1 PROJECT PURPOSE, NEED, AND OBJECTIVES

1.1 Introduction

1.1.1 The High-Speed Rail System

The California Legislature passed the High-Speed Rail Act in 1996, forming the California High-Speed Rail Authority (Authority) as a state governing body responsible for planning, designing, constructing, and operating the California High-Speed Rail (HSR) System. In establishing the Authority, the Legislature found that the state's transportation facilities were insufficient to meet the needs of the state's existing population, that the state's population and the travel demands of its citizens would continue to grow, and that the development of an HSR system is a necessary and viable alternative to automobile and air travel in the state. The Authority's mandate under the High-Speed Rail Act is to develop an HSR system that coordinates with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

The Authority proposes to construct, operate, and maintain an electric-powered HSR system in California, connecting the San Francisco Bay Area[1] (Bay Area) and Central Valley to Southern California. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90 percent of the state's population. An estimated 176 weekday trains would serve the statewide intercity travel market.[2] The system would use state-of-the-art, electrically powered steel-wheel-on-steel-rail technology, including contemporary safety, signaling, and automatic train control systems, with trains capable of operating speeds of up to 220 miles per hour in HSR sections that are fully grade separated and on a dedicated track alignment.

The California HSR System, as illustrated on Figure 1-1, would be implemented in two phases. Phase 1 would connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley. Phase 2 would extend the HSR system from the Central Valley (starting at the Merced Station) to the state's capital in Sacramento and from Los Angeles to San Diego.

[1] The Authority defines the *San Francisco Bay Area* as the five counties that would be directly served either by HSR or by interconnecting rail service: Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara Counties.

[2] *Intercity rail passenger transportation* is defined at 49 United States Code (U.S.C.) Section 24102(4) as "rail passenger transportation except commuter rail passenger transportation." *Commuter rail passenger transportation* is defined at 49 U.S.C. Section 24102(3) as "short-haul rail passenger transportation in metropolitan and suburban areas usually having reduced fare, multiple-ride, and commuter tickets and morning and evening peak period operations." The number of trains on different parts of the HSR system would vary depending on schedules and ridership.

Figure 1-1 Statewide High-Speed Rail System—Implementation Phases

1.1.2 The Decision to Develop a Statewide High-Speed Rail System

The Authority and Federal Railroad Administration (FRA) used a tiered environmental review process to support tiered decisions for the HSR system. Tiering of environmental documents means addressing a broad program in "Tier 1" environmental documents, then analyzing the details of individual projects in the larger program in subsequent project-specific or "Tier 2" environmental documents.

The *Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed California High-Speed Train System* (Statewide Program EIR/EIS) (Authority and FRA 2005) provided a programmatic analysis of implementing the HSR system across the state and compared it to the impacts of a No Project Alternative and a "modal alternative" that involved expanding airports, freeways, and conventional rail to meet the state's future transportation needs. The HSR alternative included consideration of different train technologies and vehicle types, as well as potential corridors and station locations. At the conclusion of that Statewide Program EIR/EIS, the Authority and FRA made the following decisions:

2005 Tier 1 Decisions	
Selection of transportation option	Selected the HSR alternative over the modal alternative (expanded airports and freeways) and the No Project Alternative (do nothing) to serve California's growing transportation needs.
Selection of train technology	Selected very high speed, electrified steel-wheel-on-steel-rail technology over magnetic levitation, lower speed, electrified steel-wheel-on-steel rail; and lower speed diesel (non-electrified) steel-wheel-on-steel-rail technology.
Selection of preferred alignment corridors	Selected preferred corridors for most of the statewide system to be studied in more detail in Tier 2 EIR/EISs. Deferred selection of preferred corridors for Bay Area to Central Valley to a second Tier 1 EIR/EIS process.
Selection of preferred station locations	Selected station locations along the preferred corridors to be studied in more detail in Tier 2 EIR/EISs.
Adoption of mitigation strategies	Adopted broad mitigation strategies to be refined and applied at Tier 2, as part of project planning and development and environmental review.

Sources: Authority 2005; FRA 2005
EIR = environmental impact report
EIS = environmental impact statement
HSR = high-speed rail

After completing the Statewide Program EIR/EIS, the Authority and FRA prepared a second program EIR/EIS to identify corridor and station locations for the HSR connection between the Bay Area and the Central Valley, examining connections through the Pacheco Pass, the Altamont Pass, or both (i.e., the *Bay Area to Central Valley High-Speed Train Program Environmental Impact Report/Environmental Impact Statement* [Authority and FRA 2008]). In 2008, the Authority and FRA selected a Pacheco Pass connection, with corridors and station locations for further examination in Tier 2 environmental reviews. As a result of litigation, the Authority prepared additional programmatic environmental review for the Bay Area and the Central Valley section, and again selected the Pacheco Pass connection (in the *Bay Area to Central Valley High-Speed Train Partially Revised Final Program Environmental Impact Report* [Authority 2012a]).

2008/2012 Tier 1 Decisions	
Selection of preferred alignment corridors	Selected preferred corridors for connecting the Bay Area to the Central Valley north of Fresno to be studied in more detail in Tier 2 EIR/EIS.
Selection of preferred station locations	Selected station locations along the preferred corridors to be studied in more detail in Tier 2 EIR/EISs.
Adoption of mitigation strategies	Adopted broad mitigation strategies to be refined and applied at Tier 2, as part of project planning and development and environmental review.

Sources: Authority 2012a, 2012b; FRA 2008
EIR = environmental impact report
EIS = environmental impact statement

These Tier 1 decisions established the broad framework for the HSR system that serves as the foundation for the Tier 2 environmental review of individual projects. Between San Francisco and San Jose, the existing Caltrain corridor was advanced for Tier 2 study. The station locations advanced for Tier 2 study included a station in downtown San Francisco, a potential mid-San Francisco Peninsula (Peninsula) station, a San Francisco International Airport (SFO) Station at Millbrae, and a station at the San Jose Diridon Station.

The Authority and FRA prepared these Tier 1 documents in coordination with the U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE). The USEPA and the USACE concurred that the corridors selected by the Authority and FRA in Tier 1 were most likely to yield the least environmentally damaging practicable alternative (LEDPA) under Section 404 of the Clean Water Act (CWA).

Copies of the Tier 1 documents are available on request by calling the Authority office at (800) 435-8670. The Tier 1 documents may also be reviewed at the Authority's offices during business hours at: the Authority's Northern California Regional Office 100 Paseo de San Antonio, Suite 300, San Jose, CA 95113 and the Authority's Headquarters at 770 L Street, Suite 620 MS-1, Sacramento, CA 95814.

1.1.3 Implementation of the Statewide High-Speed Rail System

Since completion of the Tier 1 documents, the State of California has taken a series of steps to advance the implementation of a statewide HSR system. These efforts have resulted in securing dedicated funding for construction of the initial part of the system in the Central Valley and have further defined the state's vision for completing the system. The HSR system has also become a key component of the state's strategy for reducing greenhouse gas (GHG) emissions as discussed in the following subsection.

1.1.3.1 California State Legislation and Funding

In August 2008, the California Legislature adopted Assembly Bill (AB) 3034, finding "it imperative that the state proceed quickly to construct a high-speed passenger train system to serve the major metropolitan areas," and submitting The Safe, Reliable, High-Speed Passenger Train Bond Act for the 21st Century (Prop 1A) to the voters. In November 2008, California voters approved Prop 1A, making $9.95 billion in bond funds available to the Authority for initiating construction of the HSR system from San Francisco to the Los Angeles basin and linking the state's major population centers. Prop 1A includes provisions for continuing legislative oversight and requires the Authority to follow certain procedures to access bond funds. In 2012, the Legislature passed Senate Bill (SB) 1029, which appropriated $7.9 billion in federal funds (see Section 1.1.3.4, The Federal Railroad Administration Grant Agreement) and Prop 1A bond funds to begin construction of the HSR system.

The HSR system is identified as an integral GHG reduction measure in the Climate Change Scoping Plan prepared by the California Air Resources Board (CARB) pursuant to AB 32, the California Global Warming Solutions Act of 2006, which required a reduction in GHG emissions to 1990 levels by 2020 (CARB 2008, 2014, 2017). In 2014, the Legislature passed SB 862, which continuously appropriated 25 percent of specified cap-and-trade[3] auction proceeds to Phase 1 (San Francisco to Anaheim) of the HSR system. The Legislature found that the HSR system, once completed and operational, "will contribute significantly toward the goal of reducing emissions of greenhouse gases and other air pollutants" and provides "the foundation for a large-scale transformation of California's transportation infrastructure" by reducing millions of vehicle miles traveled (VMT) by automobile and reducing the demand for air travel. In 2017, the Legislature extended the cap-and-trade program from 2020 to 2031.

[3] Cap-and-trade refers to the market-based mechanism established by the CARB for achieving the GHG reduction requirements in AB 32.

1.1.3.2 Business Plans for the Statewide High-Speed Rail System

The High-Speed Rail Act requires the Authority to prepare, adopt, and submit a business plan to the State Legislature every 2 years describing its implementation approach for the statewide HSR system. Since 2008, the Authority has adopted business plans in accordance with this requirement. Most recently, the Authority adopted its *2018 Business Plan: Connecting California, Expanding Economy, Transforming Travel* (2018 Business Plan) on May 15, 2018, and submitted it to the Legislature on June 1, 2018 (Authority 2018a, 2018b).

The 2018 Business Plan identifies major anticipated milestones for upcoming years, focusing on construction and program delivery. The key objectives and principles from prior business plans remain the same:

- Initiate HSR passenger service as soon as possible.
- Make strategic, concurrent investments throughout the system that will be linked together over time.
- Position the Authority to construct additional increments of the HSR system as funding becomes available.

Like the previous business plans, the 2018 Business Plan describes the phased implementation of the California HSR System. As illustrated on Figure 1-1, Phase 1 would connect the state's major metropolitan areas, extending from San Francisco and Merced to Los Angeles and Anaheim (the Bay Area and Los Angeles basin regions are considered the "bookends" of the HSR system). Phase 2 would complete extensions to Sacramento and San Diego. Phased implementation of the HSR system is consistent with the provisions of Prop 1A. The 2018 Business Plan also continues to incorporate the concept of "blended" service[4] in certain shared corridors in Northern and Southern California, including between San Francisco and Gilroy and between Burbank and Anaheim.

With regard to the timing of Phase 1 implementation, the 2018 Business Plan continues the overall approach presented in 2016, which prioritizes connecting the Silicon Valley to the Central Valley. To achieve that objective, the 2018 Business Plan calls for completing two lines initially—one in the Central Valley, from an interim station in Madera to Bakersfield, and one in the Bay Area/Silicon Valley, from San Francisco and San Jose to Gilroy—and then completing the connection from the Silicon Valley to the Central Valley via the Pacheco Pass tunnels. Completion of this Silicon Valley to Central Valley (Valley-to-Valley) connection would provide continuous HSR service from San Francisco to Bakersfield. After that portion of the system is built, it is anticipated that the system would be extended to complete all of Phase 1 and ultimately Phase 2.

The 2018 Business Plan supports concurrent investments to deliver early benefits to Southern California in the Burbank–Los Angeles–Anaheim corridor and to Northern California in the San Francisco to Gilroy corridor, as well as completion of the environmental review for all Phase 1 project sections statewide from Merced/San Francisco to Los Angeles/Anaheim by 2022.

The Authority released a Draft 2020 Business Plan in February 2020 for public review and comment. The plan's final adoption is intended at the June 2020 Board meeting for submittal to the Legislature by July 1, 2020 (Authority 2020a).

[4] As described in Section 1.1.4, San Francisco to San Jose Project Section, a "blended" system involves integrating the HSR system with existing intercity, commuter, and regional rail systems.

1.1.3.3 The California State Rail Plan

The federal Passenger Rail Investment and Improvement Act of 2008 (PRIIA) required states to develop state rail plans no less frequently than every 5 years, as a condition of eligibility for federal funding for HSR and intercity passenger rail programs. In accordance the act, the State of California adopted the *California State Rail Plan* (CSRP) in September 2018 (California Department of Transportation [Caltrans] 2018a). The 2018 CSRP emphasizes HSR as a foundational component of a statewide, integrated rail transportation network (Caltrans 2018a).

1.1.3.4 The Federal Railroad Administration Grant Agreement

In 2009, FRA announced a competitive grant program to fund HSR projects under the American Recovery and Reinvestment Act of 2009 through its High-Speed Intercity Passenger Rail Program. The State of California, acting through the Authority, successfully competed for these grant funds and received awards totaling approximately $3.5 billion. In 2010, the Authority entered into cooperative agreements with the FRA under which the FRA committed to provide the grant funds to support initial construction of the first phase of the HSR system in the Central Valley, as well as related efforts for continued planning, engineering, and right-of-way preservation for the rest of the Phase 1 system between San Francisco and Anaheim.[5]

1.1.3.5 Project-Level Environmental Reviews

In accordance with the tiered approach to environmental review described in Section 1.1.2, The Decision to Develop a Statewide High-Speed Rail System, Tier 2 (project-level) EIR/EISs for individual project sections are being prepared. Each Tier 2 EIR/EIS evaluates a geographic section of the HSR system that serves a useful transportation purpose on its own and could function independently even if the adjacent sections were not completed. Each Tier 2 EIR/EIS evaluates proposed alignments and stations in site-specific detail to provide a complete assessment of the direct, indirect, and cumulative effects of the proposed project; considers public and agency participation in the screening process; and is developed in consultation with resource and regulatory agencies, including USEPA and USACE. Each Tier 2 EIR/EIS is intended to be sufficient to support USACE's permit decisions, where applicable. Figure 1-2 illustrates the Tier 2 project sections. On July 23, 2019, the State of California and FRA signed a Memorandum of Understanding (MOU) that delegated FRA's responsibilities to the State to implement the National Environmental Policy Act (NEPA) and other federal statutes, regulations, and executive orders and to issue a record of decision for each of the Tier 2 reviews underway at that time (FRA and State of California 2019).

Prior to effective date of the NEPA Assignment MOU (July 23, 2019), the Authority and FRA completed Tier 2 EIR/EISs for the following sections:

- Merced to Fresno
- Fresno to Bakersfield
- Tier 2 EIR/EISs for the other Phase 1 project sections are all in progress: San Jose to Merced
- Bakersfield to Palmdale
- Palmdale to Burbank
- Burbank to Los Angeles
- Los Angeles to Anaheim

In addition, Supplemental EIR/EISs have been prepared for the following:

- Merced to Fresno: Central Valley Wye
- Fresno to Bakersfield: Locally Generated Alternative (Bakersfield Station)

In October 2018, the Authority certified a Final Supplemental EIR for the Fresno to Bakersfield: Locally Generated Alternative. Subsequently, in November 2019, the Authority issued a Final

[5] The grant agreements are available by request via the Authority's website: www.hsr.ca.gov/About/Funding_Finance/funding_agreements.html.

Supplemental EIS and a Record of Decision for the Fresno to Bakersfield: Locally Generated Alternative. The Authority published the *Merced to Fresno Section: Central Valley Wye Draft Supplemental Environmental Impact Report/Environmental Impact Statement* in May 2019 (Authority 2019a). The Authority completed the public review of the Draft Supplemental EIR/EIS under the California Environmental Quality Act (CEQA) in May and June 2019 and released the same document for NEPA public review in September 2019 to support a federal decision on the Central Valley Wye. A Revised Draft Supplemental EIR/Second Draft Supplemental EIS was released in March 2020 to address a bumble bee species that was recently listed as a state candidate species and may contain habitat within the Central Valley. The comment period for this document ended April 27, 2020. The Authority is planning to issue a Final Supplemental EIR/EIS in summer 2020.

APRIL 2016

Figure 1-2 Statewide High-Speed Rail System, Phase 1 and Phase 2—Project Sections

1.1.4 San Francisco to San Jose Project Section

What does "blended" mean?

Blended refers to operating the HSR trains with existing intercity, commuter, and regional trains on common infrastructure (blended operations).

Consistent with Tier 1 decisions, the San Francisco to San Jose Project Section (Project Section or project) would provide HSR service from the Salesforce Transit Center (SFTC) in San Francisco to Diridon Station in San Jose along approximately 49 miles of the Caltrain corridor. The project design has evolved since the Tier 1 decisions from a fully grade-separated, shared-use rail corridor with four tracks to predominantly blended infrastructure with predominantly two tracks, and mostly within the existing Caltrain right-of-way (Metropolitan Transportation Commission [MTC] 2012). This Project Section follows an existing transportation corridor and is designed to achieve travel times consistent with Prop 1A.[6] Figure 1-3 illustrates the Project Section, which extends from the interim 4th and King Street Station[7] in San Francisco to West Alma Avenue in San Jose. The southern portion of the alignment between Scott Boulevard in Santa Clara and West Alma Avenue in San Jose is evaluated as part of both the San Francisco to San Jose and San Jose to Merced Project Sections, although the decision on selection of alternatives between Scott Boulevard and West Alma Avenue would occur as part of the environmental process for the San Jose to Merced Project Section (Authority 2020b).

The Project Section would provide HSR services at a downtown San Francisco station, a Millbrae station, and the San Jose Diridon Station. Connections to Caltrain, Bay Area Rapid Transit (BART), and local light-rail and bus transit services, such as the Santa Clara Valley Transportation Authority (VTA), would be provided at these stations. The San Jose Diridon Station would provide additional connections to Amtrak intercity (Capitol Corridor) and interstate rail services, and to Altamont Corridor Express (ACE) service. The Millbrae and San Jose Diridon stations, respectively, would provide access to SFO and Norman Y. Mineta San Jose International Airport (SJC), which are illustrated on Figure 1-6. The Project Section would connect to the San Jose to Merced Project Section south of the San Jose Diridon Station, extending HSR service to the Central Valley[8] and on to Los Angeles via Palmdale and Burbank.

The Downtown Extension Project (DTX) is a proposed 1.3-mile-long tunnel extending the electrified peninsula rail corridor in San Francisco from the existing 4th and King Street Station to the SFTC to connect with Caltrain, BART, the San Francisco Municipal Railway (MUNI), and bus lines for Alameda–Contra Costa County Transit District (AC Transit), Amtrak Thruway, Golden Gate Transit, Greyhound, San Mateo County Transit District (SamTrans), Western Contra Costa County Transit Authority (WestCAT) Lynx, and long-distance buses. Although the Authority would not construct the DTX, HSR would use this track to reach the SFTC. The Transbay Joint Powers Authority (TJPA) Board completed construction of the SFTC (Phase 1) and officially opened the transit center August 12, 2018. The SFTC includes the transit center structure with an aboveground urban park, bus access facilities, an underground walkway to the BART system, and two below-grade levels—a concourse level and a structural shell for the HSR and Caltrain train station. Because TJPA's DTX project (Phase 2) is not yet fully funded, the date of implementation is uncertain.

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[6] Prop 1A states that the high-speed train system eligible for its bond funds be designed to be capable of achieving a 30-minute nonstop service travel time between San Francisco and San Jose (California Streets and Highways Code § 2704.09(b)(3)). Prop 1A also states that the system follow existing transportation and utility corridors to the extent feasible (California Streets and Highways Code § 2704.09(g)).

[7] The 4th and King Street Station would serve as an interim HSR station until completion of the proposed DTX, which would extend the electrified peninsula rail corridor in San Francisco from the 4th and King Street Station to the SFTC.

[8] The Sacramento and San Joaquin Valleys combined are called the Central Valley.

Sources: Authority 2019b, 2019c

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Figure 1-3 San Francisco to San Jose Project Section

The DTX and SFTC projects were evaluated in the *Transbay Terminal/Caltrain Downtown Extension/Redevelopment Project Final EIS/EIR* (USDOT et al. 2004). The TJPA certified the Final EIS/EIR in 2004. The Federal Transit Administration and FRA issued the EIS Record of Decision in February 2005 (FRA 2005) to support FRA funding the train box (the subterranean portion of the transit center that will house HSR and Caltrain trains) and securing HSR rights to use four tracks in the SFTC station in perpetuity. In 2012, a Supplemental EIS/EIR was initiated to address adjustments to the DTX tunnel design. The FRA is a cooperating agency for the preparation of the *Transbay Transit Center Program Final Supplemental EIS/EIR* (USDOT et al. 2018), published November 2018.

This Project Section EIR/EIS focuses its Tier 2 analysis on HSR service and infrastructure between the 4th and King Street Station and the San Jose Diridon Station, an area that has not been studied in a Tier 2 environmental document. Relevant information and analysis from the DTX and SFTC projects are referenced where appropriate.

1.1.5 Lead Agencies, Cooperating Agencies, and Responsible Agencies

Pursuant to 23 United States Code (U.S.C.) Section 327 and the NEPA Assignment MOU between FRA and the State of California, effective July 23, 2019, the Authority is the federal lead agency for environmental reviews and approvals for all Authority Phase 1 and Phase 2 California HSR System projects (FRA and State of California 2019). In this role, the Authority is the project sponsor and the lead federal agency for complying with NEPA and other federal laws for the San Francisco to San Jose Project Section. The FRA administers the High-Speed Intercity Passenger Rail Program and has awarded California $3.48 billion in grant funding for statewide HSR system environmental studies, as well as construction in the Central Valley. FRA also has primary responsibility for developing and enforcing railroad safety regulations in accordance with Title 49 U.S.C. Subtitle V, Part A (49 U.S.C. § 20101 et seq.). Under the NEPA Assignment MOU, the FRA retains responsibility for certain actions including Clean Air Act conformity determinations and conducting formal government-to-government tribal consultations. The Authority is also the state lead agency under CEQA.

Two cooperating agencies participate in the NEPA review process. The USACE agreed by letter, dated December 30, 2009, to act as a cooperating agency under NEPA based on its role in the permitting and approvals process. The Surface Transportation Board (STB), by letter dated May 2, 2013, is also a cooperating agency under NEPA based on its role in approving rail line construction.[9] Multiple other federal agencies have been involved in and have contributed to the environmental review, including USEPA, U.S. Fish and Wildlife Service, National Marine Fisheries Service, National Park Service, and the Advisory Council on Historic Preservation.

A number of state and regional California agencies serve as CEQA responsible agencies for the project. These agencies include: California Department of Fish and Wildlife, Caltrans, Office of Historic Preservation, California Public Utilities Commission, California State Lands Commission, State Water Resources Control Board, San Francisco Bay Conservation and Development Commission, Bay Area Air Quality Management District, and the Peninsula Corridor Joint Powers Board (PCJPB). The Final EIR/EIS for the San Francisco to San Jose Project Section can be used by these agencies either through the provisions of CEQA Guidelines Section 15220 et seq. or CEQA Guidelines Section 15096 to approve or permit aspects of the HSR project.

1.1.6 Compatibility with Federal Transportation Policy

In 2008, the U.S. Congress enacted a major reauthorization of intercity rail passenger legislation, creating a new priority for rail passenger services in the nation's transportation system. PRIIA (Division B of Public Law [PL] 110-432) authorized the appropriation of federal funds to support HSR and intercity rail passenger service implementation, including authority for the Secretary of

[9] The STB is an independent federal agency with jurisdiction over the construction and operations of new interstate rail lines (49 U.S.C. §§ 10502, 10901). In 2013, the STB determined it has jurisdiction over all sections of the proposed California HSR System, including the San Francisco to San Jose Project Section, because of the HSR system's connection to the existing interstate rail network. STB, Docket No. FD 35724 (April 18, 2013).

Transportation to establish and implement an HSR corridor development program. In the American Recovery and Reinvestment Act of 2009 (PL 111-5), Congress appropriated $8 billion in capital assistance for HSR corridors and intercity rail passenger services. Congress provided an additional $2.5 billion in the U.S. Department of Transportation (USDOT) Appropriations Act (Title I, Division A of the Consolidated Appropriations Act, 2010). The Full-Year Continuing Appropriations Act, 2011 (PL 112-110) reduced available funding by $400 million. The FRA also issued a strategic plan, *A Vision for High-Speed Rail in America* (FRA 2009), describing the agency's plan for intercity passenger rail development and subsequent program guidance to implement the High-Speed Intercity Passenger Rail Program with funding provided by Congress through the appropriations acts.

The HSR system also is consistent with recent expressions of federal multimodal transportation policy—most notably the Fixing America's Surface Transportation (FAST) Act (PL 114-94, December 4, 2015); the Moving Ahead for Progress in the 21st Century (MAP-21) Act (PL 112-141, July 6, 2012); the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (PL 109-59, August 10, 2005); the Transportation Equity Act for the 21st Century (PL 105-178, June 9, 1998); and the Intermodal Surface Transportation Efficiency Act of 1991 (PL 102-240, December 18, 1991). These laws encourage public transportation investment that increases national productivity and domestic and international competition, while improving safety, social, and environmental conditions. These laws encourage investments that offer benefits such as the following:

- Link all major forms of transportation
- Improve public transportation systems and services
- Provide better access to seaports and airports
- Enhance efficient operation of transportation facilities and service

As the most current expression of federal multimodal transportation policy, the FAST Act seeks to improve surface transportation infrastructure, including roads, bridges, transit systems, and the passenger rail network. It provides long-term funding certainty for surface transportation, meaning that states and local governments can move forward with critical transportation projects, such as new highways and transit lines, with the confidence that they will have a federal partner over the long term. Overall, the FAST Act maintains current program structures and funding shares between highways and transit. The law also makes changes and reforms to many federal transportation programs, including streamlining the approval processes for new transportation projects and financing, providing new safety tools, and establishing new programs to advance critical freight projects.

1.2 Purpose of and Need for the High-Speed Rail System and the San Francisco to San Jose Project Section

1.2.1 Purpose of the High-Speed Rail System

The Statewide Program EIR/EIS established the purpose of the statewide HSR system, and identified and evaluated alternative HSR corridor alignments and stations as part of a statewide HSR system (Authority and FRA 2005).

> *The purpose of the statewide HSR system is to provide a reliable high-speed electrified train service that links the major metropolitan areas of the state and delivers predictable and consistent travel times. A further objective is to provide an interface with commercial airports, mass transit, and the highway network and relieve capacity constraints of the existing transportation system as increases in intercity travel demand in California occur, in a manner sensitive to and protective of California's unique natural resources.*

1.2.2 Purpose of the San Francisco to San Jose Project Section

The project's purpose is to implement the California HSR System to provide the public with electric-powered HSR service that offers predictable and consistent travel times between San Francisco and San Jose, facilitates connectivity to SFO and SJC, mass transit, the Bay Area highway network, and the statewide HSR system to:

- Achieve HSR service that meets Prop 1A travel time requirements in the Caltrain corridor
- Provide blended system infrastructure that supports commercially feasible HSR, while also minimizing environmental impacts and maximizing compatibility with communities along the rail corridor
- Establish an HSR connection to the economic center of Northern California

A further purpose of the San Francisco to San Jose Project Section is to construct, maintain, and operate an electrified high-speed train system, which includes the construction, improvement, upgrade, operation, and maintenance of new and existing facilities and infrastructure necessary to support the system connecting the SFTC in San Francisco to Diridon Station in San Jose. Consistent with state law and to minimize environmental impacts by providing a reduced HSR project footprint, the system would "blend" with the existing Caltrain system through the primary use of a two-track configuration, incorporating "common level"[10] boarding platforms at stations shared with Caltrain,[11] and using existing transportation corridors and rights-of-way. The system would be designed and operated to provide consistent and predictable travel, capable of achieving a nonstop service travel time of 30 minutes between San Francisco and San Jose.

The FRA, the Authority, the USACE, and the USEPA signed an MOU (NEPA-404 MOU) in November 2010 to integrate NEPA with the permitting processes under Section 14 of the Rivers and Harbors Act (Section 408), and Section 404 of the CWA. The NEPA-404 MOU provides a structure for this process that includes several checkpoints, with Checkpoint A describing the purpose and need for the project, Checkpoint B describing the range of alternatives to be studied in the project EIR/EIS, and Checkpoint C identifying the LEDPA among the range of alternatives.

1.2.3 CEQA Project Objectives of the High-Speed Rail System in California and in the San Francisco to San Jose Project Section

The Authority's statutory mandate is to plan, build, and operate an HSR system coordinated with California's existing transportation network, particularly intercity rail and bus lines, commuter rail lines, urban rail lines, highways, and airports. As the CEQA lead agency, the Authority is preparing this project EIR/EIS consistent with specific CEQA EIR content and processing requirements. CEQA Guidelines Section 15124 requires an EIR to include a statement of objectives that support the underlying purpose of the project. In response to its statutory mandate and CEQA requirements, the Authority has adopted the following objectives and policies for the proposed HSR system and the Project Section:

- Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports consistent with the Passenger Rail Vision in the CSRP
- Meet future intercity travel demand that would be unmet by current transportation systems and increase capacity for intercity mobility

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[10] "Common-level" boarding platforms are level with the interior doors of trains such that a passenger transferring from one train to a second train is not required to climb up or down steps to gain access to the second train on the same platform.

[11] Where the Draft EIR/EIS describes platforms at 4th and King Street, Millbrae, and San Jose Diridon Stations as "dedicated" for HSR, this refers to the current understanding of scheduling and timetabling at those stations. The schedules currently developed jointly with Caltrain enable HSR and Caltrain to use separate platforms at 4th and King Street, Millbrae, and San Jose Diridon Stations, which supports more reliable and resilient operations. However, in the event that Caltrain is unable to access its scheduled platforms, it would be able to share the high-level HSR platforms through the use of high-level doors fitted on new Caltrain trains.

- Maximize intermodal transportation opportunities by locating stations to connect with local transit systems, airports, and highways
- Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel
- Provide a sustainable reduction in travel time between major urban centers
- Increase the efficiency of the intercity transportation system
- Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible
- Develop a practical and economically viable transportation system that can be implemented in phases by 2040 and generate revenues in excess of operations and maintenance costs
- Provide intercity travel in a manner considerate and protective of the region's sensitive environmental resources and reduce emissions and VMT for intercity trips
- Provide blended system infrastructure that supports a viable operations plan for HSR, while also minimizing environmental impacts and maximizing compatibility with Peninsula[12] communities

While these CEQA project objectives are not directly incorporated into the Purpose and Need under NEPA, an alternative's ability to achieve these CEQA project objectives will be considered in evaluating the reasonableness of an alternative under NEPA.

1.2.4 Statewide and Regional Need for the High-Speed Rail System in the San Francisco to San Jose Project Section

The approximately 49-mile-long Project Section is an essential component of the statewide HSR system. As the northern Bay Area terminus of the HSR system, it would provide access to a new transportation mode; contribute to increased mobility along the Caltrain corridor and throughout California; and connect the Bay Area to the rest of the statewide HSR system via three counties—San Francisco, San Mateo, and Santa Clara—as illustrated on Figure 1-3. As a major population and economic center for California, the Bay Area contributes significantly to the statewide need for a new intercity transportation service that would connect San Francisco with Los Angeles and other regions of the state, as illustrated on Figure 1-2.

The capacity of California's intercity transportation system, including San Francisco, the Peninsula, and South Bay,[13] is insufficient to meet existing and future travel demand. The current and projected future system congestion will continue to result in deteriorating air quality, reduced reliability, increased travel times, more highway accidents, and increasing GHG emissions. The current statewide and regional transportation system has not kept pace with significant increases in population, economic activity, and tourism in the state, including in the Bay Area.

The interstate highway system, commercial airports, and the conventional passenger rail system serving the intercity travel market are operating at or near capacity and will require large public investments for maintenance and expansion to meet existing demand and future growth over the next 25 years and beyond. Moreover, the feasibility of expanding many major highways and key airports is uncertain; some needed expansions may be impractical or may be constrained by physical, regulatory, environmental, political, and other factors.

The need for improvements to intercity travel in California, including intercity travel between San Francisco, the Peninsula, and San Jose, relates to the following issues:

- Future growth in demand for intercity travel, including the growth in demand in the Bay Area
- Capacity constraints that will result in increasing congestion and travel delays, including those in the Bay Area, particularly in the Peninsula and South Bay

[12] For the purpose of this Draft EIR/EIS, the *Peninsula* is San Mateo County and northern Santa Clara County.

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

- Unreliability of travel modes stemming from congestion and delays, weather conditions, accidents, and other factors that affect the quality of life and economic well-being of residents, businesses, and tourists in California, including the Peninsula and South Bay
- Reduced mobility as a result of increasing demand on limited modal connections among major airports, transit systems, and passenger rail in the state, including the Peninsula and South Bay
- Poor and deteriorating air quality and pressure on natural resources due to expanding highways and airports as well as continued urban development, including those in the Bay Area
- Legislative mandates to moderate the effects of transportation on climate change, including required reductions in GHG emissions caused by vehicles powered by the combustion of carbon-based fuels

The following sections provide additional information about the factors contributing to the need for the Project Section.

1.2.4.1 Travel Demand and Capacity Constraints

Long-distance intercity trips, defined as those trips greater than 50 miles, are a large and growing proportion of the total travel market in California because of population and employment growth. To accommodate this increased demand, the state's long-distance passenger transportation infrastructure—highways, railroads, and air service—will require capacity expansion.

Population and Employment

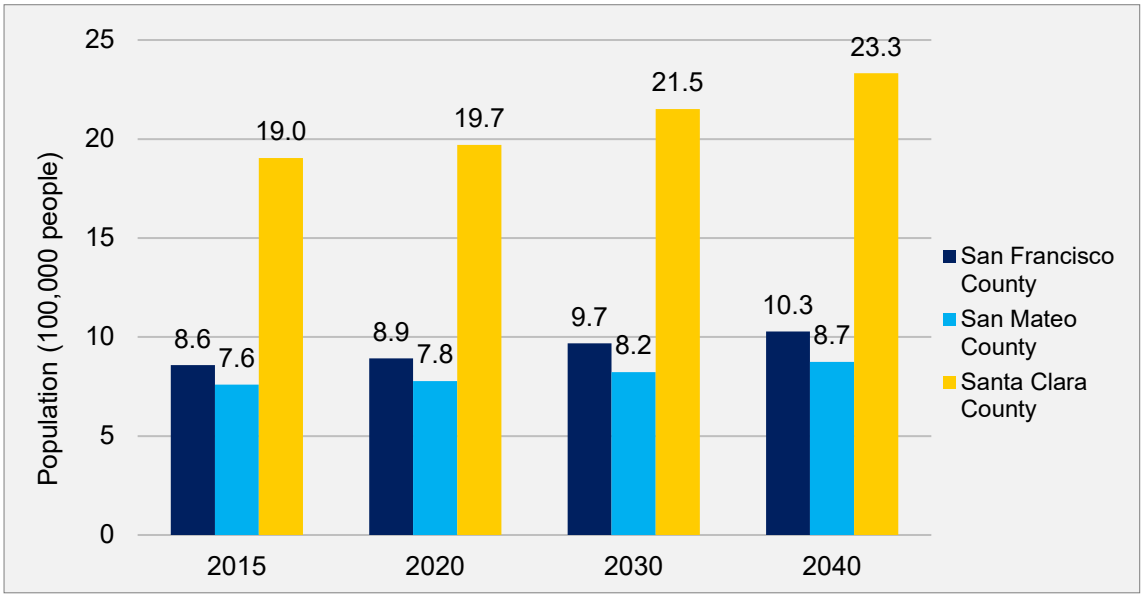
Between 2015 and 2040, the California Department of Finance (CDOF) projects that California's population will increase by more than 8 million residents, from approximately 39 million to 47 million people (20 percent growth), as shown in Table 1-1. Total population is expected to grow steadily to about 50 million by 2050 (CDOF 2014). The Bay Area, comprising nine counties—Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma—is California's second-largest metropolitan region. The project extends through San Francisco, San Mateo, and Santa Clara Counties. Projected growth rates in the three counties through which the project travels are similar to statewide projected growth—the CDOF projects the population in the three counties to increase by approximately 21 percent by 2040. The smallest and largest percent growth in population through 2040 are expected in San Mateo and Santa Clara Counties, respectively (Table 1-1). Figure 1-4 illustrates the projected population growth (represented in units of 100,000 people) between 2015 and 2040 in San Francisco, San Mateo, and Santa Clara Counties.

Table 1-1 Population Growth in California and the Counties of the San Francisco to San Jose Project Section

Area	Population		
	2015	2040 (projected)	Percent Growth 2015 to 2040
San Francisco County	857,508	1,027,004	20
San Mateo County	759,155	874,626	15
Santa Clara County	1,903,974	2,331,887	22
Counties of the San Francisco to San Jose Project Section[1]	3,520,637	4,233,517	20
California	38,907,642	47,233,240	21

Sources: CDOF 2014, 2016

[1] San Francisco to San Jose Project Section crosses San Francisco, San Mateo, and Santa Clara Counties.



Sources: CDOF 2014, 2016 JUNE 2019

Figure 1-4 Population Growth for San Francisco, San Mateo, and Santa Clara Counties

The Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC) project that between 2010 and 2040 the Bay Area will experience a growth of 1.3 million jobs, over 2 million people, and approximately 820,000 households (ABAG and MTC 2017). Between 2010 and 2015 job and population growth was greater than the increase in households due to lack of housing production. Almost 40 percent of these jobs would be in the region's three largest cities—San Francisco, San Jose, and Oakland. Nine of the 15 Bay Area cities expected to experience the greatest job growth are located in Silicon Valley because of knowledge sector job growth (ABAG and MTC 2013).

San Francisco is presently the second-largest employment center in California, and Silicon Valley, in Santa Clara County, is the largest high-tech employment center in the United States. The region also enjoys high employment in the professional services, health and education, and leisure and hospitality sectors. According to the San Francisco Convention and Visitors Bureau, San Francisco hosted 24.6 million visitors in 2015, of which approximately 18.9 million were leisure visitors and 5.8 million were visiting for business (San Francisco Travel Association 2016). As shown in Table 1-2, the lower unemployment rates and higher incomes indicate an abundance and wide range of high-level job opportunities in the counties traversed by the project.

Table 1-2 Unemployment and Income in California and in the Counties of the San Francisco to San Jose Project Section

Area	Percent Unemployment (2015)	Per Capita Personal Income (2015)
California	6.2	$53,224
San Francisco County	3.6	$96,903
San Mateo County	3.4	$88,087
Santa Clara County	4.2	$79,302

Sources: California Employment Development Department 2016a, 2016b; Caltrans 2016a

The growth of these economic centers, combined with the region's national reputation for education, medicine, and biotechnology, means that already congested local roads, highways, airports, and transit systems in the Bay Area will face unprecedented demand in the years ahead as people migrate to the state. Operation of the HSR system would reduce stress on regional freeways and highways by reducing intercity traffic and reallocating some airport travel demand.

The HSR system would serve planned mixed-use developments at the proposed HSR stations in San Francisco, Millbrae, and San Jose Diridon. The new housing proposed as part of the station area planning for the HSR stations would bring more employees into the area to help meet the projected job growth. Providing HSR service along the Peninsula at stations in Millbrae and San Jose would further support the continued growth of the Bay Area economy, providing a new regional transportation service with more direct access to San Francisco and Silicon Valley economic centers. HSR would not offer a below-market, subsidized passenger rail service, but instead would provide rapid long-distance travel, priced at commercial market rates. The pricing structure for HSR fares would be expected to be similar to typical airline fares but would fluctuate based on a variable pricing strategy (Authority 2018a). The cost of the HSR fares would discourage a daily commute to and from the Bay Area and Los Angeles basin.

Travel Demand

The population and employment growth in California and the Bay Area has resulted in increased travel demand, which is expected to continue to increase through 2040. Figure 1-5 illustrates the long-distance intercity trips[14] in California in 2010 and 2040 for automobiles, air travel, and conventional rail. Long-distance intercity travel in California is estimated to increase by approximately 51 percent between 2010 and 2040, from 548 million to about 828 million trips. The fastest-growing mode of transit for intercity trips is conventional rail, which is expected to increase 86 percent between 2010 and 2040. Without HSR, the automobile will continue to account for the greatest share of long-distance intercity travel and by 2040 is expected to account for more than 96 percent of all long-distance intercity travel.

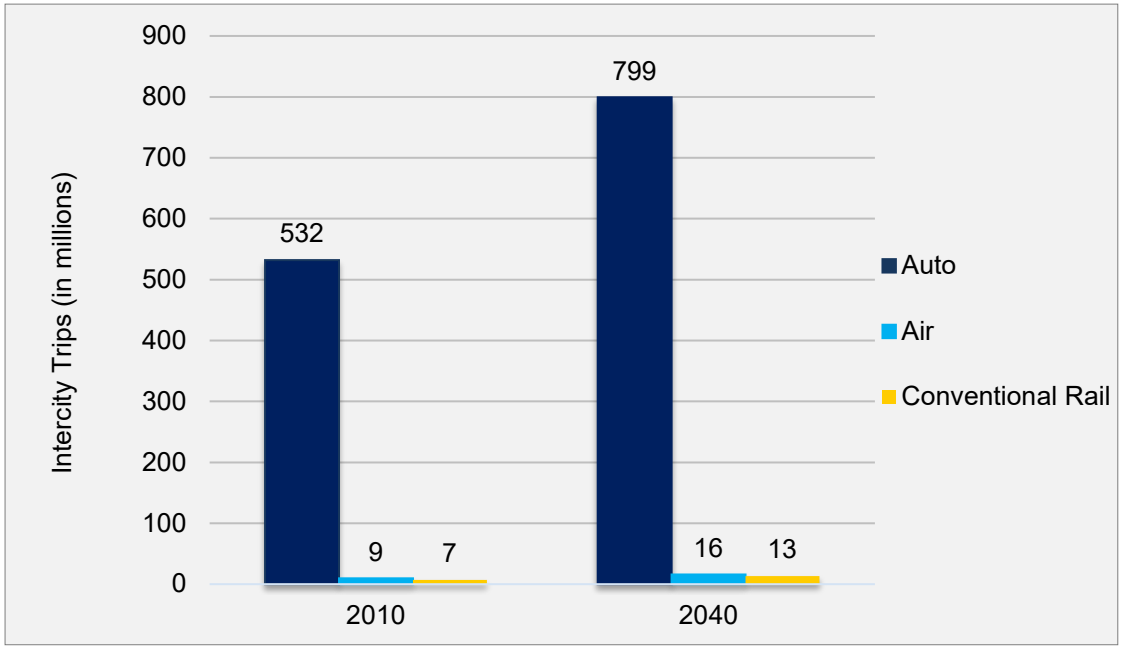


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Figure 1-5 Long-Distance Intercity Trips in California (in millions)

[14] Defined as trips greater than 50 miles.

Over the past decade the Bay Area has experienced a substantial increase in commuter traffic reflecting the increase in "reverse commute" trips[15] from San Francisco to Peninsula and South Bay locations and the increase in off-peak travel between the San Francisco, Peninsula, and South Bay locations (PCJPB 2015). With a growing Peninsula and South Bay population continuing to commute to increasing employment opportunities in San Francisco and, conversely, a growing San Francisco population commuting to increasing knowledge sector jobs in the South Bay, the existing regional transportation infrastructure between San Francisco and San Jose faces challenges in satisfying both regional and statewide travel demand. The HSR system is designed to provide additional capacity for regional and statewide travel. Figure 1-6 illustrates the major routes and airports used for long-distance travel among the markets potentially served by the HSR system.

[15] The *reverse commute* is a regularly taken round trip from an urban area (such as San Francisco) to a suburban area (such as Palo Alto or Mountain View) in the morning and returning in the evening. It typically applies to a trip to work in the suburbs from home in the city.

APRIL 2016

Figure 1-6 Major Intercity Travel Routes and Airports

The jobs-to-housing ratio is an indicator of the balance between employment and housing in a geographical area and can serve as a rough indicator of the amount of commuter travel demand to or from that geographical area. A low jobs-to-housing ratio (less than 1.0) suggests that relatively few job opportunities exist for community residents, requiring commuting elsewhere for work; while a high ratio (greater than 1.5) suggests a surplus of jobs, with employees needing to commute from surrounding areas to fill the available jobs. Table 1-3 shows the 2015 jobs-to-housing ratio and projected 2040 jobs-to-housing ratio for the San Francisco to San Jose Project Section region.

Table 1-3 Jobs-to-Housing Ratio: San Francisco to San Jose Project Section Region, 2015 and 2040

Area	2015			2040 (projected)		
	Jobs	Households	Ratio	Jobs	Households	Ratio
Counties						
San Francisco	748,545	388,515	1.9	872,230	483,695	1.8
San Mateo	385,900	270,715	1.4	472,340	317,965	1.5
Santa Clara	1,086,740	648,900	1.7	1,289,600	860,810	1.5
Cities						
San Francisco	748,545	388,515	1.9	872,230	483,695	1.8
Brisbane	5,445	1,835	3.0	16,870	6,410	2.6
South San Francisco	43,000	21,330	2.0	54,230	25,305	2.1
San Bruno	14,605	14,645	1.0	14,780	17,935	0.8
Millbrae	6,470	8,110	0.8	11,595	9,725	1.2
Burlingame	32,365	12,525	2.6	42,625	13,735	3.1
San Mateo	60,305	41,175	1.5	68,010	50,830	1.3
Belmont	9,210	10,805	0.9	9,430	11,620	0.8
San Carlos	17,825	13,445	1.3	19,135	13,985	1.4
Redwood City	69,460	30,410	2.3	86,720	38,085	2.3
Atherton	2,140	2,455	0.9	2,165	2,460	0.9
Menlo Park	35,105	13,830	2.5	42,475	17,680	2.4
Palo Alto	126,305	27,585	4.6	126,510	32,940	3.8
Mountain View	58,860	35,470	1.7	73,265	58,330	1.3
Sunnyvale	87,085	57,750	1.5	108,640	84,170	1.3
Santa Clara	136,980	46,980	2.9	170,575	57,010	3.0
San Jose	457,075	321,290	1.4	554,875	448,310	1.2

Source: ABAG and MTC 2018

Because the three counties traversed by the project have more jobs than housing, workers are commuting into these counties. By 2040, the projected increase in jobs and housing, accompanied by a continued high jobs-to-housing ratio in the three counties, would generate more commuters on the freeways, on commuter rail systems, and on regional and local bus systems commuting from surrounding areas. A similar trend is evident for several of the cities

along the Peninsula. The jobs-to-housing ratio projections provide another indication that the economic growth in the communities along the Peninsula will continue to increase travel demand for intercity travel services. The widening gap between population and employment growth and roadway capacity expansion means that a growing number of the region's residents will face congested travel conditions that will last for longer periods as more drivers adjust their time of travel to avoid the most heavily congested peak commute hours.

Freeway Congestion and Travel Delays

The existing freeway infrastructure in San Francisco, the Peninsula, and South Bay is overburdened by rapidly growing population and employment and the associated demand for transportation services. Existing demand for travel between San Francisco and San Jose via U.S. Highway (US) 101 and Interstate (I-) 280 regularly exceeds existing highway capacities, resulting in congestion that is increasing in both frequency and duration (PCJPB 2015). According to the most recent MTC Vital Signs data (MTC 2017), 7 of the Bay Area's 20 most congested highway segments (in terms of commuter time spent in congestion) are close to the project corridor. As illustrated on Figure 1-7, these segments are primarily along US 101 and highways accessing San Jose.

The most congested highway segments include the following (ranked in order of congestion, with most congested segment first):

1. US 101/I-80 in the evening, between Cesar Chavez Street and Treasure Island Tunnel in San Francisco County
2. US 101 in the evening, between Fair Oaks Avenue and Oakland Road/13th Street in Santa Clara County
3. I-280 in the evening, between Foothill Expressway and Seventh Street/10th Street/Virginia Street in Santa Clara County
4. US 101 in the evening, between Whipple Avenue and East Hillsdale Boulevard in San Mateo County
5. US 101 in the morning, between Story Road and North Fair Oaks Avenue in Santa Clara County
6. I-680/I-280 in the morning, between Capitol Expressway and Foothill Expressway in Santa Clara County
7. State Route (SR) 92 in the evening, between Hillsdale Boulevard to west end of San Mateo-Hayward Bridge in San Mateo County

Mobility data for the San Francisco–Oakland and San Jose urban areas indicate that 52 percent of peak VMT in 2014 occurred in congested conditions. Considering such factors as delay duration, value of time, and amount of excess fuel consumed, the cost of congestion can be translated into annual costs of $1,675 for the peak automobile commuter in San Francisco–Oakland, and $2,230 for the peak automobile commuter in San Jose (Urban Area Report 2014). Congestion and daily delay throughout the region, particularly on US 101 and I-280, will continue to increase if no roadway or transit improvements are made, constricting movement in the corridor, and stifling economic growth in San Francisco, the Peninsula, and the South Bay.

What is VMT?

Vehicle miles traveled, or VMT, is a measurement of miles traveled by vehicles in a specific region over a specific period of time.

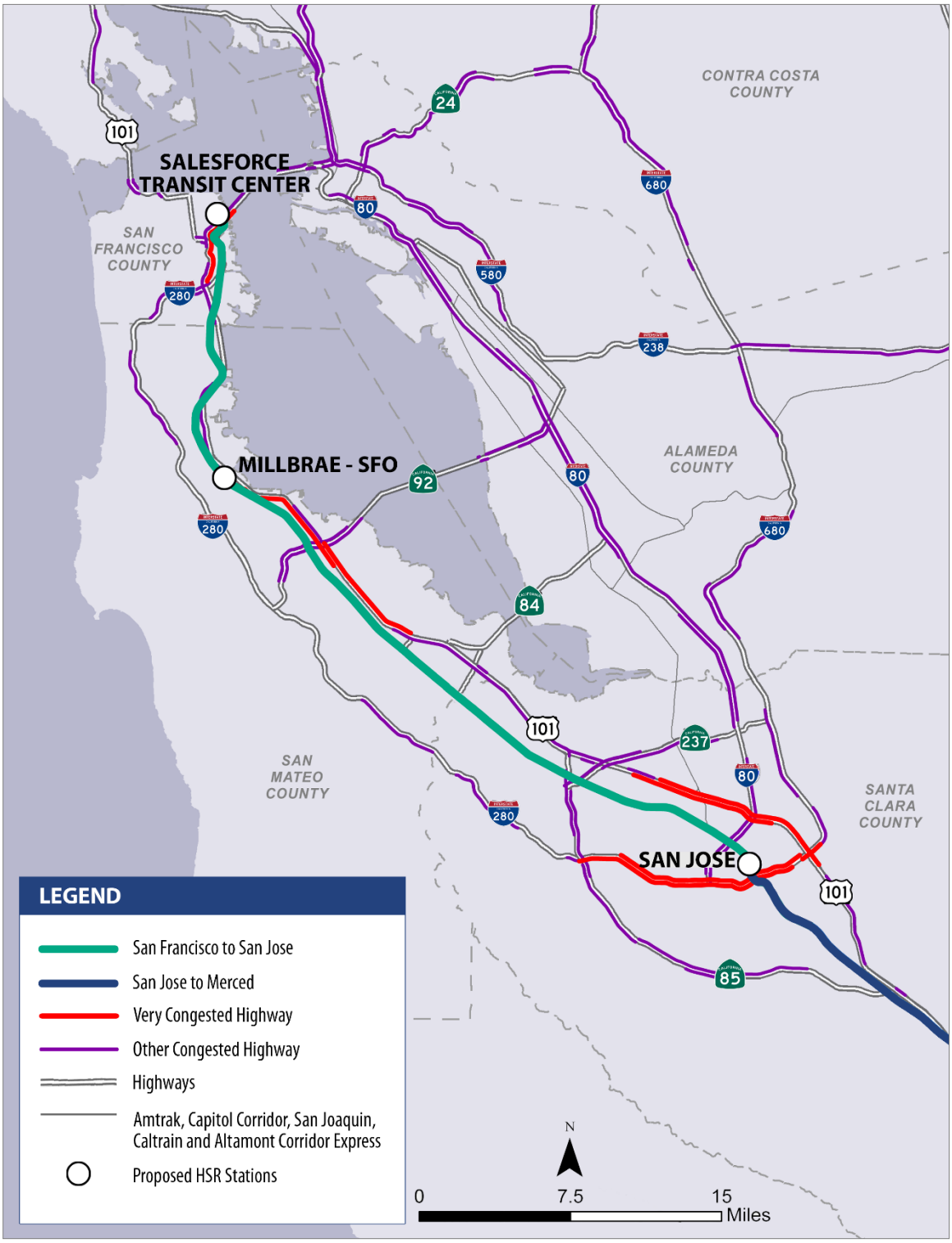

Figure 1-7 Most Congested Highway Segments

Increasing populations, in combination with increased demand for intercity travel, and an imbalance between employment and housing, are projected to generate increases to daily VMT in San Francisco, San Mateo, and Santa Clara Counties, as shown in Table 1-4. VMT in these counties is expected to increase at an average annual growth rate of between 0.5 to 1.0 percent over the 2015–2040 period, which will further exacerbate the traffic congestion in the region.

Table 1-4 Current and Projected Vehicle Miles Traveled

County	Daily Vehicle Miles Traveled (million)		
	Existing Conditions (2015)	Projection (2040)	Annual Growth Rate (percent)
San Francisco	6.6	7.5	0.5
San Mateo	11.4	13.6	0.7
Santa Clara	28.3	36.2	1.1

Source: Authority 2019d

The US 101 South Comprehensive Corridor Plan determined that the northbound US 101 section from the San Mateo/San Francisco County border near US 101/Candlestick Park to the US 101/SR 85 interchange junction in north Santa Clara County operated at level of service (LOS) E and F during peak periods, while southbound US 101 operated at LOS C and E during peak periods (Caltrans 2018). The peak period VMT on these US 101 freeway segments was forecasted to increase by 42 percent in the AM peak period and 40 percent in the PM peak period by 2030, substantially increasing congestion. The strategies for planned improvements for US 101 include ramp metering, traffic monitoring systems, closed circuit televisions, changeable message signs, auxiliary lanes, high-occupancy vehicle (HOV) lanes, transit improvements, demand management, freeway and surface street management, freeway and street improvements, and freeway/street operations (Caltrans 2012b). Completion of all planned structural and capacity improvements was estimated to significantly reduce peak period vehicle hours of delay (Caltrans 2018).

The *I-280 Transportation Concept Report* (Caltrans 2013a) determined that, in 2011, extended segments of I-280 in Santa Clara County operated at LOS F during peak hours, as well as segments in San Mateo and San Francisco Counties. The southbound direction approaching the beginning of the HOV lane in San Jose also experienced congestion. I-280 is anticipated to experience a significant increase in traffic volumes during both AM and PM peak hours by 2035, with the volume-to-capacity ratio at or exceeding 1.0 in several segments, indicating severe congestion (Caltrans 2013a). The planned improvements for I-280 through 2035 include ramp metering, changeable message signs, and camera monitors, as well as other operational strategies including traffic operation system improvements, ramp metering, and HOV lanes (Caltrans 2013a).

The major highway infrastructure in San Francisco, the Peninsula, and South Bay exemplify statewide trends, where much of the intercity travel consists of trips of intermediate distance (i.e., trips at least 150 miles long). Table 1-5 shows the expected growth in traffic volumes on major highways in California between 2010 and 2040.

Table 1-5 Travel Growth for Intercity Highways

Major Highways	Average Daily Volume 2010	Average Daily Volume 2040 (projection)	Percent Change 2010 to 2040
US 101 (between San Francisco and San Jose)	211,000	306,000	46
I-280 (between San Jose and San Francisco)	87,000	133,000	53
US 101 (between San Jose and Madera)	78,000	114,000	46
SR 152 (between San Jose and Madera)	27,000	48,000	78
SR 99 (between Modesto and Sacramento)	57,000	81,000	42
SR 99 (between Bakersfield and Modesto)	110,000	174,000	58
SR 99 (between Bakersfield and Merced)	24,000	43,000	79
I-5 (between Bakersfield and Modesto)	41,000	60,000	46
I-5 (between Modesto and Sacramento)	47,000	79,000	68
I-5 (between San Diego and Los Angeles)	229,000	284,000	24
I-5 (between Los Angeles and Bakersfield at Santa Clarita)	182,000	271,000	49
I-5 (between Lancaster and Los Angeles)	324,000	384,000	19

Source: Caltrans 2014
Average daily volume represents average weekday traffic over a 24-hour period.
I- = Interstate
SR = State Route
US = U.S. Highway

Freight Movement

Freight movement in the Bay Area is associated with international trade, domestic trade, and urban goods movement (Caltrans 2014). The region is an important international trade gateway—in 2017 the Port of Oakland was the eighth busiest port in the U.S. based on cargo volume, handling 99 percent of containerized goods moving through Northern California; the Port of San Francisco specializes in non-containerized cargo and has a thriving cruise industry; and the Port of Redwood City is the fastest-growing "small" bulk port in California (Caltrans 2011, 2012c, 2013b, 2019; Port of Oakland 2020). The Bay Area region is one of the top three primary gateways for containerized cargo on the Pacific Coast (Port of Oakland 2020). The Bay Area is also a major consumption center that relies on its domestic trade links to population-serving industries across the country; for instance, the region relies on the San Joaquin Valley for much of the warehouse and distribution infrastructure. The region also relies heavily on a local urban goods movement to provide basic consumer products, foods, and packages to residents and businesses in the region (Caltrans 2014).

The majority of freight in the vicinity of the project is transported by trucks, with more than 72 percent of the tonnage in the Bay Area transported by trucks in 2012 (MTC 2016). Passenger vehicle travel in the region competes with freight movement along I-80, I-880, I-580, I-680, I-280, US 101, portions of SR 92 (San Mateo Bridge), and other local roads. Existing truck traffic along these corridors ranges between 5,000 and 15,000 trucks per day, and these corridors will continue to be significant corridors for the movement of goods in the Bay Area. In the future, freight moving on the Bay Area freight system is expected to grow moderately at an annual growth rate of 2.2 percent, and as a result, increasing conflicts between truck and commuter traffic in this region are projected (Caltrans 2014; MTC 2016).

Two Class 1 railroads operate in the Bay Area: Union Pacific Railroad (UPRR) and BNSF Railway (BNSF). Freight flow by rail accounted for 3 percent of tonnage moved and 2 percent of

value moved in the Bay Area in 2012. Between San Francisco and San Jose, freight trains operate daily along the Caltrain corridor, making up less than 5 percent of train traffic on the Peninsula. Freight rail traffic 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, or placed on a truck trailer chassis) coming from the Port of Oakland (Caltrans 2014).

The primary products by tonnage moved in the Bay Area include waste and recycled products, construction inputs (non-metallic mineral products, gravel, and natural sands), and fuels and refinery inputs. Agricultural products also constitute a large share of goods movement. The top commodities by value being transported include electronics, machinery, and consumer products (MTC 2016).

The major international airports SFO, SJC, and Metropolitan Oakland International Airport (OAK) also act as global gateways for freight movement. OAK and SFO are not currently experiencing capacity concerns but the airport access roads do need improvement. Recent trends have shown a decline in air cargo demand and a shift to higher value cargo, such as electronics. Air freight is generally the most expensive but also the most reliable form of shipping for high-value, time-sensitive, and lightweight cargo. As such, major airports and connecting transport systems are a critical part of freight movement (MTC 2016).

Conventional Passenger Rail

The existing passenger train services in the study corridor for the Project Section are provided primarily by Caltrain and BART. Caltrain is the only commuter rail operation provided on the San Francisco Peninsula, and serves the entire study area in San Francisco, San Mateo, and Santa Clara Counties, operating from San Francisco to Gilroy via San Jose. Caltrain is managed by SamTrans and operates under the jurisdiction of the PCJPB. Caltrain operates 46 northbound and 46 southbound (a total of 92) trains per day between San Francisco and San Jose during the week, 36 trains on Saturdays, and 32 trains on Sundays. The system has a mixture of local, limited, and express trains. Annual ridership in 2016 was approximately 19.2 million (Caltrans 2018a). BART, owned by the San Francisco Bay Area Rapid Transit District, services the northern part of the study area, connecting San Francisco to Alameda and Contra Costa Counties in the East Bay and the Peninsula cities in San Mateo County. The approximately 120-mile heavy-rail rapid transit system operates on 5 routes with 48 stations, originating at Millbrae or SFO and ending at either Richmond, Antioch, Dublin/Pleasanton, or Warm Springs/South Fremont. Annual ridership in 2016 was approximately 129 million trips (BART 2016).

Other passenger rail services in the region include Capitol Corridor, San Joaquin, and ACE. The Capitol Corridor service, operated by Amtrak, runs passenger trains between the San Jose Diridon Station and Auburn via Sacramento. The San Joaquin service, also operated by Amtrak, runs from the Bay Area and Sacramento to Bakersfield and Southern California. The Capitol Corridor and San Joaquin routes served a total of 1.6 million and 1.1 million passengers, respectively, in 2016 (Caltrans 2018a). ACE, operated by the San Joaquin Joint Powers Authority, provides passenger service between the San Jose Diridon Station and Stockton via Livermore and Fremont. Ridership on ACE was approximately 1.3 million passengers in 2016 (Caltrans 2018a).

Air Travel

The demand for air travel has been growing steadily in California since 2009, and regional transportation plans (RTP) forecast continued growth in air travel over the coming decades (Caltrans 2018b). Air travel in the project region is provided by three primary airports—SFO, SJC, and OAK. A summary of the intercity service provided at these airports is shown in Table 1-6. Air travel to and from these airports is competitive with automobile travel, as each of these airports serves California's major metropolitan regions, and the costs to fly can be comparable to the cost of driving.

Between November 2014 and October 2015, Los Angeles to San Francisco was the second busiest air travel route in the United States, with 3.68 million trips (USDOT 2016a). Annual

passenger demand at SFO, the Bay Area's only primary large hub airport,[16] has already increased from 37.4 million passengers in 2009 to 44.9 million in 2013, a 20 percent increase in 4 years (Airports Council International 2014).

Table 1-6 Commercial Air Travel in the San Francisco to San Jose Project Section Region

Airport	Total 2014 Enplanements	Number of Carriers Providing In-State Service	In-State Airports Served
San Francisco International (SFO)	22,770,783	8	Bakersfield, Burbank, Eureka, Fresno, Long Beach, Los Angeles, Monterey, Ontario, Orange County, Palm Springs, Redding, Sacramento, San Diego, San Luis Obispo, Santa Barbara
Norman Y. Mineta San Jose International (SJC)	5,069,257	5	Burbank, Long Beach, Los Angeles, Ontario, Orange County, San Diego
Metropolitan Oakland International (OAK)	4,621,003	4	Crescent City, Santa Barbara, Orange County, Burbank, Long Beach, Los Angeles, Ontario, San Diego

Sources: FAA 2015a; SJC 2017; SFO 2016; San Francisco International Airport Commission 2014

Both SFO and Los Angeles International Airport are among the most capacity-constrained airports in the nation. A Federal Aviation Administration (FAA) study that examined future demand and operational capacity identified both airports as needing additional capacity by 2030 even with planned improvements (FAA 2015b). The study notes that SFO is an example of a capacity-constrained airport where new runway construction may not be a feasible solution. The study concludes that other solutions, including regional sharing of air travel among local airports, market mechanisms, and consideration of high-speed ground travel modes, will be needed to alleviate the demand and capacity constraints.

As early as 1998, SFO undertook studies to address capacity constraints associated with the airport's existing runway configuration. These studies included plans for new runways to be constructed on fill placed in San Francisco Bay, since expansion of the airport inland is not feasible. Because of environmental concerns and public opposition, SFO withdrew the expansion plans, and in 2008 the San Francisco Board of Supervisors passed a resolution that no additional fill should be placed in San Francisco Bay for new or reconfigured runways at SFO (City and County of San Francisco 2008).

Providing HSR service at the proposed Millbrae intermodal station would connect the HSR system and SFO. The HSR system, including the Project Section, would help to alleviate these capacity constraints at SFO by providing a new transportation mode between San Francisco and Los Angeles, and by improving regional transportation access to Southern California and the Central Valley.

The Bay Area's two primary medium hub airports—SJC and OAK—are projected to increase their annual passenger demand from 9.4 million passengers in 2014 to 17.6 million by 2027 at SJC, an 87 percent increase (City of San Jose 2016), and from 18 million annual passengers in 2010 to 30 million at OAK by 2025, a 67 percent increase (Port of Oakland 2006). Some projected air travel demand may be absorbed by medium hub airports in the Bay Area and Sacramento, and

[16] The FAA categorizes public-use airports based on the level of commercial air passenger traffic through each facility. Airports are categorized as primary airports (with more than 2,500 passenger boardings annually and receiving scheduled passenger aircraft service) and nonprimary, or general aviation, airports (with no scheduled passenger service or scheduled service with fewer than 2,500 passenger boardings annually) (FAA 2012). Primary airports are further subdivided by commercial air passenger volume into large hub, medium hub, small hub, and nonhub. General aviation airports are further subdivided by geographic service into national, regional, local, and basic.

by smaller external airports in the larger market area, such as Stockton and Monterey airports. However, the smaller external airports offer fewer flights and destination locations than the medium hub airports. Consequently, the external airports are not as attractive to the business commuter or international and national tourist travelers as the medium hub airports.

The HSR system would provide a new intercity travel option for air passenger from the Bay Area, serving passengers who would normally fly between the Bay Area and Los Angeles, Burbank, and Orange County. The California cities that would be served by HSR include 5 of the top 15 Bay Area domestic air passenger markets and 26 percent of all domestic passengers served from the three Bay Area airports (Regional Airport Planning Committee 2011). Because of existing constraints to expanding SFO and the large hub airports in Southern California, regional sharing of air travel among local airports, market mechanisms, and high-speed ground travel modes will be needed to alleviate the demand and capacity constraints.

Air passengers would be diverted to HSR by a combination of factors, such as frequent, reliable service, competitive fares, and arriving closer to their final destinations. These types of mode shifts have been observed internationally with the introduction of HSR—between Madrid and Seville, Spain, the share of air trips taken was reduced from 40 to 13 percent, while rail trips grew from 16 to 51 percent (Authority 2018a).

Travel Time

With growing demand for intercity travel and growing capacity constraints, total automobile travel time over the next 30 years will increase statewide. Table 1-7 shows the approximate total travel time in 2010 and the projected total travel time in 2040 for automobile, air, and rail between various city pairs.

Table 1-7 Estimated Total Travel Times (Door-to-Door in Hours and Minutes) between City Pairs by Auto, Air, and Rail (Peak Conditions)

City Pair	Auto[1]		Air[2,3]		Conventional Rail[3]	
	2010	2040	2010	2040	2010[4]	2040[5]
Los Angeles downtown to San Francisco downtown	6:27	6:53	4:37	4:32	11:40	11:29
Fresno downtown to Los Angeles downtown	3:37	3:51	4:03	4:23	5:49	5:55
Los Angeles downtown to San Diego downtown	2:24	2:28	4:11	3:55	3:02	3:24
Burbank (Airport) to San Jose downtown	5:22	5:43	3:43	3:43	10:31	10:40
Sacramento downtown to San Jose downtown	2:22	2:18	4:12	4:25	4:04	3:32

[1] Travel times come from California Statewide Travel Demand Model.
[2] Main-mode level of service assumptions are the same for 2010 and 2040 and are based on 2009 level of service conditions from the USDOT, Bureau of Transportation Statistics' origin and destination survey airline data. Total travel time differences based on changes in access/egress over time.
[3] Air and conventional rail times include access to main mode via transit, egress to main mode via transit, and terminal and wait time at station/airport. When transit is unavailable, auto is used for access/egress.
[4] Developed from published San Joaquin schedule.
[5] Year 2040 San Joaquin operating plan developed from the 2013 State Rail Plan (Caltrans 2013c).

Air and rail travel time are not projected to change substantially between 2010 and 2040. While increases in air travel times are not forecast, the number of desired flights to a given destination may be limited by runway capacity, thus reducing flexibility in available travel dates.

Projected increases in automobile travel time will be caused largely by growing travel demand and resulting congestion on highways used for intercity travel. Programmed and funded highway improvements will not measurably change these future conditions, and vehicle delays and congestion levels will continue to outpace the network's ability to serve the demand (ABAG and MTC 2017). Some capacity improvements funded for the Bay Area, Central Valley, and Southern California are only basic enhancements that will primarily improve reliability rather than travel time.

Continuing population growth and increasing tourism in California place severe demands on the already congested transportation system serving the state's major metropolitan areas. As described in the RTPs for areas that would be served by the proposed HSR system, the highways and airports serving key cities are currently operating at capacity and plans for expansion will not keep pace with projected growth over the next 20 to 40 years.

1.2.4.2 Unreliability of Travel

San Francisco, San Mateo, and Santa Clara Counties are served primarily by the US 101 and I-280 freeways. In 2014, freeway travel time during the peak period in the San Francisco–Oakland urban areas was 1.5 times as long as during low-volume conditions (Urban Mobility Scorecard 2015). This is the second-worst performance in California (behind the Los Angeles–Long Beach–Anaheim area), and the fourth worst nationally. In the San Jose area, freeway travel time during the peak period took 1.43 times as long as during low-volume conditions. On another index measuring freeway commuter stress, the San Francisco–Oakland urban area ranked worst in the nation (Urban Mobility Scorecard 2015). As congestion worsens, daily peak travel periods will lengthen.

The California Highway Patrol (CHP) publishes an annual summary of accident data for state highways. In 2017, the CHP reported that 3,904 fatalities and 277,160 nonfatal injuries occurred on California's highways (CHP 2017). With more vehicles on the intercity highways, the potential for accidents will continue to increase, resulting in increased travel delays as incidents are cleared. As delays on the freeways increase, overall system reliability tends to decrease. Implementation of HSR in the Project Section would offer a reliable and predictable alternative transportation option to highway travel.

Weather conditions in San Francisco, San Mateo, and Santa Clara Counties can adversely affect highway travel time reliability. Rain and wind can make the roads dangerously slick, while fog and glare can reduce visibility and distract drivers, increasing accident rates.

Weather conditions near SFO (primarily fog) are a key factor in flight delays, which adversely affect air travel reliability. From December 2014 to November 2015, weather was the cause of more than 57 percent of flight delays at SFO, the highest in the nation among major airports (USDOT 2016b). At SFO, capacity is highly dependent on weather conditions and whether aircraft pilots are allowed to follow visual flight rules (in good weather) or instrument flight rules (in poor weather). Implementing HSR in the Project Section would offer a transportation option that is less affected by weather conditions than driving or flying and, therefore, a more reliable and predictable option.

The reliability of rail travel along the Caltrain corridor is adversely affected by collisions and fatalities primarily associated with the joint use of the rail corridor by both passenger and freight rail services, as well as with the proximity of pedestrians and motor vehicles to trains at and along grade crossings. In 2017, California ranked second in the nation for the most highway-rail grade crossing incidents, first for the number of highway-rail grade crossing fatalities, and third for the number of railroad accidents (FRA 2018a, 2018b, 2018c). There were 18 highway-rail crossing fatalities in San Francisco, San Mateo, and Santa Clara Counties from January 2011 to December 2017 (FRA 2018d, 2018e, 2018f). Grade crossing safety is a high priority for Caltrain, the FRA, the Authority, and the California Public Utilities Commission. Highway-rail crossing improvements such as four-quadrant gates and other improvements under consideration would improve safety at existing grade crossings by reducing pedestrian, rail, and vehicle conflicts, increasing the reliability of travel along this corridor.

1.2.4.3 Limited Modal Connections

Statewide, modal connections among intercity travel facilities (primarily airports) and the extensive network of urban and commuter transit systems are often limited or cumbersome, involving multiple transfers and long waits, though improvement has been made in recent years. The HSR system would provide new and improved high-speed connections to intermodal facilities, including major airports and regional transit throughout the state. In the Bay Area, a major effort to strengthen these connections to local and regional transit systems is underway. For example, the Millbrae Station offers a connection to SFO via cross-platform service between BART and Caltrain and serves as a regional bus transit hub with multiple bus bays served by SamTrans lines. Access to SFO for passengers outside the region currently requires a combination of local and regional transit. Providing HSR service at the Millbrae Station would offer passengers from east of Gilroy and the Central Valley a more direct connection to SFO.

In downtown San Francisco, the TJPA built the SFTC, which serves as a local and regional transit hub for AC Transit, BART, Caltrain, Golden Gate Transit, Greyhound, SamTrans, MUNI, WestCAT Lynx, Amtrak, and Paratransit buses. The first phase of the SFTC was opened to the public in August 2018. It will accommodate an extension of the Caltrain rail line from its current terminus at 4th and King Streets, bringing Caltrain commuter rail and HSR service to the SFTC. The SFTC is designed to include an underground walkway connection to the BART system, which offers more than 100 miles of modern, heavy-rail service throughout San Francisco, San Mateo, Alameda, Contra Costa, and eventually, Santa Clara Counties.

The San Jose Diridon Station provides transit connectivity among Caltrain, VTA buses and light-rail routes, the Capitol Corridor (intercity passenger rail service between Sacramento and San Jose), ACE trains (commuter rail service between Stockton in the Central Valley and San Jose), and Amtrak service (connecting the Bay Area with Southern California). In addition, BART has planned an extension to the San Jose Diridon Station that will provide transit connectivity around the San Francisco Bay. Providing HSR service at the San Jose Diridon Station would expand the intercity modal connections to the Central Valley and Southern California.

HSR service between San Francisco and San Jose would provide an effective mobility option at the SFTC and San Jose Diridon Station. The service would expand linkages to a number of bus, light-rail, and commuter rail services for intercity travelers to other areas in the Bay Area and beyond.

1.2.4.4 Deterioration of Air Quality and Impact on Greenhouse Gas Emissions

Under the authority of the federal Clean Air Act (CAA), the USEPA established nationwide air quality standards to protect public health and welfare with an adequate margin of safety. The federal national ambient air quality standards (NAAQS) represent the maximum allowable atmospheric concentrations for ozone, particulate matter (particulate matter smaller than or equal to 10 microns in diameter [PM_{10}] and fine particulate matter smaller than or equal to 2.5 microns in diameter [$PM_{2.5}$]), carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. The CAA defines nonattainment areas as geographic regions designated as not meeting one or more of the NAAQS. The CAA requires that a state implementation plan (SIP) be prepared for each nonattainment area and a maintenance plan be prepared for each former nonattainment area that subsequently demonstrates compliance with the standards. A SIP is a compilation of a state's air quality control plans and rules that the USEPA has approved.

California has multiple air basins that contain nonattainment areas caused by one or more violations of the state's ambient air quality standards (Section 3.3, Air Quality and Greenhouse Gases), including the Great Basin Valleys, Lake Tahoe, Mojave Desert, Mountain Counties, North Central Coast, North Coast, Northeast Plateau, Sacramento Valley, Salton Sea, San Diego, San Francisco Bay Area, San Joaquin Valley, South Central Coast, and South Coast Air Basins (CARB 2016).

Metropolitan areas will continue to be challenged to reduce emissions to acceptable levels because of the growing number of vehicles, and to maintain air quality standards by encouraging

more efficient use of land resources, improving mobility, and providing alternative transportation facilities and services. Policies aimed at reducing the trip demand in single-occupant vehicles are integral to all transportation plans and programs to help areas currently in nonattainment status conform to the NAAQS. The Project Section is located in the San Francisco Bay Area Air Basin, which is under the jurisdiction of the Bay Area Air Quality Management District. The San Francisco Bay Area Air Basin exceeds federal and state air quality standards for ozone and $PM_{2.5}$ and the state standard for PM_{10} (Bay Area Air Quality Management District 2019). The projected population growth in the Bay Area will result in an increase in VMT, and thus in the volume of pollutants emitted by motor vehicles.

One statewide strategy adopted in CARB's California SIP is the development of multi-use transportation corridors. These corridors include designated HOV lanes, the addition of more transit, and the inclusion of rail modal options. To meet federal and state air quality standards over the next 20 to 40 years, the Bay Area and Central Valley will need to require VMT reductions, integrated land use and transportation planning and development, transportation demand strategies, operational improvements, and new technologies that improve transportation efficiencies and increase transportation alternatives to the single-occupant automobile. The electric-powered HSR system offers an additional transportation option to the single-occupant vehicle and would reduce VMT in support of the California SIP.

In 2005, California's governor set statewide targets for reducing GHG emissions. Executive Order (EO) S-3-05 requires that state agencies reduce their GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and 80 percent below 1990 levels by 2050. Shortly after the issuance of EO S-3-05, the California State Legislature adopted AB 32, the Global Warming Solutions Act of 2006. AB 32 recognizes that California is the source of substantial amounts of GHG emissions. Legislative findings in the law state the following:

> *The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to the marine ecosystems and that natural environment, and an increase in the incidences of infectious diseases, asthma, and other health-related problems.*

To avoid these consequences, AB 32 requires CARB, the state agency charged with regulating air quality, to create a plan and implement rules to achieve real, quantifiable, cost-effective reductions of GHGs in California. AB 32 requires CARB to design and implement emissions limits, regulations, and other measures to reduce statewide GHG emissions to 1990 levels by 2020. This requirement is the same 2020 target as in EO S-3-05. The Legislature has not enacted targets beyond 2020. In response to this legislation, CARB developed the *Climate Change Scoping Plan* (Scoping Plan) (CARB 2008), the state's road map to reaching the GHG reduction goals required by AB 32. The original 2008 Scoping Plan supported the implementation of a HSR system to provide more mobility choice and reduce GHG emissions. A 2017 Final Scoping Plan furthers support for HSR implementation by calling for investment in the cleanest, most advanced systems and infrastructure to move people and goods statewide to meet California's long-term air quality and climate objectives (CARB 2017).

In April 2015, Governor Brown issued EO B-30-15, setting an interim GHG emissions reduction goal for California to reduce GHG emissions to 40 percent below 1990 levels by 2030. EO B-30-15 was written to help make it possible for California to reach the ultimate goal of reducing GHG emissions to 80 percent below 1990 levels by 2050 as set forth in EO S-3-05.

SB 32, which became law in September 2016, codifies EO B-30-15 and extends the GHG emissions reduction goals of the California Global Warming Solutions Act of 2006. SB 32 requires CARB to ensure statewide GHG emissions reductions of at least 40 percent below 1990 levels by 2030. CARB adopted the *California's 2017 Climate Change Scoping Plan Update* in December 2017, which includes plans to achieve goals set forth by SB 32 (CARB 2017). HSR is a component of the statewide approach to GHG reductions from California's transportation system.

SB 100, the 100 Percent Clean Energy Act of 2018, makes it a policy of the state that eligible renewable energy resources and zero carbon resources supply 100 percent of all retail sales of electricity to California end use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045 (CARB 2018).

SB 375, which became law in September 2008, provides a new planning process to coordinate the community development and land use planning process with RTPs. SB 375 sets priorities to help California meet GHG reduction goals and requires the RTPs prepared by metropolitan planning organizations (MPO) to include a "sustainable communities strategy" or, if infeasible, an "alternative planning strategy" that would support the GHG emission reduction targets for automobiles and light trucks set by the CARB. On July 26, 2017, MTC adopted the latest RTP for the area: *Plan Bay Area 2040* (ABAG and MTC 2017), which specifies how approximately $303 billion in anticipated federal, state, and local transportation funds will be spent in the nine-county Bay Area during the next 25 years.

Metropolitan planning organizations (MPO)

MPOs are federally mandated and funded transportation policy–making organizations made up of representatives from local government and governmental transportation authorities. Comprising representatives from nine counties, the MPO for the San Francisco Bay Area is the Metropolitan Transportation Commission (MTC). The Project Section is located entirely within MTC's planning area.

Carbon dioxide (CO_2) is the transportation sector's primary contribution to climate change, accounting for 37 percent of California's GHG emissions from 2000 to 2013 (CARB 2015). CO_2 emissions from motor vehicles are essentially proportional to the amount of fuel consumed and increases in VMT—each 1 percent increase in fuel consumption results in a corresponding 1 percent increase in CO_2 emissions (USEPA 2008). The projected increase in VMT in the Bay Area will impede the region's ability to reduce its GHG emissions to meet the state standards established under SB 375. Because GHG emissions are directly proportional to the amount of fuel burned, offering effective transportation choices that can decrease driving time will be critical for reducing these emissions.

An electric-powered HSR system would reduce CO_2 emissions relative to travel by car. Emissions reductions are projected to start at almost 120,000 metric tons of carbon dioxide equivalent (CO_2e) with operation of the initial Silicon Valley to Central Valley line. With buildout of the Phase 1 system through 2040, average annual emissions reductions are projected to be over 1 million metric tons of CO_2e (Authority 2016). The HSR system would also provide a more energy-efficient mode of travel.

1.2.4.5 Deterioration of Natural Resources

In addition to improving or maintaining the state's air quality, the protection and preservation of natural resources by limiting potential impacts related to expanding freeway and airport facilities is also a critical need. Key resources affected by expanded transportation corridors include wetlands and waterways, habitat areas for sensitive species of plants and animals, wildlife migration corridors, and agricultural lands. These natural resources have been subject to both direct and indirect impacts as the population has increased and growth has proceeded in the state's less developed areas. Avoiding and minimizing impacts on sensitive natural resources is a guiding criterion in the environmental review process of the HSR system. The HSR system provides intercity travel capacity to supplement overused interstate and state highways and commercial airports, thereby limiting the need for constructing new freeway and airport facilities.

In California, new development has consumed an acre of agricultural land for every 9.4 people statewide. In the Bay Area, because of higher density development, this rate is an acre for every 9.7 persons (Thompson et al. 2008). The projected population growth in San Francisco and the communities along the Caltrain corridor in the coming decades will generate ongoing pressure to convert undeveloped lands to urban uses. The project would ease the pressure to develop open space, and thereby preserve natural resources, by expanding transit capacity on an existing rail corridor and at existing transit centers in San Francisco, Millbrae, and San Jose. Transit center planning by the local communities to increase development densities is already underway at

these existing stations proposed for use as future HSR stations. In San Francisco, the SFTC project includes residential and commercial uses, entertainment facilities, and a rooftop park; the Millbrae Station Area Plan prepared by the City of Millbrae envisions a mix of residential and commercial uses, and the VTA San Jose Diridon Station area planning project will increase development densities around the station. These transit-oriented developments will provide housing, employment, and entertainment opportunities, while minimizing impacts on sensitive natural resources.

1.2.4.6 Public Benefits of the High-Speed Rail System to the Bay Area

The HSR system would provide numerous benefits to the entire Bay Area, including environmental, economic, and social benefits. Among the public benefits that the HSR system would provide are the following:

- **Increasing mobility options**—Using current modes of travel between San Francisco and Los Angeles takes between 4.5 and 11.5 hours. The completion of Phase 1 of the HSR system, which would provide service between San Francisco and Los Angeles, would afford travel times between the two cities of less than 3 hours. As described in Section 1.2.4.3, Limited Modal Connections, a new transportation mode between San Francisco and Los Angeles would help alleviate capacity constraints at SFO from limitations on potential new runway construction. Additionally, providing HSR service at existing local and regional transit hubs would connect HSR passengers to local, regional, and state transit systems serving these stations.
- **Contributing to a cleaner environment**—The projected population growth in the Bay Area will result in an increase in VMT, and thus in the volume of pollutants emitted by motor vehicles. As described in Section 1.2.4.4, Deterioration of Air Quality and Impact on Greenhouse Gas Emissions, the electric-powered HSR system would reduce VMT in support of the California SIP, thereby contributing to a decrease in the emissions of harmful air pollutants, such as particulate matter, carbon monoxide, and nitrogen oxide. The average annual GHG emissions savings provided by the HSR system, which would equate to over 1 million metric tons of CO_2e (Authority 2016), is equal to taking 322,000 passenger vehicles off the road every year.
- **Stimulating economic activity and creating jobs**—The investment in the HSR system has, over an 11-year period from 2006 to 2017, generated between $5 billion and $6 billion in total economic activity in the State (Authority 2018a). Over the last 2 years, the Authority, working with partner agencies, was allocated and received authorization from the CDOF to use nearly $700 million in Prop 1A bond funds for improvements to existing rail lines within certain sections of the system to allow HSR to “blend” operations with other users. In the Project Section, the Authority contributed funds for the Caltrain Peninsula Corridor Electrification Project, the San Mateo 25th Avenue Grade Separation Project, and SFTC. These projects have generated jobs and business opportunities in the Bay Area, including for small and disadvantaged businesses and workers.
- **Minimizing open space conversion**—The HSR system would increase intercity travel capacity, which is presently stressed by heavy use of the interstate and state highway systems and commercial airports. As described in Section 1.2.4.5, Deterioration of Natural Resources, this increased capacity would reduce the need for new freeways and airport facilities, thereby reducing impacts on ecologically important areas that would be associated with the development of new infrastructure. The Project Section would also use the existing Caltrain corridor, minimizing disruption to natural resources.
- **Improving safety and security**—The Project Section would be built according to international safety guidelines and would include several key safety mechanisms, such as positive train control (PTC), safety improvements at existing Caltrain stations, perimeter fencing, and four-quadrant gates at at-grade crossings. These improvements are expected to alleviate a number of safety concerns related to the existing Caltrain tracks.

1.3 Relationship to Other Agency Plans, Policies, and Programs

The objectives of the California HSR System include providing an interface between the HSR system and major commercial airports, mass transit, and the highway network. This section describes plans and programs that have been considered in the development of the project alignment and station locations, or that already include recommendations for an HSR project.

1.3.1 California Transportation Plan 2040

The *California Transportation Plan 2040* (CTP 2040) (Caltrans 2016b) provides a long-range policy framework for guiding transportation decisions and investments by all levels of government and the private sector. CTP 2040 defines goals, performance-based policies, and strategies to achieve the collective vision for California's future statewide, integrated, multimodal transportation system, envisioning a sustainable system that improves mobility and enhances quality of life. Federal and state laws require developing and preparing a state transportation plan and updating it every 5 years.

The CTP 2040 (Caltrans 2016b) was adopted in June 2016, and was originally initiated in early 2010 with the development of the *California Interregional Blueprint Interim Report* (Caltrans 2012a) in response to SB 391, which requires Caltrans to update the *California Transportation Plan* every 5 years. The California Interregional Blueprint is a state-level transportation blueprint that articulates the state's vision for an integrated multimodal transportation system that complements RTPs and land use visions, and provides the foundation for the CTP 2040 (Caltrans 2016b), which concluded with the CTP's approval by the Secretary of the California State Transportation Agency in June 2016.

The CTP 2040 update focuses on meeting new trends and challenges, such as economic and job growth, climate change, freight movement, and public health. The HSR system would support CTP 2040 goals, policies, and strategies by providing an efficient and reliable means of transportation that facilitates economic and job growth, by providing electric-powered transportation that reduces GHG emissions and air pollutants that contribute to climate change, and by providing relief to California's strained highway and rail systems.

1.3.2 Plan Bay Area 2040

Plan Bay Area 2040 (ABAG and MTC 2017), adopted in July 2017, is the Bay Area's plan to meet the requirements of SB 375, which requires the state's MPOs to develop a sustainable communities strategy to reduce GHG emissions from passenger vehicles. *Plan Bay Area 2040*, developed by ABAG and MTC, serves as the region's sustainable communities strategy and RTP, integrating transportation and land use strategies to manage GHG emissions and plan for future population growth. This plan focuses on the region's housing crisis, stating that the region must "pursue a multi-pronged strategy that emphasizes the construction of new homes for residents of all incomes, the protection of the region's most vulnerable households, and the need to advocate for more financial resources to pursue local and regional solutions" (ABAG and MTC 2017).

The plan also identifies climate protection as a key initiative. The Climate Initiatives Program has two primary strategies for reducing GHG emissions: investing in strategies to reduce VMTs and transportation-related emissions, and promoting cleaner fuels through incentives, education, and policy reform. The electric-powered HSR system would reduce GHG emissions and provide a more energy-efficient transportation mode in support of SB 375 and *Plan Bay Area 2040* climate and transportation system effectiveness initiatives.

The BART extension to San Jose/Santa Clara, Caltrain Electrification, and the SFTC and DTX are three of the major transit projects included in *Plan Bay Area 2040* (ABAG and MTC 2017). These transit projects are supported by the San Francisco to San Jose Project Section, which would provide connections to BART service in San Jose and along the Caltrain corridor, contribute funding to electrification of the corridor, share corridor use with Caltrain, and provide connections to other local and regional transit services at the SFTC.

1.3.3 San Francisco Bay Area Regional Rail Plan

The *San Francisco Bay Area Regional Rail Plan* (Regional Rail Plan) (MTC 2007), adopted by MTC in September 2007, represents a long-term vision for improving the passenger rail system to serve future Bay Area travel demand. MTC joined with BART, Caltrain, and the Authority to develop the plan. The Regional Rail Plan examines ways to incorporate passenger trains into existing rail systems, improve connections to other trains and transit, expand the regional rapid transit network, increase rail capacity, and coordinate rail investment around transit-friendly communities and businesses. Prepared prior to the *Bay Area to Central Valley High-Speed Train Final Program EIR/EIS* (Authority and FRA 2008), the Regional Rail Plan explores three possible regional rail scenarios, including regional rail without HSR, regional rail with HSR entering from the east (Altamont Pass), and regional rail with HSR entering from the south (Pacheco Pass). Overall, the plan looks at improvements and extensions of railroad, rapid transit, and HSR services for the near-term (5 to 10 years), intermediate (10 to 25 years), and long-term (beyond 25 years) time frames.

The Regional Rail Plan specifically acknowledges the opportunity for HSR to enhance and accelerate regional rail improvements, noting, “a statewide high-speed train network would enable the operation of fast, frequent regional services along the high-speed lines and should provide additional and accelerated funding where high-speed and regional lines are present in the same corridor.” The plan also acknowledges that limited-stop high-speed trains could operate along the Peninsula along with continued operation of local services. The Project Section would help satisfy multiple objectives of the Regional Rail Plan by incorporating HSR passenger trains into existing rail systems, improving transit connections, expanding the transit network, and increasing rail capacity.

1.3.4 Metropolitan Transportation Commission Resolution No. 4056 Memorandum of Understanding

MTC Resolution No. 4056 (MTC 2012), adopted in March 2012, approves an MOU summarizing the agreement among the MTC, Authority, PCJPB, San Francisco County Transportation Authority (SFCTA), San Mateo County Transportation Authority, VTA, City of San Jose, City and County of San Francisco, and TJPA to:

- Jointly support and pursue the implementation of a statewide HSR system that uses a blended system and operational model on the San Francisco Peninsula Corridor with its northern terminus at the SFTC in San Francisco and its southern limit at Mile Post 51.4 at the Tamien Caltrain Station in San Jose
- Jointly recognize a defined set of interrelated projects consistent with the Authority’s phased implementation plan and with blended system operation of the corridor, that achieve objectives including capacity and connectivity for Caltrain, HSR, and freight; public safety; operational efficiency; effectiveness; and connectivity
- Generally describe, identify, and work to fully fund an interrelated program of projects, including the Peninsula Corridor Electrification Project; PTC; DTX to SFTC; and a core capacity project of needed upgrades to stations, tunnels, bridges, potential passing tracks and other track modifications, and rail crossing improvements[17]

1.3.5 Valley Transportation Plan 2040

The *Valley Transportation Plan 2040* (VTP 2040) (VTA 2014a) is the countywide long-range transportation plan for Santa Clara County prepared by VTA, which also acts as the congestion management agency for the county. VTP 2040 provides location-specific improvements in three major program areas: highways, local system, and transit. The highways program includes major freeway improvements, local freeway interchanges, and express lanes. The local system includes local roadway improvements, expressway improvements, pedestrian and bicycle projects, and

[17] Described in more detail in Section 1.4.4, Caltrain Modernization Program.

technology-related projects. The transit program includes projects related to transit efficiency and new transit improvements. The VTP 2040 capital investment program includes Caltrain and HSR station improvements at San Jose Diridon Station to accommodate HSR. Additional investments in the Peninsula Corridor were established through MTC Resolution No. 4056 and the associated MOU to prepare the corridor for implementation of blended Caltrain and HSR operations in the future. VTA was one of the agencies involved in establishing the investment framework for modernizing the Peninsula Corridor that was formalized in the MTC Resolution No. 4056 MOU.

Implementing HSR along the Peninsula is anticipated in VTP 2040 through funding allocations and VTA participation in MTC Resolution No. 4056. HSR would support the vision of VTP 2040 by increasing multimodal transportation infrastructure and services and providing benefits to air quality, while reinforcing the link between transportation and land use planning. Providing HSR at the San Jose Diridon Station would enhance the utility and connectivity of VTP 2040's planned transit investments, connecting HSR service to regional rail services such as Caltrain, ACE, Capitol Corridor, and Amtrak Coast Starlight; VTA light rail; eight VTA bus routes; and Greyhound and Santa Cruz Metro bus lines.

1.3.6 Caltrain Strategic Plan 2015–2024

Caltrain operations

Current Caltrain weekly operations include a mix of 92 express (Baby Bullet), limited, and local trains.

Caltrain provides inter- and intracounty commuter rail service along the Peninsula (San Francisco, San Mateo, and Santa Clara Counties). The PCJPB operates Caltrain 365 days a year with reduced schedules on weekends and major U.S. holidays. Scheduled headways, or the time between arrivals of trains moving in the same direction, vary by time of day, station, and service type. Overall, service is frequent during the peak periods and is provided every hour in both directions during midday periods. Caltrain now carries an average weekday ridership of more than 58,000 (Caltrain 2015: page 3). In 2012, the MTC, the Authority, Caltrain, and six other Bay Area funding partners established an agreement (MTC 2012) to support the blended system and to invest in the Caltrain Modernization Program.

The *Caltrain Strategic Plan* (Caltrain 2014) was developed in the context of the Caltrain Modernization Program. Over the coming decade, the Caltrain Modernization Program will electrify and upgrade the performance, operating efficiency, capacity, safety, and reliability of Caltrain's commuter rail service through the delivery of several key projects. These include the electrification of the existing Caltrain corridor from San Francisco to San Jose; the replacement of most of Caltrain's diesel trains with high-performance electric trains; and upgrades to the signal system that includes federally mandated safety improvements.

1.3.7 Caltrain 2040 Business Plan

Caltrain began development of a new business plan in 2018 and adopted a long range service vision in 2019. Caltrain's service vision plans for a substantially expanded rail service that would triple Caltrain's current ridership to 180,000 riders per day; increase frequency of train service during commute hours; expand express train service to every 15 minutes all day; and provide increased capacity, longer trains, and level boarding. It is a vision that includes DTX to the SFTC in San Francisco, potential new rail connections across the Dumbarton Bridge to connect communities across the San Francisco Bay, the rebuilding of a new Diridon Station in San Jose, and expanded electrified service to Gilroy and a shared corridor with HSR. The Caltrain 2040 Business Plan will further develop the service vision for the Caltrain corridor, define the infrastructure needed to support that service vision, and identify opportunities to fund the implementation of these improvements. It is anticipated that Caltrain's 2040 Business Plan will be adopted by mid-2020.

1.3.8 San Francisco Transportation Plan 2040

The *San Francisco Transportation Plan 2040 Final Report* (SFTP) (SFCTA 2013) was developed as the blueprint for San Francisco's transportation system development and investment over the next 30 years. As the congestion management agency for San Francisco, SFCTA is responsible

for developing the plan and overseeing the delivery of the Prop K half-cent local transportation sales tax program through the *New Transportation Expenditure Plan for San Francisco* (Prop K Expenditure Plan) (SFCTA 2003), which was approved by San Francisco voters in 2003. This Prop K Expenditure Plan estimates that by 2040 new growth will result in about 300,000 new transit trips per day on a system that is already strained by crowding and reliability issues. SFCTA has served since 1990 as the San Francisco program manager for grants from the Transportation Fund for Clean Air. In this role, SFCTA approves funding for transportation projects that directly benefit air quality through reduced motor vehicle emissions.

The Prop K Expenditure Plan affirms funding for a few already committed major capital projects including the San Francisco Municipal Transportation Agency's (SFMTA) Central Subway Project and the Caltrain Peninsula Corridor Electrification Project. The centerpiece of the Prop K Expenditure Plan is the development of a network of rapid bus and rail transit corridors.

The SFCTA adopted an updated Final SFTP Report in October 2017 (SFCTA 2017). The 2017 update reiterates the goals set forth in the 2013 plan but includes updates on funding forecasts and provides progress reports. The update also anticipates new policies and planning activities and reflects the updates set forth in *Plan Bay Area 2040* (ABAG and MTC 2017).

The HSR system would help achieve the goals of the SFTP by expanding the City's existing multimodal transportation networks, creating an attractive travel option and alternative to regional and long-distance automobile use, and further developing an existing rail transit corridor. The major capital project for funding in the 30-year expenditure plan is the DTX to the SFTC, which is proposed as the northern terminus for Caltrain and HSR services. Because the DTX project, which is estimated to cost $2.6 billion, is not yet fully funded, the date of implementation is uncertain.

1.3.9 San Joaquin Corridor Strategic Plan

The *San Joaquin Corridor Strategic Plan* (Caltrans 2008) formalized the short-term (3 to 5 years), medium-term (6 to 10 years), and long-term (11 to 25 years) vision for passenger rail service in the Central Valley. The San Joaquin Valley Rail Committee, established in 1987, includes representatives from 13 counties along the San Joaquin train route: Alameda, Contra Costa, Fresno, Kern, Kings, Los Angeles, Madera, Mariposa, Merced, Sacramento, San Joaquin, Stanislaus, and Tulare Counties. The Committee's focus is on possible service improvements, tracking progress, acting as an advisory council, and maintaining cooperative relationships with stakeholders and interested parties. The purpose of the plan is to develop a program of improvements that will increase rail ridership, revenue capacity, reliability, and safety in the corridor. Key stakeholders involved in the development of the plan included Amtrak, BNSF, UPRR, and the San Joaquin Valley regional transportation planning agencies. Public input on the plan suggested: (1) improving communications regarding passenger services and ensuring station safety and security in the short term, (2) adding more frequent service and more stations in the medium term, and (3) providing passenger rail in the UPRR corridor and direct connections to Los Angeles and the Bay Area in the long term.

1.3.10 ACE Extension Lathrop to Ceres/Merced

The ACE trains connect the Central Valley to the Santa Clara Valley via the Altamont Pass and Alameda County. The system operates on an 86-mile UPRR corridor and provides four round-trip trains per day between Stockton and San Jose. Two stations—Santa Clara and San Jose Diridon—overlap service with Caltrain.

The San Joaquin Regional Rail Commission (SJRRC) proposed expanding ACE service to Ceres and Merced. The focus of the ACE Extension Lathrop to Ceres/Merced (referred to as the ACE Extension) is to enhance intercity and commuter rail service and to promote greater transit connectivity between the Central Valley and the San Francisco Bay Area (SJRRC 2017). ACE will serve an important role as feeder service to the HSR system. SJRRC proposes the ACE Extensions system improvements in two phases. During Phase I of ACE Extension, ACE would be extended between Lathrop and Ceres and commuters would be able to transfer to one of the

round-trip trains between Stockton and San Jose. During Phase II of ACE Extension, ACE would be extended between Lathrop and Merced and commuters would be able to transfer to one of the round-trip trains between Stockton and San Jose. The Notice of Determination was released in August 2018, approving the proposed project.

1.3.11 Valley Link

No direct rail connection currently exists between ACE and BART. The Tri-Valley San Joaquin Valley Regional Rail Authority is proposing the Valley Link Project, which would bridge this gap and establish rail service from the existing Dublin/Pleasanton BART station to the proposed ACE North Lathrop Station.[18] The purpose of this project is to improve rail connectivity between BART and ACE; improve connection within the Bay Area; and to support the vision of the CSRP to connect the Northern California Megaregion[19] to the state rail system.

1.3.12 Capitol Corridor 2014 Vision Plan Update

The Capitol Corridor operates 15 daily round-trip trains between Sacramento and the Bay Area; all trains provide service to Jack London Square in Oakland and seven of the trains continue service south to San Jose. Two stations—Santa Clara and Diridon—overlap service with Caltrain. The Capitol Corridor currently carries approximately 1.4 million annual passengers.

The *Capitol Corridor 2014 Vision Plan Update* (Capitol Corridor Joint Powers Agency 2014) maps out a strategy and identifies system improvements to provide a modern railroad built to international standards and capable of operating at speeds of up to 150 miles per hour. This rate of speed could reduce travel times between Sacramento and San Jose to 90 minutes. The Capitol Corridor would be part of an intercity rail passenger coalition that would provide complementary service in corridors in which HSR operates and would branch off HSR to extend rail service to smaller cities in the state.

Capitol Corridor short-term improvements would focus on increasing the number of trains between Oakland and San Jose from 7 to 11 daily round-trip trains. Mid-term improvements would expand service from 11 to 15 daily round trips between Oakland and San Jose. Long-term improvements are focused on options for greater separation of freight and passenger service. Several options have been identified for further consideration, including a potential shift of passenger service to the east as it passes from the San Jose Diridon Station north to Fremont and Union City. Long-term improvements would also include additional infrastructure improvements, such as automatic train control, signal improvements, tilting rolling stock, electrification, and express train service.

1.3.13 Bay Area Rapid Transit Vision Update

BART connects San Francisco to Alameda and Contra Costa Counties in the East Bay and the Peninsula cities in San Mateo County. The BART Silicon Valley Extension, managed by VTA, is a program of improvements in the Silicon Valley Rapid Transit Corridor that will extend BART service into Santa Clara County. The first phase of the 16-mile extension, the Berryessa Extension, will provide service to Berryessa Station in San Jose in 2020. The second phase of the extension would provide service to Diridon and Santa Clara Stations, where it would overlap with Caltrain service (VTA 2018a).

The *BART Vision Update* (BART 2014) focuses on BART's longer-term future to determine where BART should focus investments. In service since 1972, BART developed the Vision Update in the context of the aging BART system. The BART Vision Update identifies railcar replacement; train control system modernization; and construction of a new, state-of-the-art maintenance and storage facility in Hayward as its immediate priorities. Other priority investments are "state of good repair" maintenance needs and station modernization. The BART Vision Update also

[18] The proposed North Lathrop Station is a component of the ACE Extension Project.

[19] The Northern California Megaregion is composed of 21 counties grouped into four regions: Bay Area, Sacramento Area, Northern San Joaquin Valley, and Monterey Bay Area.

identifies expansion as an investment priority and describes potential new corridors and infill stations to increase capacity (BART 2014).

1.3.14 San Francisco International Airport Master Plan

SFO is the largest airport serving the Bay Area and the ninth-busiest U.S. airport in terms of total passengers and total cargo tonnage. Although located in unincorporated San Mateo County, the airport is owned and operated by the City and County of San Francisco on approximately 5,100 acres just east of US 101 and west of San Francisco Bay. To accommodate forecasted growth, the approved *San Francisco International Airport Master Plan* (City and County of San Francisco 1992) addressed landside facilities, including the passenger terminal complex, aircraft aprons, air freight facilities, aircraft maintenance hangars, general aviation facilities, and support facilities such as administration, parking, and roadways. Several projects were delayed because of adverse economic conditions and the events of September 11, 2001, causing a drop in passenger levels and aircraft operations.

In 2007, passenger levels and airport operations returned to pre-2001 levels and have since steadily increased, supporting the recent completion of some of the planned facilities, including improvements to Terminal 2, Terminal 3 Boarding Area E, runway safety areas, and the Terminal 3 East Concourse. The overall total airport passenger traffic was more than 55 million in 2017, an increase of nearly 35 percent since 2010 (Caltrans 2018b). To accommodate future growth, planned projects include the construction of a new air traffic control tower and airport-owned hotel, and redevelopment of Terminal 1 and the West Field Cargo Building.

Ground transportation services at SFO include shuttles, taxis, rental cars, ridesharing, and limousines/charters. Public transit serving the airport includes BART (via SFO AirTrain), Caltrain (via BART to Millbrae Station), and SamTrans bus service directly to the airport terminals. BART provides regional connectivity between the airport and the greater Bay Area, including San Francisco, as well as providing a link to Caltrain via the Millbrae Station. SamTrans bus routes KX, 292, 397, and 398 provide 24-hour bus service between SFO and various points throughout San Mateo County and into parts of San Francisco and Palo Alto. The project would enhance modal connectivity at Millbrae Station by adding a regional/statewide transportation option, and would provide HSR travelers from outside the region a convenient connection to SFO and points throughout the Peninsula via the transportation options currently operating at Millbrae Station.

1.3.15 San Jose International Airport Master Plan

SJC is one of the three primary airports that serve the Bay Area. Classified by the FAA as a medium hub airport and ranked as the 44th busiest airport in terms of total passengers in 2013 (City of San Jose 2014), it is owned and operated by the City of San Jose on 1,050 acres at the southern end of San Francisco Bay. The airport is generally bounded by US 101 on the north, the Guadalupe River and SR 87 on the east, I-880 on the south, and Coleman Avenue and De La Cruz Boulevard on the west. The *Update: Airport Master Plan for Norman Y. Mineta San Jose International Airport* (Airport Master Plan) (City of San Jose Airport Department 2011) was approved in 1997 and updated in 2011. It identifies a range of improvements to airside and landside facilities to accommodate the forecasted 2027 air passenger, air cargo, and general aviation demand. Passenger demand fluctuated between 2006 and 2012, largely because of the nationwide recession and associated airline capacity cuts. During this period, the Airport Master Plan was revised to more closely align project implementation to air passenger and facility demands. The airport served 12.4 million passengers in 2017, a 31 percent increase from 2010 passenger volumes (Caltrans 2018b).

Ground transportation services at the airport includes shuttles, taxis, rental cars, and limousines/ charters. The VTA Route #10 (the VTA Airport Flyer) provides connections from the airport to BART, VTA light rail, Caltrain, Amtrak, and ACE rail services. A new transit link to the airport from VTA's Guadalupe light-rail transit line, and from Caltrain and the future BART extension in Santa Clara, using automated people mover technology, is part of the VTP 2040 capital investment program (VTA 2014a). Implementing the project would provide HSR service at Diridon Station,

which is close to the airport and offers a connection point for HSR and air travelers, increasing modal connectivity at this regional airport.

1.3.16 Metropolitan Oakland International Airport

Built in 1927, OAK is one of the three primary airports that serve the Bay Area's shipping and passenger travel needs. It is owned and operated by the Port of Oakland and is located on the east side of the San Francisco Bay and south of Oakland in Alameda County. The *Oakland International Airport Master Plan* was prepared between June 2004 and December 2005 and finalized in March 2006 (Port of Oakland 2006). It forecasts future aviation activity and presents potential development areas. The airport served 13 million passengers in 2017, a 26 percent increase from 2010 passenger volumes (Caltrans 2018b). The master plan forecasts an increase to 30 million annual passengers by 2025.

Ground transportation services at the airport include shuttles, taxis, rental cars, and limousines/ charters. Public transit includes BART (Oakland Airport Station) and AC Transit. BART and Line 73 of AC Transit connect OAK with the Coliseum BART station. From there, passengers can travel to Oakland, downtown San Francisco, Berkeley, and other major cities in the Bay Area. Access to Amtrak is also available from the Coliseum BART station.

1.4 Relationship to Other Transportation Projects in the Study Area

The objectives of the HSR system include providing an interface with major commercial airports, mass transit, and the highway network. Other key transportation projects in the project area that offer intercity travel benefits and that could enhance intermodal connections to the proposed HSR system are described in this section. These projects have been considered in the planning and development of the Project Section and station locations.

1.4.1 Salesforce Transit Center and Downtown Rail Extension

The SFTC will serve as a regional transportation hub replacing the former Transbay Terminal in downtown San Francisco. The SFTC extends just south of Mission Street from Second Street to Beale Street and will connect eight Bay Area counties with 11 transportation systems, including AC Transit, BART, Caltrain, Amtrak, Golden Gate Transit, Greyhound, SamTrans, MUNI, WestCAT Lynx, Paratransit, and the future HSR. The Phase 1 project was completed in 2018 with the official opening on August 11, 2018. After a temporary closure, the SFTC was re-opened following repairs on July 1, 2019.

The DTX is part of Phase 2 of the SFTC program and will extend the Caltrain commuter rail as well as future HSR service from the existing 4th and King Street Station to the new SFTC. This 1.3-mile extension will be primarily below-grade, with an underground station planned at Fourth and Townsend Streets (TJPA n.d.).

1.4.2 San Francisco Municipal Transportation Agency Central Subway Project

The Central Subway Project is Phase 2 of the SFMTA Third Street Light Rail Transit Project. It will include a 1.7-mile alignment with four new stations, extending MUNI's T-Third Line from Caltrain's existing Fourth Street Station to Chinatown. This project will link the Bayshore and Mission Bay areas to South of Market, Union Square, and downtown areas. Construction began in 2011 and is expected to continue through 2020, with testing occurring between 2020 and 2021.

1.4.3 Bayshore Multimodal Terminal

The existing Bayshore Caltrain Station will undergo improvements and development to accommodate current demand on the regional and local transportation systems as well as increases in future transportation needs because of anticipated growth in the area. The Bayshore Multimodal Terminal will alleviate pressure from increased traffic generated by multiple land development proposals such as the Brisbane Baylands, Schlage Lock, and Executive Park (SFCTA 2012). It will provide a connection hub for the new regional growth as well as the proposed transportation improvements in the area including: the MUNI T-Third Light Rail Transit extension, Geneva-Harney Bus Rapid Transit (BRT) line, the extension of Geneva Avenue

providing a street connection, additional bus and shuttle services, Caltrain Modernization, and the US 101/ Candlestick Point interchange. The Bayshore Multimodal Terminal Facility Study was carried out by the San Francisco Planning Department and four alternative concepts were presented to the public during an open house on November 3, 2016. This project presents the opportunity to develop the Bayshore Station in unison with the development of the surrounding area and neighborhoods (SFPD 2017).

1.4.4 Caltrain Modernization Program

The Caltrain Modernization Program will electrify and upgrade the performance, operating efficiency, capacity, safety, and reliability of Caltrain's commuter rail service through the delivery of several key projects. These include the electrification of the existing Caltrain corridor from San Francisco to San Jose, implementation of PTC, and the replacement of most of Caltrain's diesel trains with high-performance electric trains or electric multiple units (Caltrain 2018). The environmental process on the Peninsula Corridor Electrification Project (electrification and new electric trains) was completed in January 2015. The implementation of PTC is planned to be operable by the end of 2020. The Caltrain electrification is scheduled to be completed in 2022 (Caltrain 2018).

1.4.5 Caltrain Grade Separations in San Mateo County

Caltrain intends to improve safety in the railway corridor with grade separation between trains and vehicles/pedestrians/bicyclists. Two grade-separation projects are currently planned in San Mateo County—the 25th Avenue Grade Separation Project in San Mateo and the Burlingame Broadway Grade Separation Project. These grade-separation projects will be undertaken in coordination with the local jurisdictions. The 25th Avenue Grade Separation Project would elevate the Caltrain tracks at 25th Avenue, lower the existing roadway, and build a new elevated Hillsdale Station. Project approvals for the 25th Avenue Grade Separation Project are complete with construction underway and expected to be completed in 2021 (Caltrain 2019). Design of the Burlingame Broadway Grade Separation Project, which would separate the tracks from the roadway at Broadway and build a new elevation Broadway Station, is currently underway; environmental clearance is expected to be completed in summer 2020 (Caltrain 2019).

1.4.6 South San Francisco Caltrain Station Improvement Project

The South San Francisco Caltrain Station Improvement Project, which is currently under construction and anticipated to be completed in fall 2020, would replace the existing South San Francisco Station with a new center boarding platform connected to a pedestrian underpass (Caltrain 2019). The project, which would also entail track work and signal work, would improve safety and eliminate the hold-out rule.[20]

1.4.7 Bay Area Rapid Transit Silicon Valley Extension

The BART Silicon Valley Extension involves various transportation improvements in the Silicon Valley Rapid Transit Corridor. This corridor extends from the southern boundary of Alameda County in Fremont through Milpitas, San Jose, and Santa Clara. The planned improvements include a 16-mile, six-station extension of the existing BART system into Silicon Valley (VTA 2018a). The BART Silicon Valley program also includes other related projects and activities required to prepare the rail corridor for BART, such as relocation of existing UPRR tracks and utilities, drainage improvements, and grade-separation projects in the alignment that are funded through other sources. BART Silicon Valley is managed by the VTA in cooperation with BART. BART Silicon Valley will be constructed in phases. Phase I is the Berryessa Extension, extending 10 miles from the Warm Springs Station in Fremont and creating two new stations: (1) Milpitas Station, at the intersection of Montague Expressway and Capitol Avenue; and (2) Berryessa Station, located between Berryessa and Mabury Roads adjacent to the San Jose Flea Market (VTA 2018b, 2018c, 2018d). Phase II will extend BART from the planned Berryessa Extension for

[20] The hold-out rule is the rule enforced at Caltrain stations that have only one outboard platform which prevents a train from entering the station while another train at the station is boarding or alighting passengers.

approximately 6 miles, ending at grade in Santa Clara adjacent to the Santa Clara Caltrain Station and Santa Clara University, with three additional stations with below-ground concourses and boarding platforms.

1.4.8 Silicon Valley Express Lanes

The VTA Silicon Valley Express Lanes program is expanding the network of express lanes used by carpoolers, motorcyclists, and clean-air vehicles for free, as well as single-occupant vehicles that pay a toll with a FasTrak transponder. The program would be implemented over four phases across the SR 237 and SR 85/US 101 freeways. Operation of Phase 1 of Santa Clara County's first express lanes on the SR 237/I-880 corridor began in March 2012. Phase 2 is currently under construction, while Phases 3 and 4 are pending funding but anticipated to be built between 2019 and 2021 (VTA 2018e).

1.4.9 ACE Extension Lathrop to Ceres/Merced

As described under Section 1.3.10, ACE Extension Lathrop to Ceres/Merced, the ACE Extension proposed by the SJRRC would extend ACE service to Ceres and Merced. Specifically, SJRRC plans to extend ACE service to Manteca, Ripon, Modesto, Ceres, Turlock, Livingston,[21] Atwater, and Merced.

1.4.10 Valley Link

As described under Section 1.3.11, Valley Link, the Valley Link Project would provide a rail connection in the tri-valley, between BART and ACE. Stations would be located between the Dublin Pleasanton BART and the proposed North Lathrop Station: Isabel Station, Greenville ACE Intermodal Station, Mountain House Station, Downtown Tracy Station, and River Islands Station. The following three additional stations are currently being considered: South Front Station, Grant Line Road Station, and Ellis Station.

1.4.11 Bus Rapid Transit

In accordance with VTA's *Bus Rapid Transit Strategic Plan*, the agency has initiated BRT projects for Alum Rock Avenue and Stevens Creek Boulevard corridors (VTA 2009). A brief description of these projects follows:

- The Alum Rock-Santa Clara BRT Project provides 7 miles of limited-stop rapid transit service between the Eastridge Transit Center to the Arena Station in downtown San Jose using Capitol Expressway, Alum Rock Avenue, and Santa Clara Street. Construction was completed in May 2017.
- The Stevens Creek BRT Project would provide a rapid transit service for 8.5 miles from DeAnza College to the Transit Mall in downtown San Jose using San Carlos Avenue and Stevens Creek Boulevard. The Stevens Creek project would add BRT service in addition to the local service, which would provide fast, frequent service with limited stops and enhanced amenities for passengers (VTA 2014b). Based on ridership demand along the Stevens Creek corridor, VTA implemented Rapid 523 bus service in 2019 as a near-term improvement and early deliverable of the Stevens Creek BRT Project. It will provide a connection from the Berryessa BART Station to West San Carlos/Stevens Creek via downtown San Jose, providing fast, frequent, and reliable service to Santa Clara and Cupertino. It will increase service frequency, improve passenger waiting areas, and speed up the service with coordinated traffic signals (VTA 2018f).

[21] Only one station would be implemented in either Livingston or Atwater. At this time, SJRRC is considering them both as a possible station. SJRRC would identify the preferred station in the subsequent project-level environmental documentation for Phase II improvements, which would complete the detailed analysis of the impacts and benefits of these two options.