At-Grade Crossing Safety
SAN JOSE TO MERCED PROJECT SECTION FACTSHEET

CALIFORNIA High-Speed Rail Authority

The California High-Speed Rail Authority's (Authority) analysis in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the San Jose to Merced Project Section concludes that the 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).

IMPROVING EXISTING CROSSINGS

Safety is a top priority for the California High-Speed Rail project. For at-grade crossings (where roads cross railroad tracks), safety requirements for various speeds of operation are regulated by the Federal Railroad Administration (FRA) and the California Public Utilities Commission. The Authority works closely with these agencies to ensure the design complies with all relevant safety guidelines.

Where trains will run at grade, the project includes significant infrastructure and technology investments to allow people and cars to move across the tracks safely. Under the Preferred Alternative (Alternative 4), in the section between San Jose and Gilroy, trains will run predominantly within existing rail rights-of-way, which includes 30 existing public at-grade road crossings.

The project will make significant improvements to 29 of those crossings by adding four-quadrant gates and adding or improving median separators, traffic signals, and fencing of the railroad right-of-way where not already fenced. One existing public at-grade crossing would be closed at 7th Street in Gilroy. Other at-grade crossing closures would include one pedestrian crossing (Casey Lane) and one private driveway in Gilroy and two private road crossings (Emado Ave. and Fox Lane) in Coyote Valley.

These modifications will ensure that the high-speed rail project will meet or exceed federal safety requirements while substantially improving the crossings' existing condition.

THE VALUE OF IMPROVEMENTS

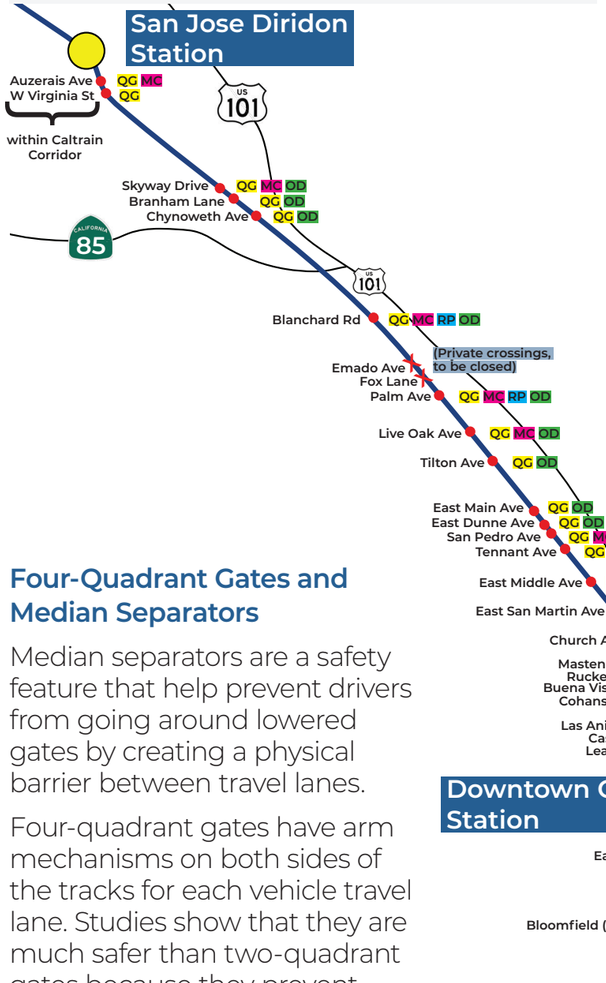
Studies (Cooper and Ragland 2012; FRA 2015) have shown that a large portion of collisions occuring at at-grade crossings are due to driver behavior or inattention. FRA estimates that 94 percent of train-vehicle collisions can be attributed to driver behavior or poor judgment (FRA 2015). A 2012 study for the California Department of Transportation (Caltrans) indicated that a key solution to rail crossing collisions is to make it more difficult for a driver to bypass lowered gates.

Median separators and long-arm gates or four-quadrant gates have been shown to reduce the potential for collisions by removing or substantially deterring the ability of vehicles to bypass two-quadrant 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).

Figure 1. Visual simulation showing at-grade crossing improvements

At-Grade Crossings along the Preferred Alternative (Alt 4)

QG Quad Gates
MC Additional Median Channelization
RP New Railroad Preemption for Existing Traffic Signal
TS New Traffic Signalization
OD Obstacle Detection
High-Speed Rail Stations
At-Grade Crossings with proposed improvements
X At-Grade Crossings being removed



Traffic Signals and Signal Preemption

Connecting signal preemption to traffic signals near 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 and the road traffic signals beyond the crossing will remain green for 5-15 seconds to ensure that vehicles already on the crossing footprint are able to clear before the **exit barriers** go down. After the train passes through the crossing, the signal resumes regular phasing and timing.

Several crossings already have traffic signals with signal preemption connected. The high-speed rail project would add preemption connections to five existing traffic signals and would add four new traffic signals with preemption connections. For crossings where Caltrain owns the corridor, the Authority will work with them to install the appropriate signal preemption components.

Four-Quadrant Gates and Median Separators

Median separators are a safety feature that help prevent drivers from going around lowered gates 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. Studies show that they are much safer than two-quadrant gates because they prevent people from driving around lowered gates to try to beat a train. The exit gates blocking the lane leading away from the tracks are equipped with a delay, to avoid trapping vehicles on the tracks.

USING TECHNOLOGY TO IMPROVE SAFETY

Technological improvements play a big role in modernizing the existing rail corridor by helping to monitor the rail system and make quick changes to improve safety and efficiency. The planned Automatic Train Control (ATC) system would include:

- Automatic Train Protection (ATP) functions of train detection, collision and overspeed prevention, broken rail detection, interlocking control, hazard detection, train separation, and work zone protection; and
- Positive Train Control (PTC), in compliance with FRA regulations, that would provide a proactive train control system to prevent train collision and derailments due to overspeeding, and protection of work zones. These features would protect against overspeed derailments and would include containment systems designed to contain a derailed train upright within the trackway in the event of a derailment.

The High-Speed Rail project will demonstrate compliance to the PTC requirements of the Rail Safety Improvement Act (RSIA, 2008) as part of the ATC System Principles document, embedding improved system safety in accordance with the international UNISIG ERA standards.

The system will be integrated with:

- **At-grade crossing operations** in the core Caltrain network North of Tamien, in addition to the crossings between Tamien and Gilroy.
- **Obstacle detection** on the Authority-controlled portion of the right-of-way so that an approaching train receives information from the ATC system about obstacles at crossings that need to be cleared before the train can proceed.
- **Control of road traffic signals** at at-grade crossings regulated by road traffic control systems. These systems use a one-way data exchange so that road data does not trigger lowering or raising of rail crossing barriers. The ATC grade crossing system will retain full control of the crossing gates at all times.

FEDERAL RAILWAY ADMINISTRATION SAFETY REQUIREMENTS

The current maximum speed for rail operations between San Jose and Gilroy 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, FRA allows at-grade crossings. FRA requires states and railroads to cooperate to determine the needed warning devices, including passive crossbucks (signs), flashing lights, two-quadrant gates (close only "entering" lanes of road), long gate arms, median barriers, and various combinations. Crossing lights and/or gates are activated by electrical circuits wired to the track (track circuits). FRA advocates a site-specific approach so that every crossing is evaluated individually and treated appropriately.