



Corridor Crossings
STRATEGY

Appendix B: Safety Enhancement Program Methodology

March 2026 (DRAFT)





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1. INTRODUCTION

Crossing safety enhancement projects (i.e., safety enhancement projects) are at-grade safety, security, mobility, and operational improvements for existing at-grade crossings.¹ These projects are short-term and deliver immediate, measurable benefits for corridor jurisdictions by strengthening public trust in rail safety, reducing risk, and improving operations.

There are 41 vehicular and 2 stand-alone bike and pedestrian at-grade crossings - in addition to bike and pedestrian at-grade crossings at Caltrain stations - on the Caltrain-owned portion of the corridor.

The enhancement types identified in tables 5 through 8 of the CCS Safety Enhancement and Elimination Programs Initiation Report are the mitigation measures identified for each crossing as part of the last Grade Crossing Hazard Analysis (GCHA), developed in 2021.

This appendix provides additional information on the:

- **Crossing Safety Enhancement Toolbox:** This section describes the main types of safety enhancements that will be considered as potential mitigation measures in the next GCHA update, which will determine the detailed scope of enhancements to be implemented at each crossing.
- **Preliminary Crossing Safety Enhancement Project Envelopes:** This section goes over the maximum project envelope of improvements for the existing at-grade crossings. These sets of improvements were explored as part of the CCS development to provide Caltrain and the corridor partners with the basis for calculating the total preliminary safety enhancement program rough order of magnitude (ROM) cost estimate. These estimates are conservative and include a robust contingency. As information becomes available, these cost estimates will be refined as appropriate.
- **Sequencing Framework:** This section describes the detailed framework used to assess and sequence the at-grade crossings for advanced safety enhancements. It includes the CCS safety enhancement evaluation criteria utilized in the assessment and the thresholds to sort the advanced safety enhancement projects into four funding groups (Group 1, 2, 3, and 4).
- **Estimated Project Costs:** Describes the process (assumptions and methodology) used to develop rough order of magnitude (ROM) cost estimates in 2024 dollars for the safety enhancement program.

All 43 Caltrain at-grade crossings were reviewed to determine preliminary safety enhancement project envelopes and calculate the total preliminary safety enhancement program ROM cost estimate. Caltrain will develop a detailed cost estimate for each crossing's advanced safety enhancement project as a result of the next GCHA update.

Safety enhancements were not identified for the UPRR crossings as UPRR leads the implementation of projects on their portion of the corridor. However, **Attachment A** lists the assessment results for all at-grade crossings, including crossings on the UPRR-owned portion of the corridor. **Attachment B** lists High-Speed Rail Proposed At-Grade Crossing Safety Improvements. **Attachment C** provides a snapshot of CPUC Section 130 Current Project List for 2024.

¹ Note: This document refers to the terms “enhancements” and “improvements” interchangeably.

2. CROSSING SAFETY ENHANCEMENT TOOLBOX

The crossing safety enhancement toolbox includes proven safety countermeasures to meet current safety requirements and standards and improve safety, security, mobility, and operations. Each enhancement is selected based on site-specific needs, safety data, and best practices and applied individually or in combination at crossings. The Safety Enhancement Program team will continue to inform and update the safety enhancement toolbox with new innovative solutions, as needed. **Figure 1** displays the types of enhancements included in the toolbox. Details for each enhancement type are provided next in this section.

The toolbox includes two sets of enhancements: baseline safety enhancements and advanced safety enhancements. The **baseline safety enhancements** currently consist of solar lane markers, pavement markings/cross hatching, delineators and city traffic timing adjustments. Baseline safety enhancements are recommended in the Trespasser/Suicide Prevention Safety Plan. These improvements typically take a few months to be implemented per crossing from design to completion. Installing these improvements upon funding availability would yield immediate safety benefits. **Advanced safety enhancements** include an array of improvements to be applied individually or coupled on a crossing-by-crossing basis upon additional analysis of crossing needs. These improvements are to be implemented in sequences following the Safety Enhancement Sequence List. As noted above, the identified safety enhancements build on the GCHA as a baseline.

Figure 1: Safety Enhancement Toolbox





2.1. BASELINE SAFETY ENHANCEMENTS

2.1.1 PAVEMENT MARKINGS/SIGNAGE/HATCHING

Proper paving and pavement marking are essential for ensuring safe and smooth crossings. A level, well-maintained surface reduces the risk of tripping, bumping, or loss of control due to uneven surfaces, helping prevent accidents and support the safe movement of vehicles, bicycles, and pedestrians. High-quality paving, such as asphalt or reinforced concrete, not only offer improved traction in wet or icy conditions but withstand the heavy and repeated loads from both rail and roadway traffic, extending the operational life of the crossing remains and reducing the frequency of repairs.

This enhancement also includes prominent pavement markings, such as reflective paint for limit lines, grade crossing symbols, and dynamic envelopes, all of which must adhere to Manual on Uniform Traffic Control Devices (MUTCD) Standards. Crossings must also comply with requirements set by the FRA, as outlined in documents such as the *Track Safety Standards*, which address track safety and crossing infrastructure. In addition, all crossings must meet the accessibility requirements of the American Disabilities Act (ADA).

The MUTCD 11th Edition, effective January 18, 2024, introduces updated guidelines for the placement railroad advance warning pavement markings and associated signage, increasing the required distance from the limit line. As a result, existing crossings should be evaluated to ensure continued compliance with the revised MUTCD standards. **Figure 2** below illustrates an example of paving within the railroad tracks at a crossing.

Figure 2: Paving at a Caltrain Railroad Crossing





2.1.2 SOLAR LANE MARKERS

Solar lane markers are devices powered by renewable solar energy, offer several benefits for both vehicle and pedestrian traffic. They significantly improve visibility at railroad crossings, especially during low-light conditions such as nighttime or adverse weather, ensuring that drivers and pedestrians can clearly see the crossing and navigate it safely. The bright, illuminated markers increase driver awareness of the roadway edge to ensure vehicles do not inadvertently turn onto the tracks. Solar lane markers are also environmentally friendly and cost-effective, as they do not require an external power source or extensive wiring, which reduces installation and maintenance costs. Solar lane markers should adhere to the MUTCD standards. **Figure 3** displays solar lane markers at an intersection.

Figure 3: Solar Lane Markers at an Intersection





2.1.3 DELINEATORS

Delineators, like medians, serve as vertical channelizers for vehicles to remain in their designated travel lane. Where delineators are often used alongside or in lieu of a median to separate directions of travel, the application of delineators in this context is to prevent vehicles from turning onto the track area and driving along the railroad corridor. These flexible delineators have reflective components to increase their visibility during both the daytime and nighttime driving conditions. In combination with the reflective nature of the solar lane markers, delineators are safety enhancements to prevent train-related vehicle incidents. **Figure 4** displays the delineators installed at the Broadway crossing in Burlingame to prohibit drivers from driving on the tracks. When first installed at this location, Caltrain used orange tubes for the delineators. Caltrain will replace them with white tubes as part of the Safety Enhancement Program.

Figure 4: Delineators at a Caltrain Railroad Crossing



Source: Broadway Caltrain Crossing, Burlingame

2.1.4 CITY TRAFFIC TIMING ADJUSTMENTS

Queueing up to and over railroad tracks poses immediate dangers to both the roadway user and people on the train itself. Effective queue mitigation measures serve to prevent vehicles from waiting in the foul of the track, directly reducing the potential for collisions with trains. Per the California MUTCD (CA MUTCD), Part 4, signalized intersections within 200 feet of a grade crossing should be interconnected to the grade crossing. Proper interconnection can serve to mitigate queueing; additional mitigation measures include traffic signal preemption and the installation of supplemental traffic signals, like pre-signals or queue cutters. When signalized intersections are in close proximity to the grade crossing, typically 100' or less, the preferred queue mitigation measure is a pre-signal. A pre-signal is designed to be preempted with the railroad and interconnected to the downstream signal; during a preemption call, the pre-signal will enter the red phase before the downstream signal, allowing vehicles to clear away from the tracks without adding new vehicles to the queue. **Figure 5** displays an example of traffic signal queue mitigation at a railroad crossing, with a traffic signal displayed in the top left corner.

Figure 5: Traffic Signal Queue Mitigation at Railroad Crossings



2.2. ADVANCED SAFETY ENHANCEMENTS

2.2.5 LIGHTING

Proper illumination at crossings benefits both motorists and bicyclists/pedestrian users by improving visibility and reducing the risk of nighttime collisions. Enhanced lighting increases awareness of the crossing for all road users. Industry's best practices recommend providing street lighting in each quadrant of a grade crossing. The Federal Railroad Administration (FRA) outlines track safety requirements, including those related to crossing infrastructure, in documents such as the *Track Safety Standards*. **Figure 6** illustrates an example of lighting at a railroad crossing.

Figure 6: Lighting at a Railroad Crossing





2.2.6 FENCING

Replacement of deficient or damaged fencing is a key maintenance effort to maintain adequate pedestrian safety. Fencing acts as a physical barrier to prevent unauthorized or accidental access to the railroad right-of-way, keeping crossing users within their designated pathway. Properly maintained fences channelize pedestrians and encourage them to use designated crossing points equipped with safety features, reducing the risk of accidents and ensuring safe crossings. By minimizing trespassing into the railroad right-of-way, fencing deters individuals from loitering in hazardous areas. Well-maintained fences also protect against vandalism and theft of railroad property, safeguarding critical infrastructure and reducing the risk of operational disruptions. At a minimum, fence replacements should comply with the FRA Track Safety Standards Compliance Manual. **Figure 7** displays an example of a pedestrian fence at a railroad crossing.

Figure 7: Fences at a Railroad Crossing



2.2.7 GATES AND GATE WARNING SIGNALS

Standards for railroad signal arms are described in CPUC *General Order (GO) 75-D* and the American Railway Engineering and Maintenance of Way Association's (AREMA) *Communications and Signals Manual of Recommended Practices*. **Figure 8** below shows a crossing warning device along the Caltrain corridor.

Figure 8: Caltrain Crossing Warning Device



Source: Caltrain, 2023

2.2.8 MEDIAN INSTALLATION/ROADWAY CHANNELIZATION

Medians are effective channelization methods at crossings, designed to prevent drivers from circumventing lowered gates and entering the crossing area during a train event. When paired with bulbouts and other traffic calming measures, these treatments narrow the travel lane width, which can help reduce vehicle speeds and encourage safer driver behavior. Narrower travel lanes also bring vehicles closer to the edge of the roadway, improving visibility of the flashing light signals. These treatments are particularly effective on wider streets and are well-suited for crossings in low traffic volume areas. **Figure 9** below illustrates a railroad crossing median and bulbout along the Caltrain corridor.

Figure 9: Railroad Crossing Median and Bulbout



Source: Caltrain Grade Crossing Improvement Project, 2021



2.2.9 CONCRETE WORK

Concrete flatwork can be used to enhance pedestrian safety at grade crossings. By providing a dedicated pathway surface, pedestrians can stay off the roadway or off non-traversable surfaces when approaching the railroad tracks. Concrete is often the material of choice for station platforms and pedestrian walkways, as its durability allows for a longer useful life for the platform. Concrete curbs serve to channelize vehicles and provide a vertical separation between vehicles and pedestrians. **Figure 10** displays an example of concrete work on railroad tracks.

Figure 10: Concrete Work on Railroad Track





2.2.10 DRAINAGE IMPROVEMENTS

Proper drainage prevents water from ponding at grade crossings, which can create a hazard condition for vehicles, pedestrians, and even trains. Providing a gutter with the proper cross-slope allows water to flow in the appropriate direction: away from the crossing, and into the nearest inlet. **Figure 11** displays a drainage inlet and gutter installation as an example of a drainage improvement at a railroad crossing.

Figure 11: Drainage Improvement at a Railroad Crossing





2.2.11 QUAD GATES

Four-quadrant gates (“quad gates”), commonly referred to as “exit gates”, are an additional safety measure used to prevent vehicles from driving around the entrance gate and entering the trackway during a train event. A crossing equipped with gates in the approach quadrants is referred to as having a two-quad system; these gates stop vehicles on approach to the crossing. However, it leaves space open for vehicles to drive around the gate in an S-curve and enter the trackway on the wrong side of the road to avoid the gates. A four-quad system prevents this from happening, as the additional two gates block the remaining travel lanes in the departure quadrants. This system significantly reduces the risk of collisions and illegal crossing by ensuring that vehicles cannot circumvent the gates to cross the tracks. Four-quadrant gates have been shown to reduce the risk of collisions by up to 98%². CPUC GO 75-D indicates the exit gates begin to lower after the entrance gates, so that no vehicle gets trapped on the crossing between the two sets of gates. Further, CA MUTCD requires crossings with exit gates to be equipped with vehicle presence detection systems, designed to ensure that if a vehicle is on the trackway, the exit gates will not descend until the vehicle is off the detection zone. **Figure 12** displays an example of a four-quadrant gate at a railroad crossing.

Figure 12: Four Quadrant Gates at a Railroad Crossing



² UC Berkeley Safe Transportation Education and Research Center.



2.2.12 INTRUSION DETECTION & MONITORING

The installation of CCTV cameras at railroad crossings allows for continuous monitoring of the area for any intrusions or track obstructions. Video analytics software can process the video feed in real-time, to detect unauthorized access (ROW intrusion) and any obstructions on the tracks. Upon detecting an issue, the system can generate alerts to train control centers. Caltrain has undertaken a pilot program which deploys an intrusion detection & monitoring technology learning software that uses a combination of LiDAR and cameras to observe crossings and send alerts to operations about potential hazards such as trespassing, crossing occupancy and track intrusion by vehicles. **Figure 13** below gives a depiction of how railroad crossing intrusion technology functions.

Figure 13: Intrusion Detection Technology at a Railroad Crossing



Source: Herzog Rail Sentry

3. PRELIMINARY CROSSING SAFETY ENHANCEMENT PROJECT ENVELOPES

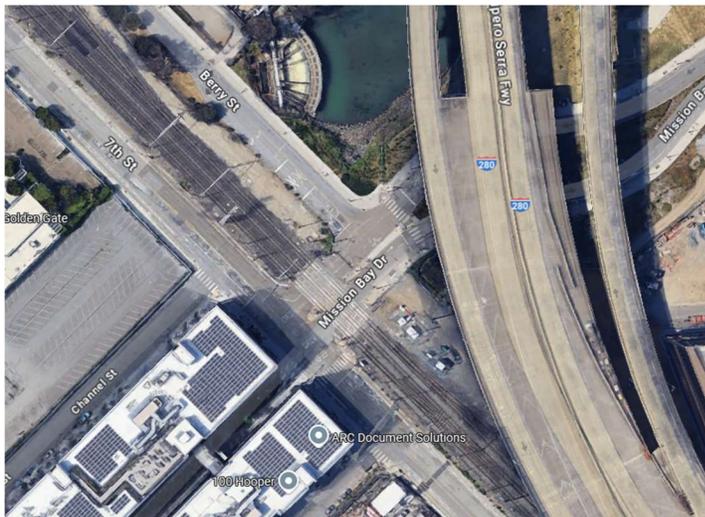
The **baseline safety enhancements** will be implemented at all Caltrain crossings.

In addition to the baseline safety enhancements, all Caltrain crossings were evaluated through aerial and street-view imagery to identify the possible **advanced safety enhancements** at each crossing to enhance safety, while also meeting Caltrain, CPUC, and MUTCD/CA MUTCD standards using the safety enhancement toolbox. This review included assessment of sight distance, existing infrastructure, recent improvements, lighting conditions, and intersection signalization (see **Figure 14**).

Table 1 outlines the advanced safety enhancements identified for each crossing and constitute the preliminary crossing safety enhancement project envelope. Crossings that have a funded closure project are not included in **Table 1** as closures will not require safety enhancements.

The California High-Speed Rail Authority (CHSRA) is in the process of implementing High-Speed Rail (HSR) service in California. The Caltrain corridor is identified as part of the HSR rail alignment. As part of the HSR's environmental process, CHSRA prepared Environmental Impact Report (EIR)/supplemental Environmental Impact Statement (EIS) for each project section. These documents identify a number of at-grade crossings with safety modifications. This presents an opportunity for the proposed safety enhancement projects to be delivered with CHSRA support. **Attachment B** lists out the identified at-grade crossing safety improvements proposed by CHSRA as part of their HSR project.

Figure 14: Mission Bay Drive Crossing Aerial



Source: Google Maps, 2025

Table 1: Preliminary Crossing Safety Enhancement Project Envelopes

County	City	Crossing	Enhancements											
			Baseline				Advanced							
														
San Francisco	San Francisco	Mission Bay Drive	+						+	+	+	+	+	
San Francisco	San Francisco	16th Street	+					+	+		+			
San Mateo	South San Francisco	South Linden Avenue	+					+	+		+	+	+	
San Mateo	San Bruno	Scott Street	+					+			+	+	+	+
San Mateo	Millbrae	Center Street	+					+			+	+	+	
San Mateo	Millbrae	Santa Paula Pedestrian Crossing						+				+	+	
San Mateo	Burlingame	Broadway*	+					+	+		+	+	+	+
San Mateo	Burlingame	Morrell Avenue Pedestrian Crossing												
San Mateo	Burlingame	Oak Grove Avenue	+					+	+		+	+	+	
San Mateo	Burlingame	North Lane	+					+	+		+	+	+	
San Mateo	Burlingame	Howard Avenue	+					+	+		+	+	+	
San Mateo	Burlingame	Bayswater Avenue	+					+	+		+	+	+	+
San Mateo	Burlingame	Peninsula Avenue	+					+			+	+	+	
San Mateo	San Mateo	Bellevue Avenue**	+					+	+		+	+	+	+
San Mateo	San Mateo	1st Avenue	+					+			+	+	+	+
San Mateo	San Mateo	2nd Avenue	+					+			+	+	+	+
San Mateo	San Mateo	3rd Avenue	+					+	+		+	+	+	+
San Mateo	San Mateo	4th Avenue**	+					+			+	+	+	+
San Mateo	San Mateo	5th Avenue**	+					+			+	+	+	
San Mateo	San Mateo	9th Avenue	+					+	+		+	+	+	+
San Mateo	Redwood City	Whipple Avenue	+					+			+	+	+	

County	City	Crossing	Enhancements										
			Baseline				Advanced						
													
San Mateo	Redwood City	Brewster Avenue	+					+	+	+	+	+	+
San Mateo	Redwood City	Broadway/Marshall St	+					+		+	+	+	+
San Mateo	Redwood City	Maple Street	+					+	+	+	+	+	
San Mateo	Redwood City	Main Street	+					+		+	+	+	+
San Mateo	Redwood City	Chestnut Street	+					+	+	+	+	+	+
San Mateo	Atherton	Fair Oaks Lane	+					+	+	+	+	+	+
San Mateo	Atherton	Watkins Avenue*	+							+	+		
San Mateo	Menlo Park	Encinal Avenue	+					+	+	+	+	+	
San Mateo	Menlo Park	Glenwood Avenue	+					+	+	+	+	+	
San Mateo	Menlo Park	Oak Grove Avenue**	+						+	+	+	+	
San Mateo	Menlo Park	Ravenswood Avenue**	+					+		+	+	+	
Santa Clara	Palo Alto	Palo Alto Avenue*/**	+				+	+		+		+	+
Santa Clara	Palo Alto	Churchill Avenue*/**	+				+	+		+			
Santa Clara	Palo Alto	East Meadow Drive*/**	+				+		+	+	+	+	+
Santa Clara	Palo Alto	Charleston Road*/**	+				+	+		+			
Santa Clara	Mountain View	Rengstorff Avenue	+					+		+	+	+	
Santa Clara	Sunnyvale	Mary Avenue	+					+		+	+	+	+
Santa Clara	Sunnyvale	Sunnyvale Avenue	+					+	+	+	+	+	
Santa Clara	San Jose	Auzerais Avenue	+						+	+	+	+	+

+Denotes proposed GCHA safety enhancements. +Denotes proposed CCS safety enhancements in addition to GCHA.

*Denotes crossings with identified safety enhancement projects led by Caltrain (completed or ongoing).

**Denotes crossings with identified at-grade projects led by the local jurisdiction (ongoing).

¹ Intrusion Detection and Monitoring is currently installed at discrete locations and being evaluated as a pilot project.

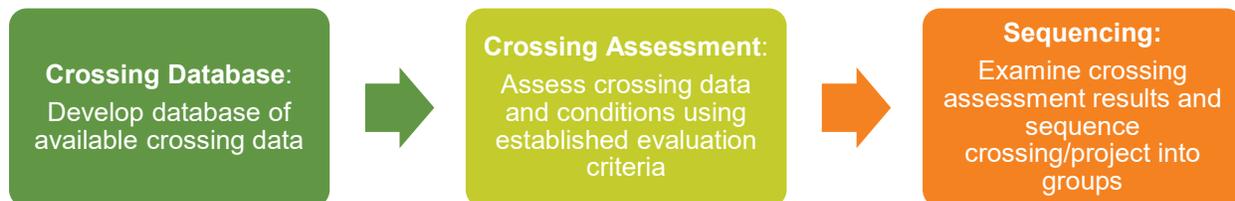
-  Pavement Markings/Signage/Hatching
-  Solar Lane Markers
-  Delineators
-  Traffic Timing Adjustments
-  Concrete Work
-  Median Installation/Roadway Channelization
-  Lighting
-  Fencing
-  Drainage Improvements
-  Quad Gates
-  Gates and Gate Warning Signals
-  Intrusion Detection and Monitoring

4. SEQUENCING FRAMEWORK

Sequenced projects enable the corridor to direct resources and investments toward the most critical high-risk crossings. This sequencing helps identify and understand funding priorities for the safety enhancement projects. Through collaboration and input from community partners and corridor cities, Caltrain developed a sequencing framework for the advanced safety enhancements, assessing all crossings along the corridor and prioritizing at-grade crossings along Caltrain-owned part of the corridor. **Figure 15** provides an overview of the sequencing framework.

The results of each factor evaluated for all 71 at-grade crossings can be found in **Attachment A**. The UPRR crossings, while scored in the same fashion as the Caltrain crossings (with the exception of the street incident-AADT ratio), are not included in the sequencing process as UPRR will lead the implementation of projects on their portion of the corridor.

Figure 15: Safety Enhancement Sequencing Framework



The CCS crossing database compiles readily available data to support the next steps in the process, ensuring sequencing is informed by both qualitative and quantitative data. The CCS crossing database includes findings from the GCHA as a baseline for recommended improvements but is a separate evaluation process.

The crossing assessment utilizes evaluation criteria that focuses on safety data to identify high-risk at-grade crossings in need of improvements. The evaluation criteria are aligned with the goals of the CCS and key grant funding opportunities, ensuring the highest-priority crossings are also those most competitive for funding. **Table 2** summarizes the crossing assessment including the evaluation criteria, factors assessed under each criterion and how crossings were scored for each factor. The factors used were selected because the number of these incidents can be attributed to a lack of safety countermeasures or enhancements.

The advanced safety enhancements were categorized into four funding groups for a strategic approach to available funding opportunities. **Table 3** identifies the four funding groups and the benchmarks (score) utilized to sort the projects into each group. **Table 4** displays the Caltrain owned crossings by funding group.

As additional technology becomes available, and data collection becomes standardized, future rounds of the sequencing process could include additional criteria such as vehicle incursions at grade crossings.



Table 2: CCS Safety Enhancement Program Assessment Evaluation Criteria

Evaluation Criteria	Factors	Scoring (Max Score = 5)
 Rail Incidents	Fatal Rail Incidents <ul style="list-style-type: none"> Total number of rail incidents that resulted in at least 1 fatality (2017-2023) 	Fatal Rail Incidents (Score of up to 2) <ul style="list-style-type: none"> 2 or more incidents = 2 1 incident = 1 No incident = 0
	Total Rail Incidents <ul style="list-style-type: none"> Total number of rail incidents at a crossing (2017-2023) 	Total Rail Incidents (Score of up to 1) <ul style="list-style-type: none"> Rail incident occurred = 1 No incident = 0
	FRA Accident Prediction System <ul style="list-style-type: none"> Predicted accident rank 	Predicted accident rank (Score of up to 1) <ul style="list-style-type: none"> Crossing rank is in top 3 = 1
 Street Incident - AADT Ratio	Street Incident - AADT Ratio <ul style="list-style-type: none"> Street incidents (2017-2023) Ratio = Total street incidents per 1,000 adjusted AADT Identify crossings with a high number of street incidents and low AADT 	Street Incident - AADT Ratio (Score of up to 1) <ul style="list-style-type: none"> Caltrain Crossings: Ratio equal to or greater than 0.84 (75th percentile excluding 0 street incidents) = 1 UP Crossings: Ratio equal to or greater than 2.65 (75th percentile excluding 0 street incidents) = 1

Table 3: Safety Enhancement Program Criteria

Funding Groups	Benchmark	Threshold
1	Crossings with a high number of fatal rail incidents and/or rail and street incidents.	Score of 3 or Higher: Crossings with 1 or more fatal rail incidents, 2 or more rail incidents, and/or top percentile group for street incidents to AADT ratio.
2	Crossings with a moderate number of rail and/or street incidents.	Score of 2: Crossings with 1 or more fatal rail incidents, 1 or more rail incidents, and/or upper percentile group for street incidents to AADT ratio.
3	Crossings with a low number of rail and/or street incidents.	Score of 1: Crossings with 0-1 fatal rail incidents, 0-2 rail incidents, and/or low number of street incidents.
4	Crossings with the little or no rail and/or street incidents.	Score of 0: Crossings with no fatal rail incidents, 0-1 rail incidents, and/or no street incidents.



Table 4: Safety Enhancement Projects by Group

County	City	Crossing	Score (Out of 5)
Group 1			
Santa Clara	Palo Alto	Churchill Avenue	5
Santa Clara	Palo Alto	East Meadow Drive	5
San Mateo	Redwood City	Brewster Avenue	4
Santa Clara	Mountain View	Rengstorff Avenue	4
San Francisco	San Francisco	Mission Bay Drive	3
San Mateo	San Bruno	Scott Street	3
San Mateo	Redwood City	Main Street	3
San Mateo	Burlingame	Broadway	3
Group 2			
San Francisco	San Francisco	16th Street	2
San Mateo	Burlingame	North Lane	2
Santa Clara	Palo Alto	Charleston Road	2
Group 3			
San Mateo	Burlingame	Bayswater Avenue	1
San Mateo	San Mateo	Bellevue Avenue	1
San Mateo	Redwood City	Whipple Avenue	1
San Mateo	Redwood City	Broadway/Marshall St	1
San Mateo	Menlo Park	Oak Grove Avenue	1
Santa Clara	Sunnyvale	Mary Avenue	1
Group 4			
San Mateo	South San Francisco	Linden Avenue	0
San Mateo	Millbrae	Center Street	0
San Mateo	Millbrae	Santa Paula Pedestrian Crossing	0
San Mateo	Burlingame	Oak Grove Avenue	0
San Mateo	Burlingame	Howard Avenue	0
San Mateo	Burlingame	Peninsula Avenue	0
San Mateo	San Mateo	1st Avenue	0
San Mateo	San Mateo	2nd Avenue	0
San Mateo	San Mateo	3rd Avenue	0
San Mateo	San Mateo	4th Avenue	0
San Mateo	San Mateo	5th Avenue	0
San Mateo	San Mateo	9th Avenue	0
San Mateo	Redwood City	Maple Street	0
San Mateo	Redwood City	Chestnut Street	0
San Mateo	Atherton	Fair Oaks Lane	0
San Mateo	Menlo Park	Encinal Avenue	0
San Mateo	Menlo Park	Glenwood Avenue	0
San Mateo	Menlo Park	Ravenswood Avenue	0
Santa Clara	Palo Alto	Palo Alto Avenue	0
Santa Clara	Sunnyvale	Sunnyvale Avenue	0
Santa Clara	San Jose	Auzerais Avenue	0
Santa Clara	San Jose	Virginia Street	0



4.1. CPUC PRIORITIZATION COMPARISON

Administered jointly by the California Public Utilities Commission (CPUC) and California Department of Transportation (Caltrans), the Section 130 Grade Crossing Hazard Elimination Program is a competitive funding grant to eliminate hazards at existing at-grade crossings. The eligible improvements include crossing closure or abandonment, at-grade railroad improvements such as warning devices, and road improvements such as lighting, medians, signage and striping, and others.

Every year, the CPUC identifies potential hazardous crossings using available data. Like the CCS elimination sequencing, the CPUC considers average daily vehicle traffic, average train traffic, and accident history. The CPUC also considers pedestrian issues and geometry. The CPUC determines which crossings to consider for funding at which the CPUC will conduct an in-depth field diagnostic review in collaboration with the railroad and jurisdiction. Then the CPUC creates a priority list based on the highest-ranking crossings in the state.

The CCS sequencing framework is tailored toward the Caltrain corridor emphasizing the crossing accident history and vehicle volumes at all crossings along the corridor.

5. PRELIMINARY ROM COSTS

A preliminary ROM estimated cost in 2024 dollars was identified for each crossing location. These ROM cost estimates are preliminary and programmatic, they are conservative and include a robust contingency; therefore, they are provided in ranges. They inform the Program Corridor-Wide Funding Strategy.

The assumed scope of project at each crossing includes all possible and relevant safety improvements that could be implemented based on the analysis of each crossing's physical characteristics and improvements proposed in the last GCHA. **The scope of each project will be revised, along with the project cost estimate, as more information becomes available. In addition, program cost estimates will be further developed and accounted for.**

This section describes the assumptions used to develop preliminary ROM cost estimates for each type and stage of safety enhancement projects.

5.1. ASSUMPTIONS

Cost estimates (Engineer's Opinion of Probable Construction Cost) from on-going safety enhancement projects and current market costs in the Bay Area were reviewed to assign each type of enhancement a ROM unit cost. It is important to note that cost estimates should be reassessed every two years, for projects that have not been initiated yet, to ensure the preliminary ROM costs used to inform the Program Corridor-Wide Funding Strategy still reflect the current market value.

Upon generating a rough order of magnitude cost to construct the possible safety enhancements at each grade crossing location, additional factors were applied to generate a holistic project cost for each crossing. Each construction estimate was adjusted to include factors such as design, environmental, construction management costs and related contingencies; construction contingency, and escalation for a multi-year project duration. The subsequent sections outline various factors that are applied to the cost estimates for each crossing.

5.1.13 CONSTRUCTION COST ESTIMATE

To ensure consistency, construction costs were developed by establishing categories of safety enhancements (to include improvements in the public right-of-way and railroad right-of-way) and then applying unit costs to these categories. It should be noted that this is a high-level preliminary ROM cost estimate, generated based on aerial and street-view imagery and does not account for any subsurface factors such as underground utility and/or soil conditions.

Table 5 and **Table 6** outline the ROM construction costs that reflect the 2024 market value for each type of safety enhancement installation and railroad improvement for baseline safety enhancements and advanced safety enhancements, respectively.

Table 5: Baseline Safety Enhancement Construction ROM Unit Costs

Description	Unit	Unit Cost (\$2024) ¹
Install solar lane markers, pavement markings/cross hatching, and delineators	Lump Sum	\$100,000 - \$300,000

Table 6: Advanced Safety Enhancement Construction ROM Unit Costs

Description	Unit	Unit Cost (\$2024) ¹
Remove concrete, asphalt, striping, utility adjustments	Lump Sum	\$100,000 - \$150,000
Install roadway elements (e.g., curb and gutter)	Lump Sum	\$250,000 - \$375,000
Install medians/channelization	Lump Sum	\$150,000 - \$225,000
Install 2 quadrants of full pedestrian treatments	Each	\$300,000 – 450,000
Install/refresh/relocate pavement markings and signage	Lump Sum	\$50,000 - \$75,000
Install 1 streetlight and related infrastructure	Each	\$25,000 – \$50,000
Install signal preemption, traffic signals, and related infrastructure	Lump Sum	\$500,000- \$750,000
Modify signal preemption, traffic signals, and related infrastructure	Lump Sum	\$300,000 – \$450,000
Railroad removals	Lump Sum	\$50,000 - \$75,000
Install 1 track of crossing panels	Each	\$75,000 - \$125,000
Install 1 railroad device	Each	\$125,000 - \$200,000
Install signal cabin	Each	\$400,000 - \$600,000
Railroad signal design allowance	Lump Sum	\$75,000 - \$300,000
Install intrusion technology	Lump Sum	\$150,000 - \$225,000

Notes: (1) The unit cost ranges are ROM construction cost estimates generally based on safety enhancement projects that are currently in the final design phase.

5.1.14 ROM COST ESTIMATE METHODOLOGY

The ROM cost ranges for the baseline safety enhancements were developed based on past Caltrain project experience and are estimated to be between \$100,000 and \$300,000. For total project cost, a 25% cost factor was applied to account for soft costs such as planning, design, environmental, and construction management.

The ROM cost ranges for advanced safety enhancements were developed based on construction costs from similar projects and included a 50% contingency to determine the upper end of the range.

Table 7 summarizes the range of advanced safety enhancements ROM project costs for each crossing by funding group. To account for soft costs, an additional 25% - 40% cost factor was applied.

Table 7: Estimated Project Costs (\$2024) for Advanced Safety Enhancement Projects

Safety Enhancement Project (Crossing)	Total Estimated Project Costs
Group 1	\$20.8 M - \$35.0 M
Mission Bay Drive	\$2.5 M - \$4.1 M
Scott Street	\$2.9 M - \$4.8 M
Broadway	\$2.5 M - \$4.2 M
Brewster Avenue	\$3.6 M - \$6.0 M
Main Street	\$2.5 M - \$4.2 M
Churchill Avenue	\$1.6 M - \$2.6 M
East Meadow Drive	\$2.8 M - \$4.7 M
Rengstorff Avenue	\$2.6 M - \$4.3 M
Group 2	\$6.9 M - \$11.5 M
16th Street	\$2.3 M - \$3.8 M
North Lane	\$2.6 M - \$4.4 M
Charleston Road	\$2.0 M - \$3.3 M
Group 3	\$16.8 M - \$28.2 M
Bayswater Avenue	\$3.3 M - \$5.5 M
Bellevue Avenue	\$3.0 M - \$5.0 M
Whipple Avenue	\$2.5 M - \$4.3 M
Broadway/Marshall Street	\$3.0 M - \$5.0 M
Oak Grove Avenue	\$2.3 M - \$3.8 M
Mary Avenue	\$2.7 M - \$4.6 M
Group 4	\$58.7 M - \$98.6 M
Linden Avenue	\$2.9 M - \$4.9 M
Center Street	\$2.3 M - \$3.8 M
Santa Paula Pedestrian Crossing	\$0.7 M - \$1.2 M
Oak Grove Avenue	\$3.0 M - \$5.0 M
Howard Avenue	\$3.0 M - \$5.0 M
Peninsula Avenue	\$2.5 M - \$4.2 M
1st Avenue	\$2.8 M - \$4.8 M
2nd Avenue	\$2.8 M - \$4.8 M
3rd Avenue	\$3.0 M - \$5.1 M
4th Avenue	\$2.2 M - \$3.6 M
5th Avenue	\$2.3 M - \$3.8 M
9th Avenue	\$2.9 M - \$4.9 M
Maple Street	\$2.9 M - \$4.9 M
Chestnut Street	\$2.8 M - \$4.7 M
Fair Oaks Lane	\$2.5 M - \$4.2 M
Encinal Avenue	\$2.3 M - \$3.8 M
Glenwood Avenue	\$2.3 M - \$3.8 M
Ravenswood Avenue	\$2.1 M - \$3.6 M
Palo Alto Avenue	\$2.1 M - \$3.6 M
Sunnyvale Avenue	\$2.5 M - \$4.2 M
Auzerais Avenue	\$2.9 M - \$4.9 M
Virginia Street	\$3.2 M - \$5.4 M

ATTACHMENT A: SAFETY ENHANCEMENT PROGRAM CROSSING ASSESSMENT RESULTS

Crossing	Owner	Fatal Rail Incidents	Total Rail Incidents	Predicted Accident Rank	Street Incident - AADT Ratio	Score: Fatal Rail Incident	Score: Total Rail Incident	Score: Predicted Accident Rank	Score: Street Incident - AADT Ratio	Final Score
Mission Bay Drive	Caltrain	1	2	9	0.91	1	1	0	1	3
16th Street	Caltrain	1	3	18	0.57	1	1	0	0	2
Linden Avenue	Caltrain	0	0	29	0.27	0	0	0	0	0
Scott Street	Caltrain	2	4	4	0.69	2	1	0	0	3
Center Street	Caltrain	0	0	38	0.56	0	0	0	0	0
Santa Paula Pedestrian Crossing	Caltrain	0	0	--	0.00	0	0	0	0	0
Broadway	Caltrain	1	9	1	0.46	1	1	1	0	3
Morrell Avenue Pedestrian Crossing	Caltrain	1	1	--	--	1	0	0	0	1
Oak Grove Avenue	Caltrain	0	1	13	0.70	0	0	0	0	0
North Lane	Caltrain	1	1	37	0.87	1	0	0	1	2
Howard Avenue	Caltrain	0	0	34	0.84	0	0	0	0	0
Bayswater Avenue	Caltrain	0	0	39	1.11	0	0	0	1	1
Peninsula Avenue	Caltrain	0	0	22	0.31	0	0	0	0	0
Villa Terrace	Caltrain	0	1	40	0.63	0	0	0	0	0
Bellevue Avenue	Caltrain	1	1	20	0.00	1	0	0	0	1
1st Avenue	Caltrain	0	0	35	0.28	0	0	0	0	0
2nd Avenue	Caltrain	0	0	32	0.64	0	0	0	0	0
3rd Avenue	Caltrain	0	0	26	0.27	0	0	0	0	0
4th Avenue	Caltrain	0	1	25	0.07	0	0	0	0	0
5th Avenue	Caltrain	0	0	30	0.00	0	0	0	0	0
9th Avenue	Caltrain	0	0	27	0.10	0	0	0	0	0
Whipple Avenue	Caltrain	1	1	10	0.37	1	0	0	0	1
Brewster Avenue	Caltrain	3	3	15	1.55	2	1	0	1	4
Broadway/Marshall St	Caltrain	0	0	28	0.85	0	0	0	1	1
Maple Street	Caltrain	0	0	36	0.00	0	0	0	0	0
Main Street	Caltrain	3	3	16	0.00	2	1	0	0	3
Chestnut Street	Caltrain	0	1	6	0.16	0	0	0	0	0

Crossing	Owner	Fatal Rail Incidents	Total Rail Incidents	Predicted Accident Rank	Street Incident - AADT Ratio	Score: Fatal Rail Incident	Score: Total Rail Incident	Score: Predicted Accident Rank	Score: Street Incident - AADT Ratio	Final Score
Fair Oaks Lane	Caltrain	0	0	8	0.00	0	0	0	0	0
Watkins Avenue	Caltrain	2	2	17	--	2	1	0	0	3
Encinal Avenue	Caltrain	0	0	33	0.00	0	0	0	0	0
Glenwood Avenue	Caltrain	0	0	31	0.00	0	0	0	0	0
Oak Grove Avenue	Caltrain	0	2	12	0.34	0	1	0	0	1
Ravenswood Avenue	Caltrain	0	1	23	0.49	0	0	0	0	0
Palo Alto Avenue	Caltrain	0	0	24	0.25	0	0	0	0	0
Churchill Avenue	Caltrain	2	9	2	1.08	2	1	1	1	5
East Meadow Drive	Caltrain	2	3	3	2.46	2	1	1	1	5
Charleston Road	Caltrain	1	6	5	0.77	1	1	0	0	2
Rengstorff Avenue	Caltrain	3	3	7	1.51	2	1	0	1	4
Castro Street	Caltrain	1	2	19	0.57	1	1	0	0	2
Mary Avenue	Caltrain	1	1	11	0.45	1	0	0	0	1
Sunnyvale Avenue	Caltrain	0	1	14	0.77	0	0	0	0	0
Auzerais Avenue	Caltrain	0	0	21	0.15	0	0	0	0	0
Virginia Street	Caltrain	0	0	41	0.00	0	0	0	0	0
Skyway Drive	UPRR	0	0	--	1.69	0	0	0	0	0
Branham Lane	UPRR	1	2	--	1.59	1	1	0	0	2
Chynoweth Avenue	UPRR	0	3	--	3.10	0	1	0	0	1
Blanchard Road	UPRR	0	0	0	--	0	0	0	0	0
Fox Lane Crossing	UPRR	0	1	0	--	0	0	0	0	0
Palm Avenue	UPRR	0	0	--	8.13	0	0	0	1	1
Live Oak Avenue	UPRR	0	0	--	8.75	0	0	0	1	1
Tilton Avenue	UPRR	0	0	--	0.63	0	0	0	0	0
East Main Avenue	UPRR	0	0	--	0.00	0	0	0	0	0
Morgan Hill Station Pedestrian Crossing	UPRR	0	0	--	0.00	0	0	0	0	0
Dunne Avenue	UPRR	0	0	--	0.05	0	0	0	0	0
San Pedro Avenue	UPRR	0	0	--	0.24	0	0	0	0	0
Tennant Avenue	UPRR	0	1	--	0.05	0	0	0	0	0
East Middle Avenue	UPRR	0	0	--	0.00	0	0	0	0	0
San Martin Avenue	UPRR	0	0	--	0.55	0	0	0	0	0

Crossing	Owner	Fatal Rail Incidents	Total Rail Incidents	Predicted Accident Rank	Street Incident - AADT Ratio	Score: Fatal Rail Incident	Score: Total Rail Incident	Score: Predicted Accident Rank	Score: Street Incident - AADT Ratio	Final Score
Church Avenue	UPRR	0	0	--	1.33	0	0	0	0	0
Masten Avenue	UPRR	0	1	--	2.13	0	0	0	0	0
Rucker Avenue	UPRR	0	0	--	2.50	0	0	0	0	0
Buena Vista Avenue	UPRR	0	1	--	4.57	0	0	0	1	1
Cohansey Avenue	UPRR	0	0	--	15.00	0	0	0	1	1
Las Animas Avenue	UPRR	0	0	--	2.06	0	0	0	0	0
Leavesly Road	UPRR	1	1	--	0.21	1	0	0	0	1
Casey Road Pedestrian Crossing	UPRR	0	0	--	0.00	0	0	0	0	0
Loof Avenue	UPRR	0	0	--	0.00	0	0	0	0	0
Lewis Street	UPRR	0	0	--	0.00	0	0	0	0	0
Martin Street	UPRR	0	0	--	4.00	0	0	0	1	1
6th Street	UPRR	0	0	--	0.35	0	0	0	0	0
7th Street	UPRR	0	0	--	0.36	0	0	0	0	0
10th Street	UPRR	0	0	--	0.07	0	0	0	0	0

ATTACHMENT B: HIGH-SPEED RAIL PROPOSED AT-GRADE CROSSING SAFETY IMPROVEMENTS

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
Mission Bay Drive	San Francisco	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane
16th Street	San Francisco	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane
Scott Street	San Bruno	Caltrain	Alternative A	B1	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Center Street	Millbrae	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Santa Paula Pedestrian Crossing	Millbrae	Caltrain	--	--	--
Broadway	Burlingame	Caltrain	Alternative A	C	4 vehicular arm gates and a 50-foot raised median or extend the raised median on the crossing street
Morrell Avenue Pedestrian Crossing	Burlingame	Caltrain	--	--	--

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
Oak Grove Avenue	Burlingame	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
North Lane	Burlingame	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Howard Avenue	Burlingame	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Bayswater Avenue	Burlingame	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Peninsula Avenue	Burlingame	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
Villa Terrace	San Mateo	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Bellevue Avenue	San Mateo	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
1st Avenue	San Mateo	Caltrain	Alternative A	E	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
2nd Avenue	San Mateo	Caltrain	Alternative A	E	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
3rd Avenue	San Mateo	Caltrain	Alternative A	E	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
4th Avenue	San Mateo	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane
5th Avenue	San Mateo	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
9th Avenue	San Mateo	Caltrain	Alternative A	E	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street.
				A	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street.
Whipple Avenue	Redwood City	Caltrain	Alternative A	C	4 vehicular arm gates and a 50-foot raised median or extend the raised median on the crossing street
Brewster Avenue	Redwood City	Caltrain	Alternative A	D	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
Broadway/Marshal I St	Redwood City	Caltrain	Alternative A	D	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
Maple Street	Redwood City	Caltrain	Alternative A	E	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
Main Street	Redwood City	Caltrain	Alternative A	E	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
Chestnut Street	Redwood City	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Fair Oaks Lane	Atherton	Caltrain	Alternative A	None	Fair Oaks Lane already has four-quadrant gates, no additional improvements are proposed.
Watkins Avenue	Atherton	Caltrain	Alternative A	B1	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Encinal Avenue	Menlo Park	Caltrain	Alternative A	B	2 vehicular arm gates, 2 pedestrian arm gates, 2 pedestrian swing gates, channelizers on adjacent lanes, a 50-foot raised median or extend the raised median on the crossing street
Glenwood Avenue	Menlo Park	Caltrain	Alternative A	E	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
Oak Grove Avenue	Menlo Park	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane
Ravenswood Avenue	Menlo Park	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
Middle Avenue Undercrossing	Menlo Park	Caltrain	--	--	--
Palo Alto Avenue	Palo Alto	Caltrain	--	--	--
Churchill Avenue	Palo Alto	Caltrain	Alternative A	D	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
East Meadow Drive	Palo Alto	Caltrain	Alternative A	D	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
Charleston Road	Palo Alto	Caltrain	Alternative A	D	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
Rengstorff Avenue	Mountain View	Caltrain	Alternative A	C	4 vehicular arm gates and a 50-foot raised median or extend the raised median on the crossing street
Castro Street	Mountain View	Caltrain	Alternative A	C	4 vehicular arm gates and a 50-foot raised median or extend the raised median on the crossing street
Bernardo Avenue Undercrossing	Sunnyvale	Caltrain	--	--	--

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
Mary Avenue	Sunnyvale	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane
				D	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
Sunnyvale Avenue ²	Sunnyvale	Caltrain	Alternative A	D	2 vehicular arm gates, channelizers on crossing streets, and a 50-foot raised median or extend the raised median on the crossing street
				A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane.
Auzerais Avenue	San Jose	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane
Virginia Street	San Jose	Caltrain	Alternative A	A	2-4 vehicular arm gates, channelizers on crossing, adjacent lanes and streets with more than 1 lane
Blossom Hill Road	San Jose	UPRR	Alternative 4	--	New crash walls
Capitol Expressway	San Jose	UPRR	Alternative 4	--	New crash walls, bridge modifications
Branham Lane	San Jose	UPRR	Alternative 4	--	Quad gates
Xanders Pedestrian Overcrossing	San Jose	UPRR	Alternative 4	--	--

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
Chynoworth Avenue	San Jose	UPRR	Alternative 4	--	Quad gates
Bernal Road	San Jose	UPRR	Alternative 4	--	--
Skyway Drive	San Jose	UPRR	Alternative 4	--	Quad gates
Great Oaks Parkway Pedestrian Overcrossing	San Jose	UPRR	Alternative 4	--	Realignment
Palm Avenue	San Jose	UPRR	Alternative 4	--	Quad gates
Live Oak Avenue	San Jose	UPRR	Alternative 4	--	Quad gates
West Valley Freeway On-Ramp	San Jose	UPRR	Alternative 4	--	--
Masten Avenue	Morgan Hill	UPRR	Alternative 4	--	Quad gates
Tilton Avenue	Morgan Hill	UPRR	Alternative 4	--	Quad gates
Dunne Avenue	Morgan Hill	UPRR	Alternative 4	--	Quad gates
Tennant Avenue	Morgan Hill	UPRR	Alternative 4	--	Quad gates
Monterey Road	Morgan Hill	UPRR	Alternative 4	--	--
East Main Avenue	Morgan Hill	UPRR	Alternative 4	--	Quad gates
Morgan Hill Station Pedestrian Crossing	Morgan Hill	UPRR	Alternative 4	--	New pedestrian underpass

Crossing	City	Ownership	Selected Alternative per HSR	Improvement Application	Improvement Application Description
San Pedro Avenue	Morgan Hill	UPRR	Alternative 4	--	Quad gates
Butterfield Boulevard	Morgan Hill	UPRR	Alternative 4	--	--
East Middle Avenue	Morgan Hill	UPRR	Alternative 4	--	Quad gates
Bailey Avenue	Coyote	UPRR	Alternative 4	--	New crash walls
Buena Vista Avenue	Gilroy	UPRR	Alternative 4	--	Quad gates
Las Animas Avenue	Gilroy	UPRR	Alternative 4	--	Quad gates
Cohansey Avenue	Gilroy	UPRR	Alternative 4	--	Quad gates
Leavesly Road	Gilroy	UPRR	--	--	--
Rucker Avenue	Gilroy	UPRR	Alternative 4	--	Quad gates
Casey Road Pedestrian Crossing	Gilroy	UPRR	Alternative 4	--	Remove Pedestrian Crossing
Martin Street	Gilroy	UPRR	Alternative 4	--	Quad gates
6th Street	Gilroy	UPRR	Alternative 4	--	Quad gates
7th Street	Gilroy	UPRR	Alternative 4	--	Road closed
Loof Avenue	Gilroy	UPRR	Alternative 4	--	Quad gates
Lewis Street	Gilroy	UPRR	Alternative 4	--	Quad gates
10th Street	Gilroy	UPRR	Alternative 4	--	Quad gates

Sources:

1. CHSRA. Project Section Environmental Documents, San Francisco to San Jose.
2. CHSRA. Project Section Environmental Documents, San Jose to Merced.

Footnotes:

² Listed under two applications as there is a discrepancy in application types in the HSR Environmental Documents.



ATTACHMENT C: SECTION 130 CURRENT PROJECT LIST 2024

County	City	Crossing	CPUC Priority List Ranking (2024)
San Francisco	San Francisco	Mission Bay Drive	--
San Francisco	San Francisco	16th Street	--
San Mateo	South San Francisco	Linden Avenue	--
San Mateo	San Bruno	Scott Street	--
San Mateo	Millbrae	Center Street	--
San Mateo	Millbrae	Santa Paula Pedestrian Crossing	--
San Mateo	Burlingame	Broadway	--
San Mateo	Burlingame	Morrell Avenue	--
San Mateo	Burlingame	Pedestrian Crossing	--
San Mateo	Burlingame	Oak Grove Avenue	--
San Mateo	Burlingame	North Lane	--
San Mateo	Burlingame	Howard Avenue	--
San Mateo	Burlingame	Bayswater Avenue	--
San Mateo	Burlingame	Peninsula Avenue	--
San Mateo	San Mateo	Villa Terrace	--
San Mateo	San Mateo	Bellevue Avenue	--
San Mateo	San Mateo	1st Avenue	--
San Mateo	San Mateo	2nd Avenue	--
San Mateo	San Mateo	3rd Avenue	--
San Mateo	San Mateo	4th Avenue	9
San Mateo	San Mateo	5th Avenue	10
San Mateo	San Mateo	9th Avenue	--
San Mateo	Redwood City	Whipple Avenue	--
San Mateo	Redwood City	Brewster Avenue	--
San Mateo	Redwood City	Broadway/Marshall St	--
San Mateo	Redwood City	Maple Street	--
San Mateo	Redwood City	Main Street	--
San Mateo	Redwood City	Chestnut Street	--
San Mateo	Atherton	Fair Oaks Lane	--
San Mateo	Atherton	Watkins Avenue	--
San Mateo	Menlo Park	Encinal Avenue	--
San Mateo	Menlo Park	Glenwood Avenue	--
San Mateo	Menlo Park	Oak Grove Avenue	--
San Mateo	Menlo Park	Ravenswood Avenue	--
Santa Clara	Palo Alto	Palo Alto Avenue	--
Santa Clara	Palo Alto	Churchill Avenue	7
Santa Clara	Palo Alto	East Meadow Drive	13
Santa Clara	Palo Alto	Charleston Road	--
Santa Clara	Mountain View	Rengstorff Avenue	--
Santa Clara	Mountain View	Castro Street	--
Santa Clara	Sunnyvale	Mary Avenue	--
Santa Clara	Sunnyvale	Sunnyvale Avenue	--
Santa Clara	San Jose	Auzerais Avenue	--
Santa Clara	San Jose	Virginia Street	--