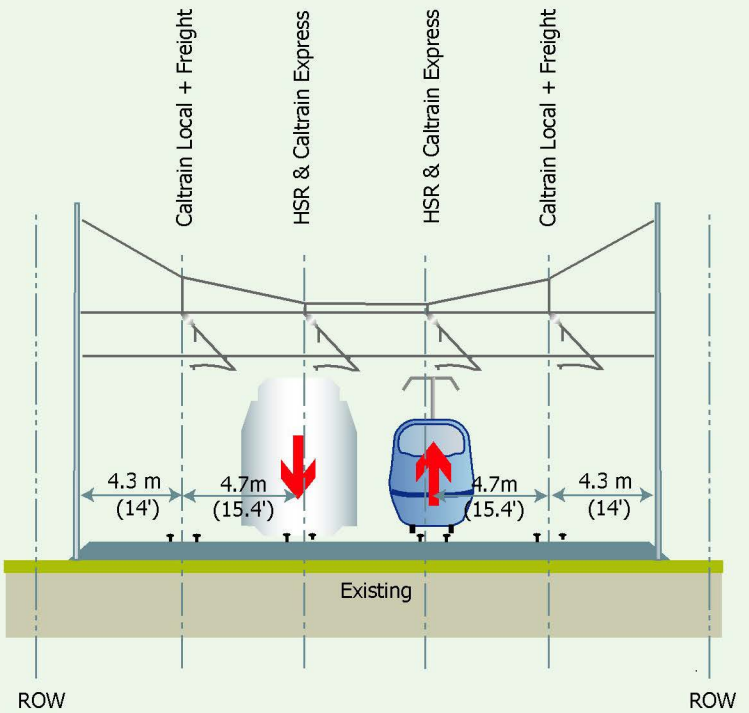
Plaintiffs' Exhibits from Record

Hearing on Motion for Judgment

Feb. 11. 2016

Seg. 10
4 main tracks at existing rail profile on existing slightly elevated embankment. 2 new main tracks on each grade of existing double main.



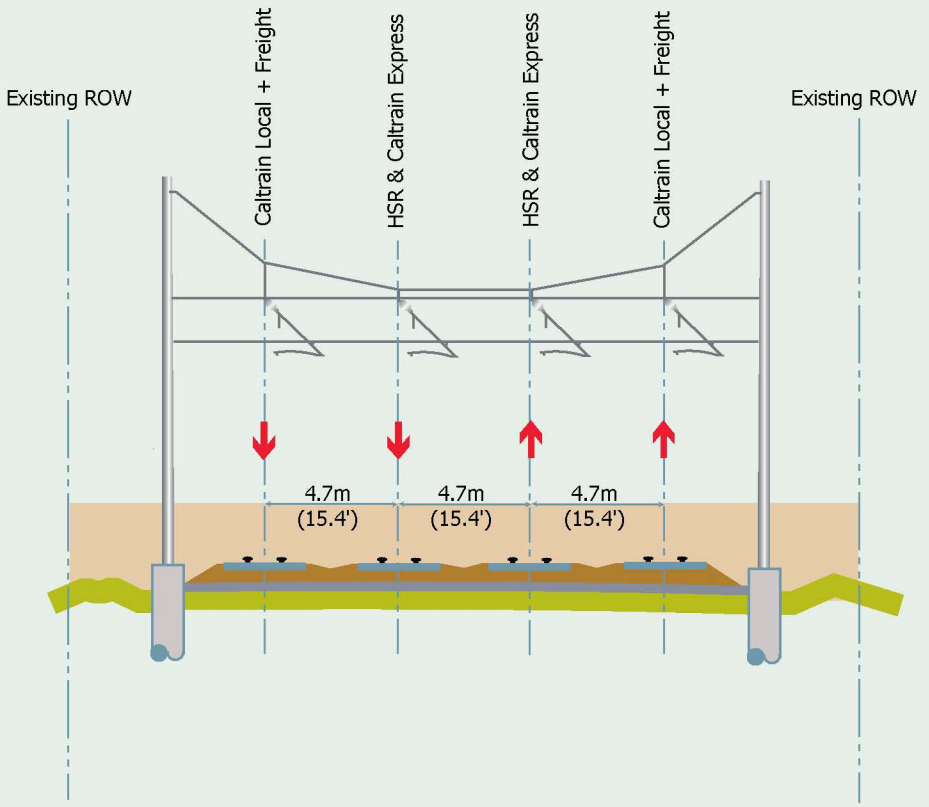
Proposed

California High-Speed Train Program EIR/EIS

Retained Fill Section
Bay Area - Merced Region
Caltrain Shared-Use Alignment
San Francisco to San Jose

Figure A.44

H7.011067

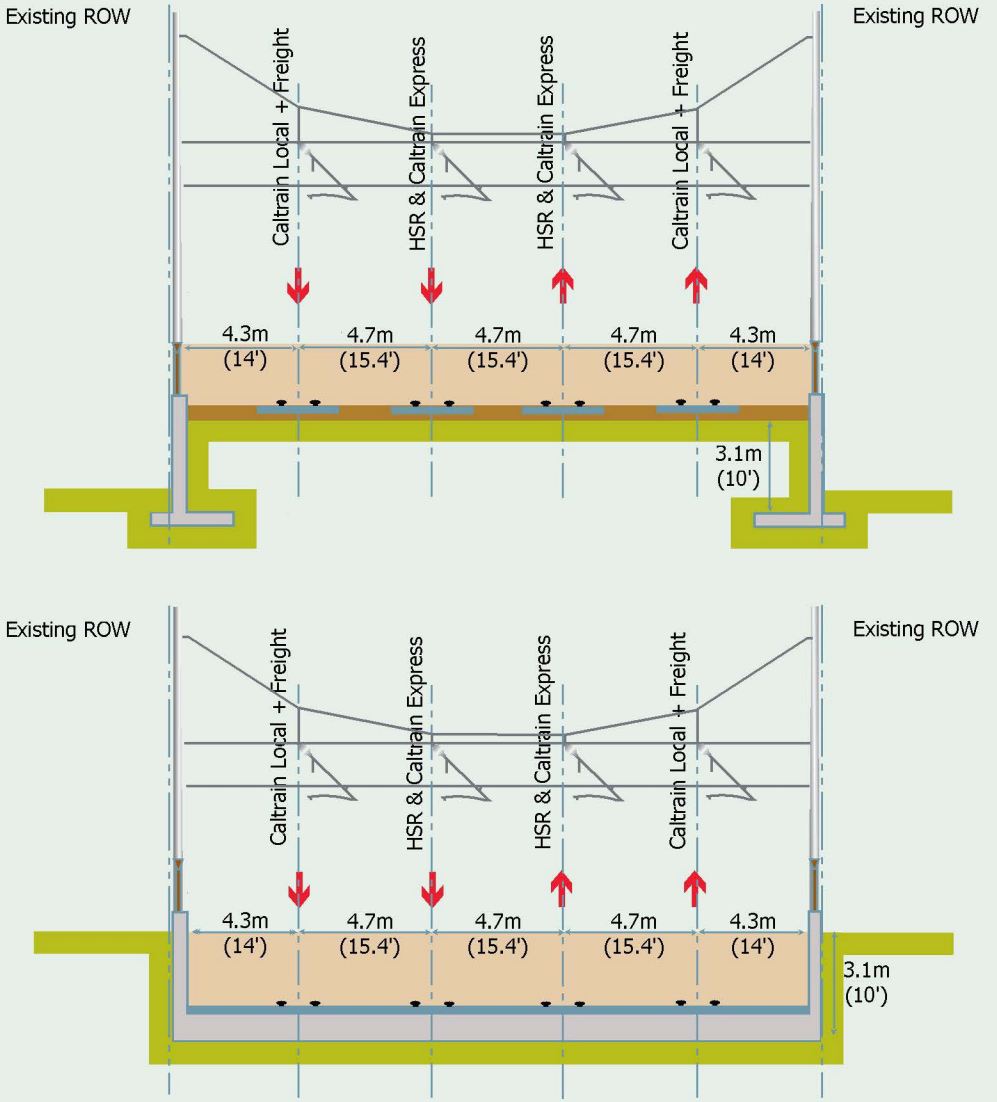


California High-Speed Train Program EIR/EIS

Typical Four Tracks at Grade
Bay Area - Merced Region
Caltrain Shared-Use Alignment
San Francisco to San Jose

Figure A.38

H7.011061

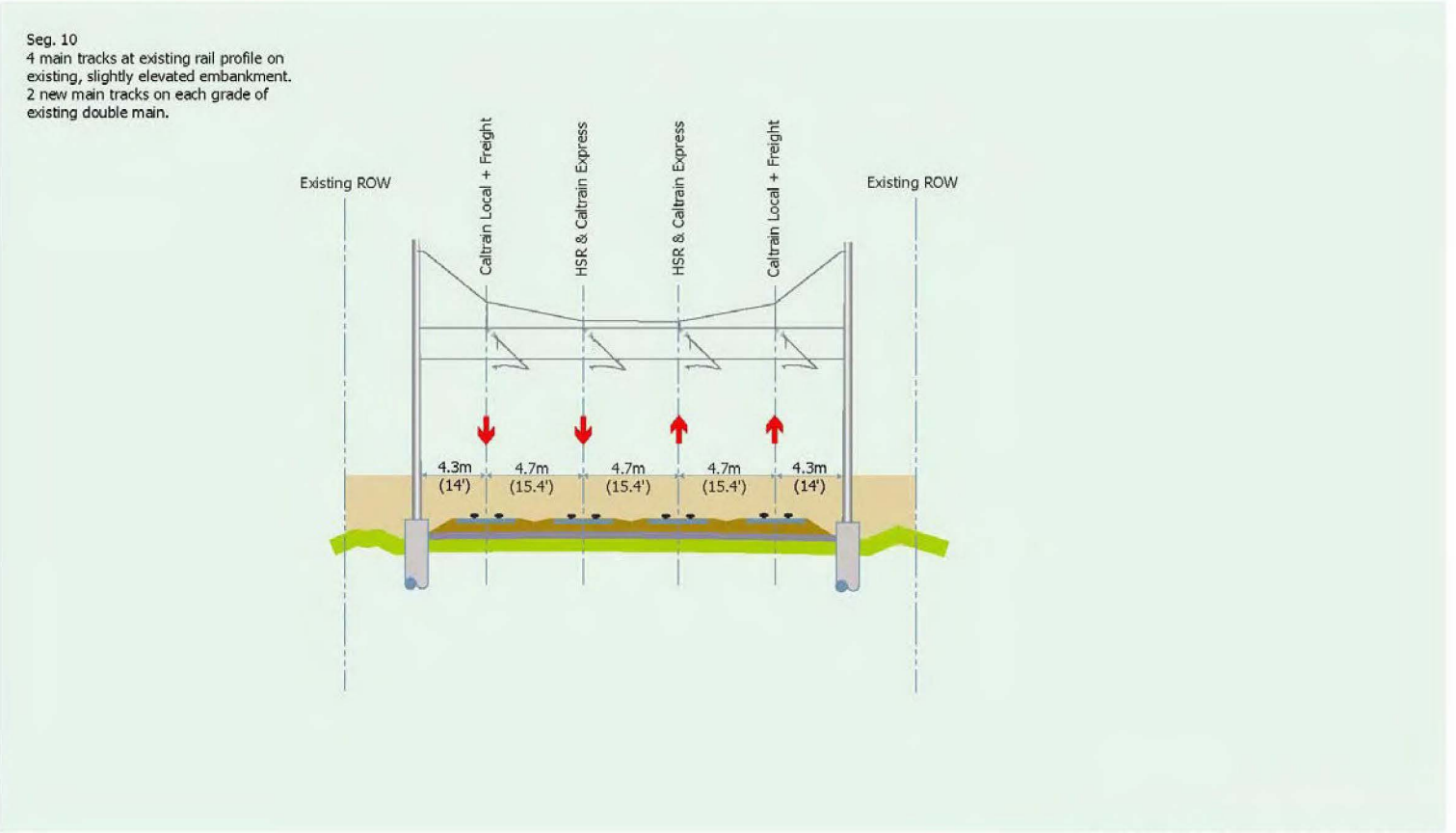


California High-Speed Train Program EIR/EIS

Typical Depressed and Embankment in San Francisco Bay Area - Merced Region Caltrain Shared-Use Alignment San Francisco to San Jose

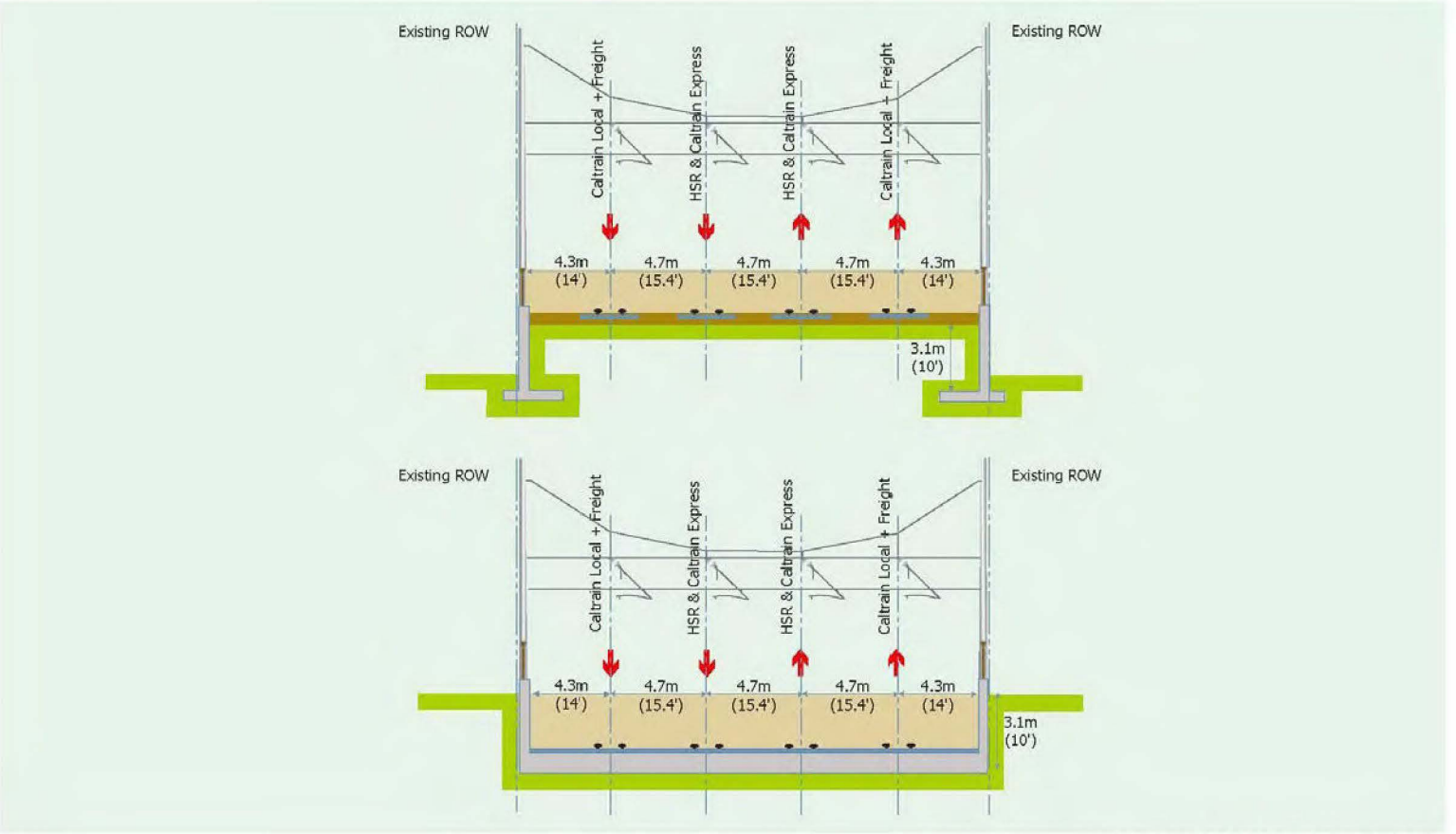
Figure A.39

H7.011062



California High-Speed Train Program EIR/EIS

Figure CC-2



California High-Speed Train Program EIR/EIS

Figure CC-3

0 Executive Summary

This report presents the results of detailed operational analyses of multiple "blended system" solutions for accommodating future Caltrain commuter rail and high speed rail services on the Caltrain Corridor between San Jose and San Francisco. These solutions are based on two services sharing rail tracks along most segments of the Corridor.

The operational analysis was based primarily on a computer simulation model of the Caltrain Corridor, capturing the trains, station stop (dwell) times, tested schedules, track, signals and track junctions (interlockings) of the future system. The computer simulation model software used to conduct the analysis, TrainOps®, is a proprietary software application developed by LTK Engineering Services. The model was customized for application to the Caltrain and high speed rail operations analysis.

The virtual world modeled in the simulation software is different than the current Caltrain system. Key differences include electrification of the Caltrain system, new Caltrain rail cars ("rolling stock") that have electric propulsion and an advanced signal system (CBOSS PTC). With electrification and an advanced signal system in place, the simulation model reflects a Caltrain Corridor with superior performance attributes compared to today's diesel system. This results in the ability to support more train traffic than can be supported today.

In some versions of the simulation model, limited new tracks in select areas of the corridor to support high speed rail stations and passing (overtake) locations to allow high speed rail trains to bypass Caltrain trains were assumed. Versions of the simulation model also varied in terms of simulated Caltrain and high speed rail train speeds, ranging from 79 mph to 110 mph.

The key findings from the simulation model and associated operations analysis are as follows:

- A blended operation on the Caltrain Corridor where Caltrain and high-speed trains are sharing tracks is conceptually feasible.
- An electrified system with an advanced signal system and electric trains increases the ability to support future train growth in the corridor.
- The blended system without passing tracks for train overtakes can reliably support up to 6 Caltrain trains and 2 high speed rail trains per peak hour per direction.
- The blended system with passing tracks for overtakes can reliably support up to 6 Caltrain trains and 4 high speed rail trains per peak hour per direction.
- Supporting high speed rail trains result in non-uniform Caltrain headways.
- Increasing speeds from up to 79 mph to 110 mph decreases travel times for both rail services.

The findings from this analysis should be viewed as a "proof of concept" in analyzing the conceptual feasibility of blended operations. The assumptions in the analysis

13 January 2013

To: Jeff Morales, CEO, California High-Speed Rail Authority
Frank Vacca, Chief Program Manager, California High-Speed Rail Authority

Fr: Joe Metzler, PMT Operations and Maintenance Manager
John Chirco, PMT Engineering Manager
Ken Jong, PMT Program Development Manager
Brent Felker, PMT Program Director

Re: Phase 1 Blended Travel Time

Purpose

The purpose of this memo is to present a technical assessment of the travel times and assumptions for a Phase 1 Blended service between San Francisco and San Jose and between San Francisco and Los Angeles. This assessment is based on the results of computer model simulations that demonstrate the "pure run time" of the modeled trains operating on a blended system can meet the Prop 1A mandates of design for a maximum 30 minutes of travel time for a non-stop SF-SJ and a 2hr 40min for non-stop San Francisco – Los Angeles service.

Assessment of Phase 1 Blended Modeling

Phase 1 Blended infrastructure consists of proposed full high-speed rail only improvements between San Jose and Los Angeles combined with blended service alignments on the Caltrain Corridor between San Francisco and San Jose. Travel times are generated from the California High-Speed Train Project (CHSTP) computer simulation model[1].

The travel times generated from the computer model account for the physical characteristics of the proposed route geometry and the times are considered "pure" travel time, or best time that might be achieved.

Travel times between San Francisco and Los Angeles follow for options for the blended service between San Francisco and San Jose, including differing maximum speeds.

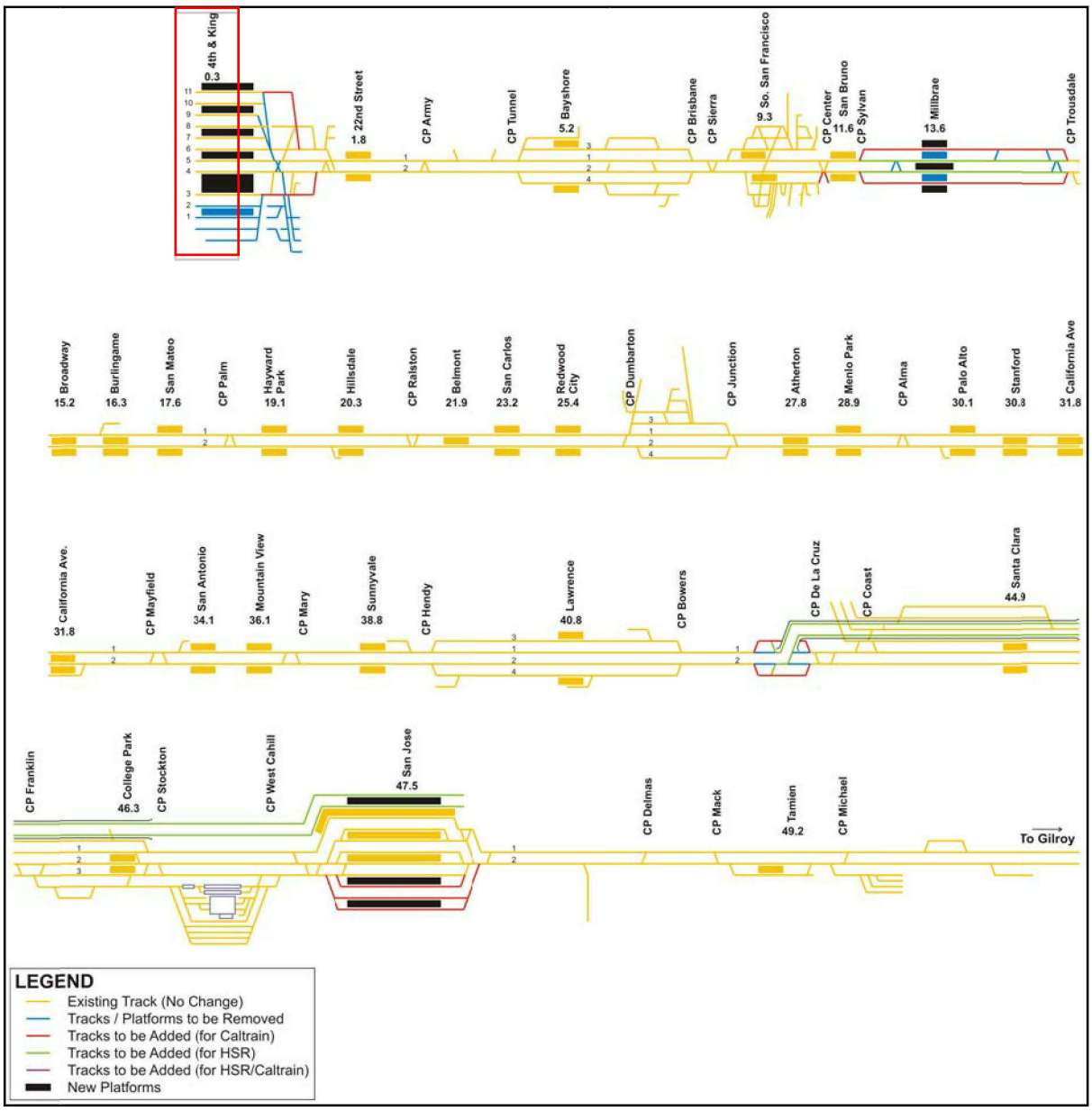
		SF-SJ (110 mph)	SF-LA	SF-SJ (125 mph)	SF-LA
Phase 1 Blended *(No Midline Overtake)*	2:02	32	2:34	30	2:32
Phase 1 Full *(Dedicated)*	2:02	Not applicable		30	2:32

The travel times indicate two possible conditions where the Phase 1 Blended options can provide for a travel time of 2hr 40min or less between SF and LA are from CHSTP model which include:

- 110 mph SF-SJ corridor maximum speed with an unimpeded path for a non-stop HST service
- 125 mph SF-SJ corridor maximum speed with an unimpeded path for a non-stop HST service

[1] Berkeley Simulation Software (BSS) Rail Traffic Controller (RTC) railroad operations simulation model software was used to produce the San Francisco – Los Angeles travel time in this analysis. The Train Performance Calculator (TPC) feature in the RTC model is capable of accurately representing the train movements over alignments with different complexity, such as grades, curves, and speed limits, based on the available tractive and braking effort specified for the train set technology taking into account the high-speed rail vehicle rolling resistance coefficients.

Figure 3. Baseline Infrastructure Track Schematic

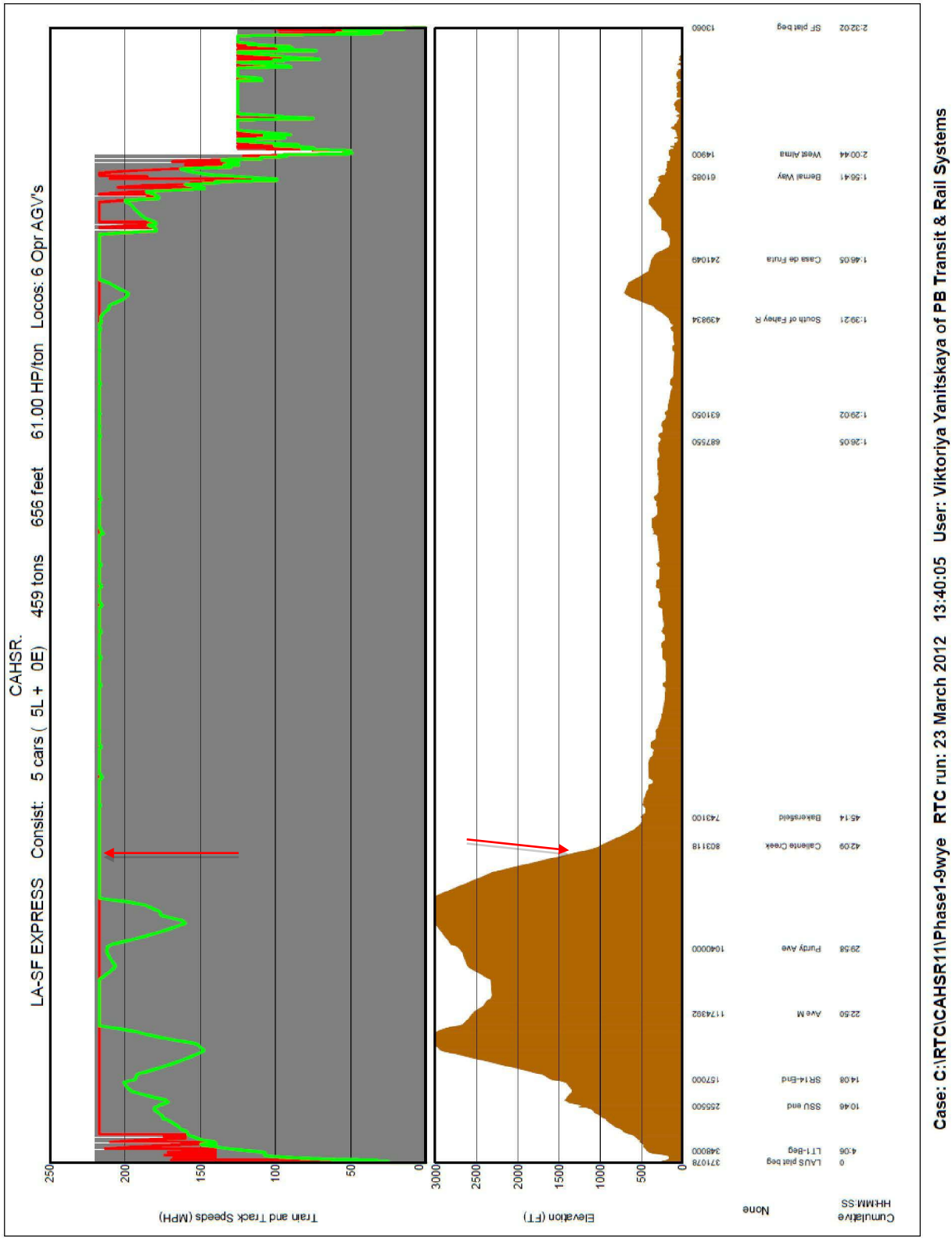


While California HSR's long-term plan is to continue from 4th & King station to Transbay Terminal in San Francisco, this segment of HSR operation was not assumed in the simulation scenarios. For the purposes of this analysis, which focuses on the operational capabilities of the existing mainline infrastructure between San Francisco and San Jose, all HSR trains were assumed to terminate/originate at the San Francisco (4th & King) Caltrain Station.

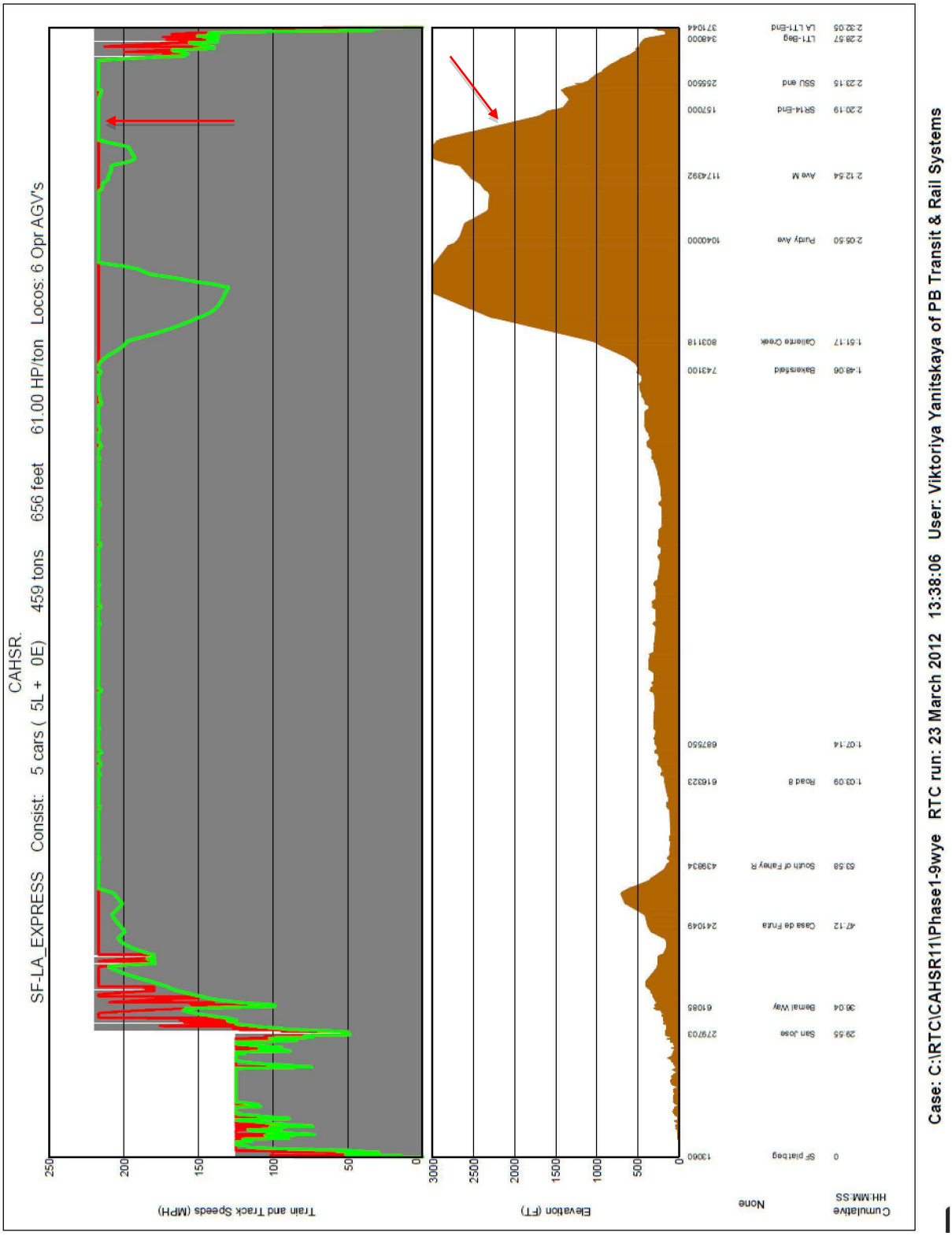
3.1.2 High Speed Rail Stations

In order to accommodate HSR service, the simulation assumed additional infrastructure at three existing Caltrain stations where HSR trains will stop. The

Train Performance Curve (CHSTP Model) – LA to SF – Phase 1 Full



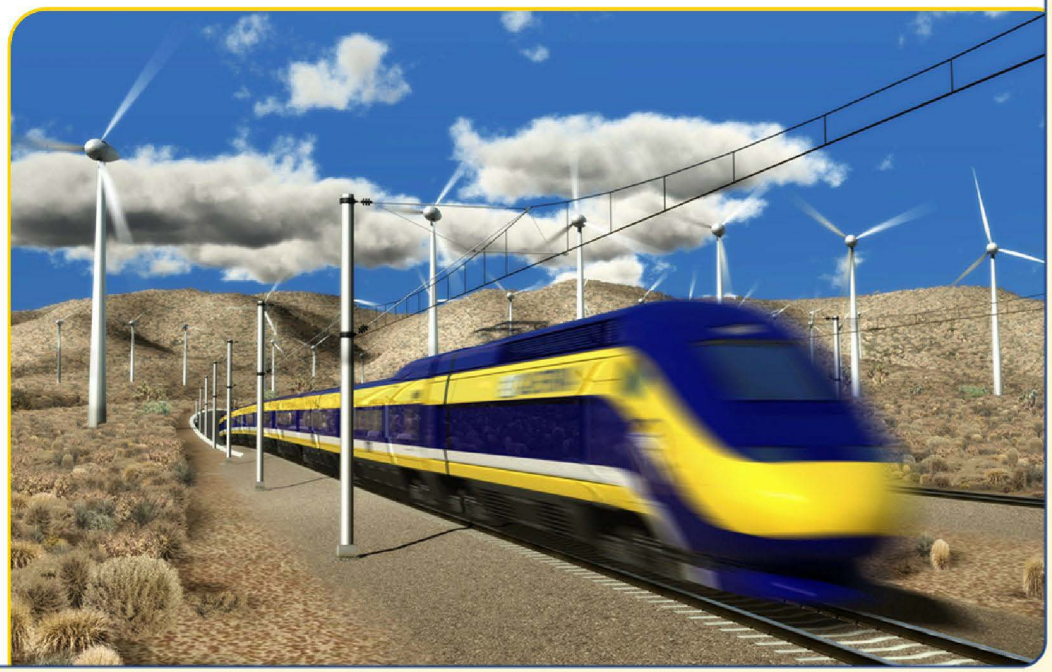
Train Performance Curve (CHSTP Model) –SF to LA – Phase 1 Full



CALIFORNIA'S HIGH-SPEED RAIL SYSTEM

Industry forum

Fresno



September 8, 2011

CALIFORNIA High-Speed Rail

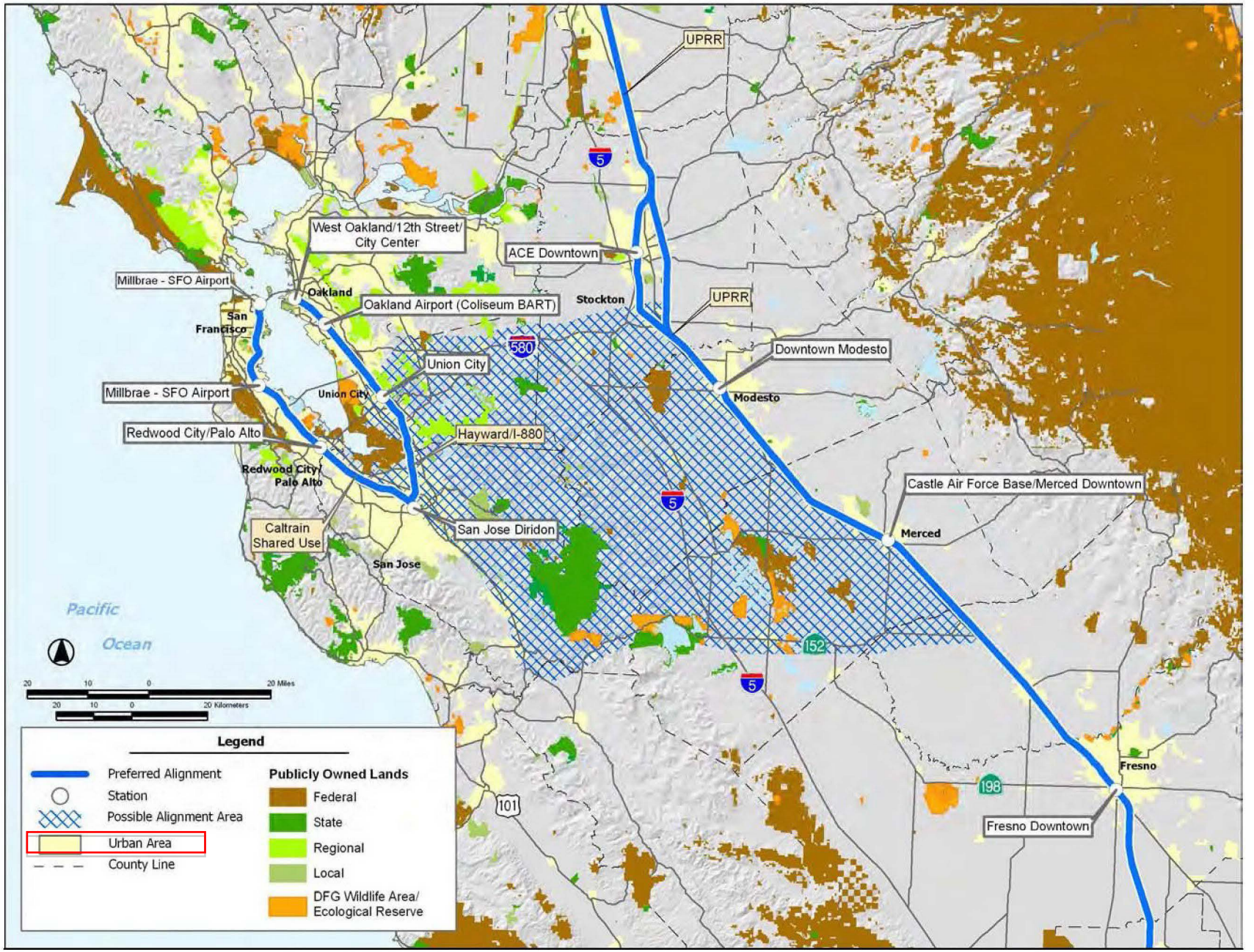
CALIFORNIA'S HIGH-SPEED TRAIN SYSTEM

Largest public infrastructure project in U.S. history

- First phase of 520 miles; 800 miles when full system is realized
- Operating speeds up to 220 mph; 90-125 mph in urban areas
- 100% clean electric power
- Safely grade-separated
- Reliable, easy way to travel
- Creates jobs/stimulates economy

CALIFORNIA High-Speed Rail

Figure S.5-2
Preferred Alignments and Stations North



U.S. Department of Transportation
Federal Railroad Administration

Figure S.1-1
Bay Area to Central Valley Corridor