CALIFORNIA High-Speed Rail Authority

At-Grade Crossing Safety Factsheet

SAN FRANCISCO TO SAN JOSE PROJECT SECTION

At-grade road crossings are locations where roads cross railroad tracks. The California High-Speed Rail Authority's (Authority) analysis in the Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) for the San Francisco to San Jose Project Section concludes that the project's impact to the safety of at-grade crossings would be "**less than significant**" under the California Environmental Quality Act (CEQA) and "**not a substantial adverse effect**" under the National Environmental Policy Act (NEPA).

The Federal Railroad Administration (FRA), which regulates railroad safety, requires a site-specific approach so that every crossing is evaluated individually and treated appropriately. Under the Preferred Alternative (Alternative A), in which trains will run within existing rights-of-way, **improvements will be made to 38 of the 39 existing public at-grade road crossings**. These modifications will ensure the high-speed rail project will meet or exceed federal safety requirements while substantially improving the condition of these crossings.

SAFETY GUIDELINES

Safety is a top priority for the Authority. For at-grade crossings, safety requirements for various speeds of operation are regulated by the FRA and the California Public Utilities Commission (CPUC). CPUC has jurisdiction in California, while FRA has jurisdiction in all of the US. The Authority works closely with these agencies to ensure the design complies with all relevant safety guidelines.

The current maximum speed for rail operations between San Francisco to San Jose is 79 mph. The high-speed rail project improvements will increase the maximum speed that trains can operate to 110 mph. For trains operating at or below 110 mph, the FRA allows at-grade crossings. The FRA requires states and railroads to cooperate to determine the needed warning devices, including signs, flashing lights, gate configurations, median barriers, and various combinations.

THE VALUE OF IMPROVEMENTS

The FRA estimates that 94 percent of train-vehicle collisions can be attributed to driver error or poor judgment (FRA 2015).

A 2012 study for the California Department of Transportation found that rail crossing collisions are greatly reduced when it is more difficult for a driver to bypass lowered gates. A four-quadrant gate system was shown in one study to reduce the likelihood of a collision by 82 percent compared to at-grade crossings with only two-quadrant gates (Cooper and Ragland 2012). This is because they prevent people from driving around lowered gates to try to beat a train.

Traffic Signals and Signal Preemption

Connecting signal preemption to traffic signals near and around rail crossings helps clear vehicle queues away from tracks prior to a train passing through. Entrance barriers will go down first to block additional vehicles from entering the crossing. The road traffic signals beyond the crossing will remain green for five to 15 seconds to ensure that vehicles already crossing the tracks are able to clear them fully before the exit barriers go down. After the train passes through the crossing, the signal resumes regular phasing and timing.

The existing signalized traffic intersections near at-grade crossings have signal preemption. The high-speed rail project would add five new traffic signals on adjacent intersections with preemption connections. Since this project section is in the Caltrain corridor, the Authority will work with Caltrain to install the appropriate signal preemption components.

At-Grade Crossings along the Preferred Alternative

With the trains running at grade, the project includes significant infrastructure investments to allow people and cars to move across the tracks safely. Under the Preferred Alternative (Alternative A), the project will make significant improvements:

- QG Add Quad Gates
- MC Additional Median Channelization
- RP New Railroad Preemption for New Traffic Signal
- TS New Traffic Signalization
- High-Speed Rail Stations
- At-Grade Crossings with proposed improvements

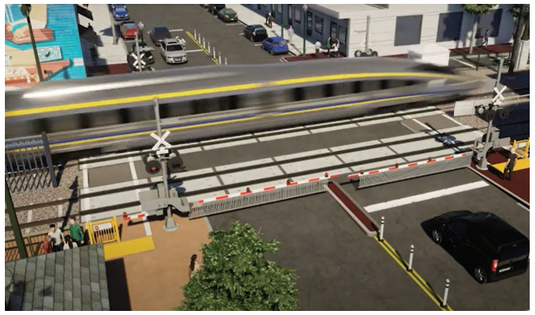

Figure 1. Visual simulation showing at-grade crossing improvements

Four-Quadrant Gates and Median Separators

A median separator is a safety feature that helps prevent drivers from going around lowered gates in the opposing travel lane by creating a physical barrier between travel lanes.

Four-quadrant gates have arm mechanisms on both sides of the tracks for each vehicle travel lane. The exit gates blocking the lane leading away from the tracks are equipped with a delay, to avoid trapping vehicles on the tracks.

CALTRAIN SIGNAL SYSTEM

Caltrain is the host railroad for the Caltrain Corridor from San Francisco to San Jose and operates the signal system. Caltrain has contracted with Wabtec Corporation to implement the Interoperable Electronic Train Management System (I-ETMS) Positive Train Control system. I-ETMS includes the following features:

- Integrates new technology with existing train control and operating systems to enhance train operation and safety.
- Prevents track authority violations (trains occupying tracks without permission), speed limit violations, unauthorized entry into work zones, and unsafe train movement in the event of human error, all of which reduce the potential for train accidents.
- With I-ETMS, the train crew remains in control of the train. The system monitors and ensures the train crew's compliance with all operating instructions, while the I-ETMS display screen provides the train crew operating information.
- As the train moves down the track, the I-ETMS on-board computer, with the aid of an on-board geographic database and global positioning system, calculates warning and braking curves based on relevant train and track information, including speed, location, movement authority, speed restrictions, work zones, and the length of the train.
- I-ETMS also communicates with wayside devices, checking for broken rails, proper switch alignment, and signal aspects.
- All information is combined and analyzed in real time to provide a "safety net" for improved train operation.

Caltrain has aggressively pursued safety upgrades including signage, pavement markings, and medians at most vehicular and pedestrian crossings. Caltrain uses a hazard analysis tool that is updated periodically to determine whether a particular crossing will receive upgrades.