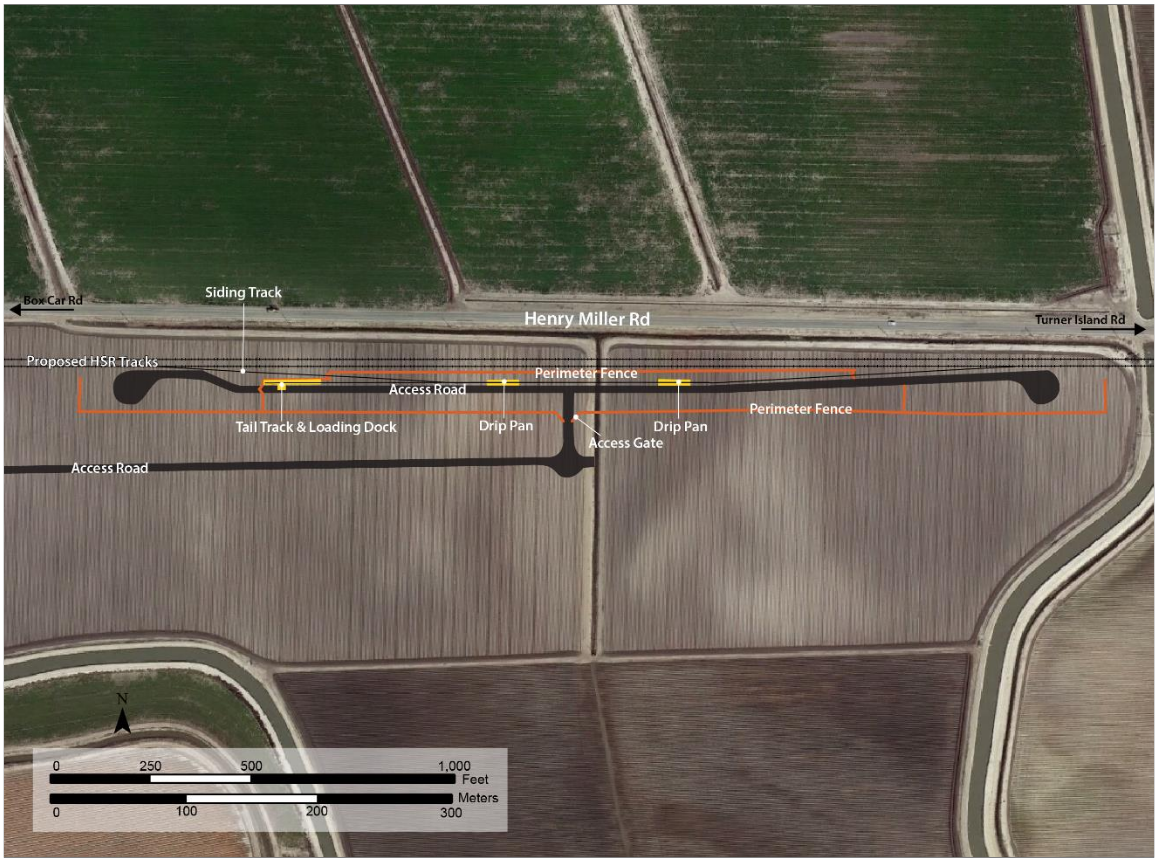


Source: Authority 2019a JUNE 2019

Figure 2-44 East Gilroy Maintenance of Way Facility (Alternative 3)

Under Alternatives 1, 2, and 3, the MOWF would encompass approximately 75 acres; the Alternative 4 MOWF would encompass approximately 50 acres. MOWFs provide storage of infrastructure inventory as well as stockpile areas for ballast and other bulk materials. MOWFs provide for dispatch, maintenance, and repair of rail-mounted equipment and include support quarters for maintenance personnel. The MOWF would occupy a linear site adjacent to the HSR mainline tracks (rail side unloading dock as well as 1,600 feet of train storage) with a maximum width of seven tracks (six yard tracks plus one siding track). It would be approximately 0.75 mile long. While most access is by rail, MOWFs also provide road-rail vehicle access locations. Security fencing 8 to 15 feet high and (depending on local conditions) a noise barrier 20 to 40 feet high would enclose the site. The site would be staffed by 75 to 150 personnel with continuous 24-hour operation; however, nighttime hours (9 p.m.–7 a.m.) would be busiest with deployment of rail-mounted equipment. Pole-mounted floodlights 50 to 100 feet tall would provide lighting for buildings, pathways, and trackwork. The South Gilroy MOWF for Alternatives 1 and 2 is described in Section 2.6.2.5, Alternative 1; the East Gilroy MOWF is described in Section 2.6.2.6, Alternative 3; and the South Gilroy MOWF for Alternative 4 is described in Section 2.6.2.7.

An MOWS would be constructed in the San Joaquin Valley Subsection near Turner Island Road (Figure 2-45). The MOWS would occupy an approximately 4-acre linear site adjacent to the HSR mainline tracks with one 1,600-foot siding track and a 200-foot tail track. An MOWS provides sufficient storage for on-track equipment to be strategically placed prior to the beginning of overnight maintenance access. The MOWS would support maintenance activities by providing a location for layover of equipment and temporary storage of materials such as ballast and other bulk materials as well as secured storage for non-bulk materials. The goal is to reduce travel time required to arrive at the maintenance location by providing access via rail, thereby enhancing the efficiency and productivity of these activities. The site would be secured with keypad access for limited vehicle access. The design includes parking for 10 to 20 vehicles. Like activities at the MOWFs, MOWS operations are more active at night, with about 30 to 40 staff. Nighttime lighting would include perimeter lighting as well as floodlights for buildings, pathways, and trackwork.



Source: Authority 2019a JUNE 2019

Figure 2-45 Maintenance of Way Siding near Turner Island Road

Safety and Security

The system safety and system security program for the development and operation of HSR is described in the Authority's SSMP (Authority 2016b). The SSMP includes the Authority's Safety and Security Policy Statement, roles and responsibilities for safety and security across the system, the program for managing safety hazards and security threats/vulnerabilities, safety and security certification program requirements, and construction safety and security requirements.

State Highway and Local Roadway Modifications

State Highway Underpasses

Where the HSR alignment is proposed to cross over state highway facilities on aerial structures, the possibility of encroachment into the Caltrans right-of-way would depend on the placement of the HSR aerial structure columns. Temporary closure of the Caltrans right-of-way may be necessary for placement of precast aerial structure sections. Traffic would be detoured onto local streets during such closures.

Roadway Overcrossings

Where the HSR alignment is at grade and runs parallel to state facilities, access would be severed where an at-grade leg of an intersection crosses the HSR alignment. Accordingly, road overcrossings would be necessary to maintain function of the state highway and local road systems. Intersecting roads would be realigned horizontally and adjusted vertically to cross over the state highway. The possibility of encroachment into the Caltrans right-of-way would depend on the placement of the overcrossing columns. The design intent of these crossings is to maintain the existing intersection and traffic patterns during construction. However, when conforming to the existing roads, some short-term closures may be required, and local traffic would use one of the other overcrossings or intersections in the vicinity.

Eliminating Leg of Intersections

The elimination of one leg of an existing at-grade intersection with a state highway was deemed necessary where the road was close to other accessible, proposed overcrossings, or where the existing average annual daily traffic was not high enough to warrant its own overcrossing. In these circumstances, the access would be severed along the leg of the intersection that the HSR track traverses. There would be no impacts on the Caltrans right-of-way as no structures are required. Local traffic would use one of the other overcrossings in the vicinity.

Bridge Retrofits

Some existing bridges over HSR may require retrofit where a structural deficiency has been identified or where there is insufficient information currently available to make such a determination (Table 2-11). The bridges have not been identified as requiring replacement under the project, but they may be in need of seismic or other improvements to meet HSR performance criteria; consequently, there is a potential need for them to be retrofitted or replaced once more detailed analysis is performed in a later design phase. Typically, in such instances the right-of-way is preserved on the crossing roadway network to the conform[10] line.

Table 2-11 Existing Bridges That Could Require Retrofit

Bridge	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Lafayette St pedestrian overcrossing	X			X
W San Carlos Ave				X
Blossom Hill Rd		X		X
Capitol Expressway		X		
Bernal Ave		X		X

Ramp Modifications

Ramp modifications would be necessary where the HSR track is on an aerial structure and the proposed columns directly interfere with the existing alignments of roadways or off-ramps. These ramps would be modified to avoid the proposed columns and to accommodate any other roadway realignments that would result from the aerial structure columns. Although the modifications would be slight, additional right-of-way may be required for the realigned off-ramps. Roadway traffic would likely use existing facilities while the realigned ramps are being constructed.

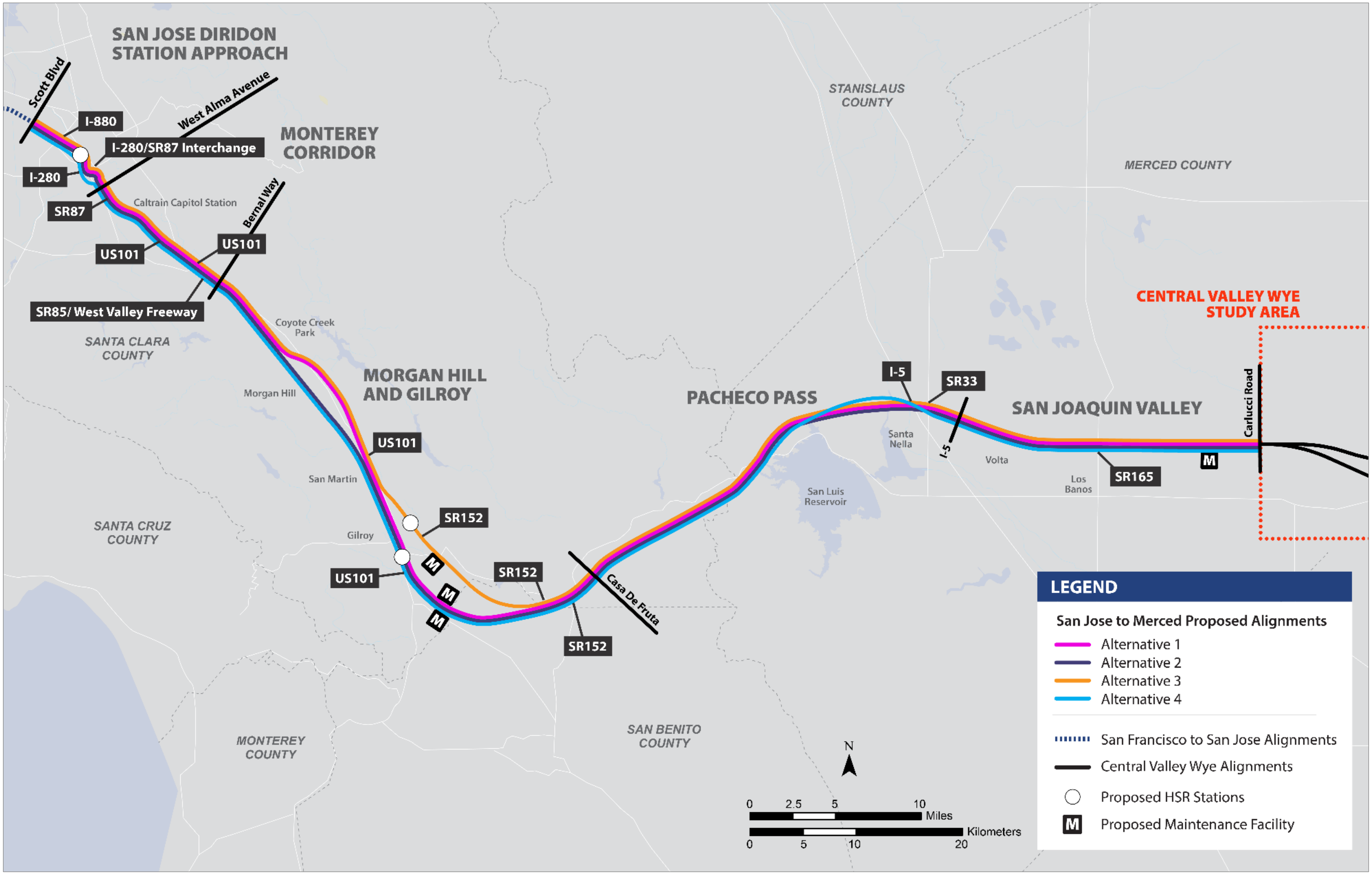
Table 2-12 shows the Caltrans facilities that would be affected by the project alternatives. Figure 2-46 illustrates their locations. Figure 2-47 through Figure 2-52 illustrate local roadway modifications that would be necessary under the project alternatives. A complete listing of these modifications is provided in Appendix 2-A, Table 2.

[10] The *conform line* is the area where the roadway that is being reconstructed returns to grade.

Table 2-12 Impact of HSR Alternatives on Caltrans Facilities

Facility	Description of Change	Alternative 1	Alternative 2	Alternative 3	Alternative 4
I-880	TCE (1, 2, 3); permanent ROW acquisition (1); aerial structure/overcrossing (2, 3)	X	X	X	
I-280/SR 87 interchange	TCE; permanent ROW acquisition; aerial structure/overcrossing	X	X	X	
I-280	TCE, permanent ROW acquisition; aerial structure/overcrossing				X
SR 87	TCE; permanent ROW acquisition; closure of on-ramp adjacent to Tamien Station and relocation; new overcrossing (4 only)	X	X	X	X
SR 85/West Valley Frwy	TCE; permanent ROW acquisition; aerial structure/overcrossing (1, 3)	X	X	X	
US 101	TCE; permanent ROW acquisition; new trench undercrossing (2); at-grade/undercrossing (4); aerial structure/overcrossing (1, 3)	X	X	X	X
SR 152	TCE; permanent ROW acquisition; aerial structure overcrossings	X	X	X	X
SR 152	TCE; permanent ROW acquisition; new overcrossing and tunnel facilities	X	X	X	X
I-5	TCE; permanent ROW acquisition; aerial structure/overcrossing; road realignment	X	X	X	X
SR 33	TCE; permanent ROW acquisition; new overcrossing	X	X	X	X
SR 165	TCE; permanent ROW acquisition; embankment/bridge structure; HSR undercrossing	X	X	X	X

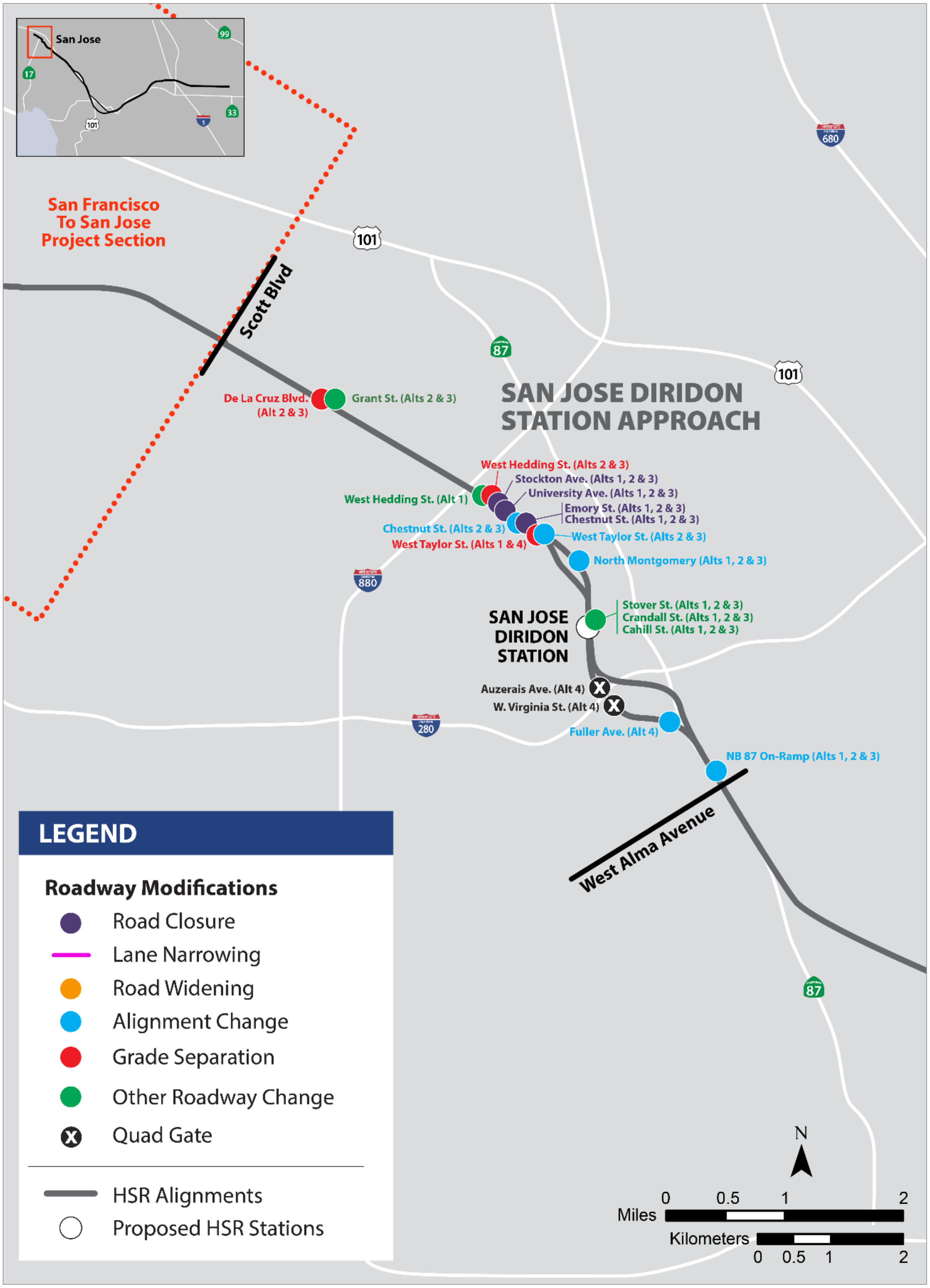
ROW = right-of-way
I = Interstate
SR = State Route
TCE = temporary construction easement



Source: Authority 2019a

JUNE 2019

Figure 2-46 Location of State Highways or Routes Affected by HSR Alternatives

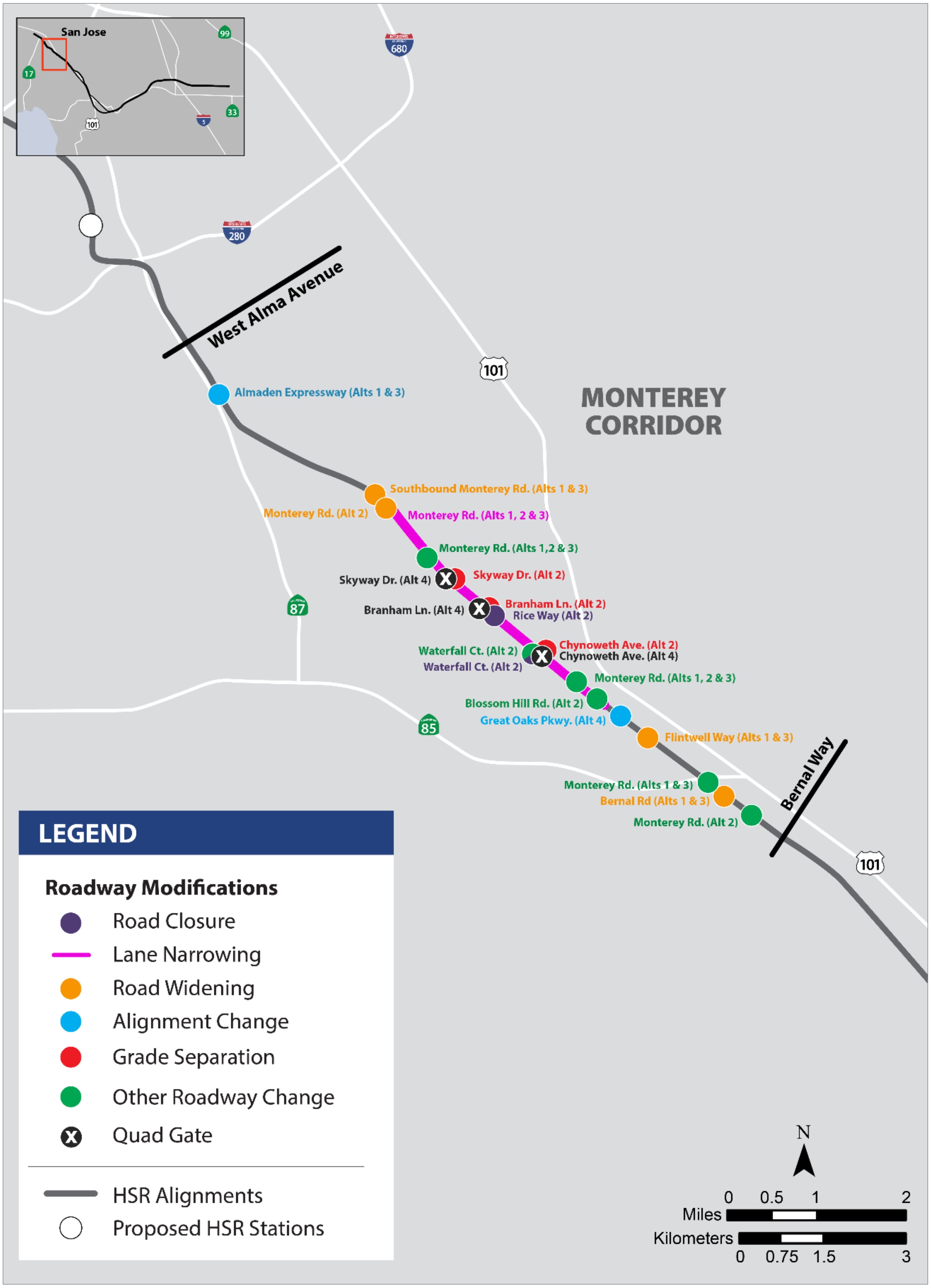


Source: Authority 2019a

JANUARY 2020

Note: Description of modifications is provided in Table 1 in Appendix 2-A.

Figure 2-47 Local Roadway Modifications Required for HSR—San Jose Diridon Station Approach Subsection

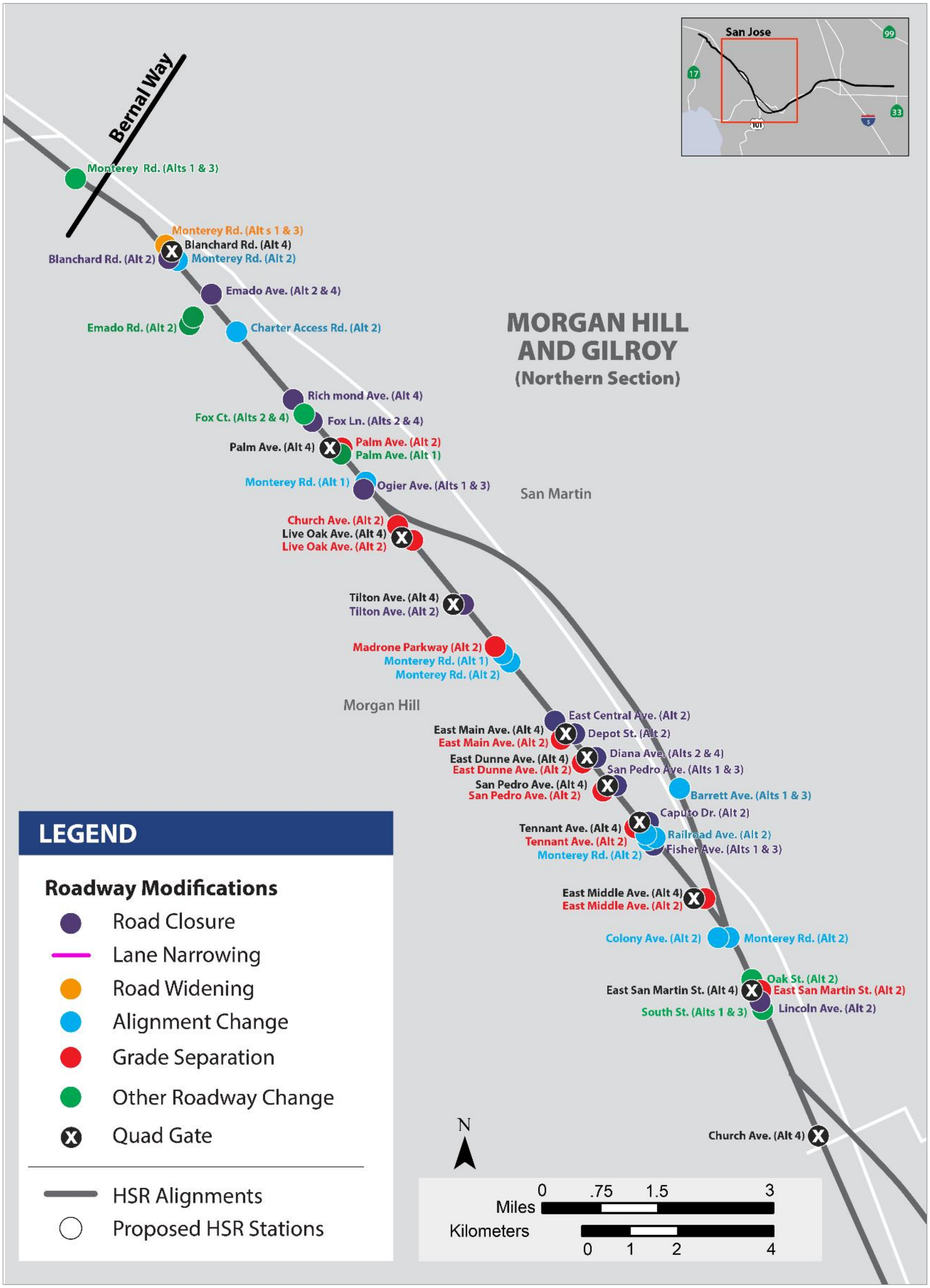


Source: Authority 2019a

JUNE 2019

Note: Description of modifications is provided in Table 1 in Appendix 2-A.

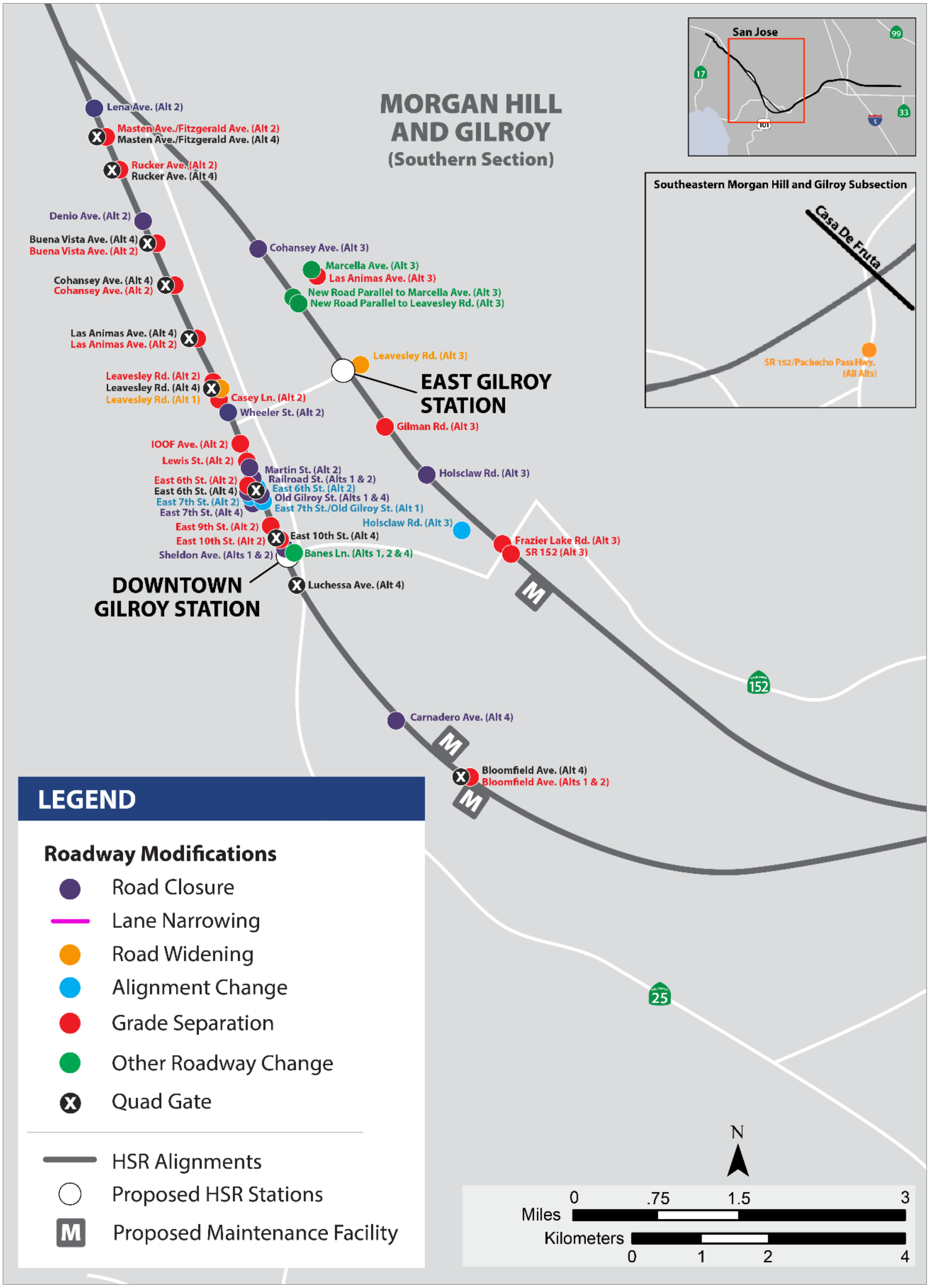
Figure 2-48 Local Roadway Modifications Required for HSR—Monterey Corridor Subsection



Source: Authority 2019a JUNE 2019

Note: Description of modifications is provided in Table 1 in Appendix 2-A.

Figure 2-49 Local Roadway Modifications Required for HSR—Morgan Hill and Gilroy Subsection (Northern Section)



Source: Authority 2019a JANUARY 2020

Note: Description of modifications is provided in Table 1 in Appendix 2-A.

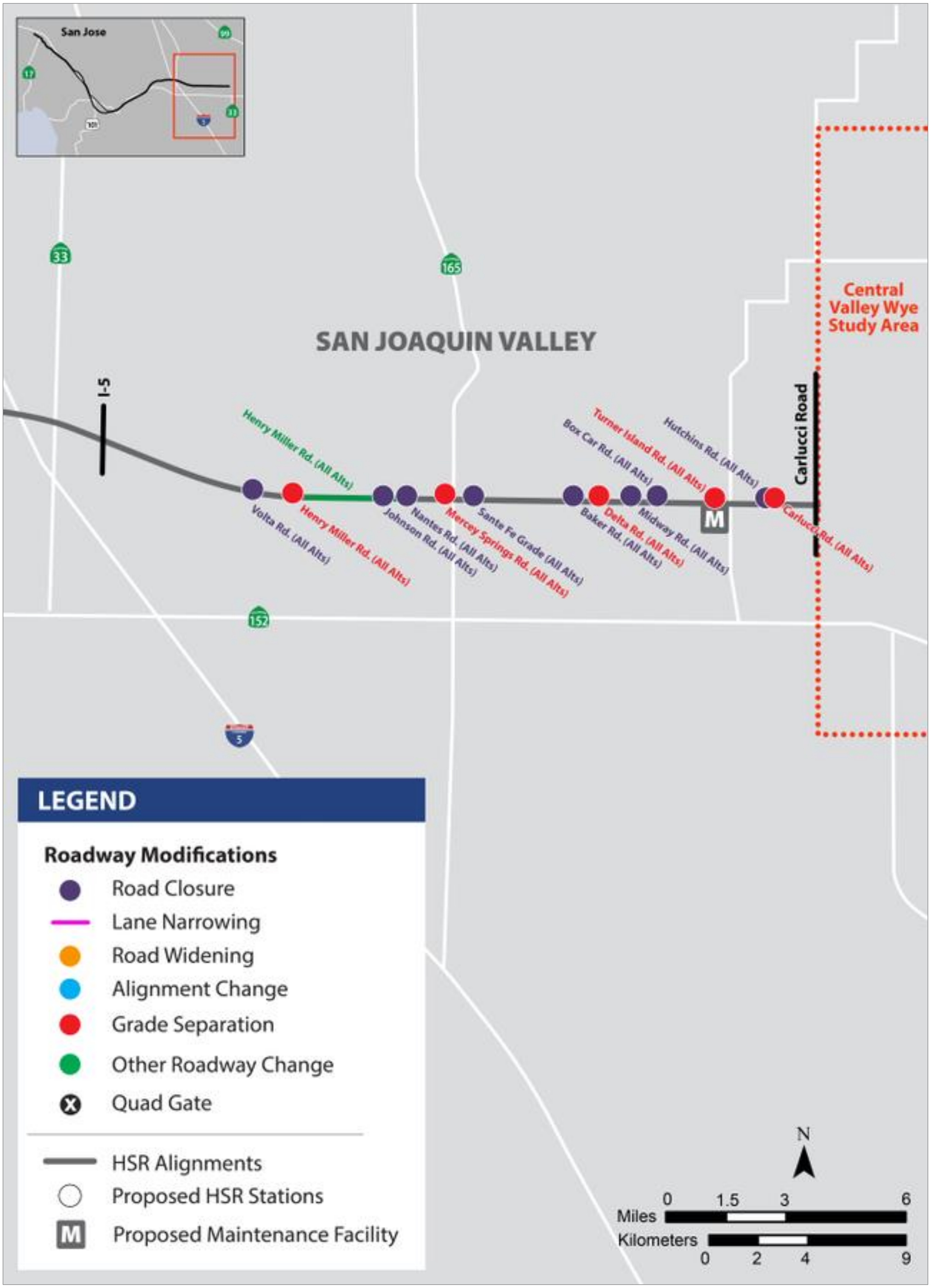
Figure 2-50 Local Roadway Modifications Required for HSR—Morgan Hill and Gilroy Subsection (Southern Section)

Source: Authority 2019a

JUNE 2019

Note: Description of modifications is provided in Table 1 in Appendix 2-A.

Figure 2-51 Local Roadway Modifications Required for HSR—Pacheco Pass Subsection



Source: Authority 2019a JUNE 2019

Note: Description of modifications is provided in Table 1 in Appendix 2-A.

Figure 2-52 Local Roadway Modifications Required for HSR—San Joaquin Valley Subsection

2.6.2.3 HSR Project Impact Avoidance and Minimization Features

The Authority has committed to implementing impact avoidance and minimization features (IAMF) consistent with the Statewide Program EIR/EIS (Authority and FRA 2005), the Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), and the Partially Revised Final Program EIR (Authority 2012b). The Authority would implement these features during project design and construction, as relevant to the project, to avoid or reduce impacts. These features are considered to be part of the project and are included as applicable in each of the alternatives for purposes of the environmental impact analysis. The full text of the IAMFs that are applicable to the project is provided in Appendix 2-E. Chapter 3 provides a brief description of each IAMF as well as its purpose in the context of each resource topic.

To address impacts on agricultural lands and dairy farms

- AG-IAMF#1: Restoration of Important Farmland Used for Temporary Staging Areas
- AG-IAMF#2: Permit Assistance
- AG-IAMF#3: Farmland Consolidation Program
- AG-IAMF#4: Notification to Agricultural Property Owners
- AG-IAMF#5: Temporary Livestock and Equipment Crossings
- AG-IAMF#6: Equipment Crossings

To control emissions from construction and operation

- AQ-IAMF#1: Fugitive Dust Emissions
- AQ-IAMF#2: Selection of Coatings
- AQ-IAMF#3: Renewable Diesel
- AQ-IAMF#4: Reduce Criteria Exhaust Emissions from Construction Equipment
- AQ-IAMF#5: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment
- AQ-IAMF#6: Reduce the Potential Impact of Concrete Batch Plants

To address visual incompatibility

- AVQ-IAMF#1: Aesthetic Options
- AVQ-IAMF#2: Aesthetic Review Process

To minimize impacts on biological resources

- BIO-IAMF#1: Project Biologist
- BIO-IAMF#2: Agency Access
- BIO-IAMF#3: Construction Period WEAP Training
- BIO-IAMF#4: Operation and Maintenance Period WEAP Training
- BIO-IAMF#5: Prepare and Implement a Biological Resources Management Plan
- BIO-IAMF#6: Establish Monofilament Restrictions
- BIO-IAMF#7: Prevent Entrapment in Construction Materials and Excavations
- BIO-IAMF#8: Delineate Equipment Staging Areas and Traffic Routes
- BIO-IAMF#9: Dispose of Construction Spoils and Waste
- BIO-IAMF#10: Clean Construction Equipment
- BIO-IAMF#11: Maintain Construction Sites
- BIO-IAMF#12: Design the Project to be Bird Safe

To minimize effects on cultural resources

- CUL-IAMF#1: Geospatial Data Layer and Archaeological Sensitivity Map
- CUL-IAMF#2: WEAP Training Session
- CUL-IAMF#3: Pre-Construction Cultural Resource Surveys
- CUL-IAMF#4: Relocation of Project Features when Possible
- CUL-IAMF#5: Archaeological Monitoring Plan and Implementation
- CUL-IAMF#6: Pre-Construction Conditions Assessment, Plan for Protection of Historic Built Resources, and Repair of Inadvertent Damage

- CUL-IAMF#7: Built Environment Monitoring Plan
- CUL-IAMF#8: Implement Protection and/or Stabilization Measures

To minimize electromagnetic issues

- EMI/EMF-IAMF#1: Preventing Interference with Adjacent Railroads
- EMI/EMF-IAMF#2: Controlling Electromagnetic Fields/Electromagnetic Interference

To minimize geologic issues and paleontological resources

- GEO-IAMF#1: Geologic Hazards
- GEO-IAMF#2 Slope Monitoring
- GEO-IAMF#3 Gas Monitoring
- GEO-IAMF#4 Historic or Abandoned Mines
- GEO-IAMF#5 Hazardous Minerals
- GEO-IAMF#6: Ground Rupture Early Warning Systems
- GEO-IAMF#7: Evaluate and Design for Large Seismic Ground Shaking
- GEO-IAMF#8: Suspension of Operations during an Earthquake
- GEO-IAMF#9: Subsidence Monitoring
- GEO-IAMF#10: Geology and Soils
- GEO-IAMF#11: Engage a Qualified Paleontological Resources Specialist
- GEO-IAMF#12: Perform Final Design Review and Triggers Evaluation
- GEO-IAMF#13: Prepare and Implement a Paleontological Resource Monitoring and Mitigation Plan (PRMMP)
- GEO-IAMF#14: Provide WEAP Training for Paleontological Resources
- GEO-IAMF#15: Halt Construction, Evaluate, and Treat If Paleontological Resources Are Found

To address effects from hazardous materials and wastes

- HMW-IAMF#1: Property Acquisition Phase I and Phase 2 Environmental Site Assessments
- HMW-IAMF#2: Landfill
- HMW-IAMF#3: Work Barriers
- HMW-IAMF#4: Undocumented Contamination
- HMW-IAMF#5: Demolition Plans
- HMW-IAMF#6: Spill Prevention
- HMW-IAMF#7: Transport of Materials
- HMW-IAMF#8: Permit Conditions
- HMW-IAMF#9: Environmental Management System
- HMW-IAMF#10 Hazardous Materials Plans

To address effects on water quality and supply

- HYD-IAMF#1: Storm Water Management
- HYD-IAMF#2: Flood Protection
- HYD-IAMF#3: Prepare and Implement a Construction Stormwater Pollution Prevention Plan
- HYD-IAMF#4: Prepare and Implement an Industrial Stormwater Pollution Prevention Plan
- HYD-IAMF#5: Tunnel Design Features and Construction Methods

To minimize effects from stations and changes in land use

- LU-IAMF#1: HSR Station Area Development: General Principles and Guidelines
- LU-IAMF#2: Station Area Planning and Local Agency Coordination
- LU-IAMF#3: Restoration of Land Used Temporarily during Construction

To minimize noise and vibration

- NV-IAMF#1: Noise and Vibration

To minimize effects on parks, recreation, and open space

- PK-IAMF#1: Parks, Recreation, and Open Space

To minimize effects on public utilities and energy

- PUE-IAMF#1: Design Measures
- PUE-IAMF#2: Irrigation Facility Relocation
- PUE-IAMF#3: Public Notifications
- PUE-IAMF#4: Utilities and Energy

To maximize safety and security

- SS-IAMF#1: Construction Safety Transportation Management Plan
- SS-IAMF#2: Safety and Security Management Plan
- SS-IAMF#3: Hazard Analyses
- SS-IAMF#4: Oil and Gas Wells

To minimize socioeconomic effects and effects on communities

- SOCIO-IAMF#1: Construction Management Plan
- SOCIO-IAMF#2: Compliance with Uniform Relocation Assistance and Real Property Acquisition Policies Act
- SOCIO-IAMF#3: Relocation Mitigation Plan

To minimize transportation and circulation effects

- TR-IAMF#1: Protection of Public Roadways during Construction
- TR-IAMF#2: Construction Transportation Plan
- TR-IAMF#3: Off-Street Parking for Construction-Related Vehicles
- TR-IAMF#4: Maintenance of Pedestrian Access
- TR-IAMF#5: Maintenance of Bicycle Access
- TR–IAMF#6: Restriction on Construction Hours
- TR-IAMF#7: Construction Truck Routes
- TR-IAMF#8: Construction during Special Events
- TR-IAMF#9: Protection of Freight and Passenger Rail during Construction
- TR-IAMF#10: Off Peak Hour Employee Work Shift Changes at HMF
- TR-IAMF#11: Maintenance of Transit Access
- TR-IAMF#12: Pedestrian and Bicycle Safety

2.6.2.4 Alternative 1

Rationale

Development of Alternative 1 was intended to minimize the project footprint, minimize ground disturbance, minimize continuous surface features, and decrease necessary right-of-way acquisition through extensive use of viaduct structures and bypassing downtown Morgan Hill. It would minimize land use displacements and conversion by staying predominantly within the existing transportation corridor right-of-way, thereby minimizing impacts of the HSR infrastructure footprint on local communities and environmental resources. The vertical profile would be increased to minimize ground intrusion. Alternative 1 would incorporate the viaduct to I-880 design option, operating in blended service between Scott Boulevard and I-880 before transitioning to viaduct through most of the San Jose Diridon Station Approach Subsection. The alternative would continue predominantly on viaduct through the Monterey Corridor and Morgan Hill and Gilroy Subsections. This alternative is distinguished by an alignment around downtown Morgan Hill and a low viaduct approach to an aerial Downtown Gilroy Station. Alternative 1 would include an MOWF south of Gilroy. The alignment would continue predominantly on viaduct and embankment across the Soap Lake floodplain before entering a short tunnel (Tunnel 1) west of Casa De Fruta. The alignment and guideway in the Pacheco Pass Subsection would be the same for all four alternatives, entailing a long tunnel around the northern arm of the San Luis Reservoir and viaducts over the California Aqueduct, Delta-Mendota Canal, and I-5. The alignment and guideway in the San Joaquin Valley Subsection would similarly be common to all four alternatives. East of the I-5 overcrossing, the guideway would be predominantly on embankment along the south side of Henry Miller Road to Carlucci Road, traveling on viaduct over major watercourses and through the GEA. Several local roadways would be relocated on bridges over the HSR embankment. An MOWS would be located near Turner Island Road.

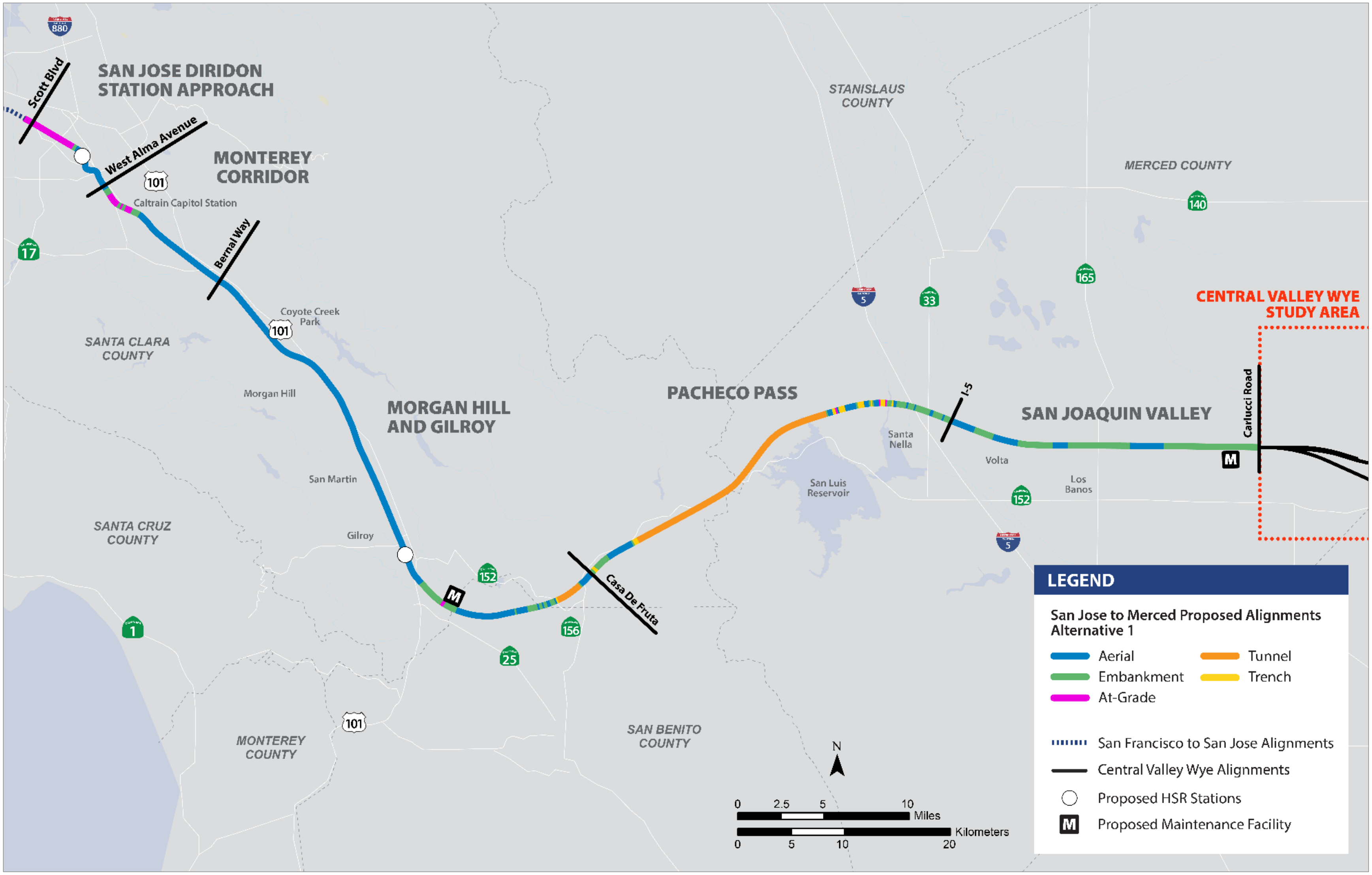
Overall, the HSR guideway under this alternative would comprise two tunnels totaling 15.0 miles, 45.4 miles of viaduct, 21.9 miles of embankment, 2.3 miles in trench, and 4.3 miles at grade in an excavated hillside cut. Figure 2-53 illustrates the primary design features of Alternative 1.

San Jose Diridon Station Approach Subsection

The San Jose Diridon Station Approach Subsection, from Scott Boulevard in Santa Clara to West Alma Avenue in San Jose, would be approximately 6 miles through the cities of Santa Clara and San Jose. The existing Caltrain track in this subsection consists of predominantly two-track and three-track at-grade alignment. South of De La Cruz Boulevard, UPRR tracks of the Coast Line from the northeast converge with the Caltrain corridor and continue south adjacent to the east side of the railroad corridor to the Santa Clara Caltrain Station. Between the Caltrain College Park Station and San Jose Diridon Station, Caltrain's Central Equipment and Maintenance Facility comprises three mainline tracks, a maintenance building, and nine yard tracks. San Jose Diridon Station includes five passenger platforms served by nine yard tracks along the west side of the station house. HSR would diverge from the Caltrain corridor at Park Avenue, just south of San Jose Diridon Station, returning to the Caltrain corridor at the north end of the Caltrain Tamien Station, which includes a passenger platform served by two tracks and a single through track.

Alignment and Ancillary Features

Alternative 1 would begin at Scott Boulevard in blended service with Caltrain at grade. Beginning at I-880 on the southbound approach to West Hedding Street, Caltrain tracks would be realigned to accommodate the HSR tracks. Dedicated HSR tracks would diverge from the Caltrain Mainline Track (MT) 2 and MT3 and continue south along the north side of the existing Caltrain corridor, crossing under West Hedding Street. To accommodate the new track configuration, the West Hedding Street roadway overpass would be replaced with a new overpass bridge that would also pass over Stockton Avenue.



Source: Authority 2019a

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Figure 2-53 Alternative 1 Proposed Alignment

Southeast of West Hedding Street, the dedicated HSR tracks would transition from a two-track at-grade configuration to retained fill and finally to a two-track aerial profile. The HSR alignment would rise on embankment to an approximately 70-foot-high aerial structure. A new bridge structure would be constructed to carry the realigned UPRR/Caltrain MT2 over the West Taylor Street underpass. University Avenue would become a cul-de-sac. A new pedestrian underpass would be constructed near the alignment of Emory Street to allow Caltrain riders to reach both platforms of the Caltrain College Park Station. The HSR viaduct would cross over West Taylor Street, then shift horizontally a maximum of 500 feet east of the existing UPRR/Caltrain mainline tracks to maintain high-speed track curvature.

Both legs of the UPRR Warm Springs Subdivision Lenzen Wye would be relocated, and North Montgomery Street would be extended north of the alignment of Lenzen Avenue almost to the former Lenzen Wye to maintain property access beneath the 60-foot-high HSR viaduct. The HSR viaduct would cross over Cinnabar Street, both legs of the relocated Lenzen Wye and North Montgomery Street, West Julian Street, and West Santa Clara Street while curving west toward the UPRR/Caltrain mainline tracks to enter a new aerial dedicated HSR station at San Jose Diridon Station. Continuing on an aerial structure, the alignment would diverge from the Caltrain right-of-way south of the San Jose Diridon Station HSR platforms by turning sharply east at the Park Avenue overcrossing. The HSR aerial structure would cross over Los Gatos Creek and San Carlos Street, then over Royal Avenue and the intersection of Bird Avenue and Auzerais Avenue, then over the I-280/SR 87 interchange. Continuing south along the east side of SR 87, the HSR aerial structure would cross over West Virginia Street and the Guadalupe River Trail, then over the Caltrain rail bridge, the Guadalupe River, and Willow Street. The HSR aerial structure would continue south over the Caltrain Tamien Station on an alignment between Tamien Station and the SR 87 freeway, transitioning to the Monterey Corridor Subsection at West Alma Avenue.

Traction Power Sites and Power Connections

One new TPSS would be constructed in this subsection on the east side of the Caltrain corridor south of I-880 in San Jose (just southeast of the I-880 overcrossing). The TPSS would be interconnected to two new gas-insulated substation breaker-and-a-half bays. The bays would be installed within the fence line of the PG&E FMC substation, just north of the I-880 overcrossing, by means of an aerial double-circuit 115-kV tie-line.

Train Control and Communication Facilities

An enhanced ATC system would control the trains and comply with the FRA-mandated PTC requirements, including safe separation of trains, over-speed prevention, and work zone protection. This system would include communications towers at intervals of approximately 1.5–3 miles. Signaling and train control elements within the right-of-way would include 10- by 8-foot communications shelters that house signal relay components and microprocessor components, cabling to the field hardware and track, signals, and switch machines on the track. Communications towers in these facilities would use 6- to 8-foot-diameter 100-foot-tall poles. The communications facilities would be sited in the vicinity of track switches and would be grouped with other traction power, maintenance, station, and similar HSR facilities where possible. Where communications towers cannot be co-located with TPSSs or other HSR facilities, the communications facilities would be sited near the HSR corridor in a fenced area approximately 20 by 15 feet.

Under Alternative 1, there would be six ATC sites between I-880 in San Jose and the I-280 and SR-87 interchange:

- Two sites near the TPSS facility
- One site just north of the San Jose Diridon Station
- Three sites between Park Avenue and the proposed HSR crossing of SR 87

One standalone communications radio site would be built at one of two alternative locations, both south of Scott Boulevard along the east side of the Caltrain corridor.

Wildlife Crossings

There would be no wildlife crossings in this subsection.

Stations

The HSR San Jose Diridon Station is estimated to have up to 15,430 boardings in 2040. The station would entail a four-track aerial alignment over the existing Diridon station at approximately 62 feet to top of rail, with 1,410-foot-long platforms above the existing Caltrain rail yard centered between Santa Clara Street and Park Avenue (Figure 2-54 and Figure 2-55). The existing historic station would remain in place. The primary HSR station building would be constructed north of the existing station building, but it would continue to the south wrapping around the existing Caltrain station building. The HSR station building would be accessed from the east at three entrances: the main entrance east of the tracks and north of the existing historic station next to the future BART alignment; an entrance south of the existing historic station; and an entrance on the east side of the alignment and south of the PG&E power station.[11] There would also be three entrances to the HSR station on the west side of the tracks: a north entrance at the end of White Street and two entrances on Laurel Grove Lane, one north and one south. The aerial station would require viaduct columns within the PG&E substation. The HSR station building would encompass 99,289 square feet with a 4,440-square-foot substation and systems building. The concourse would consist of a mezzanine level above the existing Caltrain tracks and below the HSR platforms, with three east-west connections across the tracks at the north, south, and middle.

Existing station parking spaces displaced permanently would be replaced 1:1 with new parking areas at Cahill and Park Streets and at Stockton and Alameda Streets. If the Google Downtown West proposed development is not realized, then the project would displace some existing SAP parking lot spaces and they would be replaced through a parking area north of Julian Street at the corner of Julian Street and Montgomery Street. If the Google Downtown West proposed development is realized in the SAP Center parking lot, then the Downtown West project would account for displacement of parking spaces in the SAP Center parking lot through its plans, which include a requirement to result overall in a net increase in parking available to the SAP Center by 350 spaces and the HSR project would not include an additional parking area north of Julian Street.

HSR parking demand of 1,050 spaces in 2040 would be met by commercially available parking downtown as well as at the Mineta San Jose International Airport, approximately three miles from the station. The Authority has provided a Station Area Planning grant to the City of San Jose to advance the implementation of the Diridon Station Area Plan adopted by the San Jose City Council. Through this effort, the City would address short-term parking needs during HSR and BART Phase II construction and would also address plans for transitioning the parking needed during construction to the highest and best use after construction. Another Station Area Planning grant to the VTA would fund a San Jose Diridon Station Facilities Master Plan. This grant would be used to develop a parking program to manage parking demand and supply over time to reflect changes in ridership and park-and-ride mode share. These two studies would provide input into a multimodal access plan for the station that would be developed prior to final station design and construction.

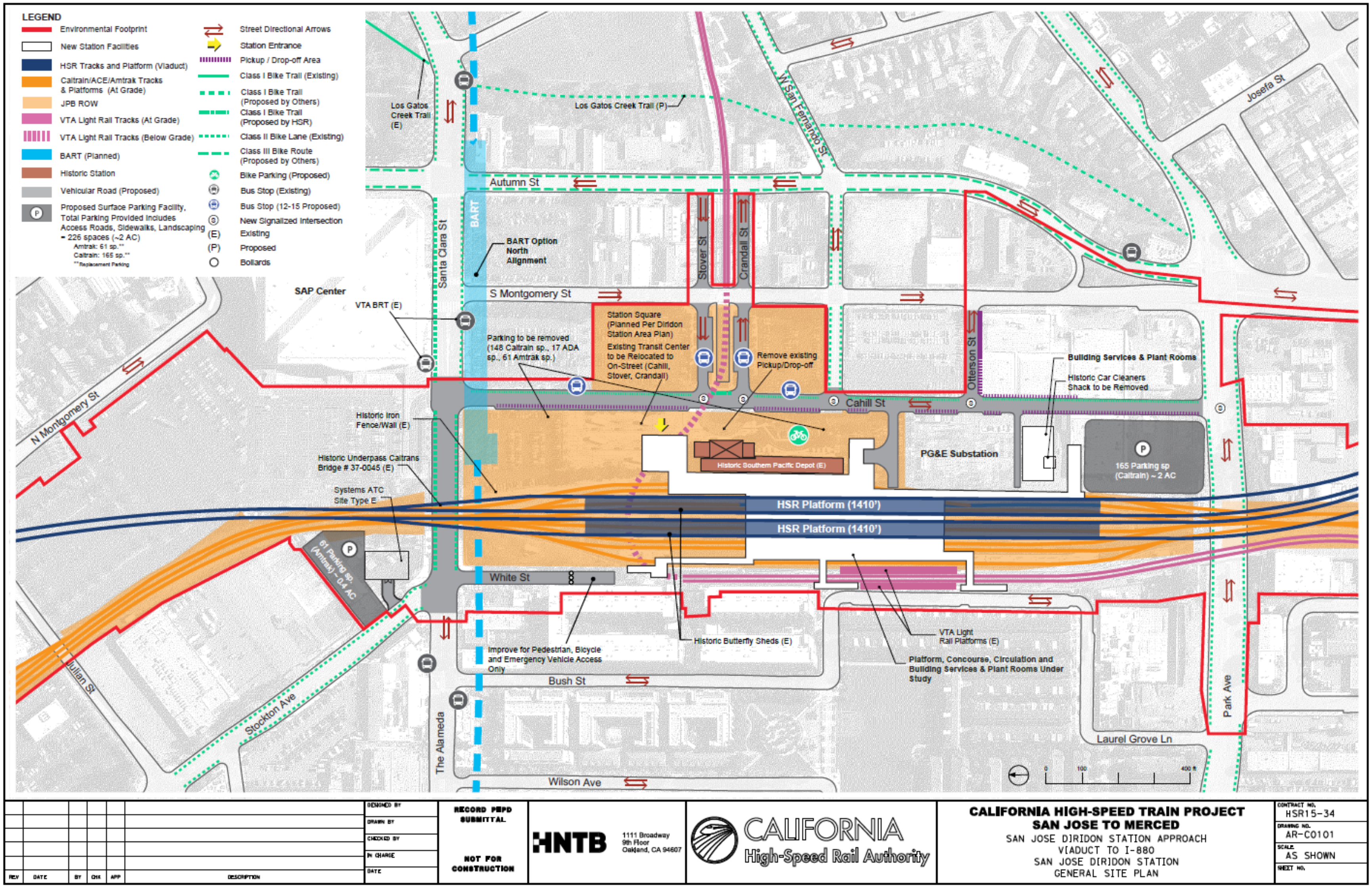
Existing underutilized parking capacity at and around the station would be used to meet the estimated HSR parking demand until a station area parking policy and program are implemented. The Authority would rely on commercially available parking to meet HSR parking demand, provided and priced in accordance with local conditions. HSR riders would be able to walk or take a shuttle, such as the City of San Jose’s DASH, from parking downtown or adjacent to the station.

The existing off-site bus transit center would be relocated to an on-street facility on Cahill, Stover, and Crandall Streets. Street improvements would include reconfiguring and extending Cahill Street from Santa Clara Street to Park Avenue, and converting Cahill, Stover, and Crandall Streets to a transit street with 12 to 15 bus stops. Montgomery Street would be reconfigured to provide curb space for a bus layover. A pick-up/drop-off zone of 1,900 square feet would be provided. New two-way cycle tracks would be installed on the east side of Cahill Street. A 4,000-

[11] The PG&E substation is not part of the project footprint.

square-foot bicycle facility would be constructed. New signals and pedestrian crossings would be developed at Cahill and Park, Otterson, Stover, West San Fernando, and Crandall Streets.

Other rail operators in the station area are Caltrain, ACE, Amtrak, VTA light rail, and future BART. VTA has plans to construct new light rail station platforms as a separate project, and BART plans to extend service from the Berryessa Station to Santa Clara with a stop at the San Jose Diridon Station by 2026.



Source: Authority 2019a

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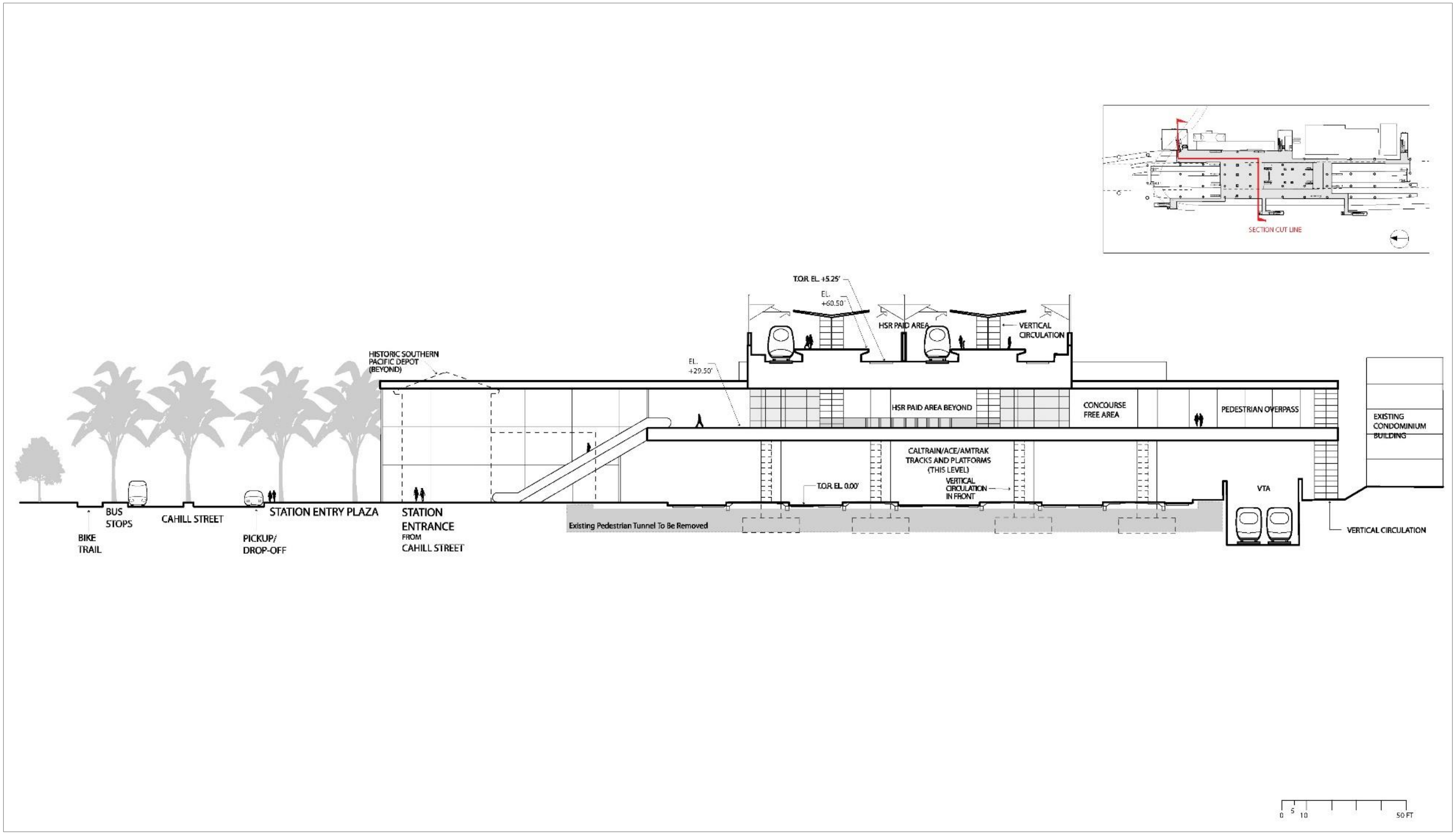
Figure 2-54 Conceptual San Jose Diridon Aerial Station Plan (Alternatives 1 and 3)



Source: Authority 2019a

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Figure 2-55 Conceptual San Jose Diridon Aerial Station Cross Section (Alternatives 1 and 3)

Maintenance Facilities

No maintenance facilities are proposed for this subsection.

State Highway or Local Roadway Modifications

The HSR viaduct crossing over the I-280/SR 87 interchange would require construction of a complex, long-span viaduct approximately 70 to 100 feet high (measured from existing ground level to top of rail). Construction activities would entail disturbance of traffic and may require temporary lane closures on the highway and associated ramps for the duration of construction. Proposed viaduct footings would be constructed below the existing freeway, and the viaduct superstructure would be constructed above the freeway. Moreover, the proposed viaduct columns would be constructed adjacent to existing freeway bridges and within the freeway shoulder, median, gore (i.e., split) of I-280, and nearby ramps. Space for HSR construction equipment and materials would be limited by the proximity of these roadway features. The HSR viaduct may also require redesign and reconstruction of existing signage, striping, or other freeway appurtenances. Three straddle bents spanning the platform and tracks are proposed to avoid affecting the existing railroad tracks near Tamien and the Tamien Station platform. The HSR footings and columns would be near the SR 87 freeway and the Lelong Street on-ramp. The footing construction would likely involve temporary closure of the ramp.

Freight or Passenger Rail Modifications

Between Scott Boulevard and Benton Street, HSR would operate on blended service tracks, entailing several minor track modifications of less than 1 foot between Scott Boulevard and I-880. The blended service tracks are owned by the PCJPB. The Santa Clara Station would remain unchanged. Beginning at I-880 on the southward approach to West Hedding Street, Caltrain tracks would be realigned to accommodate the HSR tracks. Dedicated HSR tracks would diverge from the Caltrain MT2 and MT3 and continue south along the east side of the existing Caltrain corridor. The UPRR/Caltrain MT1 tracks would be shifted east by up to 226 feet. College Park Station would have new northbound and southbound platforms and pedestrian undercrossings. The freight track would be shifted up to 64 feet at the Lenzen Wye. Straddle bents would be constructed over the existing Tamien Station.

Land Use and Community Modifications

The HSR facilities in this subsection would be constructed predominantly in the existing Caltrain right-of-way. The HSR alignment would diverge from the Caltrain right-of-way just south of the San Jose Diridon Station along a southeast alignment over the I-280/SR 87 interchange before returning to the Caltrain right-of-way just north of the Tamien Caltrain Station. This alignment would require modifications of some intersections, acquisition of TCEs, and acquisition of permanent right-of-way in some areas along the alignment.

Monterey Corridor Subsection

Alignment and Ancillary Features

The Monterey Corridor Subsection would be approximately 9 miles long and entirely within the San Jose city limits. From the San Jose Diridon Station Approach Subsection at West Alma Avenue just south of the Caltrain Tamien Station, the alignment would extend southeast to Bernal Way. Alternative 1 would be on viaduct in the median of Monterey Road. UPRR MT1, Caltrain MT2, and Caltrain storage tracks would be shifted east between West Alma Avenue and Caltrain/UPRR Control Point (CP) Lick, at the southeast base of Communications Hill. The railroad bridge over Almaden Road and the Almaden Expressway road bridge would be extended to accommodate the track shift. The UPRR Luther spur track south of Almaden Expressway would also be relocated to accommodate the MT shifts.

From West Alma Avenue, the HSR alignment would descend from a viaduct 54 feet high to embankment (i.e., 5 feet or higher) north of Almaden Road. The alignment would continue primarily on embankment to cross over Almaden Road on a short aerial structure, then under Almaden Expressway, then continue south on embankment to at grade under Curtner Avenue.

The alignment would continue south primarily at grade along the northern base of Communications Hill and ascend to aerial structure before crossing over and entering the Monterey Road median just south of Hillsdale Avenue. Construction of the viaduct over the existing Caltrain Capitol Station would require either falsework over the station if constructed by cast-in-place (CIP) methods or relocating the station 500 feet to the south if built using precast segments. The alignment would continue south on viaduct in the median of Monterey Road, crossing over Capitol Expressway, Skyway Drive, Branham Lane, Roeder Road/Chynoweth Avenue, Blossom Hill Highway, SR 85/West Valley Freeway, and Bernal Road.

The design assumes a reduction from six to four travel lanes on Monterey Road, beginning south of Southside Drive and continuing south of Blossom Hill Road, where the existing roadway is already four travel lanes. Three existing mid-block left-turn lanes would be closed because of substandard stopping sight distance. Additionally, the design assumes a combined left-turn and through lane at Palm Avenue.

Traction Power Facilities

Two traction power paralleling stations would be constructed in the subsection:

- North of the alignment near Curtner Avenue or south of the alignment at Communications Hill
- South of SR 85 or between Bernal Road and the Bernal Road ramp onto Monterey Road

Train Control and Communication Facilities

One ATC site would be constructed in the subsection at one of two locations east of the guideway in the vicinity of Chynoweth Avenue.

Three standalone communications radio sites are proposed:

- Near Almaden Road on the east side of Monterey Road (two site options)
- Near Capitol Expressway (two site options)

Wildlife Crossings

There would be no wildlife crossings in this subsection.

Stations

No stations are proposed for this subsection.

Maintenance Facilities

No maintenance facilities are proposed for this subsection.

State Highway or Local Roadway Modifications

Monterey Road between Southside Drive and south of Blossom Hill Road would be narrowed to four lanes. Three mid-block left-turn lanes into shopping centers would be closed. Appendix 2-A details local road modifications that would be required in the Monterey Corridor Subsection.

Freight or Passenger Rail Modifications

Construction in this subsection would require temporary use of areas of UPRR right-of-way for construction staging. UPRR MT1, Caltrain MT2, and Caltrain storage tracks would be shifted east between West Alma Avenue and Caltrain/UPRR CP Lick at the southeast base of Communications Hill. A railroad bridge over Almaden Road and the Almaden Expressway road bridge would be extended to accommodate the track shift. The UPRR Luther spur track south of Almaden Expressway would also be relocated to accommodate the mainline track shifts. An HSR viaduct would cross over UPRR on straddle bents with a minimum vertical clearance of 23.4 feet between stations 304+00 and 309+00. A temporary platform would be installed at the Capitol Station south of the existing platform during construction of the straddle bents supporting the HSR tracks.

Land Use and Community Modifications

HSR would require acquisition of residential, commercial, industrial, and public (Monterey Road corridor) properties in this subsection to obtain adequate right-of-way for construction and operations.

Morgan Hill and Gilroy Subsection

Alignment and Ancillary Features

The Morgan Hill and Gilroy Subsection would be approximately 30 to 32 miles long, continuing south from the Monterey Corridor Subsection. From Bernal Way in South San Jose, the alignment would extend through Morgan Hill and San Martin to the Downtown Gilroy Station, then curve generally east across the Pajaro River floodplain and through a portion of northern San Benito County before entering Tunnel 1 at the base of the Diablo Range. The alignment would exit the tunnel at Casa de Fruta Parkway/SR 152 in unincorporated eastern Santa Clara County, where it would transition to the Pacheco Pass Subsection. This subsection under Alternative 1 would use the Viaduct to Downtown Gilroy design option and an aerial Downtown Gilroy Station.

Beginning at the southern limit of the Monterey Corridor Subsection, the alignment would be on viaduct in the median of Monterey Road. In this four-lane section of the road, the design assumes a combined left-turn and through lane to Palm Avenue. The alignment would begin curving east on viaduct (approximately 40 feet above grade) near Ogier Avenue in Santa Clara County. The northbound lanes of Monterey Road would be realigned at this transition to cross beneath the HSR viaduct between columns of the aerial structure.

After crossing the Coyote Valley on viaduct, the alignment would cross over Burnett Avenue in Morgan Hill and parallel US 101 on the west side of the freeway. Continuing south, the alignment would bypass downtown Morgan Hill by crossing over Cochrane Road and associated freeway ramps, East Main Avenue, East Dunne Avenue and associated freeway ramps, and Tennant Avenue and associated freeway ramps.

South of Tennant Avenue and the Morgan Hill city limits, the alignment would turn west, relocating the cul-de-sac at Fisher Avenue to west of the guideway, then crossing over Maple Avenue, West Little Llagas Creek, East Middle Avenue, and Llagas Creek before rejoining Monterey Road and the UPRR corridor in the community of San Martin. The crossing of Llagas Creek would allow for wildlife movement by clear-spanning both banks and riparian habitat. New storm drainage infrastructure would be constructed on the west side of the alignment along Llagas Creek. The alignment would continue on viaduct along the east side of UPRR and cross over East San Martin Avenue.

South of Las Animas Avenue and the west branch of Llagas Creek, the alignment would curve east over Leavesley Road and Casey Lane. Continuing south, the viaduct would cross the Gilroy Prep School/South Valley Middle School sports field, a portion of the Gilroy Prep School campus, and Upper Miller Slough (with armor added to the channel to strengthen the stormwater conveyance) before crossing over IOOF Avenue, Lewis Street, Martin Street, East 6th Street, and a realigned East 7th Street, to arrive at the Downtown Gilroy Station on low viaduct (approximately 33 feet high).

South of the Downtown Gilroy Station, the alignment would continue on viaduct over East 10th Street. Banes Lane would be reconstructed to provide a standard cul-de-sac. South of the Princevale Channel crossing, the alignment would ascend, still on viaduct, over Luchessa Avenue, US 101, and one UPRR spur track. After branching from the main UPRR track and crossing under the HSR viaduct, the new UPRR track for freight access to the MOWF would travel at grade on the east side of the new HSR track toward the South Gilroy MOWF site. Both the UPRR track and HSR tracks would cross the City of Gilroy wastewater disposal ponds. Continuing south, the HSR alignment would ascend onto embankment. New storm drainage infrastructure would be constructed on the west side of the alignment at Carnadero Avenue, which would be closed where it meets the alignment. Bloomfield Avenue would be realigned to cross over the South Gilroy MOWF site. Sheldon Avenue would become a cul-de-sac south of the

HSR alignment and would be abandoned north of the HSR alignment. Before crossing the Pajaro River, the alignment would ascend onto viaduct.

The HSR alignment south and east of Gilroy would cross an agricultural area in Santa Clara and San Benito Counties that is part of the upper Pajaro River floodplain, historically referred to as Soap Lake. The HSR guideway would be on viaduct over the major watercourses to provide a floodplain crossing that is neutral to the hydrology and hydraulics of the floodplain and to accommodate wildlife movement. Because of the Calaveras fault crossing at this location, Tequesquita Slough would be partially filled by approximately 800 feet of HSR embankment. The embankment area would include cross-culverts and 1.3 acres of adjacent floodwater detention basins; in addition, an extended viaduct over Pacheco Creek would serve to maintain floodplain capacity and function. HSR would be on embankment between Pacheco Creek and Lovers Lane, returning to viaduct at Lovers Lane. After Lovers Lane, the alignment would continue in a combination of embankment and viaduct until reaching the west portal for Tunnel 1 on the east side of SR 152. After exiting the 1.4-mile Tunnel 1 on the west side of SR 152, the alignment would cross over SR 152 and the southern portion of the Pacheco Creek Valley on an aerial structure south of Casa de Fruta. The Tunnel 1 design variant would be in the same horizontal and vertical location as Tunnel 1, but it would have a greater superelevation[12] in the curves to allow speeds up to 220 mph in the tunnel and tunnel approaches. The alignment would transition onto embankment just beyond Southside Way at the western transition to the Pacheco Pass Subsection.

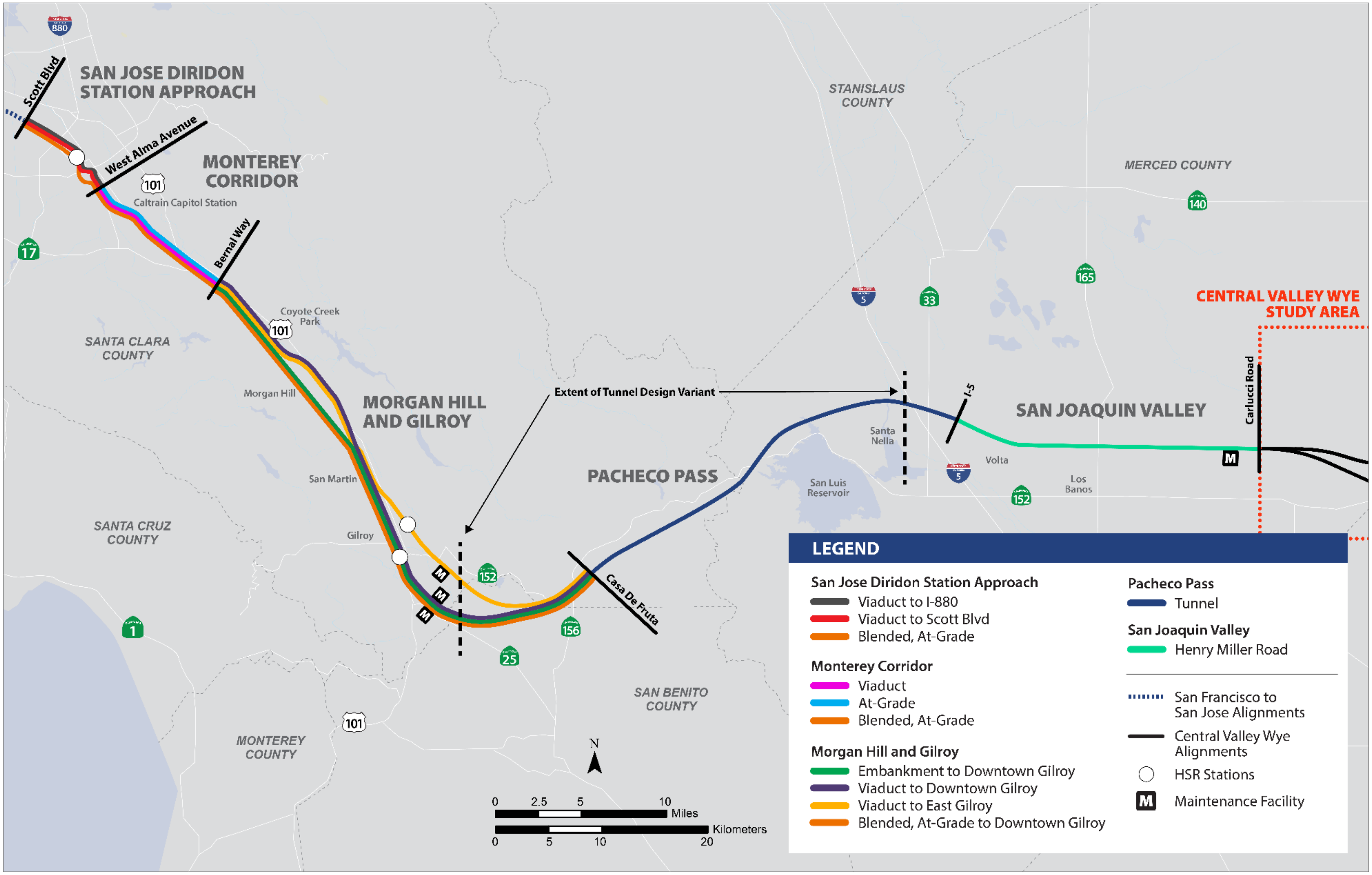
Tunnel Design Variant

The TDV consists of alterations to all the alternatives (i.e., as compared to the base preliminary designs in Volume 3) of the tunnel and tunnel approaches in the Morgan Hill and Gilroy Subsection (Tunnel 1) and the tunnel and tunnel approaches in the Pacheco Pass Subsection (Tunnel 2) to accommodate an operating speed of 220 mph. Accordingly, the TDV consists of physical changes (described in the next paragraph) and operational changes (i.e., increased speed in the tunnels and the tunnel approaches from 200 mph to 220 mph).

The TDV would not change the horizontal alignment through the tunnels. The superelevation of tracks approaching and through both tunnels would be increased to accommodate the faster operating speeds. The TDV would flatten a set of vertical curves inside Tunnel 2. The locations of the vertical curves are near the highest subsurface location within Tunnel 2. The changes to the vertical curves would modestly increase tunnel depth compared to the Tunnel 2 design of the project alternatives without the TDV. The TDV would also require a minor increase in internal diameter of Tunnel 1 from 28 feet to 28.5 feet. Since the Tunnel 1 and Tunnel 2 location and design are equivalent across Alternatives 1 through 4, these changes could be applied to any of the alternatives.

In addition, the TDV would increase spiral lengths on two horizontal curves south of Highway 101 in the vicinity of the MOWF under Alternatives 1, 2 and 4, which would result in a minor shift in horizontal alignment (less than 2.5 feet) under those alternatives. The alignment change would not change the right of way as currently proposed. Alternative 3 currently meets the geometric requirements for the higher speed north of the tunnels.The rationale for the preliminary tunnel designs of the alternatives without the TDV was to reduce the cost of the construction of the tunnels by reducing the tunnel diameter, despite the speed limitation (Authority 2016d). The Authority has developed the TDV to provide design speeds of 220 mph and has identified how it can achieve speeds without increasing the tunnel diameter so that costs of construction are the same. The location of the TDV is identified on Figure 2-56.

[12] *Superelevation* is the vertical distance between the height of the inner and outer rails at a curve. Superelevation is used to partially or fully counteract the centrifugal force acting radially outward on a train when it is traveling along the curve.



Source: Authority 2019a

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Figure 2-56 Extent of Tunnel Design Variant

Traction Power Facilities

One new TPSS, Site 4—Gilroy, would be constructed at one of two alternate locations on the north side of the alignment: east or west of Bloomfield Avenue. At this site, one new PG&E switching station could be co-located with the TPSS. Communication facilities (i.e., redundant fiber optic [two underground or one underground and one overhead on existing power structures] lines) would also be required to support the electrical interconnections connecting the TPSS to a new utility switching station, to existing PG&E facilities, or both, typically within tie-line/utility corridors.

North of Site 4—Gilroy, a traction power switching station would be constructed east of the HSR alignment at a location north of Palm Avenue.

Four traction power paralleling stations would be constructed adjacent to the guideway at the following locations:

- South of the alignment, either south of Diana Avenue or at the intersection of San Pedro Avenue and Walnut Grove Drive
- North of the alignment, either south of Masten Avenue or south of Rucker Avenue
- In the vicinity of Lovers Lane, either south of the alignment and west of Lovers Lane or north of the alignment and west of Lovers Lane
- At the Tunnel 1 east portal

PG&E would reinforce the electric power distribution network to meet HSR traction and distribution power requirements by replacing (reconductoring) the 9.8-mile Metcalf to Morgan Hill and the 10.8-mile Morgan Hill to Llagas 115 kV power lines. The existing power lines to be reconductored, reusing the poles and towers, begin at the Metcalf Energy Center in San Jose and continue southeast parallel to the alignment on the east side before crossing to the west side near Ogier Avenue. Continuing on the west side to the Morgan Hill Substation on West Main Avenue in Morgan Hill, the lines then cross the east side of Peak Avenue and Dewitt Avenue, spanning West Dunne Avenue, Chargin Drive, Spring Avenue, and several residences. The alignment would continue south across an open space area, then follow Sunnyside Avenue for approximately 0.5 mile. The alignment would continue south for approximately 4 miles, spanning additional open space areas of wineries and the Corde Valle Golf Course. The alignment would then turn east along the north side of Day Road before heading south for approximately 2.5 miles and terminating at the Llagas Substation in Gilroy. Reconductoring at Metcalf Energy Center in San Jose would be required as well.

A permanent overhead distribution line from TPSS Site 4 to the Tunnel 1 portal location would provide power to the tunnel boring machine (TBM) during construction and the tunnel fire-life-safety system during operation.

There are alternative sites for power drops at both portals for Tunnel 1. At each portal, one site is north of the alignment and one is south.

Train Control and Communication Facilities

A total of 19 ATC sites would be constructed in the Morgan Hill and Gilroy Subsection for this alternative:

- One site east of Monterey Road near Palm Avenue (two site options)
- One site at East Middle Avenue (two site options)
- One site between Las Animas Avenue and Leavesley Road
- One site south of Leavesley Road
- One site south of Lewis Street
- One site north of 6th Street in Gilroy
- Two sites south of 6th Street in Gilroy
- Two sites north of 10th Street in Gilroy

- One site south of Banes Lane
- Five sites north of Carnadero Avenue
- Three sites east of the Pajaro River
- One site near Lake Road (two site options)

Six standalone communication radio sites would be constructed in this subsection:

- Forsum Road or Blanchard Road (two site options)
- Near Bailey Avenue (two site options)
- Between Barnhart Avenue and Kirby Avenue (two site options)
- South of Cochrane Road along US 101 (two site options)
- North of Cox Avenue and south of West San Martin Avenue (two site options)
- East of the Pajaro River, south of Gilroy

Wildlife Crossings

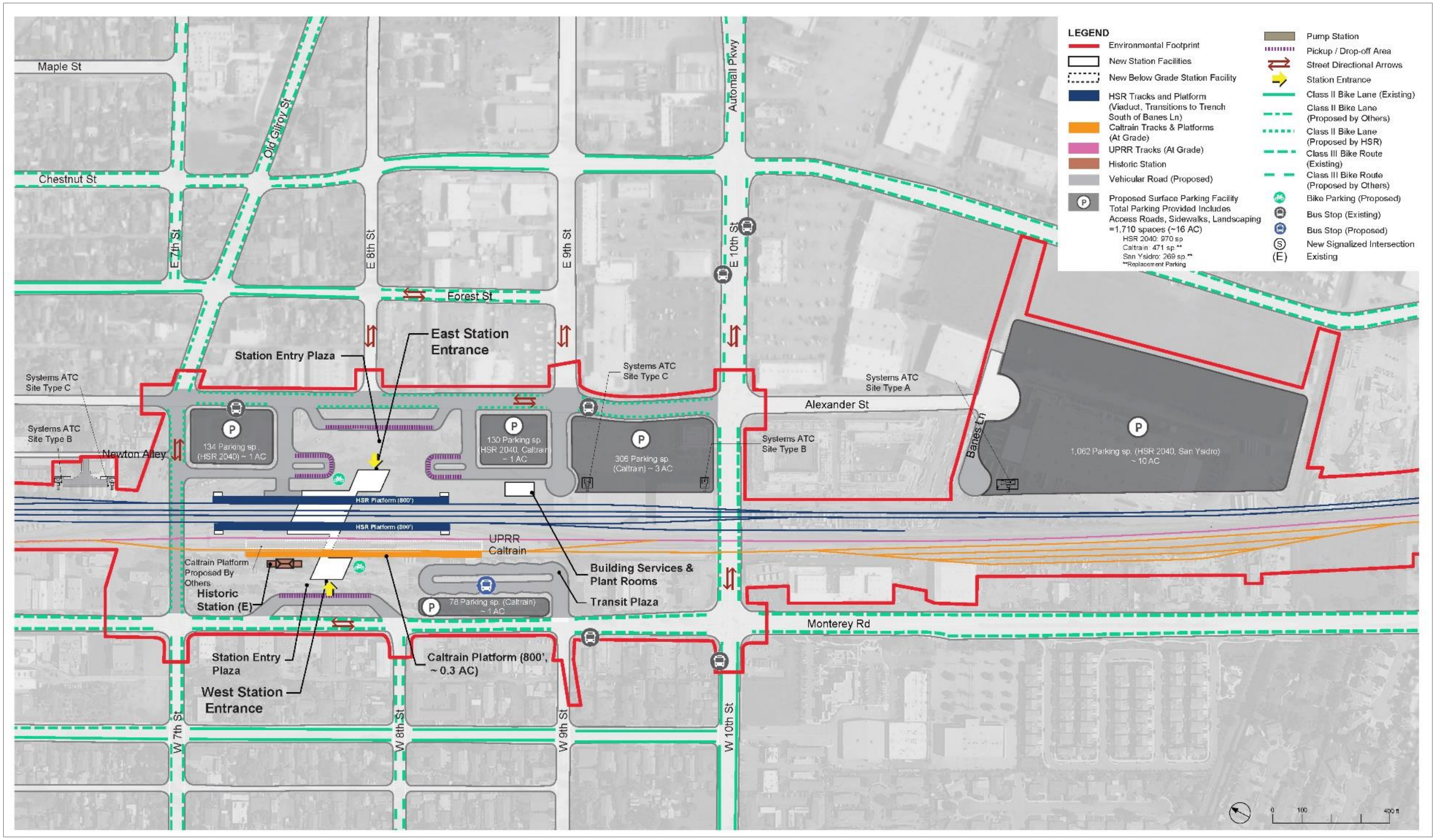
Three wildlife crossings would be provided at the base of Tulare Hill north of the Metcalf Substation connecting to Coyote Creek. The existing culvert under Monterey Road at Fisher Creek would be realigned and replaced with a larger box culvert to improve wildlife movement under Monterey Road and the HSR track. The crossing of Llagas Creek would allow for wildlife movement by clear-spanning both banks and riparian habitat. The alignment would be primarily on viaduct through the Soap Lake area to allow for wildlife movement. Viaducts have heights, widths, and depths considered to be very favorable for wildlife movement.

Stations

The Downtown Gilroy station under Alternative 1 is estimated to have 6,210 boardings in 2040. The new HSR station would be constructed south of the existing Caltrain station. The station approach would be on a low viaduct—approximately 33 feet to top of rail—with dedicated HSR tracks east of UPRR between relocated Old Gilroy/7th Streets and 9th Street. The 800-foot platforms would be on the east and west sides of the HSR tracks. The new HSR station building would have both east and west entrances: the main entrance for passengers arriving by auto or bicycle would be on the east side while the main entrance for passengers arriving on foot or by transit would be on the west side. The HSR station building would encompass 60,513 square feet with a 4,400-square-foot substation and systems building. The concourse would be below the new HSR tracks.

The existing 471 Caltrain parking spaces on the west side of the station would be replaced 1:1 by either reconfiguring parking on the west side of the station or relocating it to the east side of the station. The existing 269 San Ysidro housing development parking spaces would be replaced 1:1 with new surface parking at the south end of Alexander Street. HSR 2040 parking demand would be 970 spaces. The station site plan provides 970 new parking spaces in five areas, for a total of 1,710 parking spaces in 2040. One site would be west of the station along Monterey Road at 9th Street. The other four would be east of the station along Alexander Avenue at 7th Street, 9th Street, 10th Street, and Banes Lane. A multimodal access plan would be developed prior to design and construction of the station. The plan would be developed in coordination with local agencies and would include a parking strategy that would confirm the location, amount, and phasing of parking.

A total of eight bus bays would be provided. Street improvements would include realignment of Old Gilroy Street at East 7th Street; existing grade crossings would remain unchanged. A 4,000-square-foot bicycle facility would be built. Class II bike lanes would be provided on 7th and Alexander Streets (Figure 2-57 and Figure 2-58).



Source: Authority 2019a

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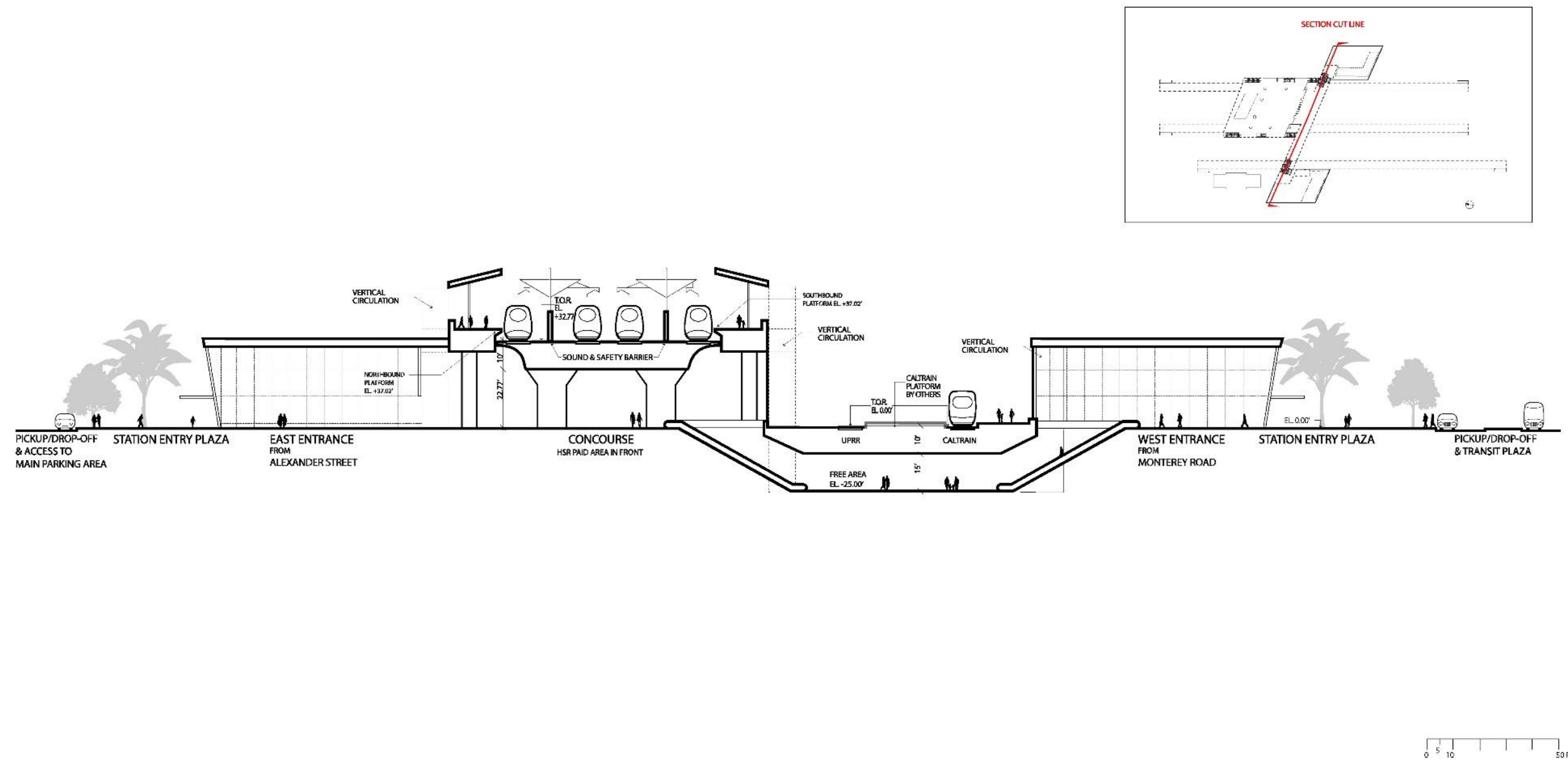
Figure 2-57 Conceptual Downtown Gilroy Aerial Station Plan (Alternative 1)



Source: Authority 2019a

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Figure 2-58 Cross Section of Downtown Gilroy Aerial Station (Alternative 1)

Maintenance Facilities

The MOWF under Alternative 1 would be in south Gilroy between Carnadero Road and Bloomfield Road to accommodate machinery and inspection and maintenance staff. The MOWF would encompass approximately 75 acres. The freight connection would be provided as described in the discussion of the alignment and ancillary features. Most of the area would be for storage of rail vehicles on tracks parallel to the HSR mainline. The MOWF would be expected to employ approximately 150 people. Figure 2-42 illustrates the conceptual site plan for the MOWF.

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be necessary in the Morgan Hill and Gilroy Subsection.

Freight or Passenger Rail Modifications

Construction in this subsection would require temporary use of areas of UPRR right-of-way for construction staging. Permanent modifications would occur at the following locations:

- South of North Avenue to South Street, UPRR right-of-way would be on either side of the HSR right-of-way, with the UPRR tracks to the south of HSR.
- South of Highland Avenue to Day Road, slivers of UPRR right-of-way would be required.
- South of Lewis Street through the downtown Gilroy station to 10th Street, UPRR right-of-way would be required for track realignment and station construction.
- From 6th Street to US 101.
- South of US 101 for a shifted UPRR siding track.
- Freight connection from UPRR to the MOWF.

Land Use and Community Modifications

Alternative 1 would require acquisition of residential, commercial, industrial, and park and recreation properties to obtain adequate right-of-way for construction and operations.

Pacheco Pass Subsection

Alignment and Ancillary Features

The Pacheco Pass Subsection would be approximately 25 miles long. The alignment would generally follow the existing SR 152 corridor east from Casa de Fruta for approximately 17 miles, then diverge north around the Cottonwood Creek ravine of the San Luis Reservoir for approximately 8 miles before transitioning to the San Joaquin Valley Subsection near I-5 in Merced County. Tunnel is the only design option in this subsection.

Landslide or Landslip Areas

Areas subject to the downward falling or sliding of a mass of soil, detritus, or rock on or from a steep slope.

From the eastern limit of the Morgan Hill and Gilroy Subsection, the guideway would transition from aerial structure to embankment along the southern boundary of Casa de Fruta. This stretch of embankment would be on fill or in excavated hillside cuts to accommodate a level HSR guideway profile over varied surface elevations and to control unstable slopes known for vulnerability to landslip (i.e., areas subject to the downward falling or sliding of a mass of soil, detritus, or rock on or from a steep slope). The alignment would ascend to viaduct over Pacheco Creek along the south side of SR 152 and remain on viaduct to the Tunnel 2 west portal. This portal would include a staging area for tunnel construction and a permanent area for traction and facility power with access provided by a service road from SR 152. Tunnel 2 would extend approximately 13.5 miles northeast. Access to the Tunnel 2 east portal for HSR construction, operations, and maintenance would be on McCabe Road north of Romero Ranch. Continuing east, the HSR guideway would be predominantly on a combination of embankment and aerial structures, with viaducts over Romero Creek and the California Aqueduct. Romero Road would be realigned at its intersection with I-5. East of I-5, the alignment would cross over SR 33/Santa Nella Road and the Central California Irrigation District (CCID) Outside Canal before transitioning to the San Joaquin Valley Subsection at Fahey Road. The Tunnel 2 design variant would be in the same horizontal location as the preliminary design, and the tunnel would be slightly deeper below the surface. It would also have a greater superelevation in the curves, providing for increased speeds up to 220 mph in the tunnel and tunnel approaches.

Tunnel Design Variant

The characteristics of the TDV in the Pacheco Pass Subsection under Alternative 1 would be the same as described in the Morgan Hill and Gilroy Subsection under Alternative 1.

Traction Power Facilities

One new TPSS, Site 5—O'Neill, would be constructed approximately 1.2 miles west of the California Aqueduct. A new 230-kV double-circuit tie-line would be constructed from the expanded Quinto switching station to the TPSS, paralleling an existing PG&E transmission line for approximately 0.6 mile. The tie-line would be installed either underground in a utility easement or overhead, requiring the existing 500-kV transmission line to be raised. No reinforcements to the PG&E power system would be required for this site. Communication facilities (i.e., redundant fiber optic lines) would also be required to support the electrical interconnection. The interconnection would link the TPSS to a new PG&E switching station, to existing PG&E facilities, or both—typically within tie-line/utility corridors.

A traction power switching station would be constructed at each Tunnel 2 portal. A power drop site would be co-located with the switching stations. A new permanent distribution power line from the Quinto switching station along McCabe Road to the Tunnel 2 east portal location would provide power for tunnel construction and fire and life safety systems during operations. The existing PG&E 230-kV Quinto switching station would be expanded within the fence line to support the HSR system.

Traction power paralleling stations would be constructed at three locations:

- Two stations within Tunnel 2 cross passages, approximately 5 miles apart;
- One station either southeast or northwest of the alignment crossing of Fahey Road.

Train Control and Communication Facilities

Three ATC sites would be constructed in the Pacheco Pass Subsection at the following locations:

- West portal of Tunnel 2
- Underground within the limits of Tunnel 2
- Adjacent to TPSS Site 5

One standalone communication radio antenna site would be constructed in the Pacheco Pass Subsection:

- Near SR 152 and the Tunnel 2 west portal

Wildlife Crossings

Four wildlife crossing culverts would be provided west of the California Aqueduct, with an additional two between the California Aqueduct and the Delta-Mendota Canal and one between the Delta-Mendota Canal and I-5. Three wildlife crossings would be provided between I-5 and Santa Nella Road, and three more between Santa Nella Road and Fahey Road. Viaducts would also function as wildlife movement areas in this subsection.

Stations

No stations are proposed for this subsection.

Maintenance Facilities

No maintenance facilities are proposed for this subsection.

State Highway or Local Roadway Modifications

SR 152 would be modified to allow for construction traffic, including road widening, an additional turnout and transition lane on westbound SR 152, and an additional left turn lane and transition lane on eastbound SR 152. The additional lanes would provide queuing space for vehicles going from SR 152 to the west portal of Tunnel 2 and a TPSS site. These modifications would permanently provide access to HSR facilities. Appendix 2-A details local road modifications that would be necessary in the Pacheco Pass Subsection.

Freight or Passenger Rail Modifications

No freight or passenger rail modifications would be required in this subsection.

Land Use and Community Modifications

Alternative 1 would require acquisition of residential, commercial, and industrial properties in this subsection to obtain adequate right-of-way for construction and operations.

San Joaquin Valley Subsection

Alignment and Ancillary Features

The San Joaquin Valley Subsection would be approximately 18 miles long, from east of I-5 (at Fahey Road) to the intersection of Henry Miller Road and Carlucci Road in Merced County, where the alignment would connect to the Central Valley Wye. The single design option in this subsection is Henry Miller Road—a combination of viaduct and embankment.

South of Fahey Road, the guideway would continue east and cross over three irrigation ditches, Cherokee Road, the CCID Main Canal, two additional irrigation ditches, and adjacent farmland on viaduct. Continuing east, the alignment would be on embankment (including four proposed culvert crossings for irrigation ditches) before ascending on an approximately 1.4-mile-long viaduct over the San Luis Wasteway, the UPRR West Side branch line, and Ingomar Grade Road.

The alignment would descend to embankment west of Volta Road while turning southeast before crossing to the south side of Henry Miller Road. Henry Miller Road would be realigned to pass over the HSR alignment on a bridge. The HSR embankment between the Volta Road overcrossing and Los Banos Creek would cross over two proposed culverts to maintain irrigation canals. The alignment would then ascend to cross over Los Banos Creek and Badger Flat Road on a 1.35-mile-long viaduct before descending onto embankment.

The alignment would continue east for 3.6 miles on embankment over several combined wildlife crossing/drainage culverts and drainage culverts, including an irrigation ditch at Wilson Road, an irrigation ditch at Johnson Road, two irrigation ditches at Nantes Avenue, the Santa Fe Canal, the San Luis Canal, the San Luis Drain, and the Porter-Blake Bypass. A road would be constructed between Badger Flat Road and Nantes Avenue. SR 165/Mercey Springs Road would be raised to cross over the HSR alignment and Henry Miller Road on a bridge. East of SR 165 and the Santa Fe Grade, the alignment would ascend to an approximately 1.8-mile viaduct south of the Los Baños State Wildlife Area across Mud Slough to maintain wildlife movement within the GEA. Baker Road, Midway Road, and Hereford/Salt Slough would be closed south of Henry Miller Road. Box Car Road would become a cul-de-sac with a new road to the east. Hutchins Road would be abandoned. The alignment would continue on embankment to the eastern limit of the subsection and the project. Culvert crossings would be provided for the San Pedro Canal, Boundary Drain, Longe Tree Canal, Devon Drain, West Delta Drain, West Delta Canal, Dambrosia Ditch, Delta Canal and seepage drain, East Delta Canal, Poso Drain, Belmont Drain, Delta Canal #1, West San Juan Drain, San Juan #1, and several other irrigation ditches and drains in the section of viaduct over the GEA. Several local roadways—Delta Road, Turner Island Road, and Carlucci Road—would be elevated over the HSR guideway, maintaining access to adjacent properties. The alignment would transition to the Central Valley Wye at Carlucci Road.

Traction Power Facilities

A traction power switching station would be constructed on the north or south side of the alignment at one of two alternate sites east of the intersection of Henry Miller Road and Santa Fe Grade.

Traction power paralleling stations would be constructed at the following locations:

- Either east or west of the Henry Miller Road overcrossing of the HSR alignment near Volta Road (two site options)
- Intersection of Henry Miller Road and Box Car Road (two site options either north or south of the alignment)

Train Control and Communication Facilities

Five ATC sites would be constructed in the San Joaquin Valley Subsection:

- One site east of the CCID Main Canal (two options)
- Three sites near Johnson Road
- One site near Box Car Road (two site options)

One standalone communication radio site would be constructed at Wilson Road (two site options: one east of the San Pedro Canal and one at Carlucci Road).

Wildlife Crossings

The rail alignment would be primarily on viaduct where it overlaps with the GEA boundary and modeled wildlife movement corridors. Three additional wildlife crossing culverts would be added between Fahey Road and Cherokee Road. Regularly spaced wildlife crossing culverts would continue through the remainder of this subsection. In total, there would be 64 wildlife crossings in this subsection.

Stations

No stations are proposed for this subsection.

Maintenance Facilities

An MOWS is proposed near Turner Island Road near the eastern limit of the project. The MOWS would be about 0.5 mile long, encompassing about 4 acres. The facility would be constructed near Henry Miller Road to avoid the GEA and other sensitive habitat.

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be necessary in the San Joaquin Valley Subsection.

Freight or Passenger Rail Modifications

No freight or passenger rail modifications would be required in this subsection.

Land Use and Community Modifications

Alternative 1 would require acquisition of land in residential, commercial, or agricultural uses to obtain adequate right-of-way for construction and operations. The alignment would traverse a portion of the GEA, requiring acquisition of land under conservation easement.

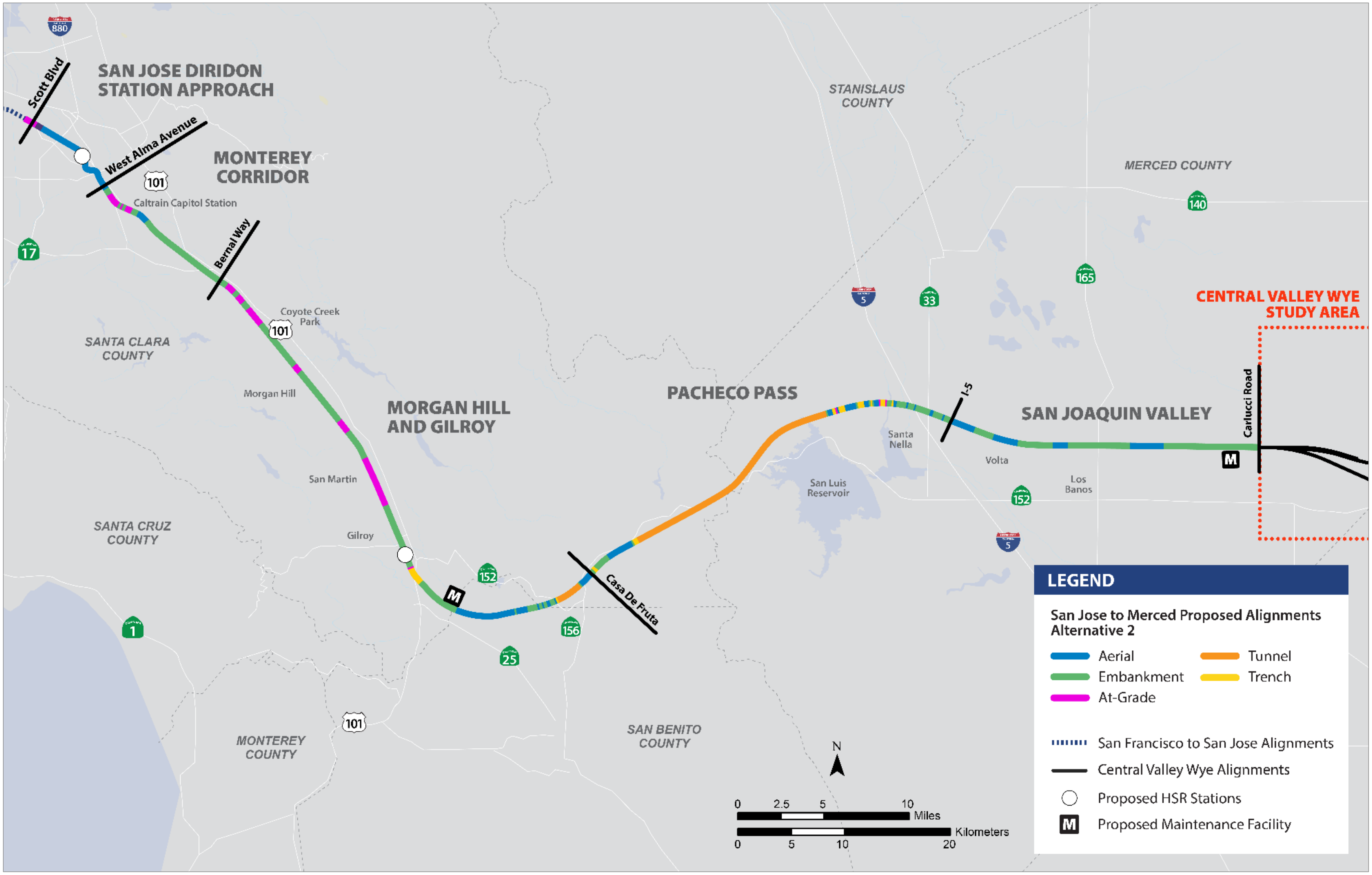
2.6.2.5 Alternative 2

Rationale

Alternative 2 is the alternative that most closely approximates the alignment and structure types identified in the prior program-level documents, implemented by limiting longitudinal encroachment into the UPRR right-of-way to combine railroad grade separations with minimum property displacements. The alignment most closely follows the existing UPRR and Monterey Road transportation corridor. The San Jose Diridon Station Approach Subsection under Alternative 2 would use a longer viaduct, ascending to aerial structure near Scott Boulevard rather than ascending to aerial structure south of I-880. A result of the longer viaduct is that blended service with Caltrain would occur north of Scott Boulevard. The alignment would be at grade through the Monterey Corridor Subsection and through Morgan Hill, and on embankment on approach and through Gilroy, maintaining a lower profile than the viaduct structures under Alternatives 1 and 3 through these areas.

Alternative 2 would operate on a dedicated viaduct from Scott Boulevard through the San Jose Diridon Station Approach Subsection. The alternative would be predominantly at grade east of the UPRR alignment through the Monterey Corridor Subsection, continuing at grade east of UPRR through Morgan Hill to an embankment approach to the downtown Gilroy station through the Morgan Hill and Gilroy Subsection. Like Alternative 1, Alternative 2 would include a South Gilroy MOWF, continuing predominantly on viaduct and embankment across the Soap Lake floodplain before entering Tunnel 1 west of Casa De Fruta. The alignment and guideway in the Pacheco Pass and San Joaquin Valley Subsections would be the same as under Alternative 1.

Overall, this alternative would be comprised of 20.9 miles on viaduct, 8.5 miles at grade, 41.0 miles on embankment, two tunnels totaling 15.0 miles, and 3.2 miles in trench. Figure 2-59 illustrates Alternative 2.



Source: Authority 2019a

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Figure 2-59 Alternative 2 Proposed Alignment

San Jose Diridon Station Approach Subsection

Alignment and Ancillary Features

Alternative 2 would begin at Scott Boulevard at grade in blended service with Caltrain. Approximately 300 feet south of Scott Boulevard, the HSR tracks would separate from the Caltrain tracks and begin ascending to embankment and then to the 50-foot-tall dedicated viaduct at Main Street. The long viaduct under Alternative 2 would have a wider footprint than the short viaduct to I-880 under Alternative 1, requiring more curve straightening of the Caltrain tracks north of I-880. At the Lafayette Street crossing, the project would replace the existing pedestrian overpass with an underpass. The existing De La Cruz Boulevard overcrossing would be replaced with an undercrossing to enable the HSR aerial structure to cross 43 feet high over De La Cruz Boulevard, the relocated UPRR MT1 and two industry tracks, and the Caltrain Santa Clara Station. The Santa Clara Station northbound platform would be reconstructed to accommodate the supports for the HSR aerial structure. South of Santa Clara Station, the three relocated UPRR tracks would cross under the HSR viaduct so that all Caltrain and UPRR tracks would be west of the HSR viaduct. The viaduct would then ascend to approximately 68 feet to cross over I-880.

Farther south, the existing West Hedding Street roadway overcrossing would be replaced by an undercrossing under the rail corridor. A short section of retained fill would be used to support the tracks over the future BART to San Jose tunnel. The intersection of Stockton Avenue and University Avenue would be replaced by cul-de-sacs. Emory Street would be a new cul-de-sac on the north side of HSR. The curve from westbound West Taylor Street to northbound Chestnut Street would be realigned for the HSR crossing over West Taylor Street; the alignment would then ascend to cross over Cinnabar Street. The UPRR Warm Springs Subdivision Lenzen Wye would be relocated to the southwest. North Montgomery Street would be extended to Cinnabar Street to maintain property access beneath the 68-foot-high HSR viaduct. The alignment would curve west toward the UPRR/Caltrain MTs before crossing over the western part of the SAP Center parking lot, then over West Santa Clara Street to enter the new dedicated HSR aerial platforms at the San Jose Diridon Station. Between San Jose Diridon Station and the transition to the Monterey Corridor Subsection at West Alma Avenue, Alternative 2 would be identical to Alternative 1.

Traction Power Facilities

One new TPSS would be constructed on the east side of the Caltrain corridor as described for Alternative 1 on the south side of I-880.

Train Control and Communication Facilities

Alternative 2 would have six ATC sites within this subsection:

- One site at Scott Boulevard
- One site at Main Street
- One site just north of the San Jose Diridon Station

South of San Jose Diridon Station, the ATC sites would be the same as under Alternative 1: three sites between Park Avenue and the proposed HSR crossing of SR 87.

No standalone communications radio sites would be located within this subsection.

Wildlife Crossings

There would be no wildlife crossings in this subsection.

Stations

The HSR San Jose Diridon Station would be constructed as described for Alternative 1.

Maintenance Facilities

No maintenance facilities are proposed for this subsection.

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be required in the San Jose Diridon Approach Subsection.

Freight or Passenger Rail Modifications

Two new bridges would be constructed over UPRR and Caltrain at De La Cruz. Caltrain would be relocated between south of Scott Boulevard and I-880. The UPRR tracks would be relocated south of De La Cruz to pass around the east side of the new Santa Clara Station northbound platform, and would connect to the existing tracks south of I-880. Like Alternative 1, Alternative 2 would shift the freight tracks at the Lenzen Wye; however, the curves would be different. South of San Jose Diridon Station, Alternatives 1 and 2 would be the same.

Land Use and Community Modifications

The HSR facilities in this subsection would be constructed predominantly in the existing Caltrain right-of-way. Like Alternative 1, the HSR alignment would diverge from the Caltrain right-of-way just south of the San Jose Diridon Station along a southeast alignment over the I-280/SR 87 interchange before returning to the Caltrain right-of-way just north of the Tamien Caltrain Station. This alternative would require modifications of some intersections and acquisition of additional TCEs and permanent acquisition of right-of-way in some areas along the alignment.

Monterey Corridor Subsection

Alignment and Ancillary Features

The Monterey Corridor Subsection is approximately 9 miles long and entirely within the San Jose city limits. Between West Alma Avenue and the northern base of Communications Hill, Alternative 2 would be the same as Alternatives 1 and 3. However, Alternative 2 would begin the viaduct transition to the Monterey Road/UPRR corridor approximately 400 feet north of the transition under Alternatives 1 and 3 but would be primarily at grade or on embankment upon entering the road/rail corridor. Alterations of existing railroad track and systems between West Alma Avenue and CP Lick (near the east base of Communications Hill) would be the same as under Alternatives 1 and 3 except for a new, continuous intrusion barrier between the existing UPRR tracks and HSR tracks.

CP Lick

Control Point or CP Lick is the location where Caltrain ownership of the rail right-of-way transitions to UPRR. It is located south of the Tamien Caltrain station.

From West Alma Avenue, the HSR alignment would descend from a viaduct 54 feet above grade to embankment north of Almaden Road. The alignment would continue primarily on embankment on the west side of the Caltrain/UPRR tracks, crossing over Almaden Road on a short aerial structure, then proceeding at grade under West Almaden Expressway and Curtner Avenue. South of Curtner Avenue, the alignment would continue south at grade along the west side of the Caltrain/UPRR tracks around the northern base of Communications Hill, ascending to aerial structure before crossing over and entering the Monterey Road/UPRR corridor just south of Hillsdale Avenue. On the approach to Monterey Road, the aerial structure would cross over the UPRR tracks and the Caltrain Capitol Station while curving southeast to return to grade within the road/rail corridor northwest of the Capitol Expressway. Monterey Road would be realigned to the east, while HSR would run along the east side of UPRR. South of Fehren Drive, Monterey Road would be reduced from six to four lanes. Continuing south, the alignment would descend into a trench beneath a widened Capitol Expressway bridge before ascending to grade at Skyway Drive. Under Skyway Drive Variant A, Monterey Road would retain its current at-grade configuration, and a new connector ramp at the north corner of the intersection of Skyway Drive and Monterey Road would connect Monterey Road to the depressed Skyway Drive underpass. San Jose Fire Station #18 would have access along the connector ramp. Skyway Drive Variant B would depress Monterey Road to connect to the Skyway Drive underpass. Under this variant, access to the mobile home park north of the intersection of Skyway Drive and Monterey Road would be provided by an access road across the northern portion of the San Jose South Service Yard property. Variant B would not provide access to the fire station.

Continuing south, the HSR alignment would be at grade or on embankment between Monterey Road and UPRR for the remainder of the subsection. Branham Lane and Roeder Road/Chynoweth Avenue would be lowered to be separated from the HSR and existing railroad crossings. Because of the new grade difference between Branham Lane and Roeder Road/Chynoweth, access to Rice Way and four driveways from Monterey Road would be closed. A new Branham Lane pedestrian bridge would span the combined railroad and Monterey Road corridor. The westbound Blossom Hill Road ramp at Monterey Road would be shifted to the east side of Monterey Road. A new pedestrian bridge would be built to maintain connectivity between Ford Road and the Caltrain Blossom Hill Station. The alignment would continue south at grade under SR 85/West Valley Freeway, with modifications to the existing highway bridge to allow HSR to pass underneath. The alignment would then cross under Bernal Road before transitioning to the Morgan Hill and Gilroy Subsection at Bernal Way.

Like the other alternatives, the design assumes a reduction from six to four travel lanes on Monterey Road, beginning north of Capitol Expressway and continuing south to Blossom Hill Road; south of Blossom Hill Road the existing roadway is already four travel lanes. Under Alternative 2, one left turn lane would be removed south of Senter Street and one left turn lane would be removed south of Roeder where Monterey Road would be depressed and grade-separated from adjacent properties. Existing mid-block left-turn lanes would be closed because of substandard stopping sight distance. Alternative 2 (and Alternative 4) differs from Alternatives 1 and 3 by shifting all Monterey Road travel lanes and median east of their current locations.

Traction Power Facilities

In the Monterey Corridor Subsection, traction power stations would be located in the same area for Alternatives 1, 2, and 3. Traction power paralleling stations would be constructed at the following locations:

- Either the north side of the alignment near Curtner Avenue or the south side of the alignment at Communications Hill (same as Alternative 1)
- Either the south side of SR 85 or between Bernal Road and the Bernal Road ramp onto Monterey Road

Train Control and Communication Facilities

Train control facilities and communication facilities under Alternative 2 would be as described for Alternative 1.

Wildlife Crossings

There would be no wildlife crossings in this subsection.

Stations

No HSR stations are proposed for this subsection.

Maintenance Facilities

No maintenance facilities are proposed for this subsection.

State Highway or Local Roadway Modifications

Appendix 2-A details shows local road modifications that would be necessary in the Monterey Corridor subsection.

Freight or Passenger Rail Modifications

Construction in this subsection would require temporary use of UPRR right-of-way for construction staging. Alternative 2 would be the same as Alternative 1 between West Alma Avenue and Communications Hill, and also at the Capitol Station. Permanent modifications would occur at the following locations:

- **Daylight Way**—Sliver of UPRR right-of-way required
- **South of Daylight Way**—This area is needed to transition from HSR running on the west of the UPRR alignment to curve over UPRR right-of-way and transition to running along Monterey Road on the east side of UPRR alignment
- **Fehren Drive to Capitol Expressway**—HSR alignment would be constructed on straddle bents to pass over UPRR
- **New rail bridge**—New bridge over new grade separations (Skyway Drive, Branham Lane, Chynoweth Avenue)
- **New pedestrian overcrossing**—New overcrossing at Blossom Hill Station

Land Use and Community Modifications

This alternative would require acquisition of residential, commercial, and industrial properties in this subsection to obtain adequate right-of-way for construction and operations.

Morgan Hill and Gilroy Subsection

Alignment and Ancillary Features

The Morgan Hill and Gilroy Subsection under Alternative 2 would be approximately 31 miles long, continuing south from the Monterey Corridor Subsection. From Bernal Way in South San Jose, the alignment would extend through Morgan Hill and San Martin to the Downtown Gilroy Station, then curve generally east across the Pajaro River floodplain and through a portion of northern San Benito County before entering Tunnel 1 at the base of the Diablo Range. The alignment would exit the tunnel at Casa de Fruta Parkway/SR 152 in unincorporated eastern Santa Clara County, and then transition to the Pacheco Pass Subsection (Figure 2-1).

From the southern limit of the Monterey Corridor Subsection, Alternative 2 would be at grade on retained fill between the UPRR right-of-way and Monterey Road in South San Jose. Because of the guideway’s proximity to UPRR, a 3-foot-thick continuous intrusion barrier would be constructed between the HSR and UPRR tracks. In contrast to the other alternatives, Alternative 2 would require construction of new roadway grade separations to maintain east-west connectivity across Monterey Road. Before turning south near Kittery Court, the two UPRR tracks would be realigned to the west to accommodate the alignment curvature required for HSR operations before returning to the existing alignment adjacent to the south side of the Calpine Metcalf Energy Center. The existing Fisher Creek culvert would be improved with a new culvert installed beneath the new HSR alignment, realigned Monterey Road, and UPRR. The creek crossing would be improved to provide a suitable wildlife crossing. The Blanchard Road grade crossing would be closed.

As the UPRR and Monterey Road rights-of-way converge to the south approaching Bailey Avenue, the four-lane Monterey Road would be realigned eastward to accommodate the HSR alignment at grade between the railroad and roadway. The existing Bailey Avenue bridge would remain in place and HSR would cross beneath the road. The alignment would continue south, ascending onto embankment, crossing beneath a new Palm Avenue bridge and a new Live Oak Avenue bridge (which would also cross over UPRR, eliminating both existing at-grade crossings). Tilton Avenue would become a cul-de-sac. Madrone Parkway would be lowered to allow HSR and UPRR to cross over the roadway. At Cochrane Road, the realigned Monterey Road would converge with the existing roadway alignment.

South along the UPRR alignment through Morgan Hill, a new culvert would be placed in the HSR embankment for Fisher Creek. The alignment would then cross over Monterey Road on a clear-span bridge. Continuing south on embankment along the east side of UPRR, the HSR and UPRR alignments would cross over Main, East/West Dunne, San Pedro, and Tennant Avenues on short bridges over the roadways, which would be lowered 17 to 30 feet below grade to maintain east-west connections. A new pedestrian underpass would be provided to maintain access from east of the HSR corridor to the Morgan Hill Caltrain Station. Railroad Avenue would be closed between San Pedro Avenue and Barrett Avenue and relocated eastward between Barrett Avenue and Maple Avenue to accommodate the HSR alignment adjacent to UPRR. The existing bridge at Butterfield Boulevard would be extended to cross over the realigned Railroad Avenue and at-grade HSR alignment. The Butterfield canal would be relocated to the east to accommodate the HSR alignment adjacent to UPRR.

Continuing south, the alignment would ascend onto embankment, and West Little Llagas Creek would flow through a new culvert. The existing East Middle Avenue would become cul-de-sacs on both sides of the alignment. A new alignment of East Middle Avenue would be built to the south, where it would cross over the HSR tracks and Monterey Road on a bridge. Monterey Road and UPRR would be realigned westward between East Middle Avenue and Roosevelt Avenue to accommodate the southward alignment curvature required for HSR operations. The realigned roadway, UPRR, and the new HSR alignment would cross Llagas Creek on new clear-span bridges. South of Llagas Creek, Monterey Road would return to the existing alignment near Roosevelt Avenue.

San Martin Avenue would be realigned between Murphy and Harding Avenues to connect to Oak Street at Llagas Avenue (north of the HSR alignment) in San Martin. HSR would cross over San Martin Avenue and Oak Street, which would be below grade. A pedestrian path under the HSR embankment would be provided south to San Martin Avenue. Depot Street, UPRR, and Monterey Road, which parallel the HSR tracks at Oak Street, would cross the newly depressed San Martin (formerly Oak) Street on bridges supported by retained fill. HSR would continue south at grade adjacent to the east side of UPRR. Church Avenue would be raised onto a bridge over both HSR and UPRR. Fitzgerald and Masten Avenues would be realigned to the south and would be depressed beneath Monterey Road, UPRR, and HSR. Similarly, Rucker Avenue and Buena Vista Avenue would be depressed beneath Monterey Road, UPRR, and HSR. Both Cohansey Avenue and Las Animas Avenue would remain at grade, with bridges for HSR and UPRR to cross over the existing streets.

Continuing south into Gilroy, the alignment would shift east for the approach to the Downtown Gilroy Station. The existing culvert for the West Branch of Llagas Creek would be extended to the east to accommodate the rail alignment shift. HSR and UPRR would be on embankment (approximately 15–25 feet high) and cross over Leavesley Road, Casey Street, IOOF Avenue, Lewis Street, East 6th Street, and the realigned East 7th Street/Old Gilroy on bridges before arriving at the Downtown Gilroy Station embankment (approximately 16 feet high). Each of these streets would be lowered approximately 20 feet beneath existing grade, and a pedestrian underpass would replace Martin Street across the rail alignment. Miller Slough would be realigned eastward in a new culvert beneath the railroad alignment. HSR and UPRR would continue on embankment and cross over East 9th Street and East 10th Street.

The HSR alignment would continue on embankment south from the Downtown Gilroy Station to the Princevale Channel, then descend into a trench under Luchessa Avenue and US 101 where existing bridges would be demolished and reconstructed to accommodate the freeway undercrossing and two UPRR spur tracks. Just south of the US 101 overcrossing, a freight connection would be made from UPRR on the south side of HSR, crossing over the HSR trench to connect to the Gilroy MOWF on the north side of HSR. Two UPRR spur tracks would be realigned to connect to the MOWF freight track north of HSR.

The remainder of this subsection—to Casa de Fruta—would be the same as under Alternative 1. The Tunnel 1 design variant would be the same as described in Alternative 1.

Tunnel Design Variant

The characteristics of the TDV in the Morgan Hill and Gilroy Subsection under Alternative 2 would be the same as described in the Morgan Hill and Gilroy Subsection under Alternative 1.

Traction Power Facilities

As under Alternative 1, one new TPSS, Site 4—Gilroy, would be constructed at one of two alternate sites on the north side of the alignment: east or west of Bloomfield Avenue. At this location, one new utility switching station would be co-located with the TPSS. Communication facilities (i.e., redundant fiber optic lines) would also be required to support the electrical interconnection of the TPSS to a new utility switching station, to existing PG&E facilities, or both—typically within tie-line/utility corridors. Site 4—Gilroy would connect to the Llagas PG&E substation via existing and proposed transmission or distribution lines along SR 152, Frazier Lake Road, and Bloomfield Avenue. Fiber optic and high-voltage lines would be reconductored overhead on existing towers where available. Where no overhead connections exist, both fiber optic and high-voltage lines would be undergrounded within or adjacent to the public right-of-way.

A traction power switching station would be constructed east of the HSR alignment at a location north of Paquita Espana Court or north of Palm Avenue.

Two traction power paralleling stations would be constructed at the following locations:

- Either the east side of the alignment between East Dunne and San Pedro Avenues or south of San Pedro Avenue
- East of the alignment, either north or south of a new Masten Avenue/Fitzgerald Avenue in-trench alignment

South of US 101, Alternative 2 would have the same two switching stations as Alternative 1:

- Either south of the alignment and west of Lovers Lane or north of the alignment and west of Lovers Lane
- In the vicinity of the Tunnel 1 east portal, either at the portal or east of SR 152 in the southern area of Casa de Fruta.

PG&E would reinforce the electric power distribution network to meet HSR traction and distribution power requirements by reconductoring the approximately 9.8-mile Metcalf to Morgan Hill and 10.6-mile Morgan Hill to Llagas 115-kV power lines. These PG&E transmission network upgrades described under Alternative 1 would also be necessary under Alternative 2.

Train Control and Communication Facilities

A total of 20 ATC sites would be constructed in the Morgan Hill and Gilroy Subsection for this alternative, three of which would be the same as those under Alternative 1:

- One site east of Monterey Road north of Palm Avenue (two site options)
- One site north of East Middle Avenue (two site options)
- One site between Las Animas Avenue and Leavesley Road
- One site south of Leavesley Road
- One site south of Lewis Street
- One site north of 6th Street in Gilroy
- Two sites south of 6th Street in Gilroy
- Two sites between 9th and 10th Streets in Gilroy
- One site south of Banes Lane
- Five sites north of Carnadero Avenue (same as Alternative 1)
- Three sites east of the Pajaro River (same as Alternative 1)
- One site near Lake Road (two site options—same as Alternative 1)

A total of six standalone communication radio sites would be constructed in this subsection at the following locations, one of which would be the same as under Alternative 1:

- Between Forsum Road and Blanchard Road (two site options)
- Near Bailey Avenue (two site options)
- Near Kirby Avenue (two site options)
- West of the intersection of Cochrane Road and Monterey Road (two site options)
- Near South Street (two site options)
- East of the Pajaro River south of Gilroy (same as Alternative 1)

Wildlife Crossings

Three adjacent box culverts would be installed to provide wildlife with a connection between Tulare Hill and Coyote Creek south of Metcalf Road. The box culverts under Monterey Road and UPRR would be replaced with larger box culverts at Fisher Creek. HSR would also be on a box culvert over Fisher Creek. These three box culverts would have larger openings than existing culverts to improve wildlife movement. There would be seven additional crossings at Emado Avenue, Laguna Avenue, Richmond Avenue, Fox Lane, Paquita Espana Court, south of Palm Avenue, and south of Live Oak Avenue.

Stations

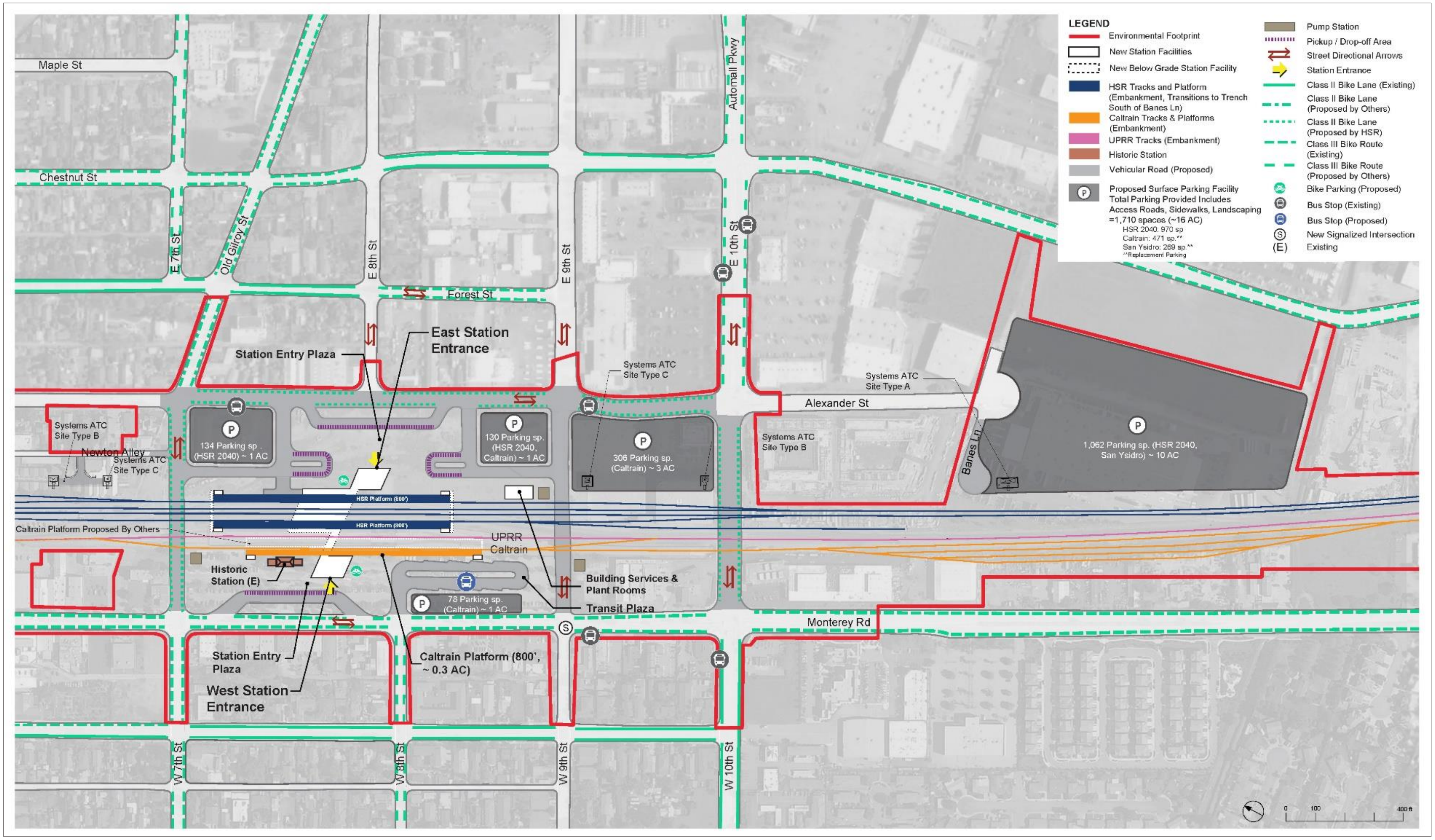
The Downtown Gilroy Station under Alternative 2 is estimated to have approximately 6,210 boardings in 2040. The station layout and configuration would be similar to those described for Alternative 1, except that UPRR and Caltrain would be elevated to the same height as HSR on the embankment. The station approach would be on embankment approximately 15 feet to top of rail, with dedicated HSR tracks to the east of UPRR between relocated Old Gilroy Street/7th Street and 9th Street. The 800-foot platforms would be on the Caltrain side of the tracks. A new HSR station would be constructed south of the existing Caltrain station. The new HSR station building would have both east and west side entrances: the main entrance for passengers arriving by auto or bicycle would be on the east side, while the main entrance for passengers arriving on foot or by transit would be on the west side. The HSR station building would encompass 64,913 square feet with a 4,400-square-foot substation and systems building. The concourse would be below raised UPRR and Caltrain tracks.

As under Alternative 1, the existing 471 Caltrain parking spaces on the west side of the station would be replaced 1:1 by either reconfiguring parking on the west side of the station or relocating it to the east side of the station. The existing 269 San Ysidro housing development parking spaces would be replaced 1:1 with new surface parking along Automall Parkway with access from the south end of Alexander Street. HSR would provide an additional 970 spaces in 2040, for a total of 1,710 parking spaces in 2040 (including existing demand). The station site plan provides 970 new parking spaces in five areas. One site would be west of the station along Monterey Road at 9th Street. The other four would be on the east side of the station along Alexander Street at Old Gilroy Street, 9th Street, 10th Street, and Banes Lane. A multimodal access plan would be developed prior to design and construction of the station. The plan would be developed in coordination with local agencies and would include a parking strategy that would confirm the location, amount, and phasing of parking.

A total of eight bus bays would be provided. Street improvements would include realignment of Old Gilroy Street at East 7th Street; existing grade crossings would remain unchanged. A 4,000-square-foot bicycle facility would be built. Class II bike lanes would be provided on 7th, Alexander, and 10th Streets. Figure 2-60 and Figure 2-61 illustrate the conceptual on-embankment downtown Gilroy station.

Maintenance Facilities

The South Gilroy MOWF under Alternative 2 would be constructed along the HSR alignment near Carnadero Avenue as described for Alternative 1 and illustrated on Figure 2-42. The freight connection would be provided as described above.



Source: Authority 2019a

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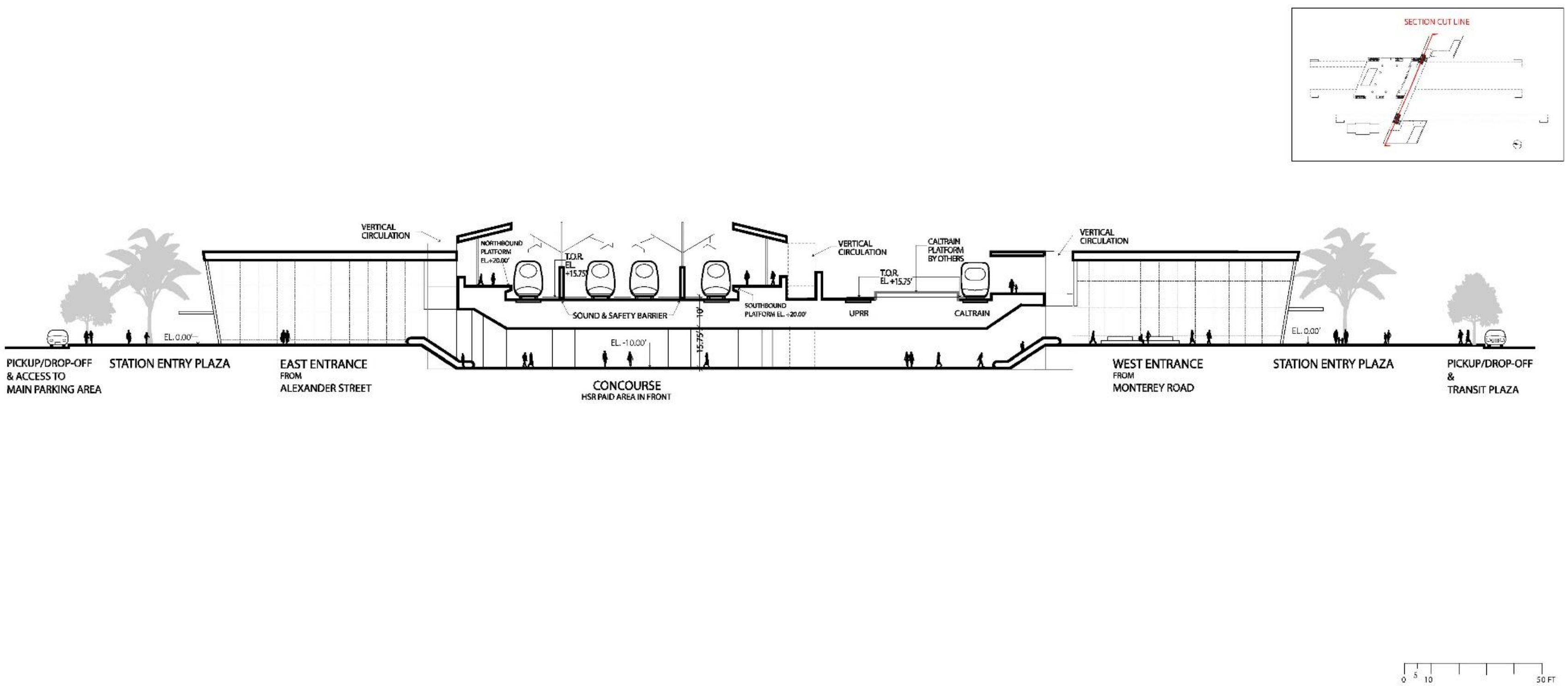
Figure 2-60 Conceptual Downtown Gilroy Embankment Station Plan (Alternative 2)



Source: Authority 2019a

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Figure 2-61 Cross Section of Downtown Gilroy Embankment Station (Alternative 2)

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be necessary in the Morgan Hill and Gilroy Subsection.

Freight or Passenger Rail Modifications

Construction in this subsection would require temporary use of areas of UPRR right-of-way for construction staging. Permanent modifications would occur at the following locations:

- For new road or rail bridges at all new grade separations
- Felice Court to Blanchard Road to allow for shifting UPRR tracks west
- South of Blanchard Road—a sliver of UPRR right-of-way required for embankment construction
- North of Campoli Drive
- East Third Street to south of Diana Avenue—right-of-way required
- Pollard Avenue to San Martin Avenue—permanent right-of-way acquisition for relocation of UPRR
- North Street to South Street—right-of-way required for HSR construction
- South of grade-separated Fitzgerald Avenue/Masten Avenue—a sliver of right-of-way required
- North of Denio Avenue to Lewis Street for shifting of UPRR track east
- East 6th Street to Luchessa—right-of-way required for construction of the Downtown Gilroy Station and approach from the north
- South of US 101 to allow for two relocated spur tracks, a shifted siding track with new UPRR right-of-way, and a new freight connection to the MOWF

Land Use and Community Modifications

Alternative 2 would require acquisition of residential, commercial, and industrial properties in this subsection to obtain adequate right-of-way for construction and operations.

Pacheco Pass Subsection

The characteristics of the Pacheco Pass Subsection under Alternative 2 would be as described for Alternative 1. The Tunnel 2 design variant would be the same as described in Alternative 1.

San Joaquin Valley Subsection

The characteristics of the San Joaquin Valley Subsection under Alternative 2 would be the same as those described for Alternative 1.

2.6.2.6 Alternative 3

Rationale

Alternative 3 was designed to minimize the project footprint through the use of viaduct and by going around downtown Morgan Hill, much like Alternative 1. Alternative 3 would bypass downtown Gilroy to an East Gilroy Station, further minimizing interface with the UPRR corridor in comparison to Alternative 1. Like Alternative 2, Alternative 3 would use the viaduct to Scott Boulevard design option, requiring less disruption of UPRR track than the shorter viaduct to I-880 option. Alternative 3 would incorporate the same alignment and profile as Alternative 1 in the Monterey Corridor, Pacheco Pass, and San Joaquin Valley Subsections, and the same alignment and profile as Alternative 2 in the San Jose Diridon Station Approach Subsection. The MOWS would be the same under all alternatives.

Alternative 3 would operate in a dedicated viaduct from Scott Boulevard through the San Jose Diridon Station Approach Subsection. The alternative would continue predominantly on viaduct through the Monterey Corridor and Morgan Hill and Gilroy Subsections on an alignment around downtown Morgan Hill to an embankment approach to the East Gilroy Station. Alternative 3 would include an East Gilroy MOWF and would continue predominantly on viaduct and embankment across the Soap Lake floodplain before entering Tunnel 1 west of Casa De Fruta. The alignment and guideway in the Pacheco Pass and San Joaquin Subsections would be the same under all four alternatives.

Overall, this alternative would comprise 43.2 miles on viaduct, 1.8 miles at grade, 24.9 miles on embankment, 2.4 miles in trench, and two tunnels totaling 15.0 miles. Figure 2-62 illustrates the alignment and track profile of Alternative 3.

San Jose Diridon Station Approach Subsection

Alignment and Ancillary Features

Under Alternative 3, the alignment and characteristics of this subsection would be as described for Alternative 2.

Stations

The HSR San Jose Diridon Station would be built as described for Alternatives 1 and 2.

Traction Power Facilities

Traction power facilities of Alternative 3 would be as described for Alternative 2.

Train Control and Communication Facilities

Train control and communication facilities under Alternative 3 would be the same as described for Alternative 2. No standalone communication radio towers would be constructed in this subsection under Alternative 3.

Maintenance Facilities

No maintenance facilities are proposed for this subsection.

State Highway or Local Roadway Modifications

State highway or local roadway modifications would be as described for Alternative 2.

Freight or Passenger Rail Modifications

Freight or passenger rail modifications would be as described for Alternative 2.

Land Use and Community Modifications

The alignment and features in this subsection would be as described for Alternative 2.

Monterey Corridor Subsection

Alignment and Ancillary Features

The alignment and features in the Monterey Corridor Subsection would be as described for Alternative 1.

Stations

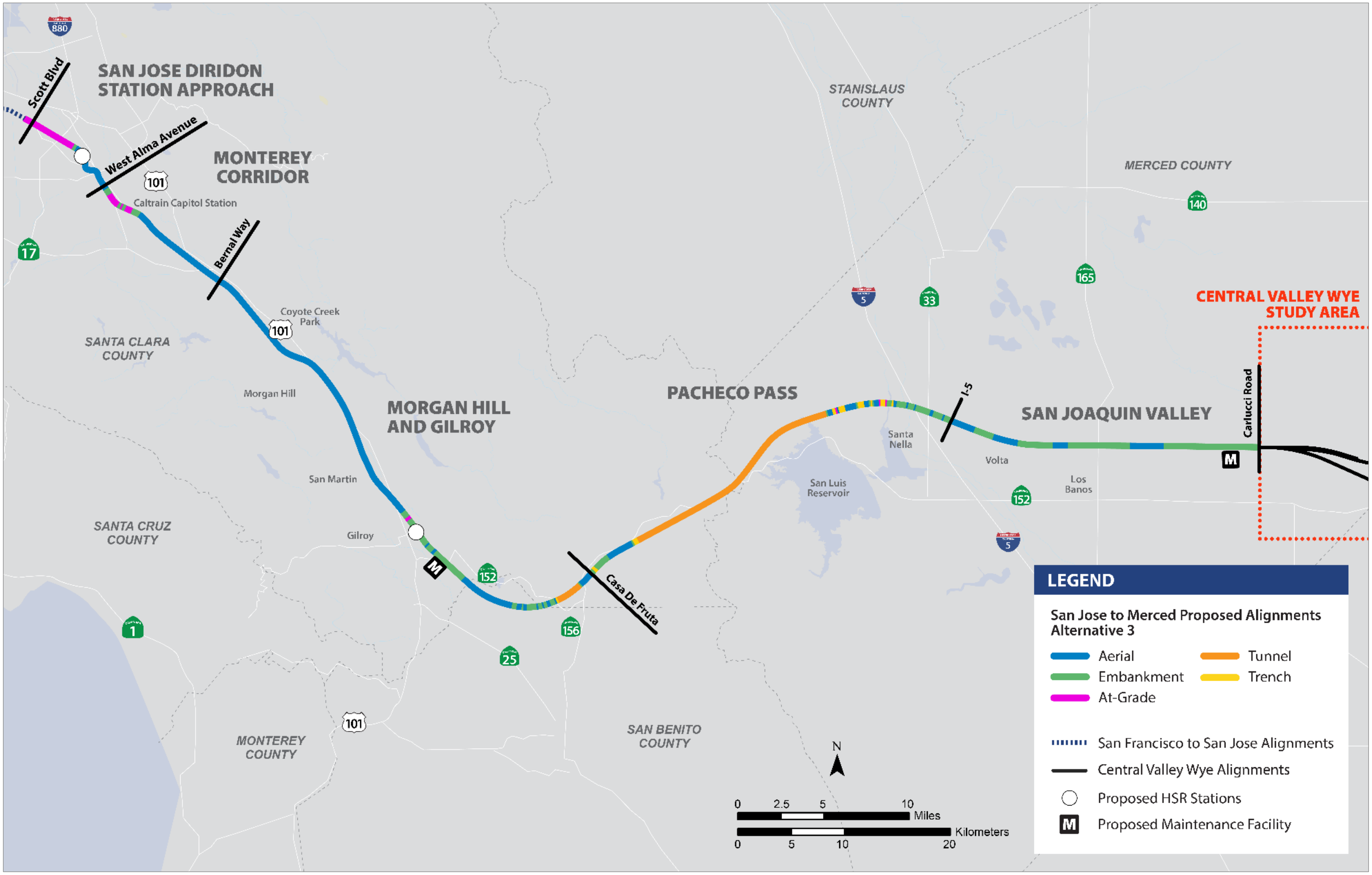
No stations are proposed in this subsection.

Traction Power Facilities

Traction power facilities under Alternative 3 would be as described for Alternative 1.

Train Control and Communication Facilities

Train control and communications facilities under Alternative 3 would be as described for Alternative 1.



Source: Authority 2019a

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Figure 2-62 Alternative 3 Proposed Alignment

Maintenance Facilities

No maintenance facilities are proposed in this subsection.

State Highway or Local Roadway Modifications

State highway or local roadway modifications would be as described for Alternative 1.

Freight or Passenger Rail Modifications

Freight rail modifications would be as described for Alternative 1.

Land Use and Community Modifications

Alternative 3 would require acquisition of residential, commercial, and industrial properties in this subsection to obtain adequate right-of-way for construction and operations.

Morgan Hill and Gilroy Subsection

Alignment and Ancillary Features

The Morgan Hill and Gilroy Subsection under Alternative 3 would be approximately 30 miles long, continuing south from the Monterey Corridor Subsection. From Bernal Way in South San Jose, the alignment through Morgan Hill and San Martin would be the same as described for Alternative 1. The Alternative 3 alignment would diverge from the Alternative 1 alignment by turning east north of Gilroy to arrive at the East Gilroy Station and an MOWF near SR 152. South of the MOWF, the alignment would curve generally east across the Pajaro River floodplain and through a portion of northern San Benito County before entering Tunnel 1 at the base of the Diablo Range. The Morgan Hill and Gilroy Subsection would end in the Pacheco Pass at Casa de Fruta Parkway/SR 152 (Figure 2-1), where the Alternative 3 alignment would converge with those of Alternatives 1, 2, and 4.

South of the Monterey Corridor Subsection, Alternative 3 would diverge east from Alternative 1 north of Gilroy, near the intersection of Monterey Road and Church Avenue. Beginning at Church Avenue, a new freight track would diverge off the UPRR mainline to provide a freight connection to the MOWF. The freight track would continue parallel to the HSR alignment on the west side until the MOWF. The alignment would cross over Church Avenue, Lena Avenue, Masten Avenue, and US 101 at Rucker Avenue on viaduct approximately 60 feet above grade. The aerial alignment would also cross over Denio Avenue and Buena Vista Avenue on viaduct before descending onto embankment. Cohansey Avenue would be closed. On the north end of the East Gilroy Station site, the alignment would cross beneath Las Animas Avenue; on the south end of the station site, Leavesley Road would be raised on bridges over the HSR embankment. At the south end of the East Gilroy Station site, the Llagas Creek overbank flow would be directed across the HSR alignment through two culvert crossings. Farther southeast, the alignment would cross over Gilman Avenue on viaduct. The alignment would cross Llagas Creek on a low viaduct, and Holsclaw Road would be closed to vehicular traffic. Levee Road would be realigned north of Llagas Creek. Continuing south, the alignment would ascend to approximately 25 feet above grade on embankment approaching the MOWF site. SR 152 would be grade-separated and realigned, crossing over the MOWF on a bridge. Both Frazier Lake Road and Holsclaw Road would connect to the grade-separated SR 152. The MOWF, on the south side of the alignment, would have the same features as the MOWF for Alternatives 1 and 2 and would similarly be on embankment. Additional flood detention basins would be installed around the eastern edge of the MOWF to provide sufficient flood capacity in the Soap Lake floodplain. Jones Creek would be realigned around the eastern boundary of the MOWF, crossing beneath the HSR viaduct over Bloomfield Avenue. Continuing on a 40-foot-high embankment and then on viaduct, the alignment would cross the Pajaro River, Millers Canal, Lake Road, Pacheco Creek, Lovers Lane, San Felipe Road, and SR 152 before entering the west portal of Tunnel 1. Tequesquita Slough would be partially filled by the HSR embankment, which would include cross-culverts, 3.1 acres of adjacent floodwater detention basins, and extended viaduct over Pacheco Creek to maintain floodplain capacity and function.

The Alternative 3 alignment would converge a short distance west of Tunnel 1 with the alignments of Alternatives 1, 2, and 4. The Tunnel 1 design variant would be the same as described in Alternative 1.

Tunnel Design Variant

The characteristics of the TDV in the Morgan Hill and Gilroy Subsection under Alternative 3 would be the same as described in the Morgan Hill and Gilroy Subsection under Alternative 1.

Traction Power Facilities

Under Alternative 3, one new TPSS, Site 4—Gilroy, would be constructed at one of two sites: north of the alignment either east or west of the former SR 152. Communication facilities (i.e., redundant fiber optic lines) would also be required to support the electrical interconnection of the TPSS to a new PG&E switching station, to existing PG&E facilities, or both—typically within tie-line/utility corridors.

As under Alternative 1, a traction power switching station would be constructed at one of two locations north of Palm Avenue and east of the alignment.

Four traction power paralleling stations would be constructed at the following locations:

- South of the alignment, either south of Diana Avenue or at the intersection of San Pedro Avenue and Walnut Grove Drive (same as Alternative 1)
- Either at the northwest or southeast corner of the HSR crossing of Masten Avenue
- South of Gilroy at one of three site options: on Lake Road north of the alignment, on Lake Road south of the alignment, or at Lovers Lane south of the alignment
- Near the Tunnel 1 east portal, either at the portal or east of SR 152 in the southern area of Casa de Fruta

The PG&E transmission network upgrades from Metcalf to Morgan Hill and from Morgan Hill to Llagas described for Alternative 1 would also be necessary under Alternative 3. In addition to a new utility switching station co-located with the TPSS, a tie-line route and power distribution to the Tunnel 1 portal under this alternative would be the same, albeit with shorter electrical line routes, as those described for Alternative 1. A distribution power line for the Tunnel 1 portals would be constructed on the south side of the alignment northeast of the intersection of Walnut Lane and SR 152, crossing over and connecting with the TPSS from the north. One power drop site would be provided at the east and west portals (two options for each portal location).

Train Control and Communication Facilities

A total of 21 ATC sites would be constructed in the Morgan Hill and Gilroy Subsection for this alternative:

- One site east of Monterey Road near Palm Avenue (two site options)
- One site East Middle Avenue (two site options)
- Two sites near Cohansey Way
- Four sites between Las Animas Avenue and Leavesley Road
- Three sites south of Leavesley Road
- Four sites north of SR 152, east of Gilroy
- Two sites within the MOWF
- Three sites north of Bloomfield Avenue
- One site near Lake Road (two site options)

A total of six standalone communication radio sites would be constructed within this subsection at the following locations (five locations are the same as those for Alternative 1):

- At Forsum Road or at Blanchard Road (two site options)
- Near Bailey Avenue (two site options)
- Between Barnhart Avenue and Kirby Avenue (two site options)
- South of Cochrane Road along US 101 (two site options)
- North of Cox Avenue and south of West San Martin Avenue (two site options)
- At Bloomfield Avenue

Wildlife Crossings

Wildlife crossings would be provided between Bernal Way and San Martin as described for Alternative 1, with crossings at Tulare Hill, Fisher Creek, and Llagas Creek. Although Alternative 3 would include more embankment than Alternative 1, it would be similar to Alternative 1 by continuing primarily on viaduct through the Soap Lake area to allow for wildlife movement.

Stations

The HSR East Gilroy Station is estimated to have approximately 6,210 boardings in 2040. The station approach would be on embankment approximately 17 feet to top of rail north of Leavesley Road (Figure 2-63 and Figure 2-64). The platforms would be 800 feet long. The station buildings would be constructed on both the east and west sides of the tracks with a connecting concourse under the tracks. The MOWF freight access track would continue through the station on the west side of the west station platform. Access for passengers arriving by auto would be available from either the east or west entrance, while the main entrance would be on the west side providing access for passengers arriving by transit or bicycle.

The HSR station buildings would encompass 58,611 square feet with a 4,400-square-foot substation and systems building. The concourse would be below the tracks and embankment. Approximately 1,520 on-site parking spaces would be provided to meet the projected demand for 1,520 spaces in 2040. Spaces would be on the east and west sides of the building. The west side station parking would be accessed from Leavesley Road and a new station access road east of the outlet mall. The east side station parking would be accessed from Marcella Avenue. A multimodal access plan would be developed prior to design and construction of the station. The plan would be developed in coordination with local agencies and would include a parking strategy that would confirm the location, amount, and phasing of parking.

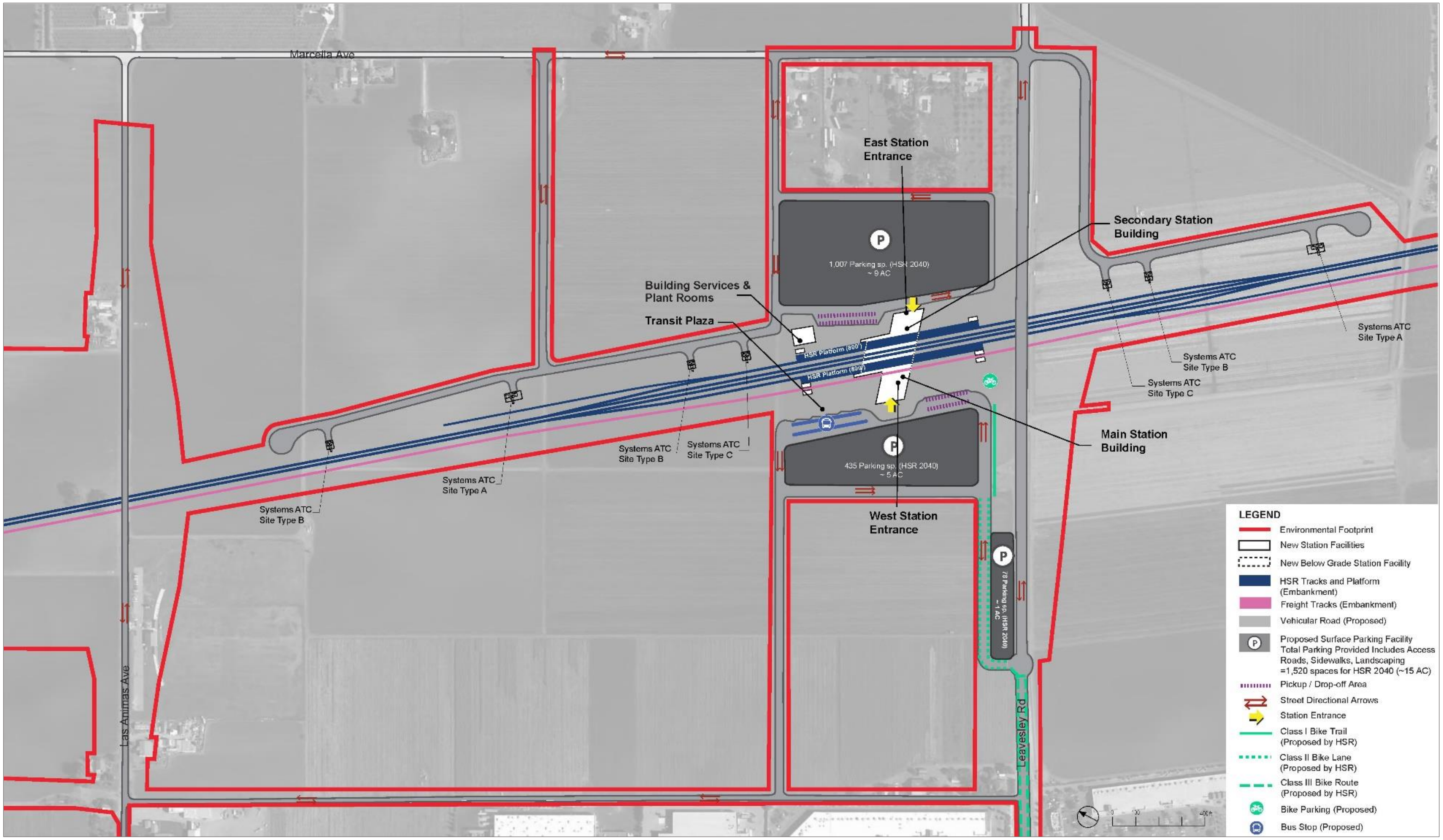
Seven bus bays would be provided on site on the west side of the station. A 4,000-square-foot bicycle parking facility would be built; a new Class III bike route would be provided from the outlet mall to the site entrance and Class II lanes from the station entrance to the parking. A Class I bidirectional off-street path would be provided adjacent to parking, connecting to the bike station. This would be a new station without any other rail operators in the station area.

Maintenance Facilities

Alternative 3 would include the East Gilroy MOWF west of the HSR mainline, south of the community of Old Gilroy (Figure 2-44). The MOWF would encompass approximately 75 acres and extend along the west side of the HSR alignment from the intersection of SR 152 and Frazier Lake Road south to Jones Creek. The site is near Holsclaw Road, a potentially eligible historic landscape, and is within the Soap Lake floodplain. The freight connection would be provided as described in the discussion of the alignment and ancillary facilities.

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be necessary in the Morgan Hill and Gilroy Subsection.



Source: Authority 2019a

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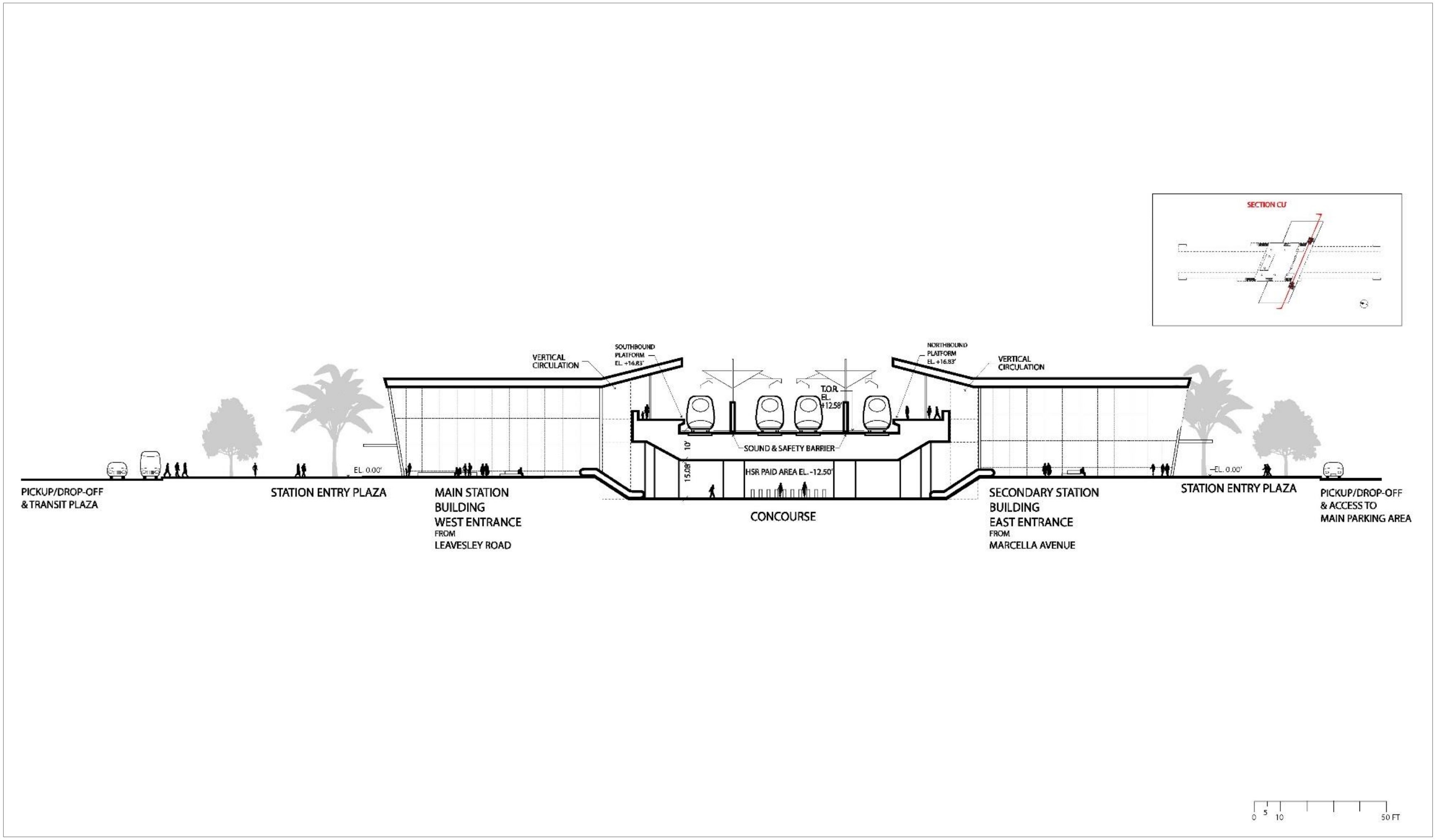
Figure 2-63 Conceptual East Gilroy Station Plan (Alternative 3)



Source: Authority 2019a

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Figure 2-64 Cross Section of East Gilroy Station

Freight or Passenger Rail Modifications

The freight rail modifications would be generally as described for Alternative 1 between Kittery and Cox. Alternative 3 would require a new freight connection to the MOWF.

Land Use and Community Modifications

Alternative 3 would displace residential, commercial, agricultural, and parks and recreation uses.

Pacheco Pass Subsection

The characteristics of the Pacheco Pass Subsection under Alternative 3 would be as described for Alternatives 1 and 2. The Tunnel 2 design variant would be the same as described in Alternative 1.

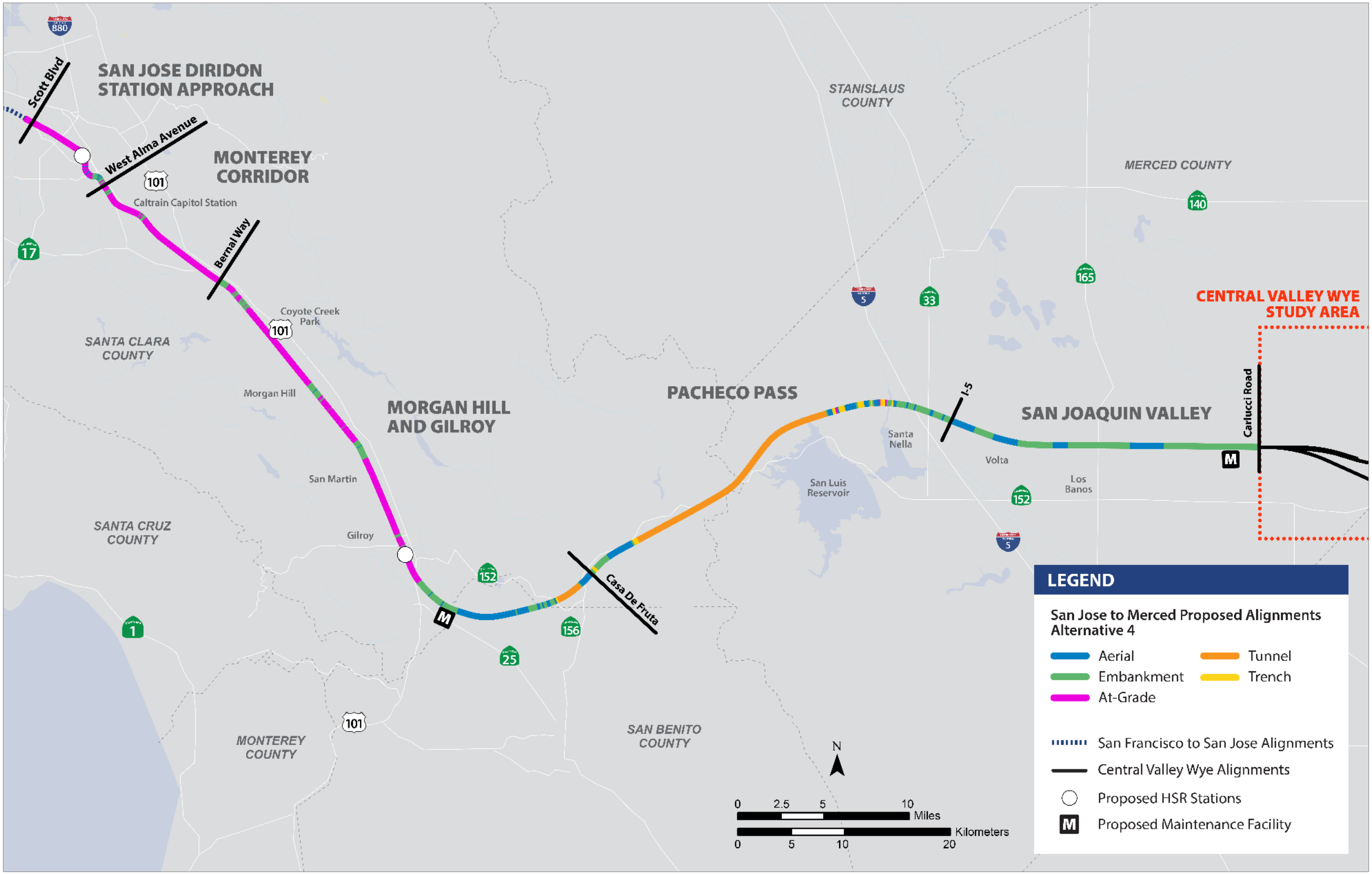
San Joaquin Valley Subsection

The characteristics of the San Joaquin Valley Subsection under Alternative 3 would be as described for Alternatives 1 and 2.

2.6.2.7 Alternative 4 (Preferred Alternative, CEQA Proposed Project)

Rationale

Development of Alternative 4 was intended to extend blended electric-powered passenger railroad infrastructure from the southern limit of Caltrain's PCEP through Gilroy. South and east of Gilroy, HSR would operate on a dedicated guideway similar to that of Alternatives 1 and 2. The objectives of this approach are to minimize property displacements and natural resource impacts, retain local community development patterns, improve the operational efficiency and safety of the existing railroad corridor, and accelerate delivery of electrified passenger rail services in the increasingly congested southern Santa Clara Valley corridor. The alternative is distinguished from the other three project alternatives by a blended, at-grade alignment that would operate on two electrified passenger tracks and one conventional freight track predominantly within the existing Caltrain and UPRR rights-of-way. The maximum train speed of 110 mph in the blended guideway would be enabled by continuous access-restriction fencing; four-quadrant gates, roadway lane channels, and railroad trespass deterrents at all public road grade crossings; and fully integrated communications and controls for train operations, grade crossings, and roadway traffic. Caltrain stations would be reconstructed to enable directional running as part of blended operations. Overall, this alternative would be comprised of 15.2 miles on viaduct, 30.3 miles at grade, 25.9 miles on embankment, 2.3 miles in trench, and two tunnels with a combined length of 15.0 miles. Figure 2-65 illustrates the alignment and track profile of Alternative 4.



Source: Authority 2019a

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Figure 2-65 Alternative 4 Proposed Alignment

San Jose Diridon Station Approach Subsection

Alignment and Ancillary Features

Alternative 4 would begin at Scott Boulevard in blended service with Caltrain on an at-grade profile following Caltrain MT2 and MT3 south along the east side of the existing Caltrain corridor. The existing Lafayette Street pedestrian overpass would remain in place, as would the De La Cruz Boulevard and West Hedding Street roadway overpasses. New UPRR track would start just south of Emory Street to maintain freight movement capacity north of San Jose Diridon Station. The new UPRR track would be east of Caltrain MT1. The existing Santa Clara Station would remain. The existing College Park Caltrain Station would be reconstructed just north of Emory Street on the west side of the Caltrain Corridor on the existing siding track to eliminate the existing holdout rule at the station. A portion of both legs of the UPRR Warm Springs Subdivision Lenzen Wye would undergo minor track adjustments, and a new bridge would be built over Taylor Street for UPRR to tie into the Lenzen Wye.

The blended at-grade alignment would continue along MT2 and MT3 to enter new dedicated HSR platforms at grade at the center of San Jose Diridon Station (Figure 2-66). HSR platforms would be extended south to provide 1,385-foot and 1,465-foot platforms and would be raised to provide level boarding with the HSR trains. The existing Santa Clara Street underpass would remain, but the track in the throat and yard would require modification. There would be no need for modifications to the VTA light rail.

Continuing south, the blended at-grade three-track alignment would remain in the Caltrain right-of-way through the Gardner neighborhood. The existing underpass at Park Avenue and the existing overpass at San Carlos Street would remain in place. Four-quadrant gates with channelization would be built at Auzerais Avenue and West Virginia Street. A new bridge for the blended HSR/MT3 track over I-280 would be constructed. The existing underpasses at Bird Avenue and Delmas Avenue would be reconstructed, as would the rail bridge overpasses. New standalone rail bridges over Prevost Street, SR 87, the Guadalupe River, and Willow Street would be built for MT3. MT1 and MT2 would remain on the existing structures. The existing Tamien Caltrain Station would remain in place.

Diridon Design Variant

The Authority has developed a DDV that would allow for higher speeds in the approaches and through Diridon Station than the preliminary design for Alternative 4 would provide. The above design is based on the PCEP track geometry and restricts speeds approaching and through the station to 15 mph. The DDV would improve the curvature in the alignment described above to the north of the station between Julian Street and Santa Clara Street and from the south end of the station to San Carlos Street. The design variant would also modify the preliminary design of the ends of the platforms, providing for increased speeds of 40 mph, comparable to the design speeds provided by Alternatives 1, 2, and 3.

North of the station, the design alterations would change the horizontal placement of the freight and electrified passenger tracks up to 37 feet to the east between Santa Clara Street and Julian Street. This would require up to 23 feet of additional property from the SAP parking lot on the east side of the rail corridor and one additional commercial property. In the platform area of San Jose Diridon Station, the HSR southbound track would shift 4 to 10 feet to the east in two discrete areas (one 117 feet long on the north side of the station and the other 92 feet long on the south side), and the platforms would be cut or filled to adjust to the revised alignment. The HSR northbound track would shift up to 2 feet to the west in one discrete area (466 feet long in the southern part of the station), and the platform would be filled to adjust. The two westernmost station tracks (used by Caltrain and occasionally other services) would move up to 5 feet to the west on the southern end of the station. None of the track shifts in the station area would require the acquisition of additional right-of-way. From the south end of the station to San Carlos Street, the design alterations would adjust the horizontal placement of the electrified passenger tracks by up to 1 foot and would not require any additional right-of-way. The VTA light-rail line storage track south of the station would be cut short by about 50 feet to maintain adequate spacing to the HSR mainline tracks (Authority 2020b).

The rationale for the Alternative 4 preliminary design without the DDV was to bring HSR service to San Jose Diridon Station with minimal changes to the PCEP infrastructure, where track geometry restricts speeds approaching and through the station to 15 mph. The Authority developed the DDV to provide design speeds of 40 mph to, from, and through San Jose Diridon Station, comparable to the design speeds provided by Alternatives 1, 2, and 3. The location of the DDV is identified in **Error! Reference source not found.**.

Traction Power Facilities

No traction power facilities would be required in this subsection under Alternative 4 because power would be supplied through PCEP facilities.

Train Control and Communication Facilities

Under Alternative 4, HSR would use the existing ATC sites included as part of the Caltrain Positive Control and Electrification Project.

One standalone communications radio site would be constructed at one of two locations, both south of Scott Boulevard along the east side of the Caltrain corridor.

Wildlife Crossings

There would be no wildlife crossings in this subsection.

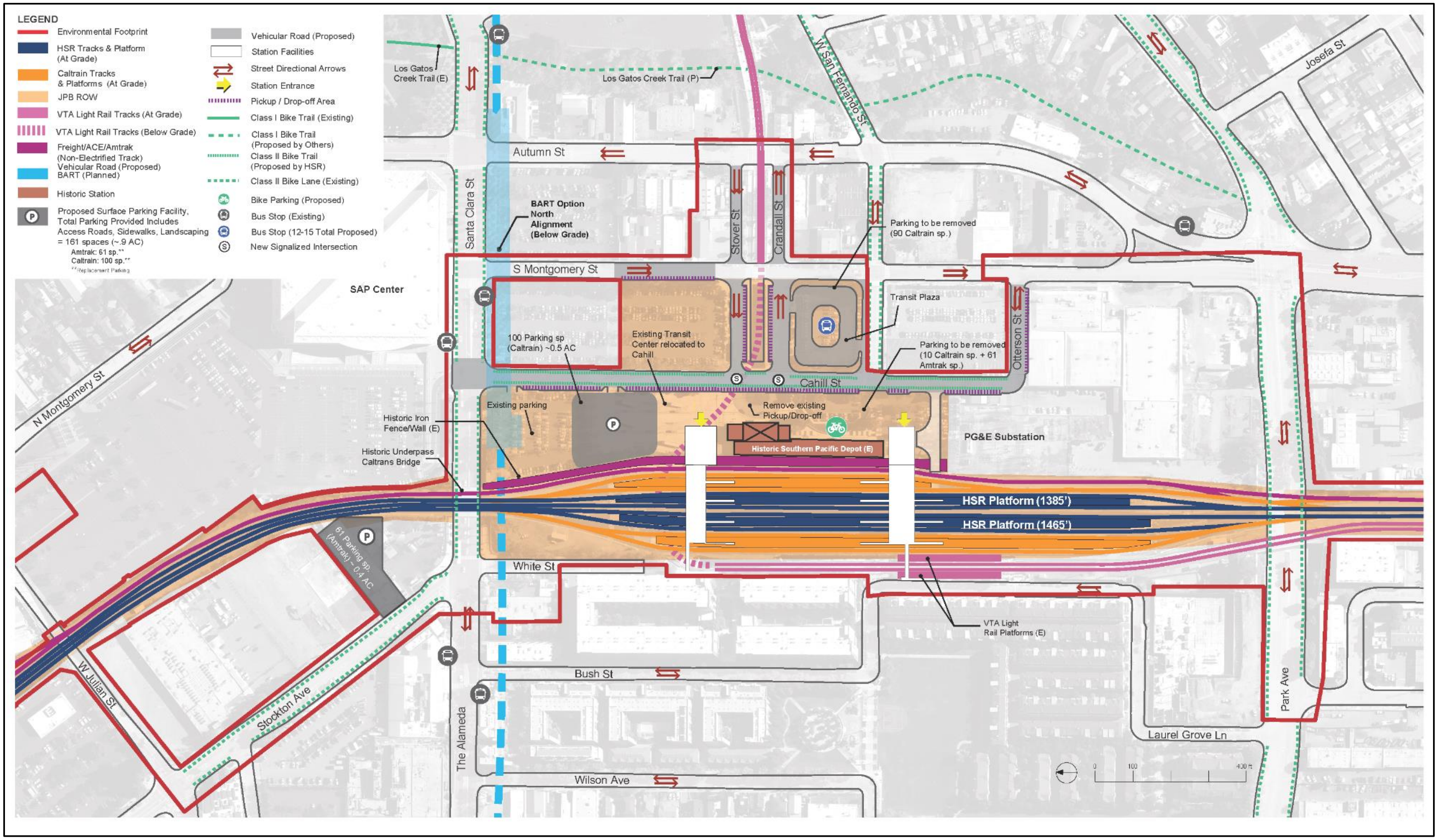
Stations

The San Jose Diridon Station would entail a four-track at-grade alignment through the center of the existing Diridon station, with 1,385- and 1,465-foot platforms centered between Santa Clara Street and Park Avenue (Figure 2-66). The existing historic station would remain in place. A pedestrian concourse would be built above the yard to provide access to the platforms below. The concourse would consist of a pedestrian walkway above the existing Caltrain tracks and below the HSR platforms, with two entrances on the east side and one on the west.

Permanently displaced station parking spaces would be replaced 1:1 in a parking structure at Cahill/Crandall Streets and a second site at Stockton/Alameda Streets. If the Google Downtown West proposed development in the SAP parking lot north of Santa Clara Street is not realized, then the project would displace some existing SAP parking lot spaces and they would be replaced through a parking garage structure north of the SAP Center in the northern part of the existing SAP Center parking lot. If the Google Downtown West proposed development in the SAP parking lot north of Santa Clara is not realized, then the Downtown West project would account for displacement of parking spaces in the SAP Center parking lot, through its plans, which include a requirement to result overall in a net increase in parking available to the SAP Center by 350 spaces and the HSR project would not include the parking structure in the SAP Center parking lot.

The existing on-site/off-street bus transit center would be relocated to an off-street facility between Cahill, Crandall, South Montgomery, and West San Fernando Streets. Street improvements would include reconfiguring and extending Cahill Street from Santa Clara Street to Otterson Street and extending Stover and Crandall Streets to South Montgomery Street. New bike lanes would be installed on the east side of Cahill Street. New signals and pedestrian crossings would be developed at Cahill and Stover Streets and Cahill and Crandall Streets.

Phasing for interim operations (2027) includes a pedestrian overhead crossing (PED OC) south of the existing historic station and would provide circulation access from the PED OC only to HSR platforms. Caltrain would continue to use the existing tunnel for access. Phasing for Valley-to-Valley service (2029) includes access to and from all Caltrain and HSR platforms. At this stage, the existing tunnel would be used only for exiting purposes on HSR platforms. At buildout, there would be an additional PED OC north of the historic station with access to all Caltrain and HSR platforms. From the HSR platforms, the existing tunnel would continue to be used only for exiting.



Source: Authority 2019a

OCTOBER 2021

Figure 2-66 Conceptual San Jose Diridon At-Grade Station Plan (Alternative 4)

Source: Authority 2019a
CEMOF = Centralized Equipment Maintenance and Operation Facility

MARCH 2020

Figure 2-67 Extent of Diridon Design Variant

Maintenance Facilities

No maintenance facilities are proposed in this subsection.

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be required in this subsection.

Freight or Passenger Rail Modifications

Because Alternative 4 would operate in blended service with Caltrain in the Caltrain/UPRR right-of-way, there would be freight track changes throughout the entire alignment from Scott Road to the South Gilroy MOWF:

- A new rail bridge over West Taylor Street
- Quad gates at Auzerais and West Virginia Street
- Freight track shifted north and east from West Virginia Street to Delmas Avenue
- New rail bridge over Bird and Delmas Avenues

Two track modifications in this subsection could have effects on environmental resources:

- New freight track MT0 along the east side of the alignment from Emory Street to San Jose Diridon Station
- MT1 (nonelectrified freight track) shifted east

To allow for single tracking during construction by VTA LRT, Alternative 4 would install a new crossover with powered switches south of Tamien Station. Power would be provided to existing switches for the four crossovers at the diamond north of Virginia VTA Station, as well as to the existing crossover south of Tamien. Alternative 4 would include signaling for these powered switches.

Land Use and Community Modifications

Alternative 4 would require the acquisition of residential, commercial, and industrial properties in this subsection to obtain adequate right-of-way for construction and operations.

Monterey Corridor Subsection

Alignment and Ancillary Features

The Monterey Corridor Subsection would be approximately 9 miles long and entirely within the San Jose city limits. From the San Jose Diridon Station Approach Subsection at West Alma Avenue just south of the Caltrain Tamien Station, the alignment would extend southeast to Bernal Way (Figure 2-65). Unlike Alternatives 1, 2, and 3, Alternative 4 would be in blended service with Caltrain on an at-grade profile within the Caltrain and UPRR right-of-way. HSR and Caltrain would operate on the electrified MT2 and MT3, while UPRR would operate on a nonelectrified MT1. The two existing tracks would be shifted to accommodate the third track. The existing Tamien Caltrain Station would remain in place with two new electrified turnback tracks constructed south of the station to facilitate turning trains outside the station platform areas. The Michael Yard would be reconfigured to a double-ended facility to accommodate storage of ACE trains and relocated to the east side of the corridor. A new standalone bridge over West Alma Avenue would be constructed for MT3 and a maintenance track, with MT1 and MT2 remaining on the existing structure. A new bridge over Almaden Road would be constructed for MT2 and MT3, while MT1 would remain on the existing structure. The bike path at Almaden Expressway would be realigned to the west in a culvert under the roadway. The existing pedestrian overpass at Communications Hill would remain in place. Capitol Caltrain Station would be reconstructed with a new center platform between MT2 and MT3. The platform would be reached by a new pedestrian overpass built at the north end of the platform. The existing Capitol Expressway overpass would remain in place. Four-quadrant barrier gates with channelization would be built at Skyway Drive, Branham Lane, and Chynoweth Avenue. The existing Blossom Hill Road overpass and adjacent pedestrian overpass would remain in place. The Blossom Hill Caltrain Station would be reconstructed; the existing pedestrian overpass and platform would be removed and a new center platform constructed between MT2 and MT3. The platform would be reached by a new pedestrian overpass built at the south end of the platform. Great Oaks Parkway would be realigned for approximately 1,350 feet to accommodate the widened rail corridor. SR 85 and Bernal Road overpasses would remain in place.

Traction Power Facilities

One traction power paralleling station would be built on the west side of the Caltrain Corridor near the Blossom Hill Caltrain Station.

Train Control and Communication Facilities

Five ATC sites would be constructed within the subsection at the following locations:

- Near Communications Hill on the east side of the Caltrain corridor near Chateau La Salle Drive
- Near Communications Hill on the east side of the Caltrain corridor near Montecito Vista Way
- Near Monterey Road on the west side of the Caltrain corridor near Capitol Caltrain Station
- Near Skyway Drive on the west side of the Caltrain corridor (two site options)
- Near Branham Lane on the west side of the Caltrain corridor

Two standalone communications radio sites would be built:

- Near Almaden Road on the east side of the Caltrain corridor
- Near Branham Lane on the west side of the Caltrain corridor

PTC sites would be constructed at the following locations:

- Two sites south of Almaden Road
- One site north of Capitol Caltrain Station
- One site co-located with the ATC site at Branham Lane

Wildlife Crossings

There would be no wildlife crossings in this subsection.

Stations

There would be no HSR stations in this subsection.

Maintenance Facilities

No maintenance facilities are proposed in this subsection.

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be required in this subsection.

Freight or Passenger Rail Modifications

Because Alternative 4 would operate in blended service with Caltrain in the Caltrain/UPRR right-of-way, there would be freight track changes throughout the entire alignment from Scott Road to the South Gilroy MOWF. Four-quadrant gates would be installed at all at-grade crossings. Capitol Station and Blossom Hill Station would have a new center platform and pedestrian underpass. Four track modifications in this subsection could have effects on environmental resources:

- Michael Yard (between West Alma and Almaden Road)—there are additional ACE storage tracks to the east
- MT1 would be shifted east from south of Almaden Expressway to south of Communications Hill
- MT1/freight would be shifted west from Pullman Way to Fehren Drive
- From Fehren Drive south to Bernal, MT1/freight would be shifted to the east of existing freight tracks

Land Use and Community Modifications

Alternative 4 would require the acquisition of residential, commercial, and industrial properties in this subsection to obtain adequate right-of-way for construction and operations.

Morgan Hill and Gilroy Subsection

Alignment and Ancillary Features

The Morgan Hill and Gilroy Subsection under Alternative 4 would be approximately 32 miles long, continuing south from the Monterey Corridor Subsection. From Bernal Way in South San Jose, the alignment would extend through Morgan Hill and San Martin to the Downtown Gilroy Station, then curve generally east across the Pajaro River floodplain and through a portion of northern San Benito County before entering Tunnel 1 at the base of the Diablo Range. The alignment would exit the tunnel at Casa de Fruta Parkway/SR 152 in unincorporated eastern Santa Clara County, where it would transition to the Pacheco Pass Subsection. This subsection under Alternative 4 would be in blended service with Caltrain on an at-grade profile within the Caltrain/UPRR right-of-way with an at-grade Downtown Gilroy Station. Past the Downtown Gilroy Station and south of the US 101 overpass, HSR would enter the fully grade-separated, dedicated track needed to operate HSR trains at speeds faster than 125 mph.

Beginning at the southern limit of the Monterey Corridor Subsection, the alignment would continue in blended service with Caltrain on an at-grade profile in the existing UPRR right-of-way. HSR and Caltrain would operate on the electrified MT2 and MT3 tracks, while UPRR would operate on MT1. A UPRR siding track would be provided between Blanchard Road and Bailey Avenue. Four-quadrant barrier gates would be installed at all existing public road crossings. Intrusion deterrents would be installed at all at-grade crossings. Three private road crossings would be eliminated and alternate access provided to those properties. The existing Bailey Avenue overpass would remain in place. The Monterey Road underpass would be reconstructed to accommodate the future widening of Monterey Road to four lanes. The Morgan Hill Caltrain Station would be reconstructed with two new side platforms built outside MT2 and MT3. The platform would be reached by a new pedestrian underpass built at the north end of the platform. The existing Butterfield Boulevard overpass would remain in place. Upper Llagas Creek bridge would be reconstructed.

The San Martin Caltrain Station would be reconstructed—the existing platform would be removed, and a new center platform would be built between MT2 and MT3. The platform would be reached by a new pedestrian overpass constructed at the south end of the platform. The existing bridge at Miller Slough would be replaced with a triple-cell box. Blended service would end just south of the Downtown Gilroy Station, where Caltrain would have access to turn back and stabling tracks relocated from the station area to south of 10th Street on the west side of the UPRR right-of-way. The Gilroy Caltrain Station would be reconstructed—the existing Caltrain platform would be shifted south and served by a southbound station track. A northbound Caltrain side platform would be provided to the east of a northbound station track. Two side platforms would be provided for HSR on the outside of the MT2 and MT3 tracks. The platforms would be reached by a new pedestrian overpass built over the center of the platforms. HSR would continue south under the US 101 overpass, which would remain in place. Past the Industry spur, HSR would ascend onto embankment and then a bridge over the UPRR. Two bridges would be constructed, one for MT2 and MT3 and one for the MOWF lead track. The UPRR Hollister branch line would be realigned to the west to accommodate HSR bridging over the UPRR tracks at a single location. HSR MT2 and MT3 would descend from the embankment before crossing over Bloomfield Avenue on a new structure. Four-quadrant barrier gates and intrusion deterrents would be installed at Bloomfield Avenue for the MOWF lead track and UPRR service track. HSR would continue past the MOWF and transition to a new viaduct structure to cross over Pajaro Creek. Continuing on viaduct until just west of Millers Canal, Alternative 4 would resume the alignment described for Alternative 1. The Tunnel 1 design variant would be the same as described in Alternative 1.

Tunnel Design Variant

The characteristics of the TDV in the Morgan Hill and Gilroy Subsection under Alternative 4 would be the same as described in the Morgan Hill and Gilroy Subsection under Alternative 1.

Traction Power Facilities

One new TPSS, Site 4—Gilroy, would be constructed at one of two locations on the east side of the alignment: south of Buena Vista Avenue or north of Cohansey Avenue. At this site, one new utility switching station could be co-located with the TPSS. Communication facilities (i.e., redundant fiber optic lines) would also be required to support the electrical interconnections of the TPSS to a new PG&E switching station, to existing PG&E facilities, or both—typically within tie-line/utility corridors.

A traction power switching station would be constructed west of the HSR alignment at Richmond Avenue.

Three traction power paralleling stations would be constructed adjacent to the guideway:

- Either south of San Pedro Avenue on the west side of the alignment or just north of Butterfield Boulevard on the east side of the alignment
- West of Lovers Lane either south of the alignment or north of the alignment (same as Alternative 1)
- Near the Tunnel 1 east portal, either at the portal or east of SR 152 in the southern area of Casa de Fruta (same as Alternatives 1 and 2)

PG&E would reinforce the electric power distribution network to meet HSR traction and distribution power requirements by reconductoring approximately 11.1 miles of existing power line associated with the Spring to Llagas and Green Valley to Llagas 115-kV power lines. The existing power lines to be reconductored, reusing the poles and towers, begin at the Morgan Hill Substation on West Main Avenue in Morgan Hill, then cross the east side of Peak Avenue and Dewitt Avenue, spanning West Dunne Avenue, Chargin Drive, Spring Avenue, and several residences. The alignment would continue south across an open-space area, then follow Sunnyside Avenue for approximately 0.5 mile. The alignment would continue south for approximately 4 miles, spanning additional open-space areas of wineries and the Corde Valley Golf Course. The alignment would then turn east along the north side of Day Road before heading south for approximately 2.5 miles and terminating at the Llagas Substation in Gilroy.

A permanent overhead distribution electrical power line from TPSS Site 4 to the Tunnel 1 portal location would provide power to the TBM during construction and the tunnel fire-life-safety system during operations.

Train Control and Communication Facilities

Twenty-three ATC sites would be constructed:

- One site south of Blanchard Road on the east side of the alignment (two site options)
- Three sites south of Live Oak Avenue on the west side of the alignment
- One site north of San Pedro Avenue on the west side of the alignment
- One site north of Barrett Avenue on the west side of the alignment (two site options)
- One site north of East Middle Avenue on the west side of the alignment
- One site in the vicinity of either Church Avenue or Lena Avenue on the east side of the alignment (two site options)
- One site between Leavesley Road and IOOF Avenue
- Two sites south of Lewis Street on the east side of the alignment
- Two sites south of 6th Street on the west side of the alignment

- Three sites in the vicinity of 10th Street on the east side of the alignment
- Four sites north of Carnadero Avenue on the west side of the alignment
- Two sites east of the Pajaro River
- One site near Lake Road (two site options) (same as Alternative 1)

PTC sites would be constructed at the following locations:

- One site south of Blanchard Road
- One site north of Bailey Avenue
- One site co-located with ATC site south of Live Oak Avenue
- One site at Cohansey Avenue
- One site south of Lewis Street
- One site south of East 6th Street

Five standalone communications radio sites would be constructed:

- Near Bernal Way on the west side of the alignment (two site options)
- South of Live Oak Avenue on the west side of the alignment (two site options)
- In the vicinity of East Central Avenue (two site options, one on either side of the alignment)
- South of California Avenue on the east side of the alignment
- East of the Pajaro River south of Gilroy

Wildlife Crossings

Twelve wildlife crossings or jump-outs would be built in this subsection:

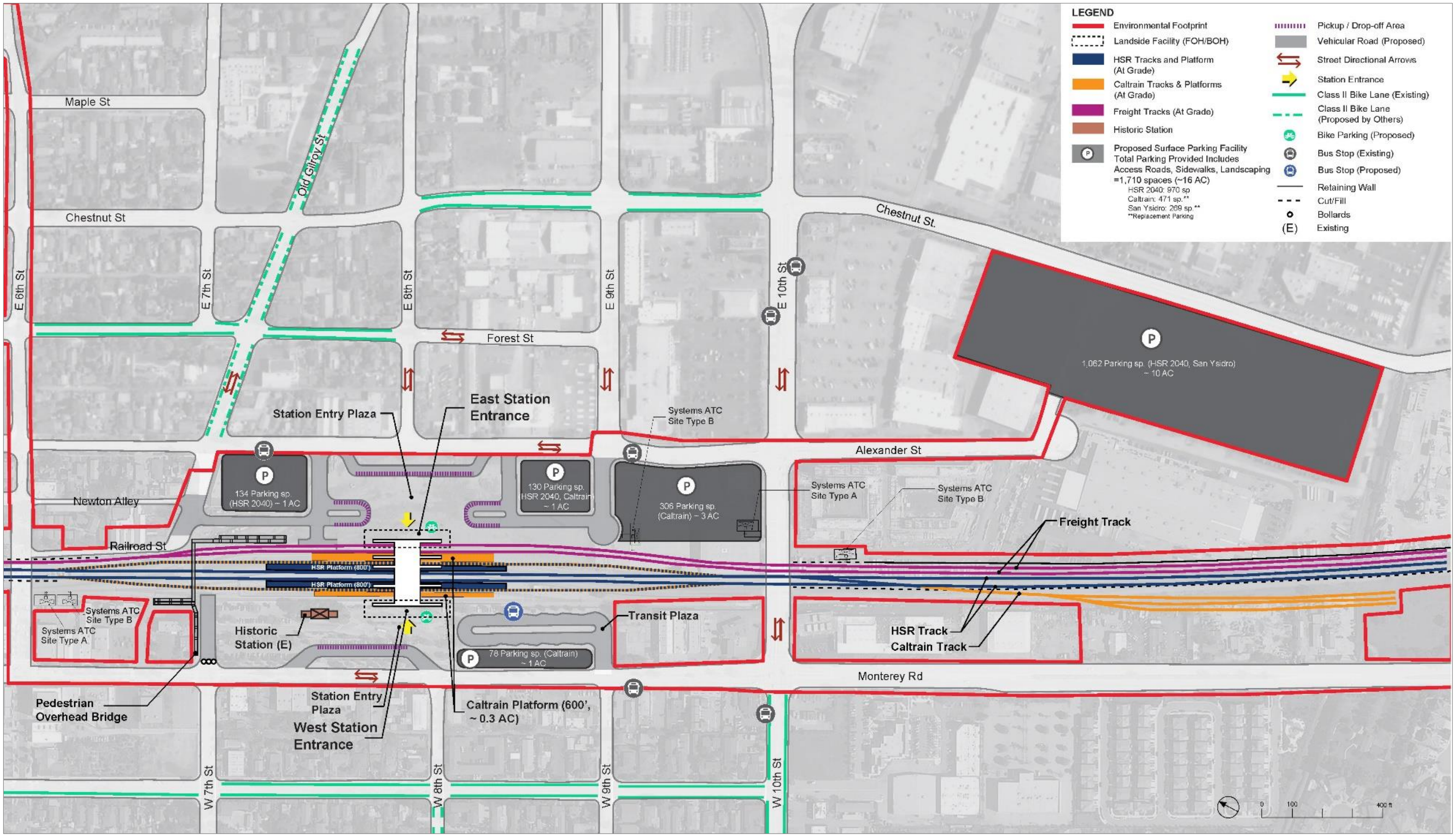
- Three adjacent wildlife crossings with jump-outs integrated into the wing walls at Tulare Hill
- Fisher Creek culvert under UPRR and Monterey Road replaced with a larger box culvert to improve wildlife crossing potential at this location
- Wildlife crossings and integrated jump-outs south of Emado Avenue, south of Fisher Road, and south of Live Oak
- Wildlife crossings at Richmond Avenue, Paquita Espana Court, and north of Kalana Avenue
- Dedicated jump-outs north of Fisher Creek, south of Blanchard Road, north of Kalana Avenue, and at Miramonte Avenue

Wildlife intrusion deterrents would be constructed for at-grade crossings at Blanchard Road, Palm Avenue, Live Oak Avenue, and Bloomfield Avenue.

Stations

The Downtown Gilroy Station approach would be at grade with dedicated HSR tracks to the west of UPRR between Old Gilroy Street/7th Street, which would be closed, and 9th Street (Figure 2-68). A new HSR station with 800-foot platforms would be built south of the existing Caltrain station. A pedestrian concourse would be built above the UPRR and Caltrain tracks to provide access to the platforms below.

The existing 489 Caltrain parking spaces on the west side of the station would be replaced 1:1 in parking lots on the east and west sides of the alignment. The existing 269 parking spaces at the San Ysidro housing development would be replaced 1:1 with new surface parking at the south end of Alexander Street. HSR parking demand would be 970 spaces in 2040, for a total of 1,728 aggregated parking spaces in 2040. The station site plan provides 970 new parking spaces in five areas. One site would be west of the station along Monterey Road at 9th Street. The other four would be on the east side of the station along Alexander Avenue at 7th Street, 9th Street, 10th Street, and Banes Lane. A multimodal access plan would be developed prior to design and construction of the station. The plan would be developed in coordination with local agencies and would include a parking strategy that would specify the location, amount, and phasing of parking.



Source: Authority 2019a

JUNE 2019

Figure 2-68 Conceptual Downtown Gilroy At-Grade Station Plan (Alternative 4)

A total of eight bus bays would be provided, adding one bay to the existing seven. East 7th Street would be closed and East 10th Street would be modified with quadrant gates and channelization. A pedestrian overcrossing would be installed to provide access between East and West 7th Street. A 4,000-square-foot bicycle facility would be built.

The Morgan Hill Caltrain Station would be reconstructed with two new side platforms built outside MT2 and MT3. The platform would be reached by a new pedestrian underpass built at the north end of the platform. The San Martin Caltrain Station would be reconstructed where the existing platform would be removed, and a new center platform would be built between MT2 and MT3. The platform would be reached by a new pedestrian overpass at the south end of the platform.

Maintenance Facilities

The South Gilroy MOWF (Figure 2-43) near Bloomfield Avenue would encompass approximately 50 acres and the program and layout would be as described for Alternatives 1 and 2. In contrast to Alternatives 1 and 2, the MOWF for Alternative 4 would be located on the west side of the tracks between Carnadero Avenue and the Pajaro River. This configuration would require realignment of the UPRR Hollister Subdivision. HSR mainline and MOWF lead track would pass over UPRR Coast Subdivision tracks.

State Highway or Local Roadway Modifications

Appendix 2-A details local road modifications that would be required in this subsection.

Freight or Passenger Rail Modifications

Because Alternative 4 would operate in blended service with Caltrain in the Caltrain/UPRR right-of-way, there would be freight track changes throughout the entire alignment from Scott Road to the South Gilroy MOWF. Four-quadrant gates would be installed at all at-grade crossings. Eight track modifications in this subsection could have effects on environmental resources:

- Eastward shift of freight track from Bernal Avenue to south of Gilroy, except from Tulare Hill to Blanchard Road and Llagas Creek curve, where some westward shifts would be necessary for curve adjustments
- South of Blanchard Road until Bailey Road, a new UPRR siding track east of the existing tracks
- The Redwood Lumber industry spur realigned at Madrone Avenue on the west side of the alignment
- New rail bridge over Monterey Road
- New side platforms and pedestrian underpass at Morgan Hill Station and new center platform and pedestrian overpass at San Martin Station
- Just south of the Downtown Gilroy Station, additional Caltrain storage tracks on the west side of the alignment
- New UPRR siding track at Downtown Gilroy Station; two freight tracks would continue south of US 101
- South of Carnadero Avenue, the UPRR Hollister track realigned to pass under HSR to accommodate the MOWF layout and provide freight access to the MOWF. A crossover just south of Bolsa Road for freight to access the MOWF

Land Use and Community Modifications

Alternative 4 would require the acquisition of residential, commercial, and industrial properties in this subsection to obtain adequate right-of-way for construction and operations.

Pacheco Pass Subsection

The characteristics of the Pacheco Pass Subsection under Alternative 4 would be as described for Alternatives 1, 2, and 3. The Tunnel 2 design variant would be the same as described in Alternative 1.

San Joaquin Valley Subsection

The characteristics of the San Joaquin Valley Subsection under Alternative 4 would be as described for Alternatives 1, 2, and 3.

2.7 Ridership

2.7.1 Travel Demand and Ridership Forecasts

Ridership forecasts were prepared to support ongoing planning for the HSR system and the analysis in this Final EIR/EIS. The forecasts were developed for the 2016 Business Plan by Cambridge Systematics, Inc. using a refined ridership and revenue model, Business Plan Model Version 3. These forecasts were based on two distinct implementation scenarios: (1) a Valley-to-Valley scenario, in which the Silicon Valley to Central Valley Line opens in 2025 and the Phase 1 HSR system opens in 2029, and (2) a Valley-to-Valley extended scenario, in which the Silicon Valley to Central Valley Line opens with an extension to San Francisco and Bakersfield in 2025, and the Phase 1 HSR system opens in 2029. For each scenario, the Business Plan presented high, medium, and low forecasts, reflecting a range of probabilities.[13] Forecasts for each scenario were presented for a range of years from 2025 through 2060.

The ridership forecasts presented in this Final EIR/EIS are based on the Valley-to-Valley implementation scenario from the 2016 Business Plan. Both the medium and high ridership forecasts are used in this Final EIR/EIS. In general, the medium ridership forecast provides for a conservative analysis of project benefits, whereas the high ridership forecast provides for a conservative analysis of adverse impacts.[14] For 2040, the 2016 Business Plan forecasts projected 42.8 million passengers under the medium ridership scenario and 56.8 million passengers under the high ridership scenario (Table 2-13).[15] The 2040 forecasts correspond to the horizon year used for impact analysis in this Final EIR/EIS, which accordingly focuses on the 2040 forecasts.

Table 2-13 High-Speed Rail System Ridership Forecasts (in millions per year)

Forecasts	Phase 1 (2029)	Phase 1 (2040)
Medium	19.3	42.8
High	26.0	56.8

Source: Authority 2016c

The Business Plan Model Version 3 model refined the previous Version 2 model by fully integrating data gathered from the more recent stated preference and preference surveys. The model was further refined by incorporating a new variable that reduced the number of trips involving a relatively long trip to or from the HSR station combined with a relatively short trip on the HSR line itself. This variable reflected the disadvantage and low likelihood of those types of trips. In addition, several other small adjustments related to auto costs and transit networks were made to the model to produce updated forecasts. Additional details regarding the modeling and

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13 The development of the 2016 Business Plan forecasts included a probability assessment, generated though an analytical technique known as Monte Carlo simulations. The Monte Carlo analysis involves running thousands of simulations to assess the likelihood that a given outcome would occur.

14 For additional detail regarding the use of medium and high ridership forecasts in this Final EIR/EIS, refer to Section 3.1, Introduction.

15 See 2016 Business Plan, Exhibit 7.1.

forecasts are presented in the *California High-Speed Rail 2016 Business Plan Ridership and Revenue Forecasting: Technical Supporting Document* (Authority 2016e).

This range of ridership forecasts reflects the development of certain aspects of the HSR system's design and certain portions of the environmental analysis, described in more detail in the following subsections. Because the ultimate ridership of the HSR system would depend on many uncertain factors, such as the price of gasoline and population growth, the HSR system described in this document has been designed to accommodate the broad range of ridership expected over the coming decades.

Since the 2016 Business Plan forecasts were developed, the Authority has adopted its 2018 Business Plan, which was accompanied by updated forecasts (Authority 2018). The 2016 and 2018 Business Plan ridership forecasts were developed using the same travel forecasting model; the forecasts differ due to changes in the model's inputs, including the HSR service plan, demographic forecasts, estimates of automobile operating costs and travel times, and airfares. The medium ridership forecast for 2040 decreased by 6.5 percent, from 42.8 to 40 million; and the high ridership forecast decreased by 10.1 percent, from 56.8 to 51.6 million. In addition, the 2018 Business Plan assumes an opening year of 2033 rather than 2029 for the full Phase 1 system.

The Authority released the Revised Draft 2020 Business Plan in February 2021 for public review and comment. The plan was adopted at the April 2021 Board meeting for submittal to the Legislature by May 1, 2021. The 2020 Business Plan forecasts were developed using the same travel forecasting model as the 2016 and 2018 Business Plans, updated for population and employment forecasts. The 2020 Business Plan Phase 1 medium ridership forecast for 2040 is 38.6 million, and the high is 50.0 million (Authority 2021).

To the extent that the lower ridership levels projected in the 2018 Business Plan or the 2020 Business Plan would result in fewer trains operating in 2040, the impacts associated with train operations in 2040 would be somewhat less than the impacts presented in this Final EIR/EIS, and the benefits accruing to the project (e.g., reduced VMT, reduced GHG emissions, reduced energy consumption) would also be less than the benefits presented in this Final EIR/EIS. Like the impacts, the benefits would continue to build and accrue over time and would eventually reach the levels discussed in this Final EIR/EIS for the Phase 1 system.

2.7.2 Ridership and HSR System Design

The HSR system analyzed in this Final EIR/EIS reflects the fact that the system is a long-term transportation investment for the State of California. It is being designed with state-of-the-art infrastructure and facilities that would serve passengers over many decades. While most of the infrastructure components are being designed and built for full utility, certain components are more flexible and can change and adapt to meet ridership as it grows over time.

While the Authority and FRA weighed ridership and revenue potential in evaluating alignment and station alternatives in the Tier 1 Program EIR/EIS documents and Tier 2 alternatives screening, the primary driver influencing design of the HSR system is not the total forecasted annual ridership but rather the performance objectives and safety requirements stipulated by the Authority, FRA, the U.S. Department of Transportation, and the regional transportation partners—including Caltrain, Amtrak, and other operators—whose systems would either use the shared segments of the HSR alignment (blended corridor) or provide connections to HSR.

In keeping with these objectives and requirements, the fully dedicated portion of the alignment comprises a two-track system for most of the right-of-way with four tracks at intermediate stations, regardless of total annual ridership. Track geometry and profile, power distribution systems, train control/signal systems, type of rolling stock, and certain station elements would be the same in both the dedicated and blended corridors regardless of how many riders use the HSR system. The locations of the heavy and light maintenance facilities also follow the mandates stipulated by technical operating requirements rather than ridership.

While the performance objectives and safety requirements are the main factors influencing HSR system design, ridership does influence some aspects of the system's design, including the size of the heavy and light maintenance facilities. The sizes of these facilities are based on the 2040 high-ridership forecast so that these facilities would be sufficient to accommodate maximum future needs. This approach is consistent with general planning and design practices for large infrastructure projects in which resilience and adaptability are incorporated by acquiring enough land for future needs up front rather than trying to purchase property at a later date when it may no longer be available or may be impractical to acquire. The use of ridership forecasts facilitates the early phases of maintenance facility construction as well as subsequent expansion of the facility as fleet size and maintenance requirements grow.

Forecasted annual ridership and peak-period ridership also play a role in determining the size of some station components, such as the size of the public accessway/egressway to the HSR system. The 2040 high-ridership forecast formed the basis for the conceptual service plan, which in turn influenced station site planning by designing station facilities to be sufficient to accommodate the anticipated increase over time of HSR use.

The 2040 high-ridership scenario was also used, along with local conditions, to determine the maximum amount of parking needed at each station. Parking demand and supply were analyzed by considering many factors—including ridership demand, station area development opportunities, and availability of alternative multimodal access improvements—to inform the size of the parking facilities at each station and the anticipated schedule for the phased implementation of these facilities. The use of the 2040 high-ridership scenario provides flexibility to change or even reduce the amount of station parking as these factors become more defined and resolved over time.

2.7.3 Ridership and Environmental Impact Analysis

The forecasts of annual HSR ridership play a role in the analysis of environmental impacts and benefits related to traffic, air quality, noise, and energy. This Final EIR/EIS uses both the medium- and high-ridership forecasts for analyzing potential adverse environmental impacts and environmental benefits of operating the HSR system. This is discussed in more detail in Section 3.1.5.6., Environmental Consequences.

2.7.4 Ridership and Station Area Parking

HSR system ridership, parking demand, parking supply, and development around HSR stations are intertwined and would evolve as ridership increases up to as many as 56.8 million passengers in 2040 when the HSR system is in full operation. To attract, support, and retain high ridership levels, the Authority is working with transportation service providers and local agencies to promote TOD around HSR stations and expand multimodal access to the HSR system.

The implementation of these activities would vary at each station because some cities and regions would be able to develop their station areas and local transit systems faster than others by the 2029 start-up of HSR revenue service and before 2040 when the HSR system would be fully operational. In addition, parking demand and supply at each station would also be affected by technological advances, such as multimodal trip planning/payment software and autonomous vehicles, as well as changes in the bundle of services available to consumers, such as ride-hailing services and bike- and car-sharing programs.

Research suggests that the percentage of transit passengers arriving at and departing from transit stations by car and needing parking accommodations decreases as development and population around the stations increases. The Authority has adopted station-area development policies that recognize the inverse relationship between parking demand and HSR station-area development. In keeping with these policies, the Authority is working with regional planners and planners in the station cities to maximize the success of the HSR system by locating stations in areas where there is, or would be, a high density of population, jobs, commercial development, entertainment venues, and other activities that generate trips. Encouraging development in high-density areas around HSR stations would allow the Authority to attain its dual goal of supporting system ridership while reducing parking demand.

However, development around HSR stations would not occur immediately. Although the HSR system would be a catalyst for development, actual construction would be dictated by local land use decisions and market conditions. The Authority would work in partnership with local governments and landowners to encourage complementary station-area development, exemplified by the station-area planning funding agreements it has provided to the City of San Jose and the City of Gilroy, but its power in this regard is limited. Consequently, the factors that determine actual parking demand and supply are dependent primarily on local decisions and local conditions.

In light of the uncertainty regarding the need for station-area parking, this Final EIR/EIS conservatively identifies parking facilities for the Gilroy Station based on the maximum forecast for parking demand, the local conditions affecting access planning, and practical means for delivering required parking. This approach identifies the upper range of actual needs for the Gilroy Station and the maximum potential environmental impacts of that range. For the San Jose Diridon Station, the Authority is not proposing to construct new parking to meet new parking demand due to HSR ridership; instead, it is assumed that new parking demand would be met by existing public and commercial parking in the general vicinity of the Diridon Station.

The Authority, in consultation with the City of Gilroy, would have the flexibility to make decisions regarding which parking facilities would be constructed initially and how additional parking can be phased in or adjusted depending on how HSR system ridership increases over time. For example, some parking facilities could be constructed at the 2029 project opening and subsequently augmented or replaced in whole or in part based on future system ridership, station-area development, and parking management strategies. A multimodal access plan would be developed for both the Gilroy and Diridon Station prior to the design and construction of parking facilities at the Gilroy Station and prior to construction of access plans for the Diridon Station. These plans would be prepared in coordination with local agencies and would include a strategy that addresses and informs the final location, amount, and phasing of parking at the Gilroy Station and multimodal access at both stations.

The Authority estimated rail, bus, auto, walk, and bike passenger access and egress trips for year 2040 for all stations, with an additional year 2029 analysis for the San Jose Diridon Station (Authority 2016f).[16] The auto mode share included estimates for pick-up and drop-off, drive and park, rental car, and taxi/shuttle/transportation network company travel modes. Parking demand was estimated based on auto drive and park mode share, while the proposed parking supply at the Gilroy Station accommodates demand to the extent that local policies and station area conditions permit. At the San Jose Diridon Station, as analyzed in Section 3.2, Transportation, the Authority concluded that new parking demand could be met through existing public and commercial parking when considering planned Caltrain and BART expansion of transit access to the Diridon Station Existing on-site parking at the San Jose Diridon Station that would be displaced by the HSR station would be replaced at a 1:1 ratio; temporarily displaced parking would be replaced at a 1:1 basis during construction and permanently displaced parking would be replaced prior to initial HSR operations.

[16] The Authority collected local station area data to prepare a Mode of Access Memorandum for each station (Authority 2016f). Data collection involved touring station areas, consulting local agencies, and reviewing local plans and policies. The memoranda were shared with the local jurisdictions in the station cities.

2.8 Operations and Service Plan

2.8.1 HSR Service

The conceptual HSR service plan for Phase 1 describes service from Anaheim/Los Angeles through the Central Valley from Bakersfield to Merced and northwest into the Bay Area, terminating in San Francisco. Subsequent stages of the HSR system include a southern extension from Los Angeles to San Diego via the Inland Empire and an extension from Merced north to Sacramento.

Train service would run in diverse patterns between various terminals. Three basic service types are envisioned:

- Express trains would serve major stations only, providing fast travel times between Los Angeles and San Francisco during the morning and afternoon peak.
- Limited-stop trains would skip selected stops along a route to provide faster service between stations.
- All-stop trains would focus on regional service.

Most trains would provide limited-stop services and offer a relatively fast run time along with connectivity among various intermediate stations. Numerous limited-stop patterns would be provided to achieve a balanced level of service at the intermediate stations. The service plan envisions at least four limited-stop trains per hour in each direction, all day long, on the main route between San Francisco and Los Angeles. Each intermediate station in the Bay Area, the Central Valley between Fresno and Bakersfield, Palmdale in the high desert, and Sylmar and Burbank in the San Fernando Valley would be served by at least two limited-stop trains every hour—offering at least two reasonably fast trains an hour to San Francisco and Los Angeles. Selected limited-stop trains would be extended south of Los Angeles as appropriate to serve projected demand.

Including the limited-stop trains on the routes between Sacramento and Los Angeles and between Los Angeles and San Diego, and the frequent-stop local trains between San Francisco and Los Angeles/Anaheim and between Sacramento and San Diego, every station on the HSR system would be served by at least two trains per hour per direction throughout the day and at least three trains per hour during the morning and afternoon peak periods. Stations with higher ridership demand would generally be served by more trains than those with lower estimated ridership demand.

The service plan provides direct train service between most station pairs at least once per hour. Certain routes may not always be served directly, and some passengers would need to transfer from one train to another at an intermediate station, such as Los Angeles Union Station, to reach their final destination. Generally, the Phase 1 conceptual operations and service plans would offer a wide spectrum of direct-service options and minimize the need for passengers to transfer.

In 2029, the assumed first year of HSR operation, two trains per hour would operate during peak and one train per hour off-peak between San Francisco and Bakersfield. When Phase 1 operations occur, this Final EIR/EIS assumes the following service:

- Two peak trains per hour from San Francisco and Los Angeles (one in off-peak)
- Two peak trains per hour from San Francisco and Anaheim (one in off-peak)
- Two peak trains per hour from San Jose and Los Angeles
- One peak train per hour from Merced and Los Angeles
- One train per hour (peak and off-peak) from Merced and Anaheim

Total daily operations for the Project Section are detailed in Table 2-14.

Table 2-14 Total Daily Operations—San Jose to Merced Project Section

Service Description	2029	2040
Non-Revenue Trains		
Between MOWF and Gilroy	0	0
Between MOWF and San Jose	0	0
Between MOWF and Merced	0	0
Revenue Trains		
Trains per peak hour (max, one-way)	2	7
Trains per off-peak hour (max, one-way)	1	4
Trains per peak period per day (max)	24	80
Trains per off-peak period per day (max)	24	96
Number of daytime operations: 7 a.m. to 10 p.m. (max)	40	148
Number of nighttime operations: 10 p.m. to 7 a.m. (max)	8	28
Total Trains by Segment		
Trains per peak hour (max, one-way)	2	7
Trains per off-peak hour (max, one-way)	1	4
Trains per peak period per day (max)	24	80
Trains per off-peak period per day (max)	24	96
Number of daytime operations: 7 a.m. to 10 p.m. (max)	40	148
Number of nighttime operations[1]: 10 p.m. to 7 a.m. (max)	8	28
Total Trains All Segments		
Trains per peak period per day (max)	24	80
Trains per off-peak period per day (max)	24	96
Number of daytime operations: 7 a.m. to 10 p.m. (max)	40	148
Number of nighttime operations: 10 p.m. to 7 a.m. (max)	8	28
Total Daily Operations	48	176

[1] No revenue trains would operate between midnight and 6am
max = maximum
MOWF = maintenance of way facility

2.8.2 Maintenance Activities

The Authority would regularly perform maintenance along the track and railroad right-of-way as well as on the power systems, train control, signalizing, communications, and other vital systems required for the safe operation of the HSR system. Maintenance methods are expected to be similar to those of existing European and Asian HSR systems, adapted to the specifics of the California HSR. However, the FRA will specify standards of maintenance, inspection, and other items in a set of regulations (i.e., Rule of Particular Applicability) to be issued in the next several years, and the overseas practices may be amended in ways not currently foreseen. The brief descriptions of maintenance activities provided in this section are thus based on best professional judgment about future practices in California.

2.8.2.1 Track and Right-of-Way

The track at any point would be inspected several times each week using measurement and recording equipment aboard special measuring trains. These trains are of similar design to the regular trains but would operate at a lower speed. They would run between midnight and 5 a.m. and would usually pass over any given section of track once in the night.

Most adjustments to the track and routine maintenance would be accomplished in a single night at any specific location with crews and material brought by work trains along the line. When rail resurfacing (i.e., rail grinding) is needed, perhaps several times a year, specialized equipment would pass over the track sections at 5 to 10 mph.

Approximately every 4 to 5 years, ballasted track would require tamping. This more intensive maintenance of the track uses a train with a succession of specialized cars to raise, straighten, and tamp the track, using vibrating “arms” to move and position the ballast under the ties. The train would typically cover a 1-mile-long section of track in the course of one night’s maintenance. Slab track, the support type anticipated at elevated sections, would not require this activity. No major track components are expected to require replacement through 2040.

Other maintenance of the right-of-way, aerial structures, culverts, drains, and bridge sections of the alignment would include culvert and drain cleaning, vegetation control, litter removal, and other inspection. Such activities would typically occur monthly to several times a year.

2.8.2.2 Power

The OCS along the right-of-way would be inspected nightly, with repairs being made when needed; these would typically be accomplished during a single night maintenance period. Other inspections would be made monthly. Many of the functions and status of substations and smaller facilities outside the trackway would be remotely monitored. However, visits would be made to repair or replace minor items and would also be scheduled several times a month to check the general site. No major component replacement for the OCS or the substations is anticipated through 2040.

2.8.2.3 Structures

Visual inspections of the structures along the right-of-way and testing of fire/life safety systems and equipment in or on structures would occur monthly, while inspections of all structures for structural integrity would be conducted at least annually. Steel structures would require painting every several years. Repair and replacement of lighting and communication components of tunnels and buildings would be performed on a routine basis. No major component replacement or reconstruction of any structures is anticipated through 2040.

2.8.2.4 Signaling, Train Control, and Communications

Inspection and maintenance of signaling and train control components would be guided by FRA regulations and standards to be adopted by the Authority. Typically, physical in-field inspection and testing of the system would be conducted four times a year using hand-operated tools and equipment. Communication components would be routinely inspected and maintained, usually at night, although daytime work may be undertaken if the work area is clear of the trackway. No major component replacement of these systems is anticipated through 2040.

2.8.2.5 Stations

Each station would be inspected and cleaned daily. Inspections of the structures, including the platforms, would be conducted annually. Inspections of other major systems, such as escalators, the heating and ventilation system, ticket-vending machines, and closed-circuit television, would be performed according to manufacturer recommendations. Major station components are not anticipated to require replacement through 2040.

2.8.2.6 Perimeter Fencing and Intrusion Protection

Fencing and intrusion protection systems would be remotely monitored, as well as periodically inspected. Maintenance would take place as needed; however, fencing and intrusion protection systems are not anticipated to require replacement before 2040.

2.9 Additional High-Speed Rail Development Considerations

2.9.1 High-Speed Rail, Land Use Patterns, and Development Around High-Speed Rail Stations

Prop 1A, approved by voters in 2008, required that HSR stations "be located in areas with good access to local mass transit or other modes of transportation and further required that the HSR system be planned and constructed in a manner that minimizes urban sprawl and impacts on the natural environment" including "wildlife corridors." The Authority embraced these policies in Prop 1A by adopting *HST Station Area Development: General Principles and Guidelines* on February 3, 2011 (Authority 2011). The purpose of the guidance was to provide "international examples where cities and transit agencies have incorporated sound urban design principles as integral elements of large-scale transportation systems."

San Jose and Gilroy have both received station area planning grants to meet the purposes outlined in the 2011 guidelines. In addition, the station area development guidelines stated, "the attention paid to the 'edges' and interface between improvements … will greatly determine the character and function of the station as a 'place'." Typical issues concerning this 'edge' or interface that are addressed in station planning include:

- Coordination of architectural design of station area infrastructure components with surrounding context
- High-quality pedestrian connections to and from station and into the surrounding community
- Traffic calming and high-quality aesthetic design of station district streets
- Preservation of important view corridors
- Design and provision of station district signage and wayfinding
- Design and provision of station district open space

Realizing the potential transportation, community, environmental, and economic benefits of HSR stations for surrounding land uses, final station design would involve Authority collaboration with rail operators, local stakeholders, and land partners to complement transit-oriented and other station-supportive development.

2.9.2 Right-of-Way Acquisition for Construction, Operations, and Maintenance of High-Speed Rail

TCEs and permanent acquisition of right-of-way would be required to construct and operate the HSR system. In building any large, modern transportation project, the displacement of a small percentage of the population is often necessary. However, it is the policy of the Authority that displaced persons not suffer unnecessarily as a result of a program that, like the HSR project, is designed to benefit the public as a whole. Individuals, families, businesses, farms, and nonprofit organizations displaced by the project may be eligible for relocation advisory services and payments. The purpose of the Uniform Act is to provide for uniform and equitable treatment of persons displaced from their homes, businesses, farms, or nonprofit organizations by federal and federally assisted programs and to establish uniform and equitable land acquisition policies for federal and federally assisted programs. Table 2-15 shows the total extent of acquisitions required for the project. Permanent acquisitions do not necessarily involve relocations because some are only partial acquisitions. A detailed analysis of displacements and relocations is presented in Section 3.12, Socioeconomics and Communities and is based on the Draft Relocation Impact Report.

Table 2-15 Right-of-Way Acquisitions

Acquisition Type	Alternative 1	Alternative 2**	Alternative 3	Alternative 4
Temporary Construction Easements (acres)				
Residential use*	50.5	194.6 (194.7)	71.2	60.9
Commercial use	47.5	72.8	21.7	31.2
Mixed use	14.1	32.7	3.2	5.9
Industrial use	157.9	195.0 (192.8)	144.1	50.9
Public facilities	23.8	29.9 (30.5)	10.4	6.8
Transportation use	21.4	25.6	25.5	1.5
Agriculture use	715.1	743.0	798.6	555.8
Open space/parks	491.1	517.7	455.9	420.4
Permanent Right-of-Way Acquisition (acres)				
Residential use	53.0	113.4	55.7	83.7
Commercial use	87.4	104.7	43.3	115.5
Mixed use	15.4	23.5	0.9	26.5
Industrial use	113.0	162.6 (161.7)	77.5	124.2
Public facilities	122.8	126.4 (125.9)	31.2	14.5
Transportation use	28.5	32.1	32.1	28.2
Agriculture use	1,133.3	1,234.6	1,417.7	1,145.1
Open space/parks	1,443.3	1,511.0	1,425.8	1,465.3

Sources: Authority 2019a; City of Santa Clara 2010; City of San Jose 1995, 2011; County of Santa Clara 1994; City of Morgan Hill 2016; City of Gilroy 2002, 2005; County of Merced 2013; County of San Benito 2015

* Some land uses designated as agricultural in the project extent also contain rural residential uses

** Alternative 2 has two Skyway Drive design variants: Alternative 2 Skyway Drive Variant A is presented first and Variant B is shown in parentheses.

2.10 Construction Plan

This section describes the Authority's phased implementation strategy for building the HSR system and summarizes the general approach to activities typically associated with pre-construction and construction of major system components. Additional detail is provided in Appendix 2-L. The construction plan is based on the phased implementation strategy for Phase 1 of the HSR system as described in the Authority's 2018 Business Plan, which assumes that:

- HSR early service from San Francisco to Gilroy would be operational in 2027.
- HSR Valley-to-Valley service would be operational in 2029.
- Phase 1, which would connect San Francisco with Los Angeles via the Central Valley, would be operational by 2033.
- Phase 2, which would subsequently extend service to Sacramento and San Diego for full system operation, would occur after the 2040 Phase 1 system operations envisioned in the Final EIR/EIS.

Table 2-16 shows the generalized approach to project construction. Construction would likely proceed concurrently along the entire project extent. Construction would occur over multiple phases between 2022 and 2028 with approximately 1.5 years of continuous construction activity at any one location. Construction would occur 5 days a week with 8-hour days (250 days per year), except for construction of the Pacheco Pass tunnels, which would occur 7 days a week, 24 hours per day. In addition to the standard construction period, 2 years of additional construction would be required after the initial Phase I startup to reconductor the existing Spring to Llagas and Green Valley to Llagas PG&E power lines. This work would begin in 2030 and would be completed within an approximately 24-month timeframe. Construction within the GEA would not occur at night (1 hour before sunset to 1 hour after sunrise).

The assumed Phase 1 opening year for purposes of the construction plan differs by 4 years from the Phase 1 opening year discussed in Section 2.7. As explained in Section 2.7.1, the ridership forecasts used in this document are derived from the 2016 Business Plan and assume a 2029 opening year for Phase 1. If the actual opening year is later (e.g., 2033), there would be an incremental reduction but not a material change in operational impacts and benefits in 2040 as described in Chapter 3. The 2033 Phase 1 opening year, on the other hand, represents the more appropriate assumption for purposes of the construction plan and evaluating construction-related impacts. The document therefore uses both opening year assumptions.

2.10.1 General Approach

The Authority would begin implementing its construction plan after receiving the required environmental approvals and permits and securing funding. Given the size and complexity of the HSR project, the design and construction work could be divided into several procurement packages. In general, the procurement packages would be grouped as follows:

- Tunnels
- Civil/structural infrastructure, including at-grade, viaduct, and trench track profiles; utility relocations; and roadway modifications
- Design and construction of passenger stations, maintenance facilities, and wayside facilities
- Rail infrastructure and testing including trackwork; design and construction of direct fixation track and subballast; ballast; ties and rail installation; switches; and special trackwork core systems, such as traction power, train controls, communications, the operations center, and procurement of trainsets

One or more design-build packages would be developed. The Authority would issue construction requests for proposals, begin right-of-way acquisition, and procure construction management services to oversee physical construction of the project. During peak construction periods, work would occur concurrently in different subsections, with overlapping construction of various project elements.

Table 2-16 Overall Construction Schedule

Activity	2021		2022		2023		2024		2025		2026		2027		2028		2029	
Tunneling																		
Right-of-way acquisition	–	– X	X	X	X	X	X	X	X	–	–	–	–	–	–	–	–	–
Environmental remediation	–	–	–	X	X	X	X	X	X		–	–	–	–	–	–	–	–
Design	–	–	– X	X	X	X	X –	–	–	–	–	–	–	–	–	–	–	
Mobilization	–	–	X	–	–	–	–	–	–		–	–	–	–	–	–	–	–
Demolition	–	–	–	X	X –	–	–	–	–	–	–	–	–	–	–	–	–	–
Clear and grub	–	–	–	X	X –	–	–	–	–	–	–	–	–	–	–	–	–	–
Site preparation/earthwork	–	–	–	X	X	X	X	–	–	–	–	–	–	–	–	–	–	–
Portals	–	–	X	X	X	X	X	–	–	–	–	–	–	–	–	–	–	–
Tunnels	–	–	– X	X	X	X	X	X	X	X	X	X	X	–	–	–	–	–
Roadbed preparation	–	–	X	X	X	X	X	X	X	X	X	X –	–	–	–	–	–	–
Demobilize	–	–	–	–	–	–	–	–	X	X	X	X	X	X	X	X –	–	X
At-Grade, Viaduct, and Trench																		
Right-of-way acquisition	X	X	X	X	X	–	–	–	–	–	–	–	–	–	–	–	–	–
Environmental remediation	–	– X	X	X	X	X –	–	–	–	–	–	–	–	–	–	–	–	–
Design	X	X	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mobilization	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Utilities relocation	–	–	–	X	X	–	–	–	–	–	–	–	–	–	–	–	–	–
Street/highway preparation	–	–	–	–	–	X	X	X	X	–	–	–	–	–	–	–	–	–
Demolition	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–
Clear and grub	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–
Earthwork	–	–	–	–	X	X	X	X	X	–	–	–	–	–	–	–	–	–
Viaduct	–	–	–	–	X	X	X	X	X	–	–	–	–	–	–	–	–	–
At-grade and below-grade cross sections (incl. stations)	–	–	–	–	X	X	X	X	X	–	–	–	–	–	–	–	–	–
Demobilize	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–

Activity	2021	2022	2023	2024	2025	2026	2027	2028	2029
Rail Infrastructure and Testing									
Mobilization	– –	– –	– –	– X	– –	– –	– –	– –	– –
Track, signal, and traction power construction	– –	– –	– –	– X	X –	– –	– –	– –	– –
Static testing	– –	– –	– –	– –	– X –	– –	– –	– –	–
Dynamic testing	– –	– –	– –	– –	– X	– –	– –	– –	– –
Full speed testing	– –	– –	– –	– –	– X	– –	– –	– –	– –
Demobilize	– –	– –	– –	– –	– – X	– –	– –	– –	–
Stations and Maintenance Facilities									
Right-of-way acquisition	X X	X X	X –	– –	– –	– –	– –	– –	– –
Design	– –	– –	– X	– –	– –	– –	– –	– –	– –
Mobilization	– –	– –	– – X	X –	– –	– –	– –	– –	–
Temporary facilities and track	– –	– –	– –	X –	– –	– –	– –	– –	– –
Building demolition	– –	– –	– –	– X –	– –	– –	– –	– –	–
Building structures and rough systems	– –	– –	– –	– X	X –	– –	– –	– –	– –
Building finish	– –	– –	– –	– – X	X –	– –	– –	– –	–
Remove/restore temporary facilities and track	– –	– –	– –	– X	X –	– –	– –	– –	– –
Demobilize	– –	– –	– –	– –	– X	– –	– –	– –	– –
Assumed Milestones per High-Speed Rail									
Record of Decision (end of 2020)	– –	– –	– –	– –	– –	– –	– –	– –	– –
Monterey Viaduct (start June 2023)	– –	– –	– X X –	– –	– –	– –	– –	– –	– –
Service Central Valley to San Jose (end of 2029)	– –	– –	– –	– –	– –	– –	– –	– –	– X
Service San Francisco to Gilroy (start of 2027)	– –	– –	– –	– –	– –	– –	X – –	– –	– –
San Francisco to San Jose begins June 2021 (San Francisco to San Jose Record of Decision March 2021)	– X –	– –	– –	– –	– –	– –	– –	– –	– –

X = activity; – = no activity

Working hours and the number of workers present at any time would depend on the activities being performed. Construction fencing would be restricted to areas designated for construction staging and areas where public safety or environmentally sensitive resources are a concern.

Consistent with the California High-Speed Rail Authority Sustainability Policy (Authority 2016g), the Authority will continue to implement sustainability practices that inform and affect the planning, siting, designing, construction, mitigation, operation, and maintenance of the HSR system. The Authority is committed to:

- Net-zero greenhouse gas and criteria pollutant emissions in construction
- Operating the system entirely on renewable energy
- Net-Zero Energy, LEED Platinum Facilities
- Planning for climate change adaptation and resilience
- Prioritizing life-cycle considerations

Applicable design standards, including compliance with laws, regulations, and industry standard practices, are included in Appendix 2-D and are considered a part of the project.

2.10.2 Pre-Construction Activities

2.10.2.1 Operational Right-of-Way

During final design, the Authority and its contractor would conduct several pre-construction activities to optimize construction staging and management. These activities include the following:

- Conducting geotechnical investigations to define precise geologic, groundwater, and seismic conditions along the alignment. The results of this work would guide final design and construction methods for foundations, underground structures, tunnels, stations, grade crossings, aerial structures, systems, and substations.
- Identifying construction laydown and staging areas used for mobilizing personnel, stockpiling materials, and storing equipment for building HSR or related improvements. In some cases, these areas would also be used to assemble or prefabricate components of guideway or wayside facilities before transport to installation locations. Precasting yards would be identified for the casting, storage, and preparation of precast concrete segments; temporary spoil storage; workshops, and the temporary storage of delivered construction materials. Field offices and temporary jobsite trailers would also be located at the staging areas. Construction laydown areas are part of the project footprint that is evaluated for potential environmental impacts; however, actual use of the area would be at the discretion of the design-build contractor. After completing construction, the staging, laydown, and precasting areas would be restored to pre-construction condition.
- Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials. Demolition would require strict controls so that adjacent buildings, infrastructure, natural or community resources are not damaged or otherwise affected by the demolition efforts.
- Relocating utilities prior to construction. The contractor would work with the utility companies to relocate or protect in place high-risk utilities, such as overhead tension wires, pressurized transmission mains, oil lines, fiber optical conduits or cables, and communications lines or facilities, prior to construction.
- Implementing temporary, long-term, and permanent road closures to reroute or detour traffic away from construction activities. Handrails, fences, and walkways would be provided for the safety of pedestrians and bicyclists.
- Siting temporary batch plants to produce Portland cement concrete or asphaltic concrete needed for roads, bridges, aerial structures, retaining walls, and other large structures. The facilities generally consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; aboveground storage tanks; and designated areas for sand and gravel truck unloading, concrete truck loading, and

concrete truck washout. The contractor would implement procedures for reducing air emissions, mitigating noise impacts, and controlling the discharge of potential pollutants into storm drains or watercourses from the use of equipment, materials, and waste products.

- Conducting other studies and investigations, as needed, such as surveys of local business, farms or dairies, and wildlife refuges to identify usage, delivery, shipping patterns, and critical times of the day or year for business, planting, harvesting activities, or recreational activities. This information would help develop construction requirements and worksite traffic control plans and would help to identify potential alternative routes. Other studies would include necessary cultural resource investigations, historic property surveys, and wildlife surveys.

Table 2-17 identifies potential construction staging and precasting yards included in the preliminary engineering design. Alternatives 1 and 3 would each require three precasting yards to produce the aerial spans for construction of the approximately 22 miles of viaduct along Monterey Road. Alternative 2 would not require precasting yards, but it would require more construction staging areas to accommodate the additional embankment construction and local roadway modifications required for this alternative. Alternative 4 would require the fewest construction staging areas. In addition to the sites identified in Table 2-17, construction staging and assembly of TBMs would occur at the tunnel portals.

Table 2-17 Construction Staging and Precasting Yards by Alternative

Type	Size	Jurisdiction	Location	Alternative			
				1	2	3	4
San Jose Diridon Station Subsection							
Staging	9 acres	San Jose	North of West Julian St, between Caltrain/UPRR and New Montgomery St	X	X	X	
Staging	8.4 acres	Santa Clara	East of Lafayette St				X
Monterey Corridor Subsection							
Precast	67.2 acres	San Jose	Between Hillsdale Ave, Caltrain/UPRR, Capitol Expressway, and Snell Ave	X		X	
Staging	15 acres	San Jose	Between Hillsdale Ave, Caltrain/UPRR, and Granite Rock Way		X		
Staging	Two 1.4-acre sites	San Jose	East Capitol Expressway	X	X	X	
Staging	Two 1.7-acre, one 2.3-acre, and one 1.8-acre sites	San Jose	Blossom Hill Road	X	X	X	
Morgan Hill to Gilroy Subsection							
Staging	11.6 acres	San Jose	East of the Monterey Rd and Emado Ave intersection	X		X	
Staging	Two 4.8- and 2.4-acre sites	San Jose	East of the Monterey Rd and Emado Ave intersection		X		
Staging	7.1 acres	San Jose	Southeast of the Monterey Rd and Bailey Ave interchange		X		
Staging	6 acres	San Jose	Southwest of Bailey Ave				X
Staging	2.4 acres	San Jose	East of Monterey Rd, between Laguna Ave and Richmond Ave		X		

Type	Size	Jurisdiction	Location	Alternative			
				1	2	3	4
Staging	Two 3.6- and 9.9-acre sites	Santa Clara County	East of Monterey Rd at Ogier Ave and Barnhart Ave, respectively		X		
Staging	13.2 acres	Santa Clara County	East of Monterey Rd and north of the intersection with Barnhart Ave	X		X	
Precast	78.1 acres	San Jose	East of the Monterey Rd and Live Oak Ave intersection	X		X	
Staging	13.9 acres	San Jose	East of the Monterey Rd and Live Oak Ave intersection		X		
Staging	29.8 acres	San Jose and Morgan Hill	Northeast of Burnett Ave intersection with Monterey Rd		X		
Staging	0.7 acre	Morgan Hill	Southwest of the US 101 and Cochrane Rd intersection	X		X	
Staging	1.6 acres	Morgan Hill	Between Monterey Rd and Butterfield Blvd, just north of East Central Ave		X		
Staging	2.9 acres	Morgan Hill	Northwest of the US 101 and East Dunne Ave interchange	X		X	
Staging	3.9 acres	Morgan Hill	Southwest of the US 101 and East Dunne Ave interchange	X		X	
Staging	0.8 acre	Morgan Hill	Northwest of the US 101 and Tennant Ave intersection	X		X	
Staging	2.2 acres	San Martin	East of Caltrain/UPRR, south of the Railroad Ave and Maple Ave intersection		X		
Staging	7.1 acres	San Martin	Northeast of the East Middle Ave and Monterey Highway intersection		X		
Staging	3.6 acres	San Martin	East of Monterey Rd between East Middle Ave and Llagas Creek				X
Staging	4.2 acres	San Martin	East of UPRR				X
Staging	11.7 acres	San Martin	West of Monterey Hwy, at the California Ave and Colony Ave intersection		X		
Staging	2.7 acres	San Martin	West of Monterey Hwy and north of Roosevelt Ave		X		
Staging	26.2 acres	San Martin	South of South St		X		
Staging	3.9 acres	San Martin	North of Church Ave		X		
Precast	36.2 acres	Santa Clara County	East of Monterey Hwy and south of Buena Vista Ave	X			
Staging	21.5 acres	Santa Clara County	South of Church Ave			X	
Staging	1.5 acres	Santa Clara County	South of Masten St			X	
Precast	Two 10.8- and 27.1-acre sites	Santa Clara County	East of US 101, between Cohansey Ave and Las Animas Ave			X	

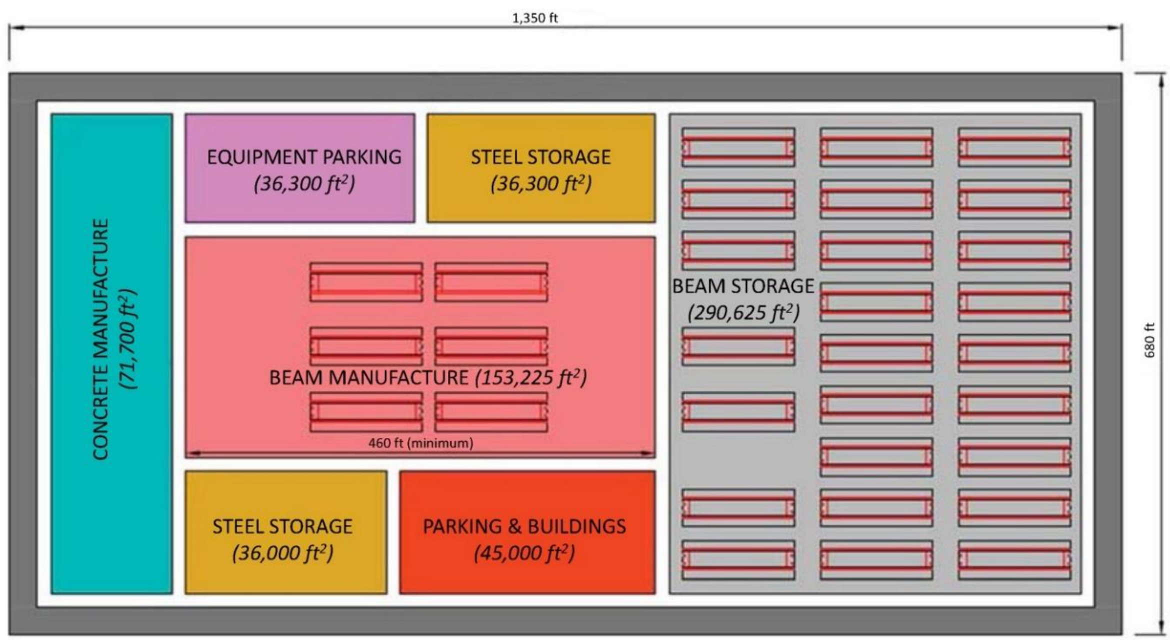
Type	Size	Jurisdiction	Location	Alternative			
				1	2	3	4
Staging	0.4 acre	Santa Clara County	South of Llagas Creek			X	
Staging	0.4 acre	Santa Clara County	South of Cohansey Ave		X		
Staging	1.5 acres	Santa Clara County	South of Las Animas Ave		X		
Staging	2.9 acres	San Benito	Lake Rd just south of 152			X	
Staging	8.8 acres	Gilroy	Northwest of the South Chestnut St and East Luchessa Ave intersection	X			
Staging	2.8 acres	Santa Clara County	Hollister Rd and Bloomfield Ave Intersection	X	X		
Staging	2.8 acres	San Benito County	West of Frazier Lake Rd	X	X		X
Staging	2.8 acres	San Benito County	West of Lake Rd	X	X		X
Staging	5.6 acres	San Benito County	Approx. 1.6 miles northwest of the Lovers Lane and Shore Rd intersection	X	X		
Staging	1.5 acres	San Benito County	West of Lovers Lane, approx. 0.6 mile south of the intersection with SR 152	X	X		X
Staging	2.8 acres	Santa Clara County	West of San Felipe Rd, approx. 0.7 mile south of its intersection with SR 152	X	X		X
Staging	2.8 acres	Santa Clara County	East of San Felipe Rd, approx. 0.7 mile south of its intersection with SR 152			X	
Staging/ Precast and batch plant	27.1 acres	Santa Clara County	Northeast of the San Felipe Rd and SR 152 intersection (Tunnel 1 west portal)	X	X	X	X
Staging	2.8 acres	Santa Clara County	Southeast of the San Felipe Rd and SR 152 intersection	X	X	X	X
Staging/ precast	14 acres	Santa Clara County	East of SR 152 and just south of Casa De Fruta Pkwy	X	X	X	X
Staging/ Precast	9.6 acres	Santa Clara County	West of SR 152 and Casa De Fruta Pkwy	X	X		X
Pacheco Pass Subsection							
Staging/Batch Plant/Precast	26.4 acres	Santa Clara County	South of SR 152, west of the tunnel portal	X	X	X	X
Staging/Batch Plant/Precast	15.0 acres	Merced County	East of tunnel portal, west of McCabe Rd	X	X	X	X
Staging	2.9 acres	Merced County	Fahey Rd	X	X	X	X

Type	Size	Jurisdiction	Location	Alternative			
				1	2	3	4
San Joaquin Valley Subsection							
Staging	36.7 acres	Merced County	West of Los Banos Creek	X	X	X	X
Staging	7.3 acres	Merced County	Northeast of the Henry Miller Rd and Mercey Springs Rd intersection	X	X	X	X
Staging	3.5 acres	Merced County	Southwest of Henry Miller Rd and Mercey Springs Rd intersection	X	X	X	X
Staging	1.1	Merced County	Midway Rd, south of Henry Miller Rd	X	X	X	X

Source: Authority 2019a

Approx. = approximately
Ave = Avenue
Blvd = Boulevard
Hwy = Highway
I = Interstate
Pkwy = Parkway
Rd = Road
SR = State Route
St = Street
UPRR = Union Pacific Railroad
US = U.S. Highway

The precasting yards required for Alternatives 1 and 3 would be located south of Communications Hill in San Jose, north of Morgan Hill, and north of Gilroy in unincorporated Santa Clara County. These precasting yards would encompass at least 35 acres to accommodate beam manufacturing and casting beds; concrete manufacturing through batch plants; storage of steel and beams; heavy equipment parking; administration buildings; employee parking; and access roads. Figure 2-69 shows a typical precasting yard layout, including estimated size requirements for each element.



MAY 2017

Figure 2-69 Typical Precasting Yard Layout

2.10.2.2 Non-Operational Right-of-Way

In certain negotiated right-of-way (ROW) purchase situations, the Authority may enter into agreements to acquire properties or portions of properties that are not directly needed for the construction of the HSR project and are not intended to be part of the operational ROW. These are known as excess properties and are distinct from severed remnant parcels, which are evaluated as part of the project footprint. While eventually these properties would likely be sold as excess state property, these excess properties are not part of the project footprint and in the interim the Authority would need to conduct various management and maintenance activities on them (Authority 2018).

The process for acquisition and disposal of excess property is detailed in Chapter 16 of the California High Speed Rail Authority Right of Way Manual (ROW Manual) (January 2019). Chapter 11 of the ROW Manual identifies the following management and maintenance activities that may occur on any given excess property. The activities required on a given parcel will be dependent on site conditions including the presence of buildings or other structures, existing land uses, and habitat conditions.

Structure Demolition

Various structures may be present on excess property including single and multi-family residences, mobile homes, mobile offices, warehouses and other light industrial structures, sheds, fences, concrete driveways, signs, other non-descript buildings, and related appurtenances and utilities (in-ground pools, septic systems, water wells, gas lines, etc.) as well as orchards and ornamental shrubs and trees.

If the Authority determines that any existing uses of a particular structure are not going to continue, it may, following additional environmental review if/as necessary (for example, to confirm the structure is not considered historic), decide to demolish and remove the structure. Demolition of a structure may also be appropriate if the structure is in a state of disrepair or a potential safety and security concern exists from trespassers.

The properties may include utilities such as water wells, septic systems, gas, and electric lines that would require removal in accordance with local and State regulations. Local construction permits for demolition and removal would be secured from the local agency with jurisdiction (e.g. well demo permit, septic removal, etc.).

Vegetation Management

Excess properties may have a variety of vegetation present including ornamental landscaping, various crops including orchards or vineyards, and natural habitats such as annual grassland. Vegetation management may occur as part of initial site clearing efforts or as part of ongoing management.

Initial site clearing is likely to occur in conjunction with structure demolition. Ornamental landscaping may be removed to reduce ongoing maintenance needs. Vegetation removal or disturbance may be necessary for equipment access during structure demolition. If certain agricultural crops are present on site, particularly orchards or vineyards, they may be removed if the Authority determines that it is appropriate based on the condition of the plants.

Ongoing vegetation management activities may include mowing, discing, or similar mechanical control, the clearing of firebreaks on larger properties, and, if noxious weeds are present, they may be treated with the use of approved herbicides. Mowing or other mechanical control may be used to maintain vegetation at a certain height or density based on site specific concerns of security, visual appearance or fire prevention. The mechanical control of weed species may also be appropriate depending on the relevant species and site conditions. Firebreaks may be mowed or disced in an approximately 12-foot band around the exterior of a site. Internal fire breaks may be appropriate for larger sites. All herbicide application will be conducted in a manner consistent with product labeling and applicable laws including application by a licensed Pest Control Advisor if appropriate.

Pest Management

Pest management may include the mechanical control of insects, rodents and other animals. Mechanical removal (trapping) of rodents and other animals may be appropriate in or around structures that exist on excess properties. Mechanical removal of animals will be conducted by a licensed Pest Control Advisor and after obtaining any appropriate local approvals. Rodenticide will not be used for the control of animals.

Chemical control of insects may occur in or around buildings on excess property or in agricultural areas to control pest species. Any pesticide application will be conducted in a manner consistent with product labeling and applicable laws including application by a licensed Pest Control Advisor if appropriate and after obtaining any appropriate local approvals.

Site Security

Site Security will primarily consist of the installation of fencing around properties. The installation of fencing may be appropriate on properties where structures will remain or where there is a safety and security concern or particular risk of trespass. Fencing will consist of 6-12 -foot high chain-link fencing and may include barb wire or similar features at the top. Fence posts may be either metal or wood and require an excavation up to four inches in diameter and three feet deep. Other security devices such as security lighting, an alarm system or cameras may be implemented if specific conditions require it. If buildings or other structures are present on the site, windows and doors may be boarded up to prevent trespass. “No Trespassing” or similar signs may be posted as appropriate.

Site security will also involve the periodic inspection of excess properties for signs of trespass and the removal of any accumulated trash or dumping.

Structure Maintenance

If buildings or other structures remain onsite, they will be maintained in a clean and orderly condition so as not to detract from the general appearance of the neighborhood. If the property is rented or leased, maintenance activities will be undertaken as needed to ensure the health and safety of occupants. Maintenance and repair activities may include exterior and interior painting, yard maintenance, repair or replacement of plumbing, electrical facilities, roofs, windows, heaters, and built-in appliances and other similar activities.

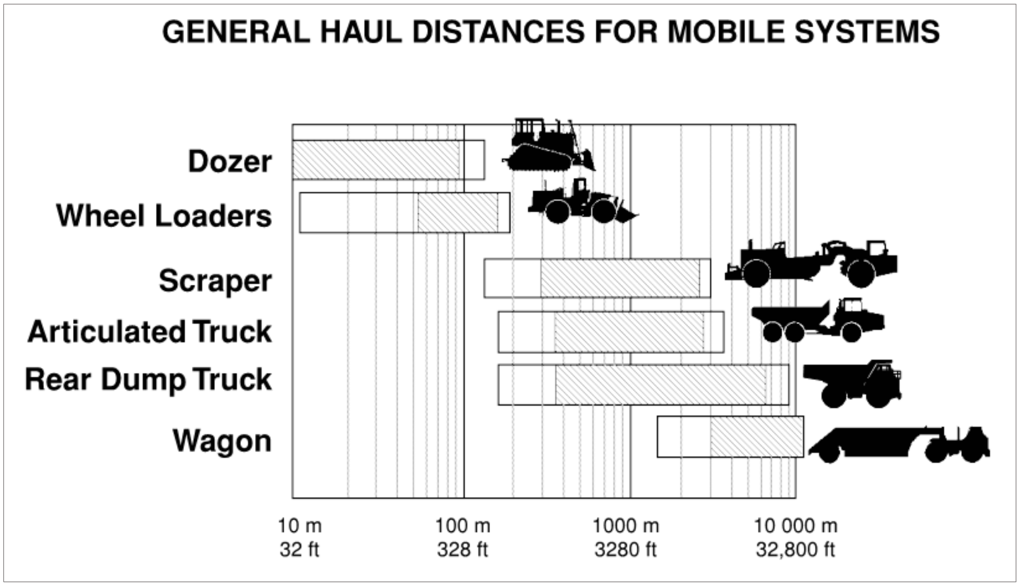
2.10.3 Major Construction Activities

Major types of construction activities for the project include earthwork; bridge, aerial structure, and roadway crossings; railroad systems; and station construction, as briefly described in the following subsections.

2.10.3.1 Earthwork

Earthwork is a general term applied to the movement or removal of soils by mechanical equipment (excavation) and the placement and compaction of soils by mechanical equipment (embankment). Earthwork would be conducted using conventional earthmoving methods and heavy construction equipment, such as dozers, wheel loaders, scrapers, articulated trucks, rear dump trucks, and wagons. The type of equipment used would depend on the hauling distance, with trucks or wagons used for longer distances. Figure 2-70 shows the general haul distances and equipment type.

The HSR system seeks to balance the volume of soils needed for excavation and embankment and to minimize the input of materials from quarries and disposal of materials outside the right-of-way. This earthwork balance assumes that excavated soils would be suitable for use as embankment fill (Appendix 2-L). The Authority and its contractors are conducting geotechnical investigations within the HSR project footprint to assess the geotechnical properties of existing soils, evaluate opportunities for soil re-use, and determine improvements to make existing soils suitable for HSR re-use.



MAY 2017

Figure 2-70 Expected Haul Distances by Equipment Type

The project would require greater quantities of embankment than excavation for Alternatives 2 and 4, requiring approximately an additional 2.3 million and 900,000 cubic yards of ballast and subballast material, respectively. Ballast and subballast materials may be imported from off-site quarries. To minimize material transport, the preliminary engineering design has identified construction staging sites (Table 2-17) that would store excavated materials close to where they would be placed, minimizing repeated handling of materials.

All four project alternatives would require earthwork construction. Alternatives 2 and 4 would require construction of 53 to 59 miles of embankment or trench, while Alternatives 1 and 3 would require 29 miles of embankment or trench construction. The greater amount of earthwork under Alternatives 2 and 4 is primarily a result of the embankment and at-grade profile through the Morgan Hill and Gilroy Subsection.

2.10.3.2 Bridge, Aerial Structure, and Roadway Crossing Construction

As is done for existing HSR systems around the world, most of the elevated guideways would be designed and built using single box segmental girder construction. Where needed, other structural types and construction methods would be considered. This section provides an overview of the construction methods required for foundations, substructures, and superstructures of bridges, aerial structures, and roadway crossings. Figure 2-71 illustrates the typical components of aerial structures.

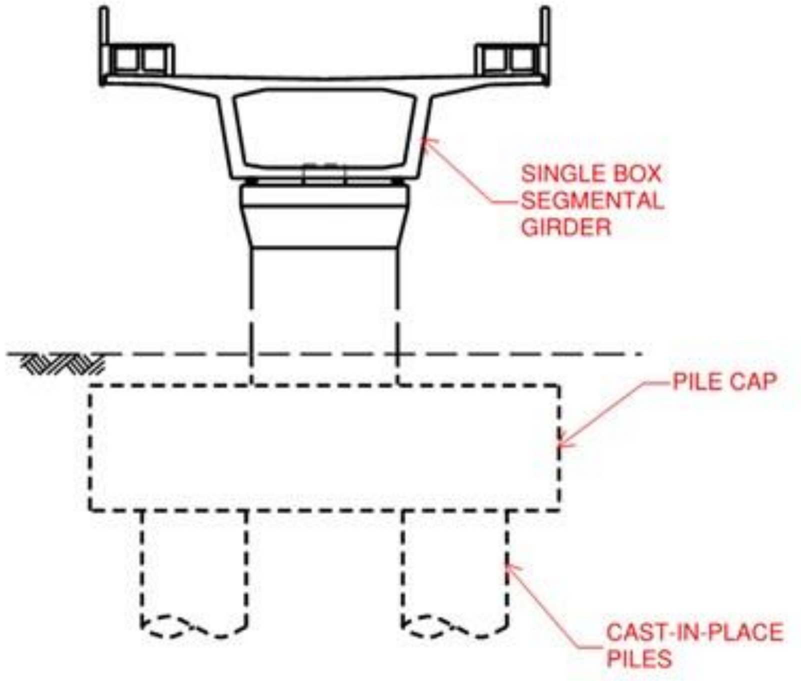


Figure 2-71 Typical Aerial Structure Components

Foundations

A typical aerial structure foundation pile cap is supported by an average of four large-diameter (5 to 9 feet) bored piles. Depth of piles depends on the geotechnical conditions at each pile site. Pile construction can be achieved by using rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated pile production rate is 4 days per pile installation. Additional pile installation methods available to the contractor include bored piles, rotary drilling CIP piles, driven piles, and a combination of pile jetting and driving.

Following completion of the piles, pile caps can be constructed using conventional methods supported by structural steel: either precast and pre-stressed piles or cast-in-drilled-hole piles. For pile caps constructed near existing structures such as railways, bridges, and underground drainage culverts, temporary sheet piling (i.e., temporary walls) can be used to minimize disturbances to adjacent structures. Sheet piling installation and extraction would likely be achieved using hydraulic sheet piling machines.

Substructure

Typical aerial structures of up to 90 feet would be constructed using CIP bent caps and columns supported by structural steel and installed upon pile caps. A self-climbing formwork system may be used to construct piers and portal beams more than 90 feet high. The self-climbing formwork system is equipped with a winched lifting device, which is raised up along the column by hydraulic means with a structural frame mounted on top of the previous pour. In general, a 3-day cycle for each 12-foot pour height can be achieved. The final size and spacing of the piers depend on the type of superstructure and spans they are supporting.

Superstructure

The selection of superstructure type would consider the loadings, stresses, and deflections encountered during the various intermediate construction stages, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load effects from erection equipment. Accordingly, the final design would depend on the contractor's selected means and methods of construction, such as full-span precast, span-by-span, balanced cantilever segmental precast, and CIP construction on falsework. These superstructure construction methods are described in full detail in Appendix 2-L and are summarized as follows:

- **Full-span precast construction**—Box girders would be precast and prestressed in advance as full spans and stored in a precasting yard. The 110-foot precast segments, weighing around 900 tons, would be transported along the previously constructed aerial guideway using a special gantry system (Figure 2-72). This method is anticipated to be used for approximately 95 percent of the construction in the Monterey Corridor and Morgan Hill and Gilroy Subsections under Alternatives 1 and 3.
- **Span-by-span precast segmental construction**—Shorter box girder segments would be precast and prestressed and stored in a precasting yard. These segments, limited to 12-foot segments weighing less than 70 tons, would likely be individually transported to the construction site by ground transportation. Once the gantry system is in place, construction would involve hoisting the segments from the ground and installing and tensioning the prestressing tendons to create the box girder (Figure 2-73).
- **Balanced cantilever segmental construction**—In locations where construction would occur over existing facilities that prevent equipment and temporary supports on the ground, balanced cantilever segmental construction may be used. Under this construction method, box girder segments (12-foot segments weighing less than 70 tons) that are either precast or CIP would be placed in a symmetrical fashion around a bent column. The segments would be anchored at the ends by cantilever tendons located in the deck slab, with midspan tendons balancing the weight between two cantilevers (Figure 2-74). Precast segments would be precast off site, transported to the construction site, and installed incrementally onto a portion of the existing cantilever using ground cranes, hoisting devices, or a self-launching gantry. Segments can also be CIP and installed two at a time, one at each end of the balanced cantilever. Segments generated by CIP are generally longer than those in precast construction since they do not need to be transported to the construction site.
- **Cast-in-place construction on falsework**—The method involves creating a suspended formwork with either a launching girder or gantry system. Once the formwork is in position and reinforcements and prestressing are placed, concrete is poured and the prestressing is stressed. The formwork is then removed and moved to the next segment (Figure 2-75).

Construction of road crossings and bridges would be similar to the approaches described for aerial structures. The superstructure would likely be constructed using precast, prestressed, concrete girders and CIP deck. Approaches to bridges would be earthwork embankments, mechanically stabilized earth wall, or other retaining structures.

Figure 2-72 Full-Span Precast Construction on Taiwan HSR

Figure 2-73 Span-by-Span Precast Segmental Construction

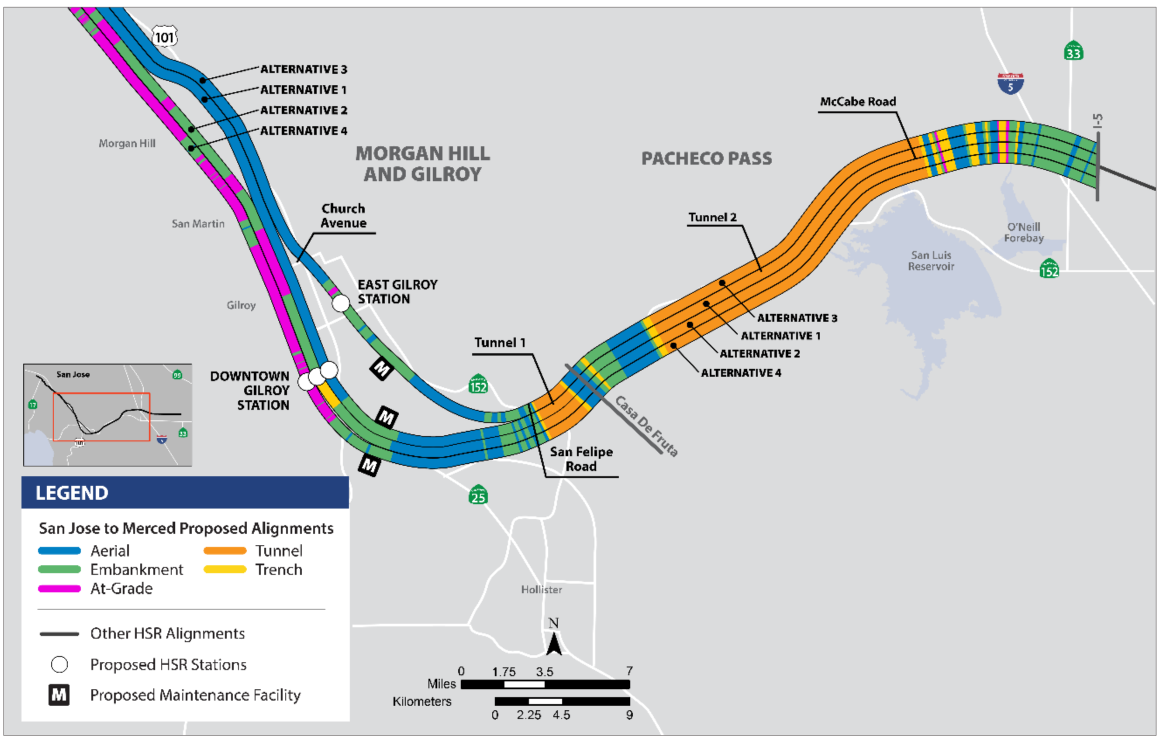
Figure 2-74 Balanced Cantilever Segmental Construction

Figure 2-75 Cast-in-Place Construction on Formwork

Crossings of existing railroads, roads, and the HSR would be constructed on the line of the existing road or offline at some locations. When constructed online, the existing road would be closed or temporarily diverted. When constructed offline, the existing road would be maintained in use until the new crossing is completed. Single tracking of VTA service would be necessary during construction of the SR 87 bridge under Alternative 4. The following project features are necessary for VTA to modify operations during construction: a new crossover with two powered switches south of Tamien Station, provision of power to six existing switches, and installation of track signals at these new and existing powered switches. Where HSR would cross over existing railroads, the Authority would coordinate with the rail operators to avoid operational impacts during construction. Under all four alternatives, where new roadway undercrossings of existing railroads are required, a temporary shoofly track would be constructed to maintain railroad operations during undercrossing construction.

2.10.3.3 Tunnels

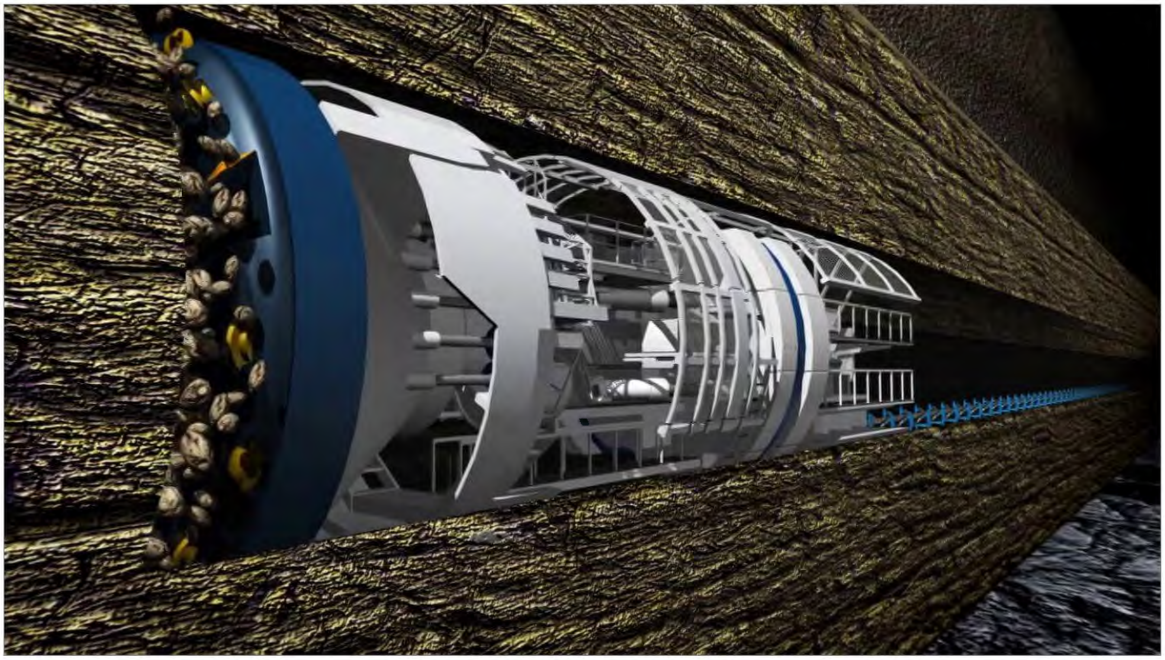
Tunnels would be used where the HSR system passes through a hill or mountain where the vertical profile is too deep to use an open cut to pass through the topography. The project would require the construction of two tunnels—Tunnel 1 in the Morgan Hill and Gilroy Subsection and Tunnel 2 in the Pacheco Pass Subsection. Figure 2-76 illustrates the two tunnel locations for the project. Figure 2-77 illustrates a typical TBM. Figure 2-78 shows two TBMs at a twin-bore tunnel. Figure 2-77 and Figure 2-78 are representative of what is anticipated for the project tunnels. These would be twin-bore, single-track tunnels, with lengths of approximately 1.6 and 13.5 miles, respectively, and a minimum internal diameter of 29.5 feet. Localized enlargements, or niches, may be required at intervals to accommodate equipment such as OCS tensioning devices, traction power paralleling stations, ventilation fans, communication equipment, signaling equipment, and drainage systems. Cross passages, placed no more than 800 feet apart, would be required between adjacent tunnels to provide emergency exits. The Authority would acquire exclusive underground property approximately 132 feet wide and 62 feet high to accommodate both tunnels and all support elements.



Source: Authority 2019a

JUNE 2019

Figure 2-76 Locations of Tunnels along the Alternatives



DECEMBER 2017

Figure 2-77 Tunnel Boring Machine

JANUARY 2018

Figure 2-78 Tunnel Boring Machines at Double Portal Entrance

Preparation for and construction of these tunnels would occur over a 6-year period, and would generally proceed as follows:

- **Construction of access roads to the future tunnel portal sites**—A new access road would be constructed on the west side of SR 152 from Walnut Avenue to the east portal of Tunnel 1, and a new road and bridge across Pacheco Creek would be constructed to the west portal of Tunnel 2. McCabe Road would be improved to provide access to the east portal of Tunnel 2.
- **Construction of power system**—Overhead power lines would be installed to the construction staging areas, and portable diesel generators would be installed to provide backup power supply.
- **Preparation of tunnel portals**—A large, level area would be constructed at each tunnel portal, including installation of retaining walls to minimize grading and slope modification. At the portals for Tunnel 2, this construction would likely include hillside slope reduction or application of drainage techniques, as well as ongoing monitoring and maintenance, to reduce the potential for landslides. Tunnel portals would initially be used to store precast materials and equipment, assemble and maintain equipment, stockpile tunnel spoils, and conduct ongoing monitoring and measuring of safety and ventilation systems. Portals would also be designed to accommodate housing trailers, ventilation buildings, communications equipment, power facilities, water and sewage, lighting and fencing, and clear areas for parking and storage.[18]
- **Manufacturing and transport of precast tunnel support materials**—Precast materials, such as the tunnel lining segments, would be manufactured off site and transported to the tunnel portals.

Tunnel excavation would likely be conducted using a combination of TBMs and conventional tunneling methods at either end of the tunnel portals. The type of machine used would be determined by the Authority's design-build contractor, based on the tunnel length, the particular geology of the project, the amount and characteristics of groundwater present, and other factors. A detailed discussion of tunnel construction methods is available in the *San Jose to Merced Project Section Conceptual Tunnel Design and Constructability Considerations—Pacheco Pass* (Authority 2017b) and is summarized below:

- **Conventional tunneling methods**—The primary conventional tunneling method anticipated to be used is a roadheader, consisting of a boom-mounted cutting head, a loading device usually involving a conveyor, and a crawler traveling track to move the machine forward into the rock face. Drill-and-blast techniques and the use of hydraulic excavators could also be required. For conventional tunneling methods, the estimated power demand is 3,000 kilovolt-amperes (kVA) to operate two roadheaders, two drill jumbos, and ancillary equipment, with 1,000 kVA emergency power supply.
- **Tunnel boring machines**—TBMs are shielded or open-type machines consisting of a rotating cutting wheel, called a cutterhead, followed by a main bearing, a thrust system, and trailing support mechanisms. Support mechanisms can include conveyors or other systems for muck removal, control rooms, electrical systems, dust removal, ventilation, and mechanisms for transport of precast segments. These machines excavate rock with disc cutters mounted in the cutterhead, and then transfer the excavated rock through openings in the cutterhead to a belt conveyor for removal from the tunnel. Following TBM excavation, a tunnel lining is built with steel ribs and lagging or precast concrete segments. The shield is then pushed forward with hydraulic jacks that thrust against the installed lining and the back of the tunnel shield. For TBM excavation, the estimated power demand for a single construction staging area of a twin-bore tunnel is 7,500 kVA to power two TBMs, trailing gear,

[18] Reinforced structures may be necessary for permanent support at tunnel portals. Permanent structures would be designed for the most unfavorable load combinations. Depending on the various conditions, including slope stability, static earth pressures, and seismic loading, slope stability mitigation measures may be required.

continuous conveyors, ventilation fans, lights, pumps, shop equipment, change house, yard lighting, and office trailers, as well as 4,000 kVA for an emergency power supply.

- **Transport of tunnel spoils**—Tunnel excavation would generate large volumes of soil and rock materials (an estimated 0.5 million cubic yards from Tunnel 1 and 4.3 million cubic yards from Tunnel 2). Tunnel spoils would be temporarily stockpiled at the tunnel portal and, depending on geotechnical properties, distributed along the alignment and reused for embankment fill or nonstructural fill. Depending on the rate of excavation, the transport of tunnel spoils could require approximately 160 3-axle dump truck trips per day at each tunnel portal (Appendix 2-L).

2.10.3.4 Railroad Systems Construction

The HSR system would include trackwork, traction power electrification, signaling, and communications. After completion of earthwork and structures, trackwork is the first rail system to be constructed, and it must be in place at least locally to start traction power electrification and railroad signalizing installation. Trackwork construction generally requires the welding of transportable lengths of steel running onto longer lengths (approximately 0.25 mile), which are placed in position on crossties or track slabs and field-welded into continuous lengths.

Tie-and-ballast and slab track construction would be used. Tie-and-ballast construction, which would be used for at-grade profiles and minor structures, typically uses crossties and ballast that are distributed along the track bed by truck or tractor. In sensitive areas, such as where the HSR is parallel to or near streams, rivers, or wetlands, and in areas of limited accessibility, this operation may be accomplished by using the constructed rail line for material delivery. For major civil structures, slab track construction would be used. Slab track construction is a nonballasted track form using precast supports to which the track is directly fixed.

Traction power electrification equipment to be installed includes TPSSs, traction power switching and paralleling stations, and the OCS. Traction power facility equipment and houses are typically fabricated and tested in a factory, then delivered by tractor-trailer to a prepared site adjacent to the alignment. TPSSs are assumed to be located every 30 miles along the alignment. Traction power switching stations are located every 15 miles and traction power paralleling stations every 5 miles along the alignment. The OCS is assembled in place over each track and includes poles, brackets, insulators, conductors, and other hardware.

Signaling equipment to be installed includes wayside cabinets and bungalows, communications radio towers, wayside signals (at track interlockings[19]), switch machines, insulated joints, impedance bonds, and connecting cables. The equipment will support automatic train protection; enhanced automatic train protection; and PTC to maintain train separation, routing at interlocking, and speed.

2.10.3.5 Station Construction

Because the HSR stations in San Jose and downtown Gilroy would be co-located with existing Caltrain stations, existing train operations would be maintained during HSR station construction/modification. The San Jose Diridon Station and Downtown Gilroy Station would be reconstructed to accommodate the HSR system, while the East Gilroy Station would be a new station. HSR stations require significant coordination and planning to accommodate safe and convenient access to existing businesses and residences, to complement transit-oriented and station-supportive development, and to accommodate traffic control during construction periods. Additional information about the station areas is provided in Section 2.6.2. The typical construction sequence at station areas would be as follows:

- **Demolition and site preparation**—The contractor would be required to construct detour roadways, new station entrances, construction fences and barriers, and other elements to

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[19] *Interlockings* are signaling equipment that control safe train movement and prevent conflicting movements at junctions or crossings.

replace the removal from service of existing facilities on the worksite. The contractor would be required to perform street improvement work, site clearing and earthwork, drainage work, and utility relocations. Additionally, electrical substations and maintenance facilities are assumed to be newly constructed structures. For platform improvements or additional platform construction, the contractor may be required to realign existing track.

- **Structural shell and mechanical/electrical rough-ins**—For these activities, the contractor would construct foundations and erect the structural frame for the new station, enclose the new building, construct new platforms, and connect the structure to site utilities. Additionally, the contractor would rough-in electrical and mechanical systems and install specialty items such as elevators, escalators, and ticketing equipment.
- **Finishes and tenant improvements**—The contractor would install electrical and mechanical equipment, communications and security equipment, finishes, and signage. Additionally, the contractor may install other tenant improvements if requested.

San Jose Diridon Station

Under Alternatives 1, 2, and 3, the project would involve modification of the existing San Jose Diridon Station—existing platforms would be rebuilt, and the vertical circulation would be modified and replaced. Modifying the station would take place in six stages, with one of the station tracks and platforms closed for each stage. The first stage would temporarily close the easternmost Caltrain tracks and platforms to construct the HSR viaduct piers and reconstruct the platforms. When this work is complete, the easternmost tracks and areas would recommence operation. The second stage would temporarily close the next set of track and platform, and so on through five stages. The sixth stage would construct the station house. After completing the five stages of HSR viaduct supports and during construction of the HSR concourse and platforms, all Caltrain tracks and platforms would be operational.

Under Alternative 4, the project would primarily involve installing new turnouts and modifying the configuration of San Jose Diridon Station to build two aerial 1,400-foot platforms for HSR, retain two platforms for commuter and conventional intercity trains, provide passenger services and train operations support in new structures north and south of the existing station building, build new overhead concourses for passenger access to train platforms, and relocate the existing bus station in three stages to accommodate progressive growth in HSR services (Figure 2-79):

- San Francisco to Gilroy Early Service in 2027 would require all passenger platform improvements, HSR passenger and operations support in a building south of the existing station house, and an overhead concourse from the south HSR station building with ramps to the two HSR platforms. Access to existing subway ramps would be retained for HSR passenger egress.
- Valley-to-Valley Service in 2029 would require ramps from the south overhead concourse to the Caltrain platforms.
- Phase 1 Service in 2033 would require development of another HSR building north of the existing station house, relocation of the existing bus station at that location, a second overhead pedestrian concourse from the north HSR station building with ramps to all train platforms, and closure of all platform ramps down to the subway.

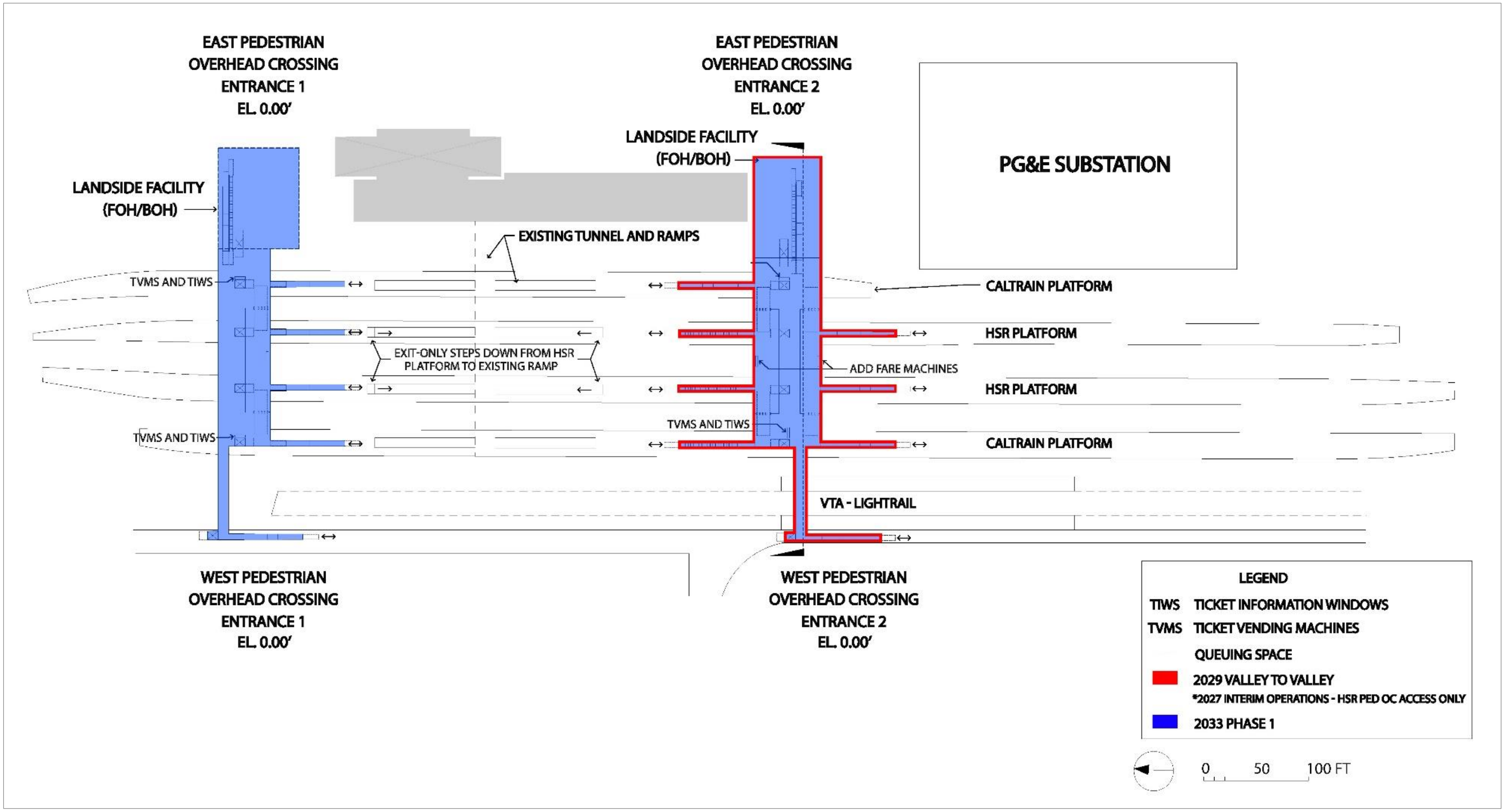

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Figure 2-79 Phasing of San Jose Diridon Station for Alternative 4

Downtown Gilroy Station

A Downtown Gilroy Station would be constructed under Alternatives 1, 2, and 4. Under Alternative 1, the HSR station would be co-located and constructed around the existing Gilroy Caltrain Station. A pedestrian undercrossing would connect the new station entrances on either side of the track, and Caltrain service would not be interrupted for construction of the undercrossing. Track realignment work would, however, temporarily relocate the existing Caltrain platform. Under Alternative 2, the existing station platforms would be rebuilt. UPRR, Caltrain, and HSR tracks would be located on the same elevated structure, and Caltrain service would be disrupted during track realignment and station construction. During work on the Caltrain and UPRR facilities, temporary tracks and platforms would be located at the future HSR platform locations as a shoofly.

Under Alternative 4, the existing station platforms would be repurposed for longer HSR platforms with tracks on the inside and two shorter platforms on the outside for Caltrain, Amtrak, and TAMC. A new overhead concourse would provide passenger access to all platforms.

East Gilroy Station

An East Gilroy Station would be constructed under Alternative 3. This would be a new station. The proposed site would require limited work within the constraints of existing buildings or infrastructure. As there is no existing train service in this area, construction of this station would not affect existing train service. The nearest train service is in downtown Gilroy, west of US 101.

Other Stations Affected by HSR Construction

Construction of the alternative alignments would affect the following existing Caltrain stations: Santa Clara Station, College Park Station, Capitol Station, Tamien Station, Blossom Hill Station, Morgan Hill Station, and San Martin Station. Construction work at these stations would be coordinated with the affected transit service providers to maintain access to and operation of existing facilities or to provide temporary facilities to support continued operation during construction. Construction could entail shifting the position of the platforms or access, changing platform types, providing grade-separated pedestrian access to platforms, maintaining parking capacity, and other methods to maintain operations.

2.11 Permits

The Authority has entered into agreements with environmental resource agencies to facilitate the issuance of environmental authorizations required prior to construction. These agreements are intended, in part, to identify the Authority’s responsibilities in meeting the requirements of these federal and state regulatory processes.

A memorandum of understanding (MOU) was established in 2010 between the FRA, Authority, USACE, and USEPA (FRA et al. 2010) regarding integration of NEPA, Clean Water Act Section 404, and Rivers and Harbors Act Section 14 (“Section 408”) processes. In addition, the Authority and FRA entered into a Section 106 Programmatic Agreement with the California State Historic Preservation Officer in 2011 to establish the process for considering effects on historic properties during project-level environmental reviews. An MOU was established between the Authority and the State Water Resources Control Board (SWRCB) regarding items that would require a Complete Application for Clean Water Act Section 401 Certification and/or Waste Discharge Requirements, the delineation of nonfederal wetlands and other waters of the state that are not waters of the U.S., and any future amendments to the existing SWRCB requirements regarding applications and delineation methods.

Table 2-18 shows the major environmental reviews, permits, and approvals required for the project. The table identifies each agency's status as a NEPA cooperating agency or CEQA responsible agency. As a state agency, the Authority is exempt from local permit requirements; however, in order to coordinate construction activities with local jurisdictions, the Authority plans to pursue local permits as part of construction processes consistent with local ordinances. These local permits may include, but are not limited to, major encroachment permits, grading and drainage permits, and major improvement permits. The agencies identified in the table are anticipated to rely on the EIR/EIS documents to support their permitting and approval processes. Other approvals may require new specific documentation.

Table 2-18 Anticipated Environmental Reviews, Permits, and Approvals

Agency	Permit
Federal	
U.S. Army Corps of Engineers (NEPA cooperating agency)	▪ Section 404 Permit for discharge of dredge or fill materials into waters of the U.S., including wetlands, under the Clean Water Act of 1972 ▪ Section 14 of the Rivers and Harbors Act of 1899 (Section 408) permission to alter or modify a facility or feature of any federal project levee or federally regulated flood control system
U.S. Department of the Interior, Bureau of Reclamation (NEPA cooperating agency)	▪ Encroachment permit ▪ Use permit
U.S. Department of Transportation/Federal Railroad Administration	▪ Section 4(f) of the U.S. Transportation Act of 1966
U.S. Department of Interior/National Park Service	▪ Section 6(f) of the Land and Water Conservation Fund Act of 1965
U.S. Advisory Council on Historic Preservation and the California State Historic Preservation Office	▪ Section 106 consultation (National Historic Preservation Act of 1966) and memorandum of agreement
U.S. Environmental Protection Agency (NEPA cooperating agency)	▪ Review of environmental impact statement under Clean Air Act Section 309 ▪ Review of environmental justice conclusions ▪ General Conformity Determination
U.S. Fish and Wildlife Service	▪ Section 7 consultation and biological opinion/incidental take statement pursuant to the Endangered Species Act of 1973
National Oceanic and Atmospheric Administration, National Marine Fisheries Service	▪ Section 7 consultation and biological opinion/incidental take statement pursuant to the Endangered Species Act of 1973
Surface Transportation Board (NEPA cooperating agency)	▪ Authority to construct and operate new rail line

Agency	Permit
Federal Emergency Management Agency	▪ Conditional Letter of Map Revision (CLOMR) ▪ Letter or Map Revision (LOMR) ▪ No-Rise Certification for floodways
U.S. Department of Agriculture, Natural Resources Conservation Service	▪ Watershed and Flood Prevention Operations Program review for modifications to levees along Llagas Creek (Alternative 3 only) and West Branch Llagas Creek (Alternatives 1, 2, and 4).
State	
California Department of Fish and Wildlife (CEQA responsible agency)	▪ Incidental take permit under Section 2081 of the California Fish and Game Code ▪ California Fish and Game Code Section 1600 et seq. lake and streambed alteration agreement
California Department of Transportation (Caltrans) (CEQA responsible agency)	▪ Caltrans encroachment permits ▪ Joint use agreements ▪ Transfers of jurisdiction
California Public Utilities Commission (CEQA responsible agency)	▪ Approval for construction and operation of railroad crossings of public road and ministerial Notice of Construction or discretionary Permit to Construct associated with network upgrades to PG&E facilities.
California State Historic Preservation Office	▪ Section 106 consultation (National Historic Preservation Act of 1966)
California State Lands Commission (CEQA responsible agency)	▪ Lease for crossing state sovereign lands
State Water Resources Control Board Central Valley Water Quality Control Board San Francisco Bay Regional Water Quality Control Board (CEQA responsible agencies)	▪ Section 401 Water Quality Certification under the Clean Water Act of 1972 ▪ Construction General Permit (Order No. Order 2009-0009-DWQ) ▪ Industrial General Permit (Order No. 2014-0057-DWQ) ▪ Caltrans Statewide MS4 Permit (Order No. 2012-0011-DWQ) ▪ Phase I Municipal Separate Storm Sewer System (MS4)/Municipal Regional Permit (Order No. R2-2015-0049) ▪ Phase II MS4 Permit (Order No. 2013-0001-DWQ) ▪ VOC and Fuel General Permit (Order No. R2-2012-0012) ▪ Groundwater General Permit (Order No. R2-2012-0060) ▪ Discharges with Low Threat to Water Quality (Order No. R3-2011-0223) ▪ Dewatering and Other Low Threat Discharges (Order No. R5-2013-0074) ▪ Spill prevention, control, and countermeasure (SPCC) plan (part of Section 402 process) ▪ Stormwater construction and operation permit
California Department of Water Resources (CEQA responsible agency)	▪ Encroachment permit

Agency	Permit
Regional	
San Joaquin Valley Air Pollution Control District (CEQA responsible agency)	▪ Rule 201 General Permit Requirements, Rule 403 Fugitive Dust, Rule 442 Architectural Coatings, Rule 902 Asbestos, and Rule 9510 Indirect Source Review
Bay Area Air Quality Management District (CEQA Responsible Agency)	▪ Rule 201 General Permit Requirements, Rule 403 Fugitive Dust, Rule 442 Architectural Coatings, Rule 902 Asbestos, and Rule 9510 Indirect Source Review
Monterey Bay Air Resources District (CEQA Responsible Agency)	▪ Rule 201 General Permit Requirements, Rule 403 Fugitive Dust, Rule 442 Architectural Coatings, Rule 902 Asbestos, and Rule 9510 Indirect Source Review

CEQA = California Environmental Quality Act
NEPA = National Environmental Policy Act