CONSOLIDATED SAFETY STUDY FOR CALTRAIN IN SANTA CLARA COUNTY

Executive Summary

The VTA in conjunction with the Peninsula Corridor Joint Powers Board (PCJPB) is developing a safety improvement program for the Caltrain commuter rail system within Santa Clara County. This program will not only assess at-grade street crossings similar to a program initiated by PCJPB in San Mateo County, but it will also address other problem locations where pedestrian, cyclist, and motor vehicle safety is impacted. Included in the evaluation are at-grade railway/highway crossings, Caltrain stations, and pedestrian-intensive areas outside of street crossings and stations where public traffic frequently crosses, and/or exists adjacent to, the tracks. As part of the evaluation, the proximity of nearby schools to these three (3) types of crossings will also be investigated. The study considers the Caltrain corridor from Palo Alto to Gilroy, including the portion of the track way south of Mile Post (M.P.) 51.64 (southern San Jose) to M.P. 77.71 in Gilroy, which is under Union Pacific Railroad (UPRR) controlled dispatch.

Existing conditions have been reviewed at each of the 38 roadway/railway at-grade intersections in the County. An inventory of existing and typically provided elements such as pedestrian gates, concrete crossing panels, channelizing guard rail for pedestrians, emergency ADA gates, pedestrian tactile warning devices, and roadway median islands has been prepared for each crossing. Standards for grade crossing safety improvements that have been developed by PCJPB and supported by the California Public Utilities Commission (CPUC) would be used as the basis for improvements at grade crossings. Typically, a formal "Diagnostics" Meeting would be held with the City, CPUC, PCJPB/Caltrain, and adjacent property owners as appropriate to review existing and proposed safety measures at a grade crossing and recommend appropriate improvements. In San Mateo County, such an evaluation has taken place, and up to $400,000 in civil and train signal improvements have been recommended at each crossing. Funding for this work is available through several avenues, including "Section 130" funding secured through the CPUC.

An implementation plan has been developed which analyzes the priority of a given safety improvement element and gives a recommendation for the timing of such improvements as related to short/mid/long term constructability. There are 17 types of improvement projects identified with this study. The High priority improvements include 11 types of improvement projects, the Medium priority grouping includes five (5) types of projects, and only one (1) type of improvement is considered Low priority. Within these, 11 of the 17 improvements can be readily discussed with stakeholders and be implemented within a planned, prioritized construction schedule. Two of the projects could be implemented in the "medium" term, and the final three are "long" term projects requiring extensive coordination and/or design effort.

1. Purpose

The Consolidated Safety Study for Caltrain is being funded by the Santa Clara Valley Transportation Authority (VTA) in order to develop a safety improvement program that ultimately will reduce incidents along the rail corridor and thereby enhance operational performance. Since any incident on the Peninsula Corridor Joint Powers Board (PCJPB, or Caltrain) right-of-way has the potential of impacting Caltrain operations, available incident data and recently adopted engineering standards will form the basis of analysis and comparison for this study. A goal of this study is to produce a list of prioritized recommendations for bicycle, pedestrian and vehicular safety improvements along the Caltrain corridor within Santa Clara County (between Palo Alto and Gilroy). Emphasis will be on at-grade street crossings, Caltrain stations, locations near schools, and other pedestrian-intensive areas. Generally, the areas studied will include features crossing or immediately adjacent to the Caltrain ROW.

The study will focus on existing conditions— first establishing lists of the features under consideration (e.g., stations and street crossings) and then determining which ones warrant improvements within a prioritized listing. For example, stations that have been recently upgraded for safety could probably be removed from the list. Locations with perceived safety problems will be prioritized (e.g., type of feature or number and severity of incidents occurring at a given location). Prioritization will be coordinated with Caltrain, VTA, Union Pacific Railroad (UPRR), Caltrans and other jurisdictional authorities. An order-of-magnitude cost estimate will be made for each location in which safety could be enhanced by improvements. Recommendations on the environmental clearance process will also be included within the study.

Figure 1 is an overview map of the Caltrain corridor within Santa Clara County, including Caltrain stations, major at-grade street crossings, grade-separated overpasses/underpasses, parks, commercial/downtown areas, hospitals, and other features that could have an impact on rail safety.

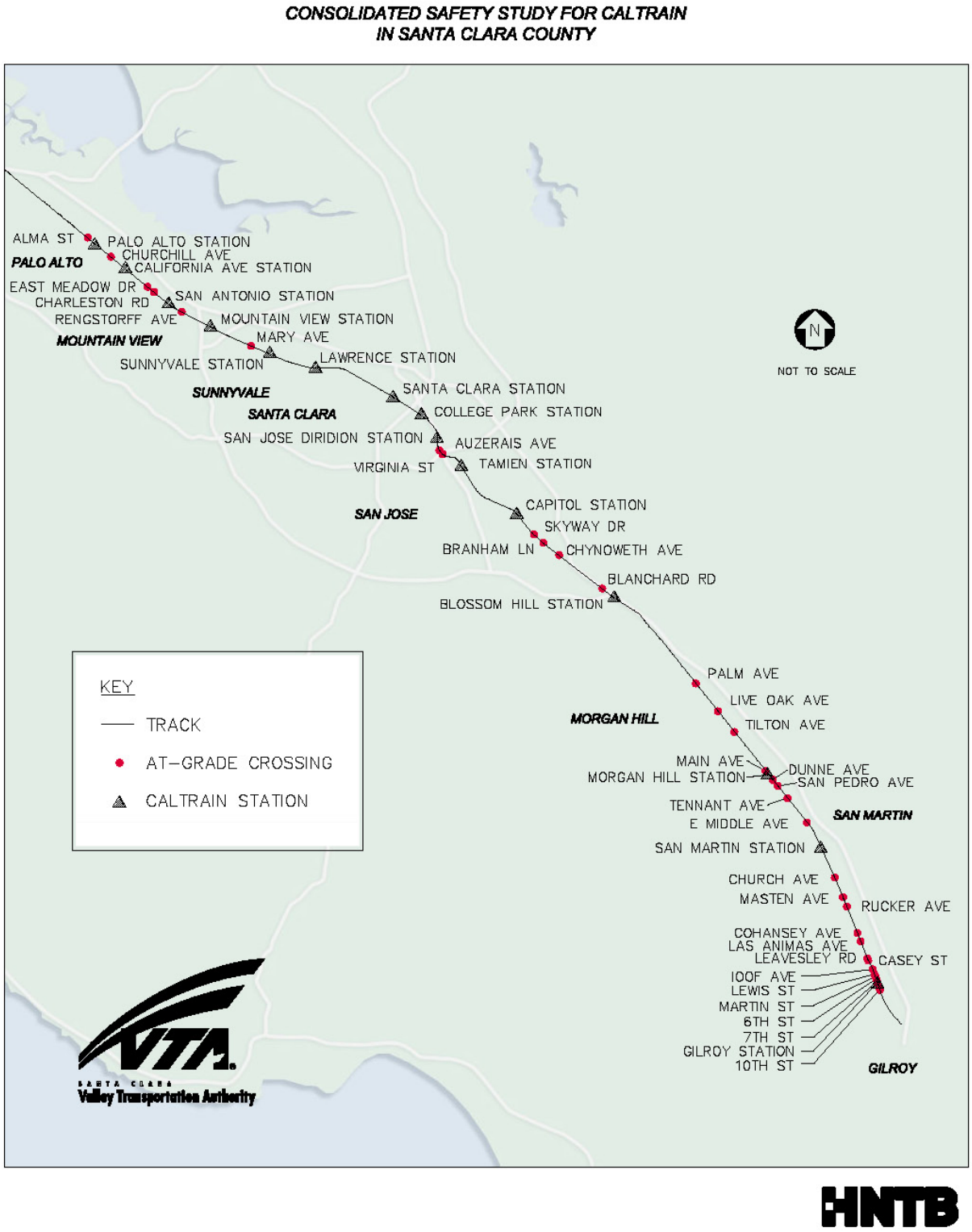


Figure 1: Overview Map of Caltrain Corridor in Santa Clara County

2. Study Process

2.1. Background and Setting

VTA is funding a program to study safety improvements to the Caltrain corridor within Santa Clara County. A similar program (administered by PCJPB) is underway in San Mateo County to examine all Caltrain at-grade (non-separated) street crossings and recommend and construct safety improvements where appropriate. PCJPB and the California Public Utilities Commission (CPUC) have developed engineering standards for street crossings and automatic highway crossing warning (AHCW) systems that are constantly evolving. All new crossings must meet currently applicable codes, but such standards are not normally made retroactive for existing crossings. However, whenever a crossing is modified in any significant way, it must be brought up to the current code. These standards, and the upgrades required by them for any given crossing, must be considered in determining where the most beneficial improvements will be made.

The Santa Clara County program additionally examines other areas of safety concerns, such as Caltrain stations, nearby schools and playgrounds, and other bicycle/pedestrian-intensive areas. One good source of identifying locations where safety improvements may be warranted is the available incident data. This information is collected by a number of agencies, including the Federal Railroad Authority (FRA), CPUC, UPRR, and PCJPB itself. Existing conditions (for example fencing and crossing treatments) will be examined, photographed, and described at the locations identified as potential candidates where safety improvements could be beneficial.

2.2. Identification of Improvements and Study Tasks

Identification of locations where safety improvements can be made, estimation of the cost of such improvements, and recommendation of a design and construction implementation plan is the overall objective of this study.

2.2.1. Data Collection and Review

To determine a priority listing of improvements, the primary initial task is the collection of existing data. System data (e.g., stations, street crossings, and fencing plans), available from Caltrain and the VTA, was assembled. The location of schools and other features was gathered from the cities and other jurisdictions along the corridor, as well as through readily available online Internet resources such as http://maps.live.com. As the data was collected, it was organized and categorized for easy retrieval; information not relevant to this study was then removed from consideration. Examples of this include street crossings that are completely up to current code or a Caltrain station that has recently been upgraded for safety improvements (for example, the University Avenue Caltrain Station in Palo Alto, which is scheduled for ADA related safety improvement construction starting in summer 2007).

Incident data can be used to determine other locations that could benefit from safety improvements. Incident records are kept by Caltrain, UPRR, FRA, and CPUC and often contain suggestions for preventing a reoccurrence of the incident. Summaries of incidents that occurred in the study's geographical area dating back to 2001 were obtained for review and evaluation. The relevant data was then sorted by location and categorized as to number and severity of incidents.

Both PCJPB and VTA have a number of projects in various stages of planning. A listing of such projects, prioritized and with proposed time-frames and cost estimates, has been developed and included as Table 1. Any proposed project within the study area that could qualify as a safety related service or operations enhancing improvement will be given special consideration as a potential candidate for this study. It will also be noted when such projects were originally proposed as part of another program, and the agency or organization proposing them.

Table 1: Programmed Projects

Mile post	Location	City	Project Sponsor	Project Cost	Notes
29.76	Alma Street / Palo Alto Avenue	Palo Alto	CPUC	$400,000	Section 130 Approved Funding, 2008
31.01	Churchill Avenue	Palo Alto	CPUC	$750,000	Section 130 Approved Funding, 2008
33.0	East Meadow Drive	Palo Alto	CPUC	$1,500,000	Section 130 Approved Funding, 2008
	California Avenue Station	Palo Alto	PCJPB		Platform, underpass and bridge deck repair, 2007
33.3	Charleston Road	Palo Alto	CPUC	$1,500,000	Section 130 Approved Funding, 2008
	University Station	Palo Alto	PCJPB		Underpass and platform repair, 2007
34.24	Rengstorff Avenue	Mountain View	CPUC	$1,500,000	Section 130 Approved Funding, 2008
34.24	Rengstorff Avenue	Mountain View	City of Mountain View		Grade Separation Study
35.94	Castro Street	Mountain View	CPUC	$900,000	Section 130 Approved Funding, 2008
37.96	Mary Avenue	Sunnyvale	CPUC	$750,000	Section 130 Approved Funding, 2008
	Santa Clara Station	Santa Clara	PCJPB	$26,000,000	Platform and pedestrian underpass
	South Terminal	San Jose	PCJPB		Phase I, Platform work, 2009
	South Terminal	San Jose	PCJPB		Phase II, Track and Signal Components, 2010
48.22	West Virginia Street	San Jose	CPUC	$400,000	Section 130 Approved Funding, 2008
48.06	Auzerais Street	San Jose	CPUC	$400,000	Section 130 Approved Funding, 2008
	Caltrain Stations	Various	CPUC	$1,500,000	Section 130 Approved Funding, 2008

2.2.2. Conceptual Plan

Each location along the corridor has been examined at a preliminary level for perceived safety problems. Locations identified as having problems were reviewed more thoroughly to define the problem, in either general (type of problem) or specific terms. Possible solutions (either general or specific) have been proposed for each identified location, along with order of magnitude cost estimates for their implementation. Assumptions have been made on how to prioritize the various locations, and each location is prioritized by and/or within its category. The selection of locations warranting safety improvements and the prioritizing of the identified locations based on general or specific assumptions constitutes the conceptual plan of this study. However, this is expected to be an iterative process; see section 2.2.3. below.

2.2.3. Coordination

Specific locations identified as warranting safety improvements and the assumptions made to

prioritize such locations will be closely coordinated with PCJPB, VTA, City, CPUC and UPRR personnel. Similar studies (e.g., San Mateo Safety Grade Crossing Improvement Program) will be examined and discussed with VTA and other interested parties.

Meetings and conferences often result in modified locations and the assumptions used to prioritize them: there are numerous approval authorities who may have different agendas and obtaining consensus is often a challenge. The primary mechanism for obtaining concurrence is through formal field diagnostics meetings. These meetings, typically held on site at railway/roadway at-grade crossings, provide opportunities for stakeholders to view existing conditions, comment on proposed improvements, offer suggestions on possible improvements, and generally hear the concerns of all the affected stakeholders. The scope of this study does not include diagnostics meetings; however it is anticipated that a framework for improvements at every at-grade crossing in Santa Clara County will be developed such that diagnostics meetings can be scheduled as the first and most important step in defining safety improvements at the railway/roadway crossings. Upon completion of diagnostics meetings, specific improvements are identified, programmed, and constructed.

2.2.4. Reports

This report documents our findings, proposed assumptions for selecting locations, prioritized recommendations for safety improvements, proposed solutions, and order of magnitude cost estimates for the alternative solutions at the recommended locations.

An initial DRAFT report, written as more of a Work Plan, emphasizing the approach to the study, contained initial compilations of the raw data identifying the street crossings, stations, nearby schools, and other locations within the study area.

This FINAL report contains the prioritized listing of locations and recommendations for specific improvements by location. For each location selected, a solution, and possible alternative solutions, is proposed with an order of magnitude cost estimate. Recognizing that budget constraints and other considerations may result in the re-prioritizing, and even re-selection, of some locations, this is expected to be an iterative process through the project development process.

A follow-on study is being undertaken by VTA to examine the relationship between safety related improvements and train operations.

3. Design Requirements

3.1. Authorities and Stakeholders

The approval by a number of different authorities is required for safety improvements to be considered for implementation at any given location. Besides Caltrain, which must approve any modifications within its ROW, and VTA, the agency that is funding this study, approvals from the CPUC, County of Santa Clara, and local jurisdiction or municipality are required. Furthermore, for the rail corridor south San Jose, UPRR concurrence will be required. Cities within the Santa Clara County portion of the Caltrain corridor are: Palo Alto, Mountain View, Sunnyvale, Santa Clara, San Jose, Morgan Hill, and Gilroy. There are also segments of the corridor within unincorporated Santa Clara County (such as the San Martin area). As previously discussed, these stakeholders would be asked to attend field diagnostics meetings and would be involved in review of construction plans as they are developed. With improvements to sidewalks and construction of median islands often extending beyond the railway right of way, encroachment permits or other agreements would be needed for work in the City streets. Where their assets could be impacted, approval from entities such as Caltrans could be required. Stakeholders to a specific improvement include the owners or residents of any abutting properties, especially if there are easement considerations. These parties could be private citizens, state and federal agencies, or public and private utilities (e.g., Santa Clara Valley

Water District (SCVWD) or AT&T), among others. The safety improvements typically considered do not impact adjacent private properties; they are generally contained with railway and street rights of way.

3.2. Design Criteria

The study included the preparation of a preliminary Design Basis Memorandum (DBM), outlining

design criteria to be used (see appendix A). This document calls out PCJPB Standards as the primary criteria, to be supplemented by standards employed by the various Cities, AASHTO, MUTCD, and Caltrans Highway Design Manual. The DBM includes sections for general civil design, utilities, streets, sidewalks, track work (rail, ties, and panels), traffic and railway signals, fencing, signing and striping. There is also a section containing references to applicable standards and criteria.

3.3. Traffic

Traffic impacts need to be considered in selecting and prioritizing locations for safety improvements. Upgraded street crossings often provide benefits to existing traffic patterns, as well as improving safety at the highway-rail crossing. Implementation of median islands can have a dramatic effect on movement to and from streets and driveways adjacent to the tracks. Identification of these issues is critical at the diagnostics stage to initiate dialogue between the agencies and neighborhood interests. Traffic impacts may also exist for an improvement of any type during the period of its construction. Such impacts include detours and lane and street closures, which could be in effect at certain times and days or over a specific period. The "cost" of traffic impacts may need to considered in the order of magnitude cost estimate for a given safety improvement, although it is often hard to quantify. It is presumed that the improvement, upon its completion, will result in comparable, if not better, roadway traffic conditions.

Vehicle traffic counts and frequency of train crossings are key elements used to set priorities. Average Daily Traffic (ADT) numbers for the roadways are grouped to identify the highest traffic locations for vehicles. The VTA's Bicycle and Pedestrian Advisory Committee also provided a list of at-grade crossings and their suitability for bicycle/pedestrian access (Table 2). Crossings needing improvements based on this list are given priority for implementation timing assuming all other metrics are equal. The scope of safety improvements typically would not address roadway widening or installation of features such as sidewalks where they don't currently exist.

Between Palo Alto and San Jose, there are 96 scheduled Caltrain routes per day - between San Jose and Gilroy, there are six (6) scheduled Caltrain routes per day. UPRR typically runs up to 18 trains per day between Palo Alto and Gilroy. Three "tenants" also run passenger service within Santa Clara County: The Altamont Commuter Express (ACE) has four (4) westbound trains in the morning and four (4) eastbound trains in the afternoon; the Amtrak Capitol Corridor has 15 westbound and 14 eastbound trains per day; and the Amtrak Coast Starlight has one train in each direction per day. For the ACE and Capitol Corridor trains, the route in Santa Clara County runs between De La Cruz Blvd (just north of the Santa Clara Caltrain station) and Diridon Station in San Jose. The Coast Starlight continues past Diridon through Gilroy and onto destinations south of the county. All of these train frequencies factor into the recommendations for crossing and other improvements.

Table 2: Bicycle/Pedestrian Crossing Inventory

Crossing	Sidewalks	Bike Lanes	Shoulders
Alma St.	Yes	Yes	No
Churchill Ave.	Yes	Yes	No
West Meadow Dr.	Yes	Yes	No
Charleston Rd.	Yes	Yes	No
Rengstorff Ave.	Yes	Yes	No
Castro St.	Yes	No	Yes
Mary Ave.	Yes	No	No

Crossing	Sidewalks	Bike Lanes	Shoulders
Sunnyvale Ave.	Yes	No	No
Auzerais Ave.	Yes	No	No
West Virginia Ave.	Yes	No	No
Skyway Dr.	No	No	Yes
Branham Lane	Yes	Yes	No
Chynoweth Ave.	Yes	No	Yes
Blanchard Rd.	No	No	No
Palm Ave.	No	No	No
Live Oak Ave.	No	No	No
Tilton Ave.	No	No	No
Main St.	Yes	Yes	No
Dunne St.	Yes	Yes	No
San Pedro Ave.	No	No	No
Tennant Ave.	No	Yes	No
Middle Ave.	No	No	No
San Martin Ave.	Yes	No	No
Church Ave.	No	No	No
Masten Ave.	No	No	No
Rucker Ave.	No	No	No
Buena Vista Ave.	No	No	No
Cohansey Ave.	No	No	No
Las Animas Ave.	No	No	No
Leavesley Rd.	Yes	Yes	Yes
Casey Rd.	Asphalt Ped Xing Only	N/A	N/A
IOOF Ave.	Yes	No	Yes
Lewis St.	Yes	No	Yes
Martin St.	Yes	No	Yes
6th St.	Yes	No	Yes
Old Gilroy St.	Yes	No	Yes
10th St.	Yes	No	Yes

3.4. Utilities

Almost any safety improvement, even the installation of a short section of fence, could affect, and be affected by, existing utilities. Many underground utilities are immediately adjacent to, as well as sometimes within or crossing, the PCJPB right of way. Utility and PCJPB corridors have many overlapping easements, including overhead utilities that cross and run parallel to the ROW in numerous locations. Existing utility maps should be examined for any safety improvement proposed for selection. In doing this, the costs of relocating or protecting-in-place underground/overhead utilities will be considered in developing the order of magnitude cost estimate.

4. Safety Improvement Program

Safety improvements for the Caltrain corridor within Santa Clara County are shown in the following four (4) categories: At-grade Highway-Rail Crossings, Caltrain Stations, Grade Separations, and Right-of-Way Fencing.

4.1. At-grade Highway-Rail Crossings

In this section, the individual elements of protection for vehicles, bicycles and pedestrians are detailed. The first elements (items 4.1.1 through 4.1.9) are predominately geared towards on-street improvements that benefit vehicle and bicycle safety. In this report, all references to “highway”

include all roadways intersecting the tracks, regardless of their functional classification. The subsequent elements describe pedestrian safety improvements.

4.1.1 Signs

The California Manual on Uniform Traffic Control Devices (CA MUTCD) prescribes the standards to be used for signs and pavement markings on all facilities open to public use in the State of California. An entire chapter (chapter 8) of the CA MUTCD is devoted to traffic controls for highway-rail grade crossings. At the minimum, the MUTCD prescribes that one highway-rail Grade Crossing (cross buck) sign shall be used in each approach to the grade crossing. If there are two or more tracks, a supplemental Number of Tracks Sign shall also be installed. A highway-rail grade crossing advanced warning sign shall be used in advance of every grade crossing except when the edge of the tracks to the edge of the parallel roadway is less than 100 feet. In that case, other signs are used. The cross buck sign shall be placed on the right side of the roadway on each approach to the crossing. If sight distance is unsatisfactory, a second sign may be placed on the left side of the roadway so that two cross buck signs are displayed per approach.

Another type of sign that is commonly used at grade crossings is the *Do Not Stop On Tracks* sign. This sign should be located on the right side of the roadway to provide adequate visibility to motorists approaching the crossing or stopped on the crossing. In Santa Clara County, lengthy segments of the Caltrain corridor run parallel to and abut Central Expressway and Monterey Highway. These signs are critical for crossings in this vicinity, as there is not sufficient storage space for vehicles between the tracks and adjacent signalized intersections.

The above-mentioned signs warn motorists or pedestrians of the existence of a railroad crossing, but in no active way warn them of an oncoming train. These signs are required as a minimum treatment at all crossings, and are recommended to be reviewed and placed where they do not currently exist. Many highway-rail grade crossings have been in place for many years, pre-dating the existence of current standards such as the MUTCD. Implementation of current standards is an imperative first step to this safety program.

4.1.2 Pavement Markings

At highway-rail grade crossings, there shall be pavement markings consisting of an X, the letters RR, no passing markings, and a transverse STOP line. The STOP line should be placed at a right angle to the traveled way approximately 8-feet in front of a gate, if present, but no closer than 15-feet from the nearest rail. These markings indicate where traffic should stop to remain clear of a passing train. Per the CA MUTCD, identical (RXR) markings shall be placed on all paved approaches to the at-grade crossing (such as parallel roadways intersecting the cross-street adjacent to gates or at tee-intersections).

Through the active railroad crossings, 4" white pavement stripes with white reflective markers are also included to provide direction to motorists and cyclists that the roadway is continuous through the crossing. This helps deter unintended turns onto the tracks, especially during night time hours. For visually impaired pedestrians, installation of 12" white markings to denote the pedestrian pathway is also typically installed.

4.1.3 Roadway Median Islands

Median islands may be placed along the roadway centerline on approaches to the grade crossing, in order to prevent and discourage vehicles from going around the lowered gates and entering the track way. Incidents have occurred when vehicles have navigated around/through the lowered gates after a train has cleared the crossing, only to be struck by oncoming trains moving in the opposite direction on the second track. Although standards do not exist for a prescribed design length, 50' - 60' is considered for typical installations, as it

prevents queuing for 2 to 3 cars on approach and prevents those 2nd, 3rd, and subsequent vehicles from driving around the first cars waiting at the lowered gates. Typical median island width is 4', though this is governed by the width of existing roadway, and often is decreased to 1' or 2' when constrained. Median hardscape treatments would typically be constructed per the City Standards for the location in question (e.g. cobblestone, stamped concrete, brick pavers or flat concrete islands).

With installation of roadway median islands, consideration must be given to adjacent driveways and/or roadways that parallel the tracks. Installation of islands that block accesses or require modification to local traffic circulation patterns can become an issue in obtaining stakeholder concurrence on the improvements.

4.1.4 Median Gate System

At some locations, the roadway width and geometrics are such that using the typical single arm gate per approach is not the best solution. With a maximum gate length of 32', some multilane roadways will require median gate assemblies to protect all lanes of traffic on each approach to the crossing. When a median gate is installed, a minimum 8'-6" wide median is required for protection of the gate assembly.

4.1.5 Concrete Crossing Panels

Uneven crossing surfaces, potholes and gaps between the rails, cause hazards for bicycles and motorists as well as pedestrians. A good alternative to improve the drivability as well as the aesthetics of the crossing is to install concrete panels. Concrete panel railroad crossings provide smooth passage for vehicles and bicycles driving over rails. PCJPB has installed concrete grade crossing panels at the majority of crossings in urban areas.

This type of crossing surface is made of separate concrete panels, usually about six to seven inches thick and eight to 10 feet long, reinforced with an angle iron frame around the perimeter. The panels fill the space created by the tracks, up to the level of the road pavement. Installation of concrete panels is the most effective means of improving bicycle safety at crossings.

4.1.6 Clearing and Grubbing / Sightline Improvements

As much as practical, a goal would be to remove any vegetation and other obstructions within the right-of-way that would interfere with motorists' ability to see approaching train traffic. Typically this is a maintenance exercise, however there are many locations along the corridor where vegetation has been allowed to grow and restrict sight lines on approaches to the crossings.

4.1.7 Advanced Signal Pre-emption

The CA MUTCD requires that all signalized intersections within 200' of a railway/highway at-grade crossing be connected to the train signals so that pre-emption of the roadway traffic signals can occur upon train approach. Historically, pre-emption has been designed as simultaneous pre-emption, whereby the traffic signals are alerted to the approach of a train at the same time that the train gates begin to descend. The traffic signals are interrupted from their current phase in order to allow traffic crossing from the tracks to receive a green signal, thereby clearing the tracks of vehicles before the train arrives. Advanced pre-emption, which simply stated means that the traffic signals go into a traffic clearing phase in advance of the train signals, has advantages whereby large, slow moving vehicles are given a longer timeframe to clear the tracks. Advanced pre-emption does not currently exist along the PCJPB corridor, but is recommended as a long-term improvement, primarily due to the costs associated with train signal modifications that are required. With a change to advanced

pre-emption, significant modifications to both rail and city traffic signal controlling equipment are required.

An alternative, less costly option that would require detailed analysis, would be to extend the existing simultaneous pre-emption clearing times for crossings where clearing times appear insufficient. This does not help provide additional time for vehicles to clear the tracks before the gates descend, however it does provide additional time before the train actually arrives at the crossing.

In any case, any changes to roadway/railway signal pre-emption that would result in significant changes to either or both systems would require significant coordination with PCJPB and the effected City's traffic engineering department.

4.1.8 Pre-Signals

In order to reduce motorist confusion at crossings where streets parallel to the tracks have a signalized intersection, "Pre-signals" can be installed in advance of the tracks. These are particularly advantageous when there is reduced storage availability between the tracks and the parallel street, as exists along Central Expressway and Monterey Highway in Santa Clara County. By installing pre-signals, vehicles are given a red indication before entering the train's dynamic envelope within the crossing.

4.1.9 Four-Quadrant Gate System

To improve safety at grade crossings, four-quadrant gate systems may be installed. A four-quadrant gate system consists of a series of automated gates to control traffic on all lanes approaching and leaving an at-grade crossing. These gates would be used along with flashing-light signal system to control all lanes of traffic. These systems require installation of vehicle detection devices so that exit gates remain open until vehicles trapped on the tracks can exit the tracks. Some of these systems may require a median island between opposing traffic approaching the grade crossing. PCJPB practice currently precludes installation of four-quadrant gate systems due primarily to maintenance and reliability issues surrounding vehicle detection systems. It is felt that a combination of the other safety improvement elements provides a more cost effective long-term solution to grade crossing safety.

4.1.10 Guardrails

A railroad signal may be a point hazard requiring the use of traffic barrier, guardrail or crash cushion. Guardrails, per PCJPB standards, are tubular steel railings designed to channelize pedestrians into the desired crossing location and away from gate mechanisms or other obstructions. This channelization also serves to discourage undesired pedestrian movements across the roadway at unmarked/unauthorized crossings.

4.1.11 Pedestrian Back Gate System

The pedestrian back gate systems are similar to the automatic vehicle arm gates that exist at most railway/roadway crossings, except that the gate arm is shorter and the primary means of protection is for pedestrians, not vehicles. These gates are typically mounted on the back side of the vehicle gate assemblies, lowering away from the roadway in the re-routed pedestrian path that is created through the combination of guardrails and other elements shown in the standard PCJPB grade crossing detail (Figure 2).

4.1.12 Emergency Swing Gate

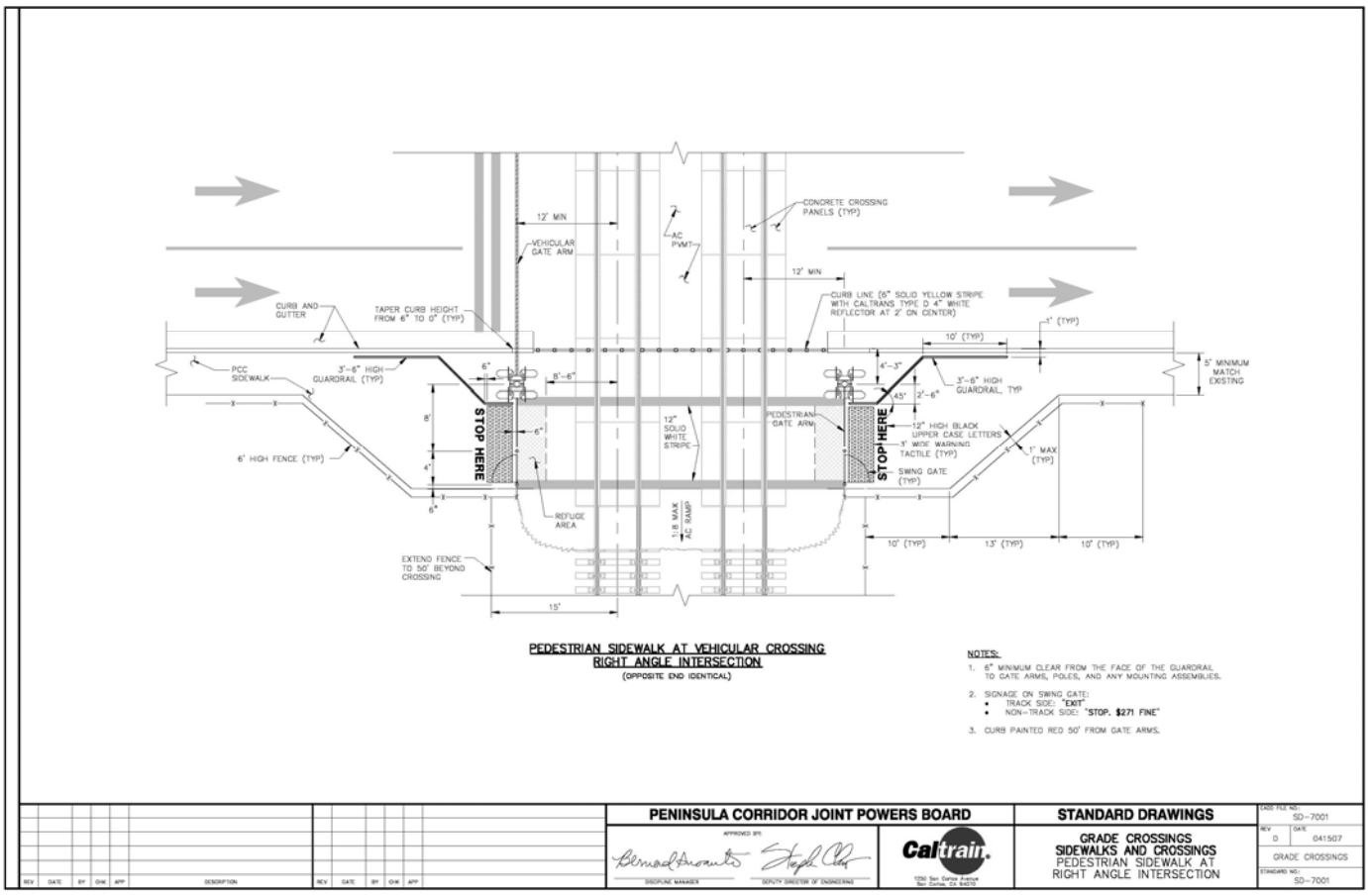
In conjunction with the pedestrian back gates, swing gates are required, opening away from the tracks, thus permitting a quick exit for pedestrians or wheelchairs trapped in the track way. These gates are painted bright yellow, with clearly marked signs and spring-loaded

hinges that return them to their default closed position when not in use.

4.1.13 Sidewalk Improvements/ADA Improvements

In many locations, wear and tear has made the roadway and sidewalk approaches to the crossing not very pedestrian or bicycle friendly. Uneven crossing surfaces, potholes and gaps between the rails cause hazards for pedestrians as well as for people with disabilities. To remedy these problems, sidewalk approaches should be restored to minimum ADA standards (5% maximum grade, or 8.33% grade if less than 30' run) and be built up to the track way to allow for a smooth transition up and over the tracks.

Figure 2: PCJPB Grade Crossing Standard



4.1.14 Tactile Warning Treatment

Pedestrian tactile warning treatment in sidewalks adjacent to a track way crossing is another form of improving pedestrian safety. The purpose of the tactile warning is to identify for pedestrians a safe stopping location and safe refuge area that is outside the train's dynamic envelope. When crossing the tracks, the tactile warning treatment provides suitable warning to pedestrians that they are entering an area of increased risk, and again when they are exiting the risk envelope on the other side. This is also clearly shown in the PCJPB grade crossing standard in Figure 2.

4.1.15 Fencing

Fencing along railroad grade crossings may be used to guide pedestrians to a preferred crossing point or to discourage pedestrians from attempting dangerous crossing movements. Locations were fencing should be considered are areas of heavily concentrated pedestrian traffic and locations where there is a history of incidents involving pedestrians crossing at inappropriate locations. As part of a grade-crossing improvement program, fencing would typically be limited to closing off the first 50'-100' adjacent to the crossing, securing areas between signal houses and/or adjacent buildings or areas of high pedestrian traffic. Chain link fence can be used; however the recently adopted PCJPB standard for wire mesh fence has proven to be a more durable, vandal-resistant form of fencing. The wire mesh fence is the standard being implemented by PCJPB in San Mateo County.

4.2. Caltrain Stations

Many of the Caltrain stations have undergone improvements in recent years, as part of PCJPB's goal of eliminating the "hold-out rule". The hold-out rule requires passengers boarding and disembarking a northbound train to cross the southbound tracks and board from a narrow center platform. This requires southbound trains to hold back while the train makes the station stop. There is always the risk that a passenger may mistake a northbound express or limited for a local and move to the center platform when it is not safe to do so. Improvements related to removal of the hold-out rule have included installation of fencing, guardrails and pedestrian gates to force pedestrian movements at the ends of where the trains stop at the stations.

Other improvement projects have been undertaken at Caltrain stations to improve bicycle and pedestrian movements around the platform areas. As part of any station improvement project, this is a primary design consideration. The California Avenue and Palo Alto (University) stations are currently undergoing construction to eliminate the hold-out rule and to improve pedestrian/ADA access at the train platforms.

The PCJPB continues to implement their Station Improvement Program to address a variety of safety improvements (in addition to other station upgrades), therefore, the implementation plan for this study will focus on the at-grade crossings.

4.3. Grade Separations

The most definitive safety improvement that can be undertaken in a railway corridor safety program is to provide for grade separation between trains and vehicles/pedestrians/bicyclists. There are two main alternatives of grade separation that could be constructed. One would be to raise the track profile and go over the existing roadway. This altenative would require the tracks to be up on a raised embankment. The other alternative would be to lower the roadway profile thus creating and undercrossing below the tracks. Either one of these alternatives would have major utility impacts. The undercrossing in particular, would require the relocation of most of the utilities found under the street surface. The undercrossing alternative could also have a higher impact on the surrounding properties and traffic circulation patterns could be disrupted or changed altogether. Due to the magnitude associated with this type of project the planning and construction of it would have a long duration. The costs associated with these types of projects could be fairly high. Some of the impacts that should be considered are: disruption of neighboring properties, utility relocation and possible right-of-way acquisition.

4.4. Right of Way Fencing

Schools, both public and private, identified as existing within close enough proximity to the Caltrain corridor to have potential safety impacts are tabulated in Appendix C with vicinity maps showing their relationship to the local roadway network and the Caltrain corridor. PCJPB's right of way is generally not fenced, and this is a major safety concern in these areas. This is also the case with the UPRR corridor south of San Jose. A Corridor Fencing Program is being implemented by PCJPB, whereby fencing is recommended on one side of the corridor to discourage cut-across pedestrian movements. Most projects that are being planned, designed, or constructed, now include fencing. At a minimum, fencing of the areas surrounding schools, especially along routes between the school and the neighborhoods where the students live, is recommended. As the PCJPB continues to implement their Corridor Fencing Program, the implementation plan for this study will focus on the at-grade crossings.

A review of incident data (Summary in Table 3, detailed in Appendix D) also identifies patterns of trespassing or areas of high-pedestrian usage that would benefit from additional right of way fencing. Examples of these areas are at creek/river crossings and highway grade separations.

Table 3: Incident Summary

NEAREST CROSSING	CITY	MILE POST	INCIDENTS	FATALITIES	INJURIES
ALMA ST	PALO ALTO	29.8	2	1	
PALO ALTO STATION	PALO ALTO	30.7	3	3	
CHURCHILL AVE	PALO ALTO	31.2	3	1	
EAST MEADOW DR	PALO ALTO	32.8	2	2	
BETWEEN EAST MEADOW AND CHARLESTON	PALO ALTO	33.0	1	1	
CHARLESTON AVE	PALO ALTO	33.4	5	1	1
S OF GREENMEADOW WY	MOUNTAIN VIEW	33.6	1	1	
RENGSTORFF AVE	MOUNTAIN VIEW	34.7	4	2	
FRANKLIN ST	MOUNTAIN VIEW	35.8	1	1	
CASTRO ST	MOUNTAIN VIEW	35.9	1		
MOUNTAIN VIEW STATION	MOUNTAIN VIEW	36.1	2	1	2
S OF MT VIEW STATION	MOUNTAIN VIEW	36.1	1	1	
NORTH OF BERNARDO AVE	MOUNTAIN VIEW	37.3	1	1	
MARY AVE	SUNNYVALE	37.7	2	1	
N OF MATHILDA AVE	SUNNYVALE	38.5	2	2	
SUNNYVALE STATION	SUNNYVALE	38.8	1		1
SUNNYVALE	SUNNYVALE	38.9	1	1	
NEWHALL ST	SAN JOSE	45.8	1	1	
SAN CARLOS AVE	SAN JOSE	47.9	1		1
AUZERAIS AVE	SAN JOSE	48.0	1		1
S OF DELMAS AVE	SAN JOSE	48.8	1		1
WILLOW ST	SAN JOSE	49.0	1		1
FEHREN RD	SAN JOSE	52.4	1	1	
BRANHAM LN	SAN JOSE	54.0	1		
BLOSSOM HILL RD	SAN JOSE	58.5	1	1	
S OF MENARD RD	SAN JOSE	61.5	1	1	
TILTON AVE	MORGAN HILL	65.17	1	1	
S OF KALANA AVE	MORGAN HILL	66.5	1	1	
SAN PEDRO AVE	MORGAN HILL	68.1	1	1	1
PRIVATE	SAN MARTIN	73.0	1		1
COHANSEY AVE	GILROY	75.1	1		
LAS ANIMAS	GILROY	75.4	1		1
10TH ST	GILROY	77.7	1		
MONTEREY HWY	SAN JOSE	N/A	1		1

NEAREST CROSSING	CITY	MILE POST	INCIDENTS	FATALITIES	INJURIES
			51	27	12

A right of way fencing program has been adopted by PCJPB to provide fencing along the railroad right of way throughout portions of Santa Clara County. PCJPB has a three-year construction project underway for constructing right of way fence at the following locations:

Table 4: PCJPB Right of way Fencing Program

MP Location	Description	Linear Ft. of Fence	Comments	City	Type of Fence
31.80 to 33.00	Oregon Exp to Meadow	6300	West side fenced, but east side open to Alma with many paths	Palo Alto	Welded Wire
36.46	At OH Ped crossing	225	Turn around area on west side south of creek. 125' N & 100' S	Mountain View	Welded Wire
36.80 to 38.60	Whisman Rd to Mathilda Ave	9510	Evelyn Ave along west side, no fence	Mountain View & Sunnyvale	Welded Wire
44.7 to 44.8	CP Coast to Santa Clara station	300	Lots of traffic from station to Brokaw Rd on east side across UP tracks	Santa Clara	Hi-Security
48.4 to 48.5	Illinois Ave to Willis Ave, east side	200	Foot traffic from east along track both ways	San Jose	Welded Wire
50.6	SW corner Curtner Ave OH	200	Cut off access from mobile home park	San Jose	Welded Wire

5. Quantifying Safety Improvements with Operations

Another component of this project is the correlation of safety improvements with operations and operational costs. For this effort, HNTB has engaged a subconsultant, Transportation Resource Associates, Inc. (TRA), to perform this evaluation, analysis, and presentation. Appendix E is TRA's proposed methodology for conducting this task in three phases, including a final report. The report will be a separate volume following on the Consolidated Safety Study for Caltrain in Santa Clara County.

6. Conclusions and Recommendations

The conclusion and recommendations of this study are summarized in Table 5 below as a prioritized implementation program for the different types of improvements. Implementation priority is based on design and construction cost, lead time required for stakeholder coordination and design effort. The next steps in the project will include meetings with the various Cities and Agencies to solicit input regarding the extent of the safety improvements, adjacent projects that may affect the safety improvements, and establishing a plan as the project advances through various phases of design and construction.

Table 5: Prioritized Implementation Strategy

Improvement Type	Priority*	Implementation	Cost
Grade crossing sign improvements	High	Short term	Low
Grade crossing pavement markings	High	Short term	Low
Roadway median islands	High	Short to mid-term	Medium
Advanced pre-emption	Medium	Long-term	High
Median gate system	Medium	Mid- to long term	High
Concrete crossing panels	Medium to Low	Short term	Low
Clearing/Sightline improvements	High	Short term	Low
Pre-Signals	Medium to High	Mid-term	High
Four quadrant gate system	Low	Long term	High
Guardrails	Medium	Short term	Low
Pedestrian back gates	High	Short term	Medium
Emergency swing gates	High	Short term	Low
Sidewalk improvements	Medium to low	Mid- to long term	Medium
Tactile warning treatment	High	Short term	Low
At-grade channelization fencing	High	Short term	Low
Station improvements	High	Long term	High
Right of way fencing	High	Short- to mid term	Medium
* Priority is based on the value the improvement provides strictly as a safety improvement.			

A checklist of the at-grade crossings has been compiled and included as At-Grade Crossings – Inventory Evaluation Checklist at the end of this section. This checklist shows two (2) phases of implementation with a 'family' of improvements to be constructed in each phase. For Phase 1, striping, signing, and median islands would be constructed at each at-grade crossing. For Phase 2, the construction of gates, sidewalks, ramps, and other infrastructure elements would be constructed at each at-grade crossing.

These at-grade crossings have been compiled and included as At-Grade Crossings – Implementation Plan (by Fiscal Year) following the Checklist noted above. This implementation plan shows funding sources, a schedule, and listing of the geographical location (by priority). The prioritization basis is noted as well. This Implementation Plan could be modified as additional funding sources are identified, amounts revised, and local improvements are completed which would establish a need to complete improvements at these at-grade crossings.

APPENDIX A: DESIGN BASIS MEMORANDUM

Santa Clara Valley Transportation Authority (VTA)

Consolidated Safety Study for Caltrain Santa Clara County

Design Basis Memorandum

Revision 1 – Final November, 2007

HNTB

Revision History

Rev. No.	Date	Issue	Description
A		Initial Issue	For Internal and VTA Review

Approvals

Task Order Manager	QA Manager
D. Russell_____	A. Tachibana_____
VTA Project Manager	
M. Basma_____	

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1.0 Introduction

This Design Basis Memorandum (DBM) documents the design standards, criteria, and assumptions that will be used to develop the detailed engineering design for the Consolidated Safety Study for Caltrain Santa Clara County. The DBM also identifies and provides rationale for planned exceptions to the applicable standards and criteria. The purpose of the DBM is to help ensure clear direction on the basis of the design before commencing final design activities.

Project Description

The purpose of the Consolidated Safety Study for Caltrain Santa Clara County is to make safety improvements and state of good repair modifications to both vehicular and pedestrian at-grade crossings along the Caltrain corridor in Santa Clara County.

Program activities will include review and evaluation of the current railroad safety systems, roadway safety standards, pedestrian and vehicular traffic and conditions at existing at-grade crossings. Improvement details will be developed through a collaborative and pragmatic approach to grade crossing safety between VTA, PCJPB, HNTB, CPUC and the local roadway maintenance jurisdictions.

The program goal is to implement Caltrain at-grade crossing standards at all pedestrian and vehicular crossings and make systematic improvements to the entire grade crossing protection system. Key features or components may include:

- Crossing gate advanced warning system
- Pedestrian crossing gates
- Improvements to sidewalks and pedestrian access
- Traffic signage, routing and signalization
- Modifications to improve sight distance
- Crossing closures
- Safety Fencing
- Traffic signal pre-emption
- Upgrade to LED flashers
- Roadway medians and/or channelization
- Installation of four-quadrant gates where other improvements are not feasible

This Grade Crossing Improvement Project is located within seven municipalities, as indicated herein:

City of Palo Alto:

1. Alma St
2. Churchill Ave
3. East Meadow Dr
4. Charleston Rd

City of Mountain View:

5. Rengstorff Ave
6. Castro St

City of Sunnyvale:

7. Mary Ave
8. Sunnyvale Ave

City of San Jose:

9. Auzerais Ave
10. Virginia St
11. Skyway Ave
12. Branham Ln
13. Chynoweth Ave
14. Blanchard Rd
15. Emada Ave

City of Morgan Hill:

16. Palm Ave
17. Live Oak Ave
18. Tilton Ave
19. E. Main St
20. Dunne Ave
21. San Pedro Ave
22. Tennant Ave

Unincorporated Santa Clara County (San Martin area):

23. East Middle Ave
24. San Martin Ave
25. Church Ave
26. Masten Ave

City of Gilroy:

27. Rucker Ave
28. Buena Vista Ave
29. Cohansey Ave
30. Las Animas Ave
31. Leavesly Rd
32. Casey Rd
33. IOOF Ave
34. Lewis St
35. Martin Ave
36. 6th St
37. 7th St
38. 10th St

Project Coordination with Outside Agencies

This project will require coordination between multiple jurisdictional agencies including:

- California Public Utilities Commission (CPUC)
- Peninsula Corridor Joint Powers Board (PCJPB)
- Santa Clara VTA (VTA)
- City of Palo Alto
- City of Mountain View
- City of Sunnyvale
- City of San Jose
- City of Morgan Hill
- City of Gilroy
- Santa Clara County
- Pacific Gas & Electric (PG&E)
- Union Pacific Railroad (UPRR)
- AT&T
- MCI/Sprint
- Santa Clara Valley Water District (SCVWD)

Civil Design Requirements

This section summarizes the civil (roadway, utilities and sidewalk) design standards and criteria applicable to this project. Each crossing will be evaluated and designed to meet applicable criteria and standards. However, each crossing is unique, and existing conditions that are beyond the scope of improvements with this project may prevent application of some of the criteria. A list of exceptions will be developed, and this DBM will be updated at the completion of the conceptual design stage.

This section includes standards and criteria pertaining to general civil design, utilities, grading and drainage, street signage and pavement markings. The sites will be designed to the standards listed in section 3.0 Project Reference Documents. In general, PCJPB standards will be supplemented with City and AASHTO standards for street related design. The PCJPB Standards take precedence over other codes within PCJPB right of way. City Standards and AASHTO will govern over the Manual of Uniform Traffic Control Devices (MUTCD) and California Department of Transportation (Caltrans) Highway Design Manual (HDM) as appropriate.

General Requirements

Specific design criteria applicable to this project are summarized in Table 2.1.

Table 2.1 Civil Design Criteria

Design Parameter Description	Standard	Comment
	Basic Design Criteria	
Type of Street	Local Road (Urban Street)	
Design Speed	To be confirmed through concept development at each location as appropriate to match existing street geometrics	Dependent on City Standards
Proposed Advisory Speed	Min 5mph less than design speed	Dependent on City Standards
Existing Posted Speed	Varies	
Sight Distance		
Stopping Sight Distance	Dependent on City Standards or HDM	
Corner Sight Distance	N/A	
Design Vehicle Selection	To be confirmed with each jurisdiction	
	Geometric Design Criteria	
Grade		
Minimum Grade	0.3%	Project will maintain existing street grades
Maximum Grade	5%	Project will maintain existing street grades
Length of Vertical Curve	HDM Fig 201.4 & Fig 201.5, AASHTO	Project will maintain existing street grades
Horizontal Alignment		
Minimum Curve Radius	50’	Dependent on City Standards
Superelevation	None	
Geometric Cross Section		
Minimum Lane Widths	11’ min; 12’ typical	Dependent on City Standards
Minimum Cross Slope	1%	

Typical Cross Slope	2% for new construction 1.5~3% for resurfacing & widening portion	
Maximum Algebraic Grade Difference between Cross Slopes	Between oppose traffic lanes: 6% for rehabilitation & widening; 4% for new construction) Between traveled way and shoulder: 5%	
Curb Offset (from edge of traveled way to face of curb)	1' without gutter; 2' with gutter	
Parking/ Bike Lane	5' min where applicable	Dependent on City Standards
Sidewalk Widths	5' min.	Dependent on City Standards
Minimum Median Width	1' min, 4' typ	Dependent on City Standards
Horizontal Clearances		
Minimum horizontal clearance	Per PCJPB Crossing standards	
Vertical Clearance		
Design vertical clearance	Per CPUC Standards	No new grade separations included in this project.
At-Grade Intersection		
Truck Turn Template	Dependent upon jurisdiction	
Minimum Fire Truck Access	Dependent upon jurisdiction	
Driveway Access	Varies	Dependent on City Standards
Wheel Chair Ramps	Federal ADA/California Title 24	
Min Curb Return Radius	Dependent upon jurisdiction	
Signing and Striping	California MUTCD as supplemented by PCJPB grade crossing standards (2007)	

Utilities

The design team will investigate existing utilities, coordinating with private utility owners, PCJPB, and the Cities during final design to develop a base map with locations of all known utilities in the area of each crossing. High risk utilities will be positively located as required by the design in accordance with Caltrans' policy on high and low risk underground facilities within highway rights of way.

Minor variations to signal standards may be implemented in order to design around existing utilities that would otherwise not require relocation. Where existing utilities are required to be re-routed, the following requirements shall apply:

- Utilities shall be routed perpendicular and/or parallel to PCJPB's alignment and traction power facilities.
- Design of utilities shall adhere to the requirements for stray current and corrosion control as prescribed by the utility owner.
- Design of the utility relocations shall comply with the design requirements of the utility owner and applicable local, state and federal agencies.

Utilities to be addressed shall include but are not limited to:

- Telephone
- Fiber Optic Cable
- Cable TV
- Gas
- Petroleum Lines
- Fuel Lines
- Street Lights
- Traffic Signal
- Water
- Water/Forced Main

- Reclaimed Water
- Sanitary Sewer
- Storm Drains
- Electrical lines (overhead and underground)
- Train signal cables

Roadway Elements

The scope of this project is limited to safety related improvements at each of the at-grade crossing locations. This will generally be achieved by improving sight distance at the crossings where possible, and by creating barriers to pedestrians and vehicles from entering the tracks while a train is approaching or moving through the crossing. The project will not improve existing non-standard design features related to roadway profile or horizontal alignment at grade crossing locations.

Sight Distance

Sight distance improvements will be achieved primarily through clearing and grubbing of existing overgrown vegetation.

Medians

The primary vehicle barrier proposed for construction is median islands. These will be designed to constrain vehicles within their lanes at the railway crossings. Median islands will be designed to appropriate City standards, and will be limited to hardscape features only (stamped concrete, pavers, cobblestone, and AC or PCC paved median islands). In locations where median islands require narrowing of the roadway traveled lanes, a minimum 11' lane width will be maintained. If an island gate is required (see section 2.3), then a minimum width of 8'6" is required per CPUC standards.

Landscaping or other architectural improvements are not included in the scope of the project. Pedestrian barriers will encompass fencing and gates, and these are described in section 2.1.4.

Sidewalks and Walkways

Sidewalks, ADA Requirements

Improvements to sidewalks will be in accordance with ADA requirements and will be designed based on the PCJPB standards for grade crossings. Existing crossing gate assemblies will not be relocated (see section 2.3), therefore modifications to the grade crossing standards will be made for each location in order to accommodate existing conditions. Where improvements to the pedestrian crossings warrant addition of concrete crossing panels, these will be included. Otherwise, AC paving will be added to improve pedestrian crossings.

Grading and Drainage

The design of drainage facilities belonging to other agencies that are relocated or modified because of this project shall conform to the design criteria and standards of that agency. In general, relocation of existing drainage facilities shall be "replacement in kind" or "equal construction," unless conditions of flow, loading, or operation are altered. If conditions are altered, designs shall conform to the design criteria and the standards of the agency involved. These drainage design criteria are intended to protect the rail system line and facilities from storm water damage; and to protect the PCJPB from liability for damage to other properties from storm water flows caused by this project's construction activities.

Fencing, Railing and Safety Gates

PCJPB has a separate construction program for installing right of way fencing along the rail corridor. As such, fencing improvements are limited to the immediate area of the crossings, to channelize pedestrian movements into the improved signal-protected crossings. Emergency swing gates will be added wherever feasible to provide emergency egress from the tracks while the signal arms are in operation. ADA compliant railing will also be included as needed at locations adjacent to vertical drop-offs.

Working clearances for PCJPB equipment will be provided on all sides of new fencing, as will horizontal and vertical clearance for equipment removal, replacement and/or maintenance.

Street Signs and Pavement Markings

New signs and pavement markings will be installed to reflect any street alignment changes such as sight distance, signalization additions and roadside parking restrictions. Existing signs and pavement markings that are impacted by the project shall be replaced or removed correspondingly. Supplemental pavement markings will be added (e.g. "Keep Clear", "Rail Crossing Ahead") where it does not currently exist but is warranted.

All signing and pavement markings shall be based on the California MUTCD and applicable City Standards. At a minimum, Part 8 (Traffic Controls for Highway-Rail Grade Crossings) of the California MUTCD will be

Traffic Signals (Roadway)

Although coordination between the grade crossing improvements and existing traffic signals is expected to be minimal, the following represents a checklist of the design criteria and required electrical elements:

- Criteria for design will be the California MUTCD, 2006, comprising the FHWA MUTCD.
- Caltrans Standard Plans and Specifications dated April 2006.
- Vehicle and pedestrian signal indications will be LED'S.
- Pedestrian signals will be manually actuated and will have pedestrian countdown indications as well as audible pedestrian signals.
- The safety lighting at signalized intersections is 250W HPS.
- Vehicle detector loops are type A except loops that are closest to the limit line are type D.
- Type A detector hand holes.

There are no new traffic signals proposed with this project.

Railroad Track Criteria

Condition of crossing surfaces and approaches at each of the grade crossings will be evaluated during the design of each crossing. Additional concrete panels may be added at select crossings for pedestrian accommodation. This will be evaluated during development of detailed construction plans.

Generally, the rail and ties at the crossings are in good condition, and track work is not included in this project.

Railroad Signal Criteria

HNTB will review and evaluate the current railroad safety systems in place at each of the affected crossings. Pedestrian and vehicular traffic and current site conditions at existing at-grade crossings will be considered. Improvement details will be developed through a collaborative and programmatic approach to grade crossing safety between PCJPB, HNTB, CPUC and the local roadway maintenance jurisdictions.

The track signals will be designed to PCJPB Signal Design Criteria and PCJPB Communication/Signal Engineering Standards dated 11/01/97, supplemented by the AREMA Manual for Railway Engineering. All signal design work shall be done in Micro-Station. PCJPB drafting standards, such as level symbology and blocks, shall be used on the plan sheets.

Automatic Highway Crossing Warning (AHCW) System - Crossing Design Criteria

- No changes will be required to the location of existing crossing equipment. This will include all crossing gate assemblies, cantilevers, signal houses and underground conduits and cables.
- No changes will be required to the existing signal system.
- Existing predictor units and their setup/warning times will not be modified, with the exception of only those crossings requiring new traffic pre-emption, which will require associated modifications to the predictor unit.
- Crossing controller units in each crossing will be upgraded to a 40 amp solid state crossing controller at locations requiring additional gate assemblies.
- Electrical services to the existing signal houses will not require to be upgraded.
- If an island/median gate is required, the island will be a minimum 8'6" wide per California MUTCD and CPUC requirements.
- Wherever possible, crossings will be designed for pedestrian gates. This will include new CPUC #9 gate assemblies in the existing open quadrants, and new back gates to the already existing roadway gate assemblies.

-
- All existing incandescent flashers will be upgraded to LED's. All new flashers will be LED's.
- Existing spare signal conduits will be utilized, where available, for all new cable.
- Cable depths and conduit sizes will be designed per PCJPB standards.
- Traffic pre-emption shall be maintained and reviewed at intersections that presently have this feature, and installed at crossings that now require traffic pre-emption for adjacent intersections. Existing traffic pre-emption circuits with a 2-wire circuit shall remain. All new intersections requiring traffic pre-emption shall be designed to PCJPB's 10-wire circuit.
- Existing standby battery power shall be reviewed and designed to provide 48 hours of back-up power at locations requiring additional crossing equipment. Standby battery power for traffic signals is not included as part of the AHCW crossing design.
- A diagnostic team review of each crossing shall be conducted after the acceptance of the 35% design documents. Diagnostics team to include, but not limited to, PCJPB, HNTB and CPUC.

Project Reference Documents

The following documents contain standards and criteria that apply to this work.

General Reference Documents

- HNTB Project Schedule, latest revision.
- HNTB Companies, Northern California Office Best Practices, Quality Assurance / Quality Control Manual, Revision 1, 10/29/04.
- AREMA

Local Design Criteria

- Santa Clara County Standards
- City of Palo Alto Standards
- City of Mountain View Standards
- City of Sunnyvale Standards
- City of San Jose Standards
- City of Morgan Hill Standards
- City of Gilroy Standards
- PCJPB Standard Drawings for Grade Crossings/Typical Street crossings, 2007
- Caltrain Safety and Security Certification Program Plan, October 20, 2003
- PCJPB/CALTRANS – Technical Design & Constructability Review Guide, Rev. 0 Feb 2001
- PCJPB Signal and Communication Standards, 11/01/97 (currently being updated)
- PCJPB Standards, Volumes I and II
- PCJPB CADD Manual, 11/04
- Caltrain Track Standards, March 2, 2002

State Design Criteria

- California Public Utilities Commission (CPUC), General Orders, specifically General Order No. 75-D
- California Manual of Uniform Traffic Control Devices (MUTCD) 2006 (which incorporates FHWA MUTCD 2003)
- California Title 24
- Caltrans Standard Plans, April 2006
- Caltrans Highway Design Manual (HDM)
- Applicable Public Utilities Commission of the State of California General Orders:
  - General Order 26-D, Regulations Governing Clearances on Railroads and Street Railroads with Reference to Side and Overhead Structures, Parallel Tracks, Crossings of Public Roads, Highways and Streets

-
- General Order 72-B, Rules Governing the Construction and Maintenance of Crossings at Grade of Railroads with Public Streets, Roads and Highways in the State of California
- General Order 75-D, Regulations Governing Standards for Warning Devices for At-Grade Highway-Rail Crossings in the State of California
- General Order 88-B, Rules for Altering Public Highway-Rail Crossings

Federal Design Criteria

American Association of State Highway and Transportation Officials (AASHTO)

- AASHTO Policy on Geometric Design of Highways and Streets, 5th Edition, 2004
- AASHTO Roadside Design Guide, 2002
- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities, 1st Edition
- AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads

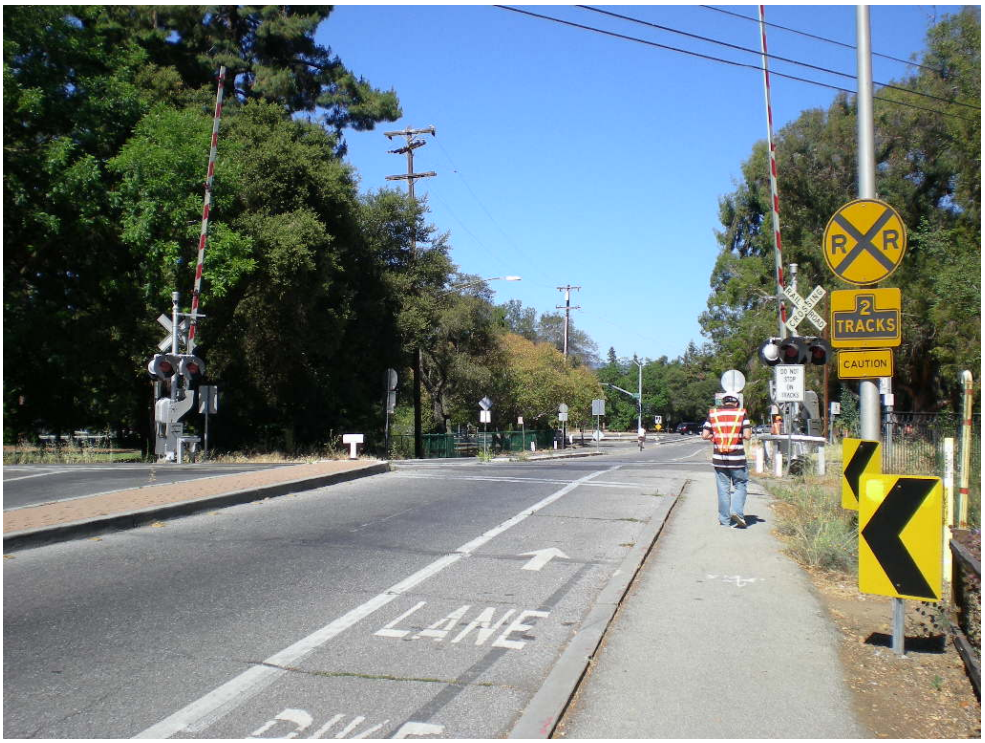
U.S. Federal Regulations

- American Disabilities Act / Title 24. (Included in CalDAG Guidelines)
- Code of Federal Regulations (CFR) Chapter 49 Part 234 and Part 236.

APPENDIX B: AT-GRADE CROSSINGS

AT-GRADE CROSSING INVENTORY

ALMA STREET



KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • Concrete path off to the side of the road.		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No RXR Pavement Markings
Southwest Quadrant • No Pedestrian Gate • No Existing Sidewalk • No Swing Gate		**Southeast Quadrant** • No Pedestrian Gate • No Existing Sidewalk • No Swing Gate

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT(VEH/DAY)	**N/A**			
Road Configuration:	**Road crosses track at an angle. Raised medians on both sides of the track. Concrete panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands	●	
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp	●	
Extinguishable Message Sign		**X**
RXR Pavement Markings		**X**
12" Pedestrian Delineation Line		**X**
6” Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

CHURCHILL AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Warning Tactiles • No Swing Gate • No Medians		**Northeast Quadrant** • No Warning Tactiles • No Swing Gate • No Medians • No Right Turn LED Sign
Southwest Quadrant • No Warning Tactiles • No Swing Gates • No Medians		**Southeast Quadrant** • No Warning Tactiles • No Swing Gates • No Medians

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Alma Street runs perpendicular to Churchill Avenue. Sidewalk on all four quadrants terminates at Alma St. Small storage space east of the tracks. Close proximity to High School.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates	●	
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	○	
AC Ramp	●	
Extinguishable Message Sign		**X**
RXR Pavement Markings		**X**
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

EAST MEADOW DRIVE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Warning Tactiles • No Swing Gate • No Medians		**Northeast Quadrant** • No Warning Tactiles • No Swing Gate • No Medians • No Right Turn LED Sign
Southwest Quadrant • No Warning Tactiles • No Swing Gates • No Medians		**Southeast Quadrant** • No Warning Tactiles • No Swing Gates • No Medians

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT (VEH/DAY)	**N/A**			
Road Configuration:	**Alma Street runs perpendicular to E. Meadow Dr. Sidewalk on all four quadrants terminates at Alma St. Rubber Panels at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates	●	
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	○	
AC Ramp	●	
Extinguishable Message Sign		**X**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

CHARLESTON ROAD

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Warning Tactiles • No Swing Gate • Advanced Warning Sign not visible due to vegetation		**Northeast Quadrant** • No Warning Tactiles • No Swing Gate • No Medians • No Right Turn LED Sign
Southwest Quadrant • No Warning Tactiles • No Swing Gates • No Medians		**Southeast Quadrant** • No Warning Tactiles • No Swing Gates • No Medians

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Alma Street runs perpendicular to Charleston Ave. Sidewalk on all four quadrants terminates at Alma St. Rubber Panels at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates	●	
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	○	
AC Ramp	●	
Extinguishable Message Sign		**X**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

RENGSTORFF AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Medians		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Medians • AC Ramp crumbling

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT (VEH/DAY):	**21,000**			
Road Configuration:	**Central Expwy runs perpendicular to Rengstorff Ave. Sidewalk on all four quadrants terminates at Central Expwy. AC pavement at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		X
Pedestrian Back Gates		X
Emergency Swing Gates		X
Tactile Warning Tiles		X
Guardrails		X
Concrete Panels		X
Sidewalk	●	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	○	
AC Ramp	●	
Extinguishable Message Sign		X
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		X
6" Vehicle Delineation Solid Stripe with Type D reflectors		X
12" Stop Here Letters		X
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		X
Advanced Signal Pre-Emption		X

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

CASTRO STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Warning Tactiles • No Swing Gates		**Southeast Quadrant** • No Warning Tactiles • No Swing Gates

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT (VEH/DAY):	**16,860**			
Road Configuration:	**Central Expwy runs perpendicular to Castro St. Sidewalk on all four quadrants terminates at Central Expwy. Concrete Panels at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates	●	
Pedestrian Back Gates	○	
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk	●	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	●	
AC Ramp	●	
Extinguishable Message Sign	●	
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

MARY AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT (VEH/DAY):	**21,900**			
Road Configuration:	**Evelyn Avenue runs perpendicular to Mary Ave. Sidewalk on all four quadrants terminates at Evelyn Ave. Concrete Panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates	●	
Pedestrian Back Gates		X
Emergency Swing Gates		X
Tactile Warning Tiles		X
Guardrails		X
Concrete Panels		X
Sidewalk	●	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	●	
AC Ramp	●	
Extinguishable Message Sign	●	
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		X
6" Vehicle Delineation Solid Stripe with Type D reflectors		X
12" Stop Here Letters		X
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		X
Advanced Signal Pre-Emption		

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

SUNNYVALE AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**96**	**N/A**	**N/A**	**N/A**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Hendy Avenue runs perpendicular to Sunnyvale Ave. Sidewalk on all four quadrants terminates at Hendy Ave. Concrete Panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp	●	
Extinguishable Message Sign	●	
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

AUZERAIS AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**8**	**2**	**18**
ADT (VEH/DAY):	**8,300**			
Road Configuration:	**Tracks run perpendicular to Auzerais Avenue. Sidewalk on all four quadrants. Concrete Panels at crossing. Sidewalk abuts against concrete panels.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

VIRGINIA AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**8**	**2**	**18**
ADT (VEH/DAY):	**1,700**			
Road Configuration:	**Tracks run perpendicular to Virginia Avenue. Sidewalk on all three quadrants. Concrete and Rubber Panels at crossing. Blind curve from western approach.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	○	
Sidewalk	○	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	○	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

SKYWAY AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**13,300**			
Road Configuration:	**Tracks run perpendicular to Skyway Avenue and parallel to Monterey Road. Sidewalk on three quadrants. AC Pavement at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk	○	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

BRANHAM LANE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**21,700**			
Road Configuration:	**Tracks run perpendicular to Branham Lane and parallel to Monterey Road. Sidewalk on three quadrants. Concrete Panels at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates	●	
Pedestrian Back Gates		X
Emergency Swing Gates		X
Tactile Warning Tiles		X
Guardrails		X
Concrete Panels	●	
Sidewalk	○	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		X
Extinguishable Message Sign		X
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		X
6" Vehicle Delineation Solid Stripe with Type D reflectors		X
12" Stop Here Letters		X
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		X
Advanced Signal Pre-Emption		X

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

CHYNOWETH AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**16,700**			
Road Configuration:	**Tracks run perpendicular to Chynoweth Ave. and parallel to Monterey Road. Sidewalk on three quadrants. AC pavement at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates	●	
Pedestrian Back Gates		X
Emergency Swing Gates		X
Tactile Warning Tiles		X
Guardrails		X
Concrete Panels	●	
Sidewalk	○	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		X
Extinguishable Message Sign		X
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		X
6" Vehicle Delineation Solid Stripe with Type D reflectors		X
12" Stop Here Letters		X
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		X
Advanced Signal Pre-Emption		X

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

BLANCHARD ROAD

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**1,700**			
Road Configuration:	**Tracks run perpendicular to Blanchard Rd and parallel to Monterey Road. No Sidewalk. Concrete Panels at crossing. Small storage space east of the tracks.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**N/A**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

EMADA AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
List seRoad Configuration:	**Tracks run perpendicular to Emada Ave. No Sidewalk. Concrete Panels at crossing. Private access road. STOP controlled crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates		**N/A**
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**N/A**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings		**X**
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

PALM AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Track runs perpendicular to Palm Ave. and parallel to Monterey Road. No Sidewalk. AC Pavment at crossing. Small storage space east of the tracks. Very low Pedestrian Activity.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings		**x**
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

LIVE OAK AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Tracks run perpendicular to Palm Ave. and parallel to Monterey Road. No Sidewalk. AC Pavment at crossing. Small storage space east of the tracks. Very low Pedestrian Activity.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings		**x**
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

TILTON AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • No Sidewalk
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • No Sidewalk

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**1,900**			
Road Configuration:	**Tracks run perpendicular to Tilton Ave. and parallel to Monterey Road. No Sidewalk. AC Pavment at crossing. Small storage space east of the tracks. Very low Pedestrian Activity.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings		**x**
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

MAIN STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**7,227**			
Road Configuration:	**Track runs perpendicular to Main St.. Sidewalk in all approaches. Concrete Panels at crossing. Median islands with cobblestone finish.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	●	
AC Ramp	●	
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

DUNNE STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**27,007**			
Road Configuration:	**Track runs perpendicular to Dunne St.. Sidewalk in all approaches. Rubber Panels at crossing. Median islands with landscape area finish.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates	●	
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	●	
AC Ramp	●	
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

SAN PEDRO AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Track runs perpendicular to San Pedro Ave. No Sidewalk. AC Pavement at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

TENNANT AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**27,317**			
Road Configuration:	**Tracks run perpendicular to Tennant Ave. Sidewalk on two of the quadrants. Concrete Panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates	●	
Pedestrian Back Gates		X
Emergency Swing Gates		X
Tactile Warning Tiles		X
Guardrails		X
Concrete Panels	●	
Sidewalk	○	
Median Islands		X
Curb & Gutter in front of Gate Assembly		X
AC Ramp		X
Extinguishable Message Sign		X
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		X
6" Vehicle Delineation Solid Stripe with Type D reflectors		X
12" Stop Here Letters		X
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		X
Advanced Signal Pre-Emption		X

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

EAST MIDDLE AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Tracks run perpendicular to E. Middle Ave. No Sidewalk. Concrete Panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

SAN MARTIN AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Track runs perpendicular to San Martin Ave. No Sidewalk. Concrete Panels at crossing. Crossing located just south of the San Martin Station.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings	○	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

CHURCH AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Track runs perpendicular to Church Ave. No Sidewalk. AC Pavement at crossing. Not a signalized intersection. STOP Sign stops Church Ave. at Monterey Highway.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings	○	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

MASTEN AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**13,600**			
Road Configuration:	**Track runs perpendicular to Masten Ave. No Sidewalk. Concrete Panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign	●	
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

RUCKER AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**900**			
Road Configuration:	**Track runs perpendicular to Rucker Ave. No Sidewalk. Concrete Panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings	○	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

BUENA VISTA AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**2,700**			

Road Configuration:	**Track runs perpendicular to Buena Vista Ave. No Sidewalk. Concrete Panels at crossing. Not a signalized intersection. Substantial grade difference between track and Monterey Hwy.**

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings	○	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

COHANSEY AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**800**			

Road Configuration:	**Track runs perpendicular to Cohansey Ave. No Sidewalk. AC Pavement at crossing. Not a signalized intersection. Substantial grade difference between track and Monterey Hwy.**

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings	○	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

LAS ANIMAS AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**1,000**			

Road Configuration:	**Track runs perpendicular to Las Animas Ave. No Sidewalk. SE quadrant Sidewalk approach. Concrete Panels at crossing. Not a signalized intersection. Substantial grade difference between track and Monterey Hwy.**

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk		**X**
Median Islands		**X**
Curb & Gutter in front of Gate Assembly		**X**
AC Ramp		**X**
Extinguishable Message Sign		**X**
RXR Pavement Markings	○	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

LEAVESLEY ROAD

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**34,000**			
Road Configuration:	**Track runs perpendicular to Leavesley Road. Monterey Hwy runs next to tracks. Sidewalk on all approaches. Concrete Panels at crossing. Free Right Turn off of Monterey Hwy.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates	●	
Pedestrian Back Gates		X
Emergency Swing Gates		X
Tactile Warning Tiles		X
Guardrails		X
Concrete Panels	●	
Sidewalk	●	
Median Islands	●	
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		X
Extinguishable Message Sign		X
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		X
6" Vehicle Delineation Solid Stripe with Type D reflectors		X
12" Stop Here Letters		X
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		X
Advanced Signal Pre-Emption		X

Legend:

● Fully compliant
○ Partially compliant
X Missing

AT-GRADE CROSSING INVENTORY

CASEY ROAD

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Track runs perpendicular to Casey Road. Pedestrian-only crossing. Sidewalk on all approaches. Concrete Panels at crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates		**N/A**
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands		**N/A**
Curb & Gutter in front of Gate Assembly		**N/A**
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings		**X**
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**N/A**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

IOOF AVENUE

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**4,600**			
Road Configuration:	**Track runs perpendicular to IOOF Avenue. Sidewalk on all approaches. Concrete Panels at crossing. Crossing adjacent to bridge. Mid block crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

LEWIS STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Track runs perpendicular to Lewis Street. Sidewalk on all approaches. Concrete Panels at crossing. Mid block crossing. Adjacent TOD under development.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

MARTIN STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles • Trees and Power Pole obstruct visibility
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles • Power Pole obstructs visibility		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**N/A**			
Road Configuration:	**Tracks run perpendicular to Martin St. Sidewalk on all approaches. Concrete Panels at crossing. Trees and Power poles create visibility issues. Mid block crossing. Adjacent TOD under development.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

6TH STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**5,400**			
Road Configuration:	**Tracks run perpendicular to 6th St. Sidewalk on all approaches. Concrete Panels at crossing. Mid block crossing.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

7TH STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**3,300**			
Road Configuration:	**Multiple tracks run perpendicular to 7th St. Sidewalk on all approaches. Rubber Panels at crossing. Mid block crossing. Adjacent to Gilroy Station.**			

CROSSING EVALUATION CHECKLIST

Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels		**X**
Sidewalk	●	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	●	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

AT-GRADE CROSSING INVENTORY

10TH STREET

KEY ISSUES BY QUADRANT

Northwest Quadrant • No Pedestrian Gate • No Swing Gate • No Warning Tactiles		**Northeast Quadrant** • No Pedestrian Gate • No Swing Gate • No Warning Tactiles
Southwest Quadrant • No Pedestrian Gate • No Swing Gates • No Warning Tactiles		**Southeast Quadrant** • No Pedestrian Gate • No Swing Gates • No Warning Tactiles

ADDITIONAL DATA

	Caltrain	ACE	Coast Starlight (Amtrak)	UPRR
Train Traffic (Trains/day):	**6**	**N/A**	**2**	**18**
ADT (VEH/DAY):	**19,350**			
Road Configuration:	**Tracks run perpendicular to 10th St. Sidewalk on the northside quadrants. Concrete Panels at crossing. Mid block crossing. Adjacent to Gilroy Station.**			

CROSSING EVALUATION CHECKLIST

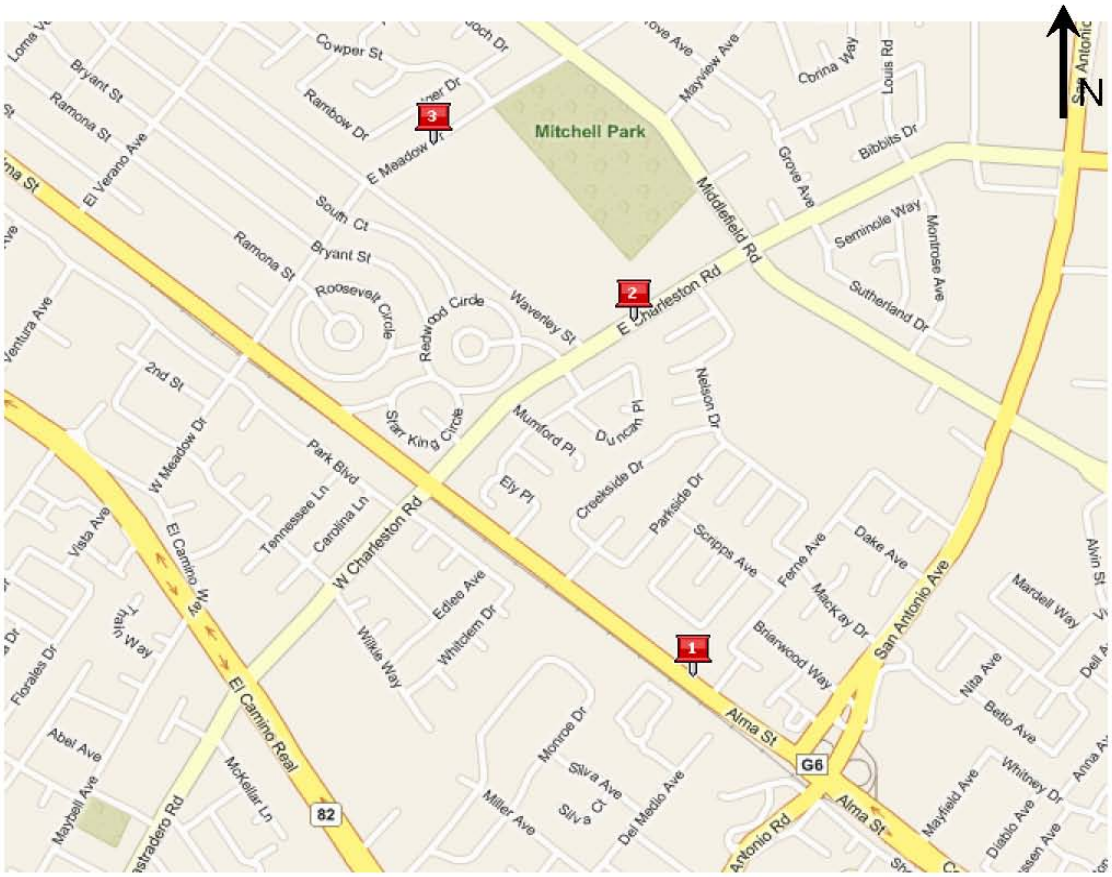
Checklist Item	Existing	Needs
Vehicle Gates	●	
Median Gates		**N/A**
Pedestrian Back Gates		**X**
Emergency Swing Gates		**X**
Tactile Warning Tiles		**X**
Guardrails		**X**
Concrete Panels	●	
Sidewalk	○	
Median Islands		**X**
Curb & Gutter in front of Gate Assembly	○	
AC Ramp		**X**
Extinguishable Message Sign		**N/A**
RXR Pavement Markings	●	
12" Pedestrian Delineation Line		**X**
6" Vehicle Delineation Solid Stripe with Type D reflectors		**X**
12" Stop Here Letters		**X**
MUTCD Compliant Signs	●	
Welded Wire Mesh Fencing		**X**
Advanced Signal Pre-Emption		**X**

Legend:

- ● Fully compliant
- ○ Partially compliant
- **X** Missing

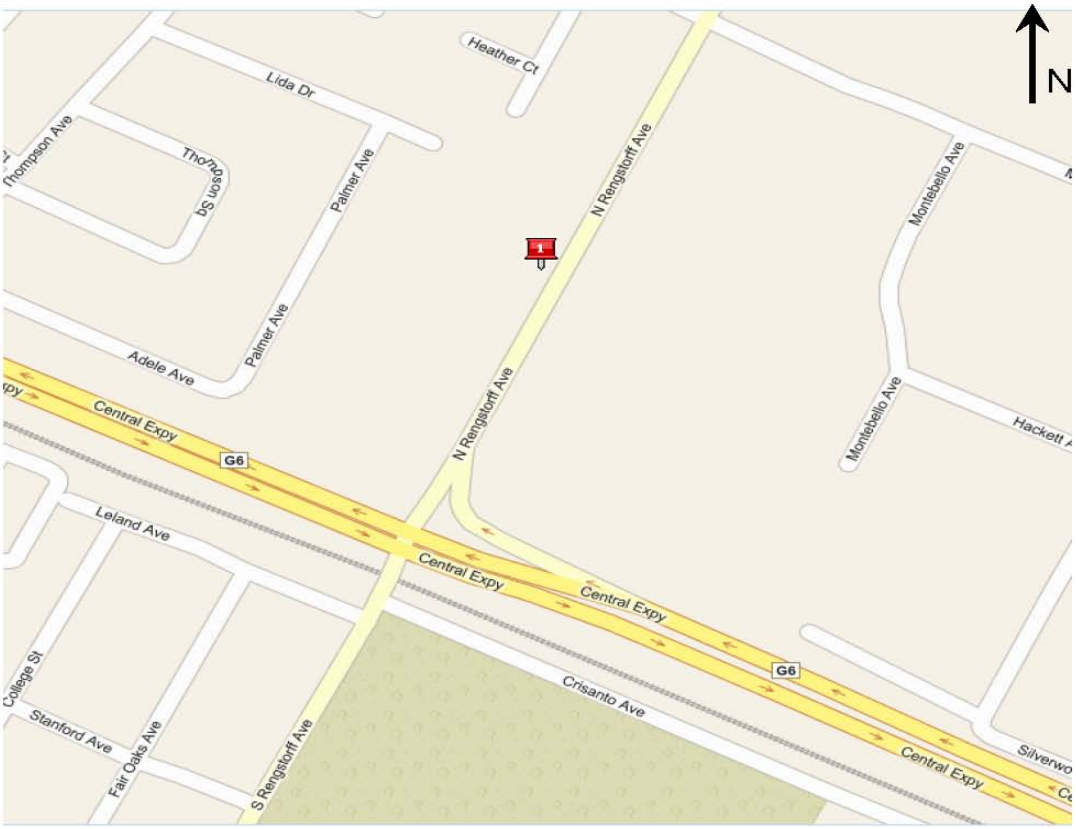
APPENDIX C: SCHOOL VICINITY MAPS

Schools Within 2000 Feet of Caltrain Corridor:
PALO ALTO



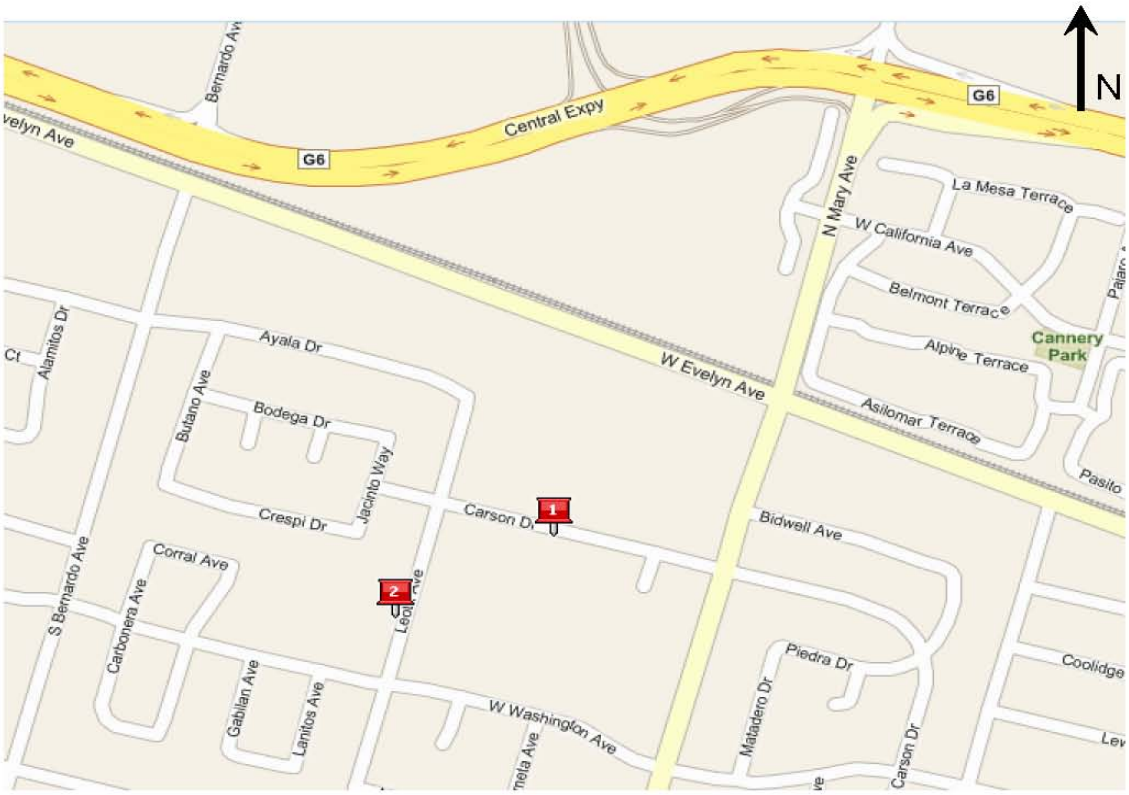
1:	Montessori School of Los Altos, Palo Alto, CA
2:	Hoover Elementary School, Palo Alto, CA
3:	Jane Lathrop Stanford Middle School, Palo Alto, CA

Schools Within 2000 Feet of Caltrain Corridor: MOUNTAIN VIEW



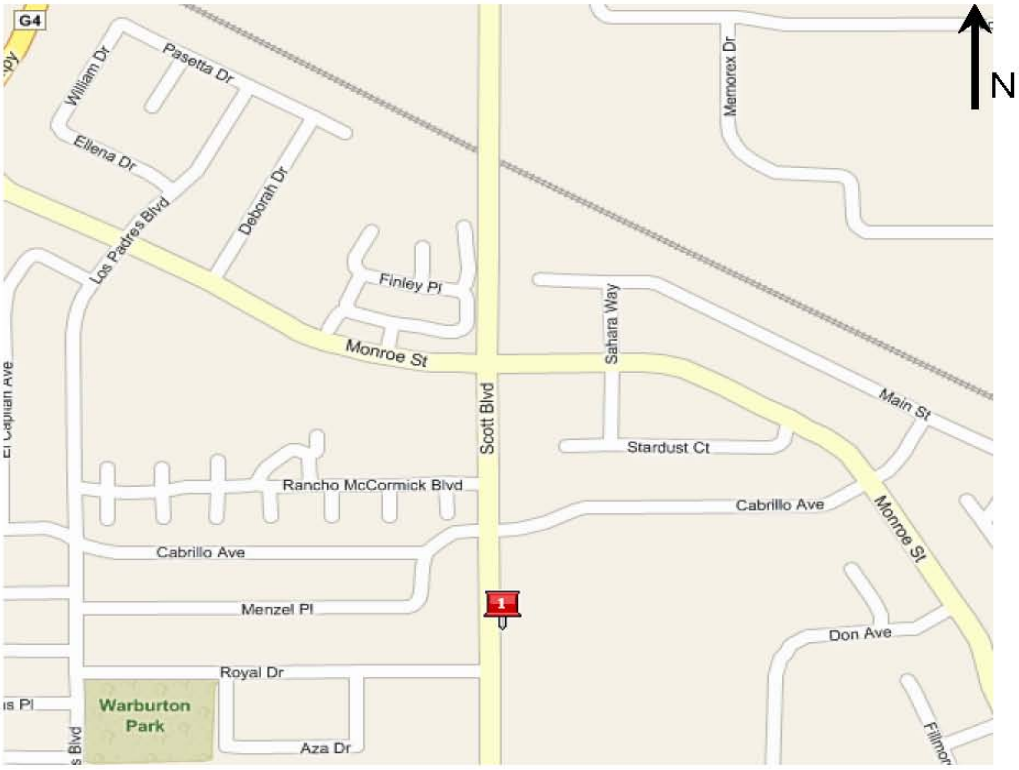
1:	Girls Middle School, Mountain View, CA

Schools Within 2000 Feet of Caltrain Corridor: SUNNYVALE



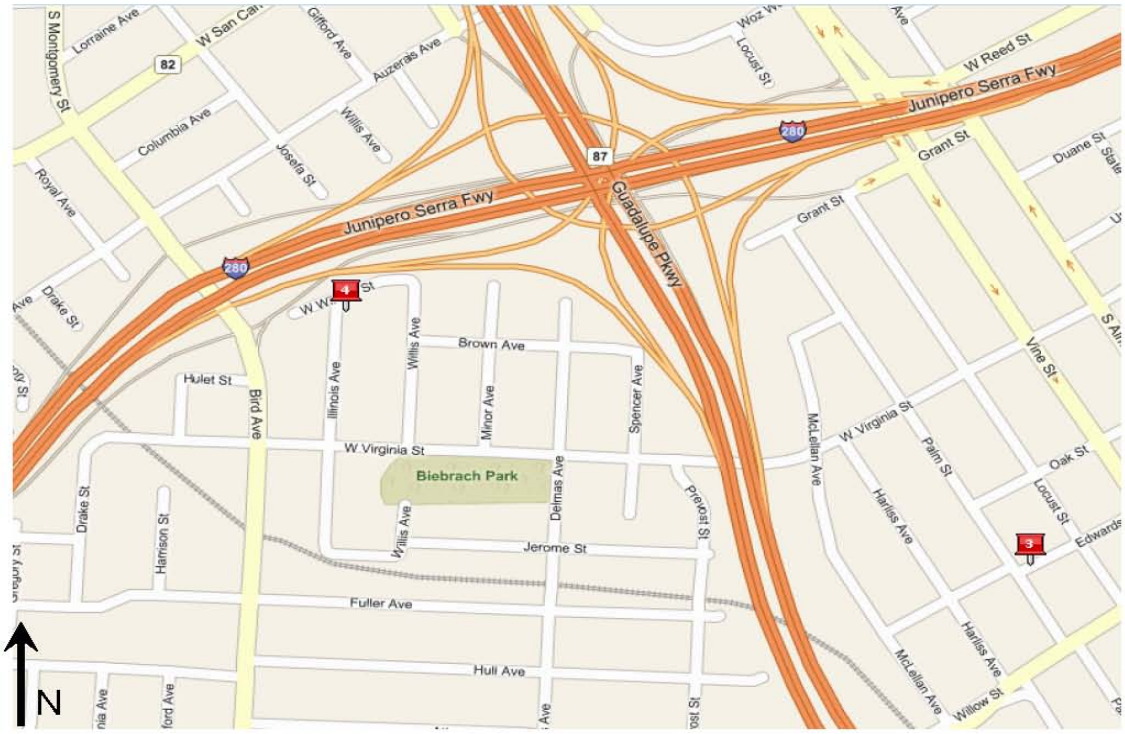
1:	Vargas Elementary School, Sunnyvale, CA
2:	St Cyprian School, Sunnyvale, CA

Schools Within 2000 Feet of Caltrain Corridor: SANTA CLARA



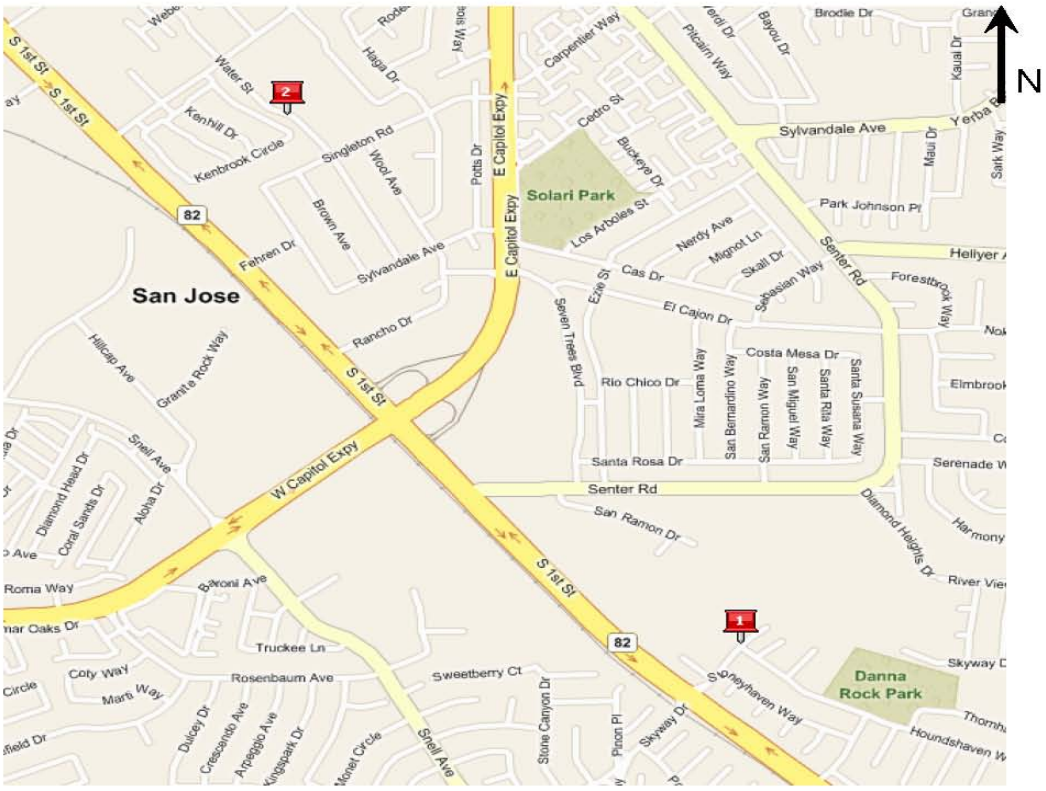
1:	Scott Lane Elementary School, Santa Clara, CA

Schools Within 2000 Feet of Caltrain Corridor:
SAN JOSE



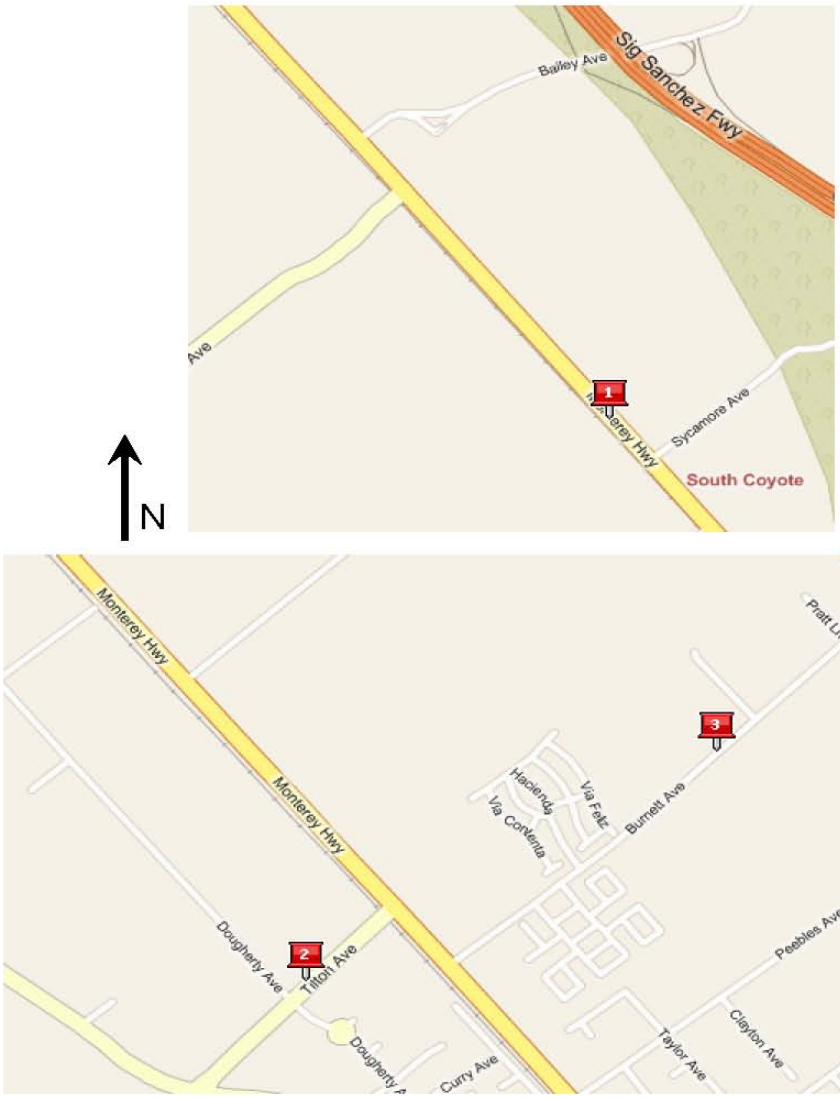
1:	Valley Christian High School, San Jose, CA
2:	Captain Jason M Dahl Elementary School, San Jose, CA
3:	Sacred Heart Nativity School, San Jose, CA
4:	Gardner Academy Elementary, San Jose, CA

Schools Within 2000 Feet of Caltrain Corridor: SAN JOSE



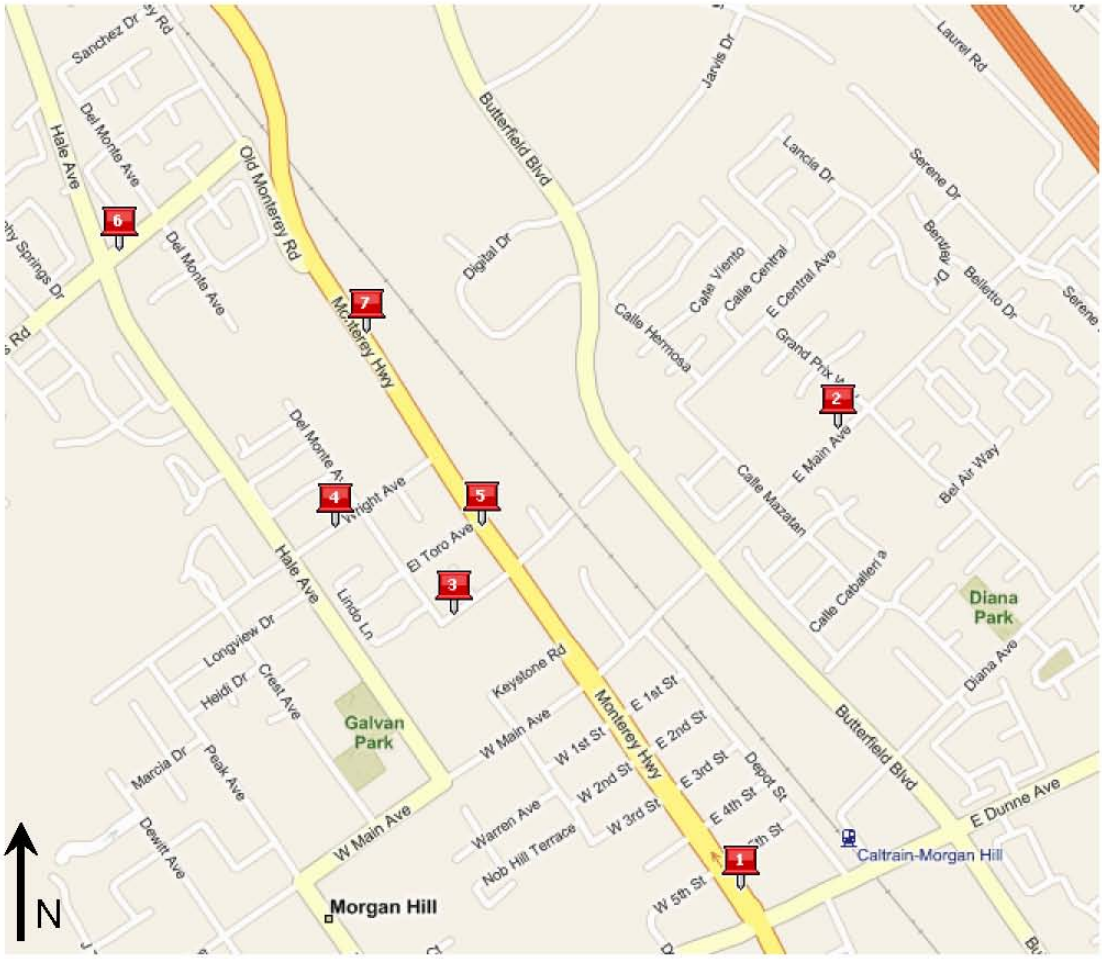
1:	Valley Christian High School, San Jose, CA
2:	Captain Jason M Dahl Elementary School, San Jose, CA
3:	Sacred Heart Nativity School, San Jose, CA
4:	Gardner Academy Elementary, San Jose, CA

Schools Within 2000 Feet of Caltrain Corridor: MORGAN HILL (Outlying)



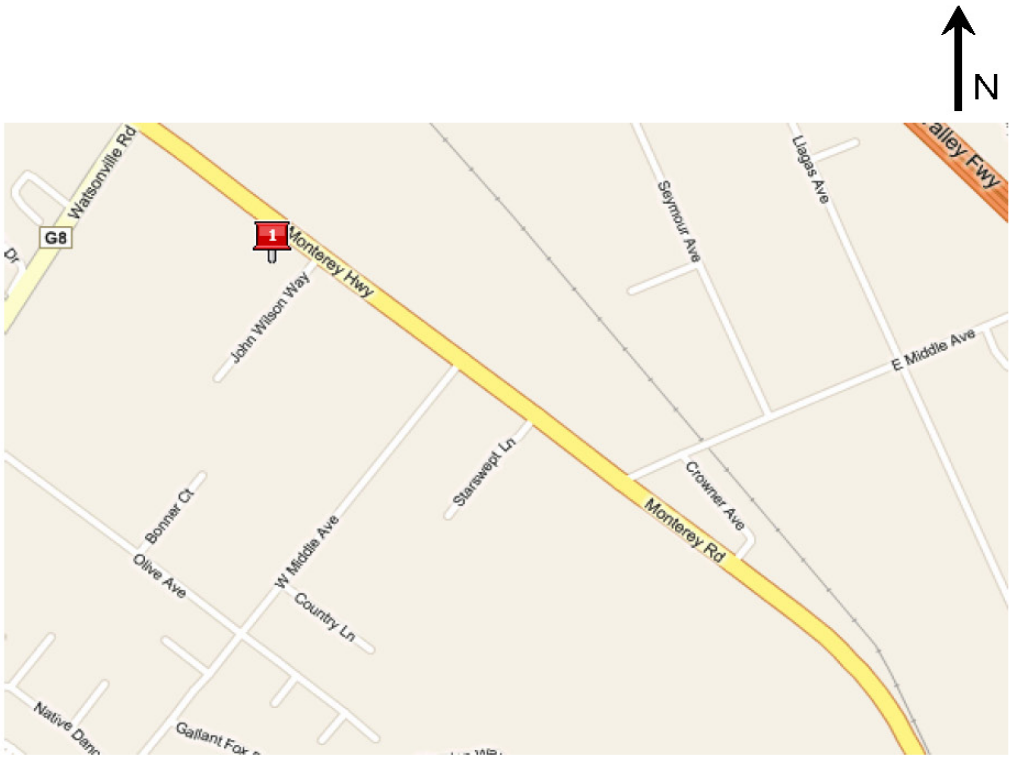
1:	Charter School of Morgan Hill, Morgan Hill, CA
2:	Burnett Elementary School, Morgan Hill, CA
3:	Ann Sobrato High School, Morgan Hill, CA

Schools Within 2000 Feet of Caltrain Corridor: MORGAN HILL (Central)



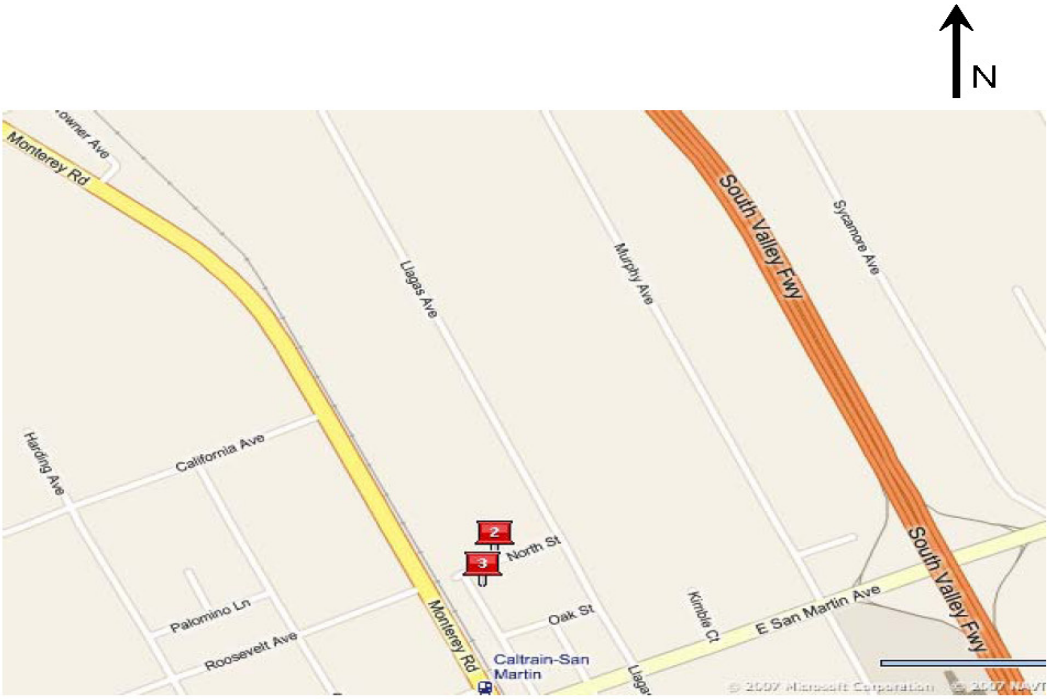
1:	Gavilan College, CA
2:	El Toro Elementary School, Morgan Hill, CA
3:	Lewis H Britton Middle School, Morgan Hill, CA
4:	Crossroads Christian School, Morgan Hill, CA
5:	Morgan Hill Preschool Academy, Morgan Hill, CA
6:	Shadow Mountain Baptist School, Morgan Hill, CA
7:	Central High School, Morgan Hill, CA

Schools Within 2000 Feet of Caltrain Corridor:
SAN MARTIN



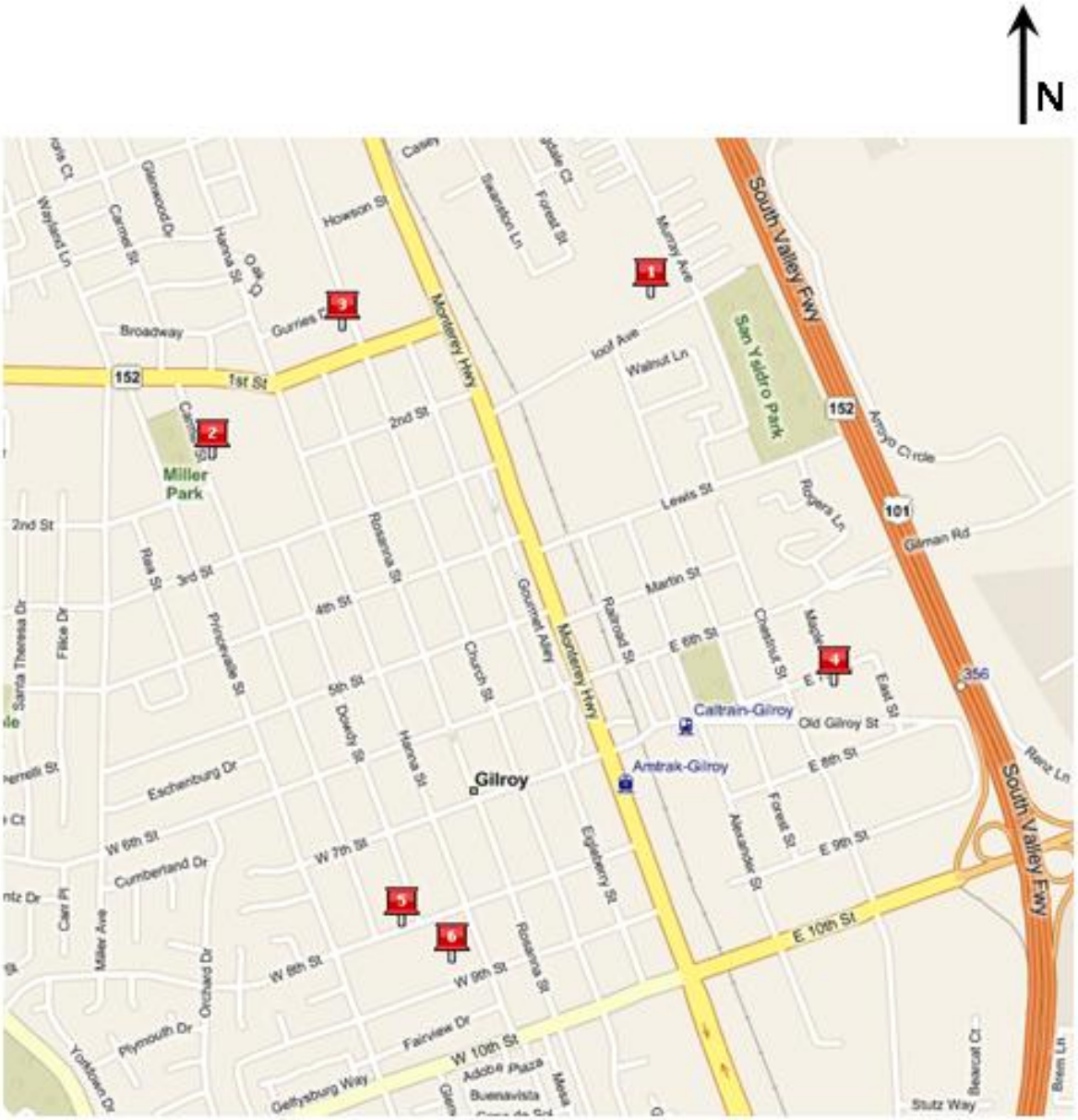
1:	Oakwood County School, San Martin, CA

Schools Within 2000 Feet of Caltrain Corridor: SAN MARTIN



2:	San Martin-Gwinn School, San Martin, CA
3:	San Martin Community Preschool, CA Child Development Center, San Martin, CA

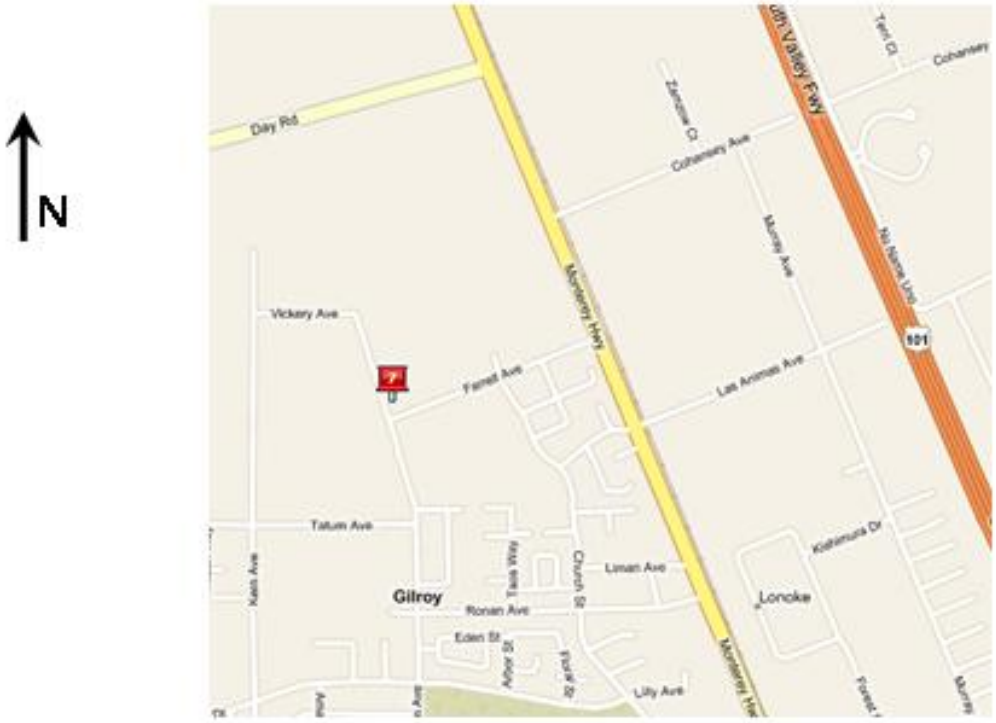
Schools Within 2000 Feet of Caltrain Corridor: GILROY (South)



1:	South Valley Middle School, Gilroy, CA
2:	Brownell Middle School, Gilroy, CA
3.	St. Mary's Catholic School, Gilroy, CA
4.	Eliot Elementary, Gilroy, CA

5.	Glen View Elementary, Gilroy, CA
6.	State Preschool, Gilroy, CA

Schools Within 2000 Feet of Caltrain Corridor: GILROY (North)



7:	Antonio del Buono Elementary School, CA
8:	Rucker Elementary School, CA

APPENDIX D: DETAILED INCIDENT INFORMATION

	DATE	CITY	ROAD TYPE	CROSSING	MILE POST	INCIDENT SUMMARY	CROSSING PROTECTION	FATAL?	INJURIES	COMMENTS
	FEB 05	MOUNTAIN VIEW	PUBLIC	1/2 MILE SOUTH OF MOUNTAIN VIEW STATION		CALTRAIN STRUCK TRESPASSING PEDESTRIAN		1		Homeless Person xing tracks running under HWY 85
	JUNE 28	PALO ALTO	PUBLIC	EAST MEADOW DR	33.00	CALTRAIN STRUCK VEHICLE	GATES	1		Vehicle crossing tracks was struck by NB express train.
2006	DATE	CITY	ROAD TYPE	CROSSING	MILE POST	INCIDENT SUMMARY	CROSSING PROTECTION	FATAL?	INJURIES	
	JAN 04	MOUNTAIN VIEW	PUBLIC	RENGSTORFF AVE	34.74	CALTRAIN STRUCK REAR BUMPER OF VEHICLE	GATES			Driver drove around/thru gates
	JAN 23	MORGAN HILL	PUBLIC	SAN PEDRO AVE	71.45	CALTRAIN STRUCK VEHICLE	GATES	1	1	Driver drove around/thru gates
	MAR 03	PALO ALTO	PUBLIC	EAST MEADOW DR	33.00	CALTRAIN STRUCK TRESPASSING PEDESTRIAN	GATES	1		Standing in gage of track.
	MAR 09	SUNNYVALE	PUBLIC			CALTRAIN STRUCK PEDESTRIAN		1		
	APR 06	MOUNTAIN VIEW	PUBLIC	MT. VIEW STATION		CALTRAIN STRUCK PEDESTRIAN		1		Possible Suicide
	JUL 22	PALO ALTO	PUBLIC	BET. EAST MEADOW DR. AND CHARLESTON RD.		CALTRAIN STRUCK TRESPASSING PEDESTRIAN		1		Laid down in front of train.
	AUG 01	SAN JOSE	PUBLIC	FEHREN DR		UPRR TRAIN STRUCK PEDESTRIAN		1		
	SEP 25	PALO ALTO	PUBLIC	CHURCHILL AVE	31.00	CALTRAIN STRUCK STALLED VEHICLE ON TRACKS	GATES			Vehicle stopped on crossing
	OCT 02	PALO ALTO	PUBLIC	CHARLESTON RD	33.40	CALTRAIN STRUCK VEHICLE	GATES			Vehicle stopped on crossing
	OCT 05	MOUNTAIN VIEW	PUBLIC	RENGSTORFF AVE	34.70	CALTRAIN STRUCK PEDESTRIAN	GATES	1		
	OCT 12	MORGAN HILL	PUBLIC	TILTON AVE	65.30	PASSENGER TRAIN STRUCK TRUCK	GATES	1		
	NOV 12	MOUNTAIN VIEW	PUBLIC			CALTRAIN STRUCK PEDESTRIAN		1		

2005	**DATE**	**CITY**	**ROAD TYPE**	**CROSSING**	**MILE POST**	**INCIDENT SUMMARY**	**CROSSING PROTECTION**	**FATAL?**	**INJURIES**	
	FEB 14	MORGAN HILL	PUBLIC		69.00	CALTRAIN STRUCK VEHICLE				Auto abandoned in foul of main track
	MAR 23	PALO ALTO	PUBLIC	CHARLESTON AVE	33.33	CALTRAIN STRUCK VEHICLE WHICH WAS REAR ENDED BY ANOTHER VEHICLE PROPELLING IT INTO THE TRACKS	GATES			
	MAY 30	SUNNYVALE	PUBLIC	NORTH OF MATHILDA AVE.	38.50	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian jumped in path of train
	JUL 09	PALO ALTO	PUBLIC	E. MEADOW DRIVE	32.80	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian standing in gage of train
	NOV 21	SAN JOSE	PUBLIC	BLOSSOM HILL RD	58.50	UP TRAIN STRUCK TODDLER		1		
	DEC 02	SAN JOSE	PUBLIC	AUZERAIS AVE	48.00	BICYCLIST RODE BIKE INTO CLOSED GATE AND FELL			1	
	DEC 09	PALO ALTO	PUBLIC	CHARLESTON AVE	33.50	CALTRAIN STRUCK PEDESTRIAN	GATES	1		Standing in gage of track.
	DEC 24	MOUNTAIN VIEW	PUBLIC	NORTH OF BERNARDO AVE.	37.30	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian jumped in path of train
2004	**DATE**	**CITY**	**ROAD TYPE**	**CROSSING**	**MILE POST**	**INCIDENT SUMMARY**	**CROSSING PROTECTION**	**FATAL?**	**INJURIES**	
	JAN 06	PALO ALTO	PUBLIC	CHURCHILL AVE	31.70	CALTRAIN STRUCK VEHICLE	GATES			
	JAN 20	PALO ALTO	PUBLIC	CHARLESTON AVE	33.40	CALTRAIN STRUCK VEHICLE	GATES		1	Vehicle stalled on tracks
	FEB 18	MOUNTAIN VIEW	PUBLIC	AT FRANKLIN STREET	35.80	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian jumped into the train path
	APR 29	MOUNTAIN VIEW	PUBLIC	RENGSTORFF AVE	34.70	CALTRAIN STRUCK STALLED VEHICLE	GATES			
	JUN 26	MOUNTAIN VIEW	PUBLIC	MT. VIEW STATION	36.10	TWO (2) PEDESTRIANS RIDING OUTSIDE OF TRAIN			2	
	JUL 03	SAN JOSE	PUBLIC	AT NEWHALL STREET	45.80	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian sitting on ballast adjacent to track.

	NOV 6	PALO ALTO	PUBLIC	PALO ALTO STATION	30.10	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian jumped into the train path
	DEC 12	PALO ALTO	PUBLIC	PALO ALTO STATION	30.20	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian laying in the foul of tracks
2003	**DATE**	**CITY**	**ROAD TYPE**	**CROSSING**	**MILE POST**	**INCIDENT SUMMARY**	**CROSSING PROTECTION**	**FATAL?**	**INJURIES**	
	JAN 08	SUNNYVALE	PUBLIC	MARY AVE		CALTRAIN STRUCK VEHICLE ATTEMPTING TO U-TURN ON CROSSING	GATES			Vehicle got stuck on tracks while maneuvering
	MAY 20	MOUNTAIN VIEW	PUBLIC	RENGSTORFF	34.70	CALTRAIN STRUCK TRESPASSER	GATES	1		
	MAY 21	SAN JOSE	PUBLIC	AT WILLOW ST	49.00	PEDESTRIAN WALKING ON GAGE OF TRACK			1	
	AUG 07	SAN JOSE	PUBLIC	SOUTH OF KALAND AVE	66.50	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian laying on tracks
	NOV 13	SAN JOSE	PUBLIC	BRANHAM LN	54.00	CALTRAIN STRUCK VEHICLE	GATES			
	NOV 14	PALO ALTO	PUBLIC	PALO ALTO STATION	30.70	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian jumped in front of train
	DEC 09	PALO ALTO	PUBLIC	ALMA AVE	29.80	CALTRAIN STRUCK ABANDONED VEHICLE	GATES			
2002	**DATE**	**CITY**	**ROAD TYPE**	**CROSSING**	**MILE POST**	**INCIDENT SUMMARY**	**CROSSING PROTECTION**	**FATAL?**	**INJURIES**	
	APR 25	SUNNYVALE	PUBLIC	SUNNYVALE STATION	38.80	CALTRAIN STRUCK PEDESTRIAN	GATES		1	Pedestrian jumped into path of train.
	MAY 29	SAN JOSE	PUBLIC	SOUTH OF DELMAS AVE.	48.80	CALTRAIN STRUCK PEDESTRIAN			1	Pedestrian walking across tracks
	AUG 16	SAN MARTIN	PRIVATE		73.00	TRAIN STRUCK VEHICLE MOVING OVER CROSSING	STOP SIGNS		1	
	OCT 07	PALO ALTO	PUBLIC	CHURCHILL AVE	31.20	CALTRAIN STRUCK PEDESTRIAN	GATES	1		Pedestrian ran into gage of track at Gate Crossing.
2001	**DATE**	**CITY**	**ROAD TYPE**	**CROSSING**	**MILE POST**	**INCIDENT SUMMARY**	**CROSSING PROTECTION**	**FATAL?**	**INJURIES**	
	JAN 15	SAN JOSE	PUBLIC	MONTEREY HWY			GATES		1	

	FEB 28	GILROY	PUBLIC	COHANSEY AVE			GATES			
	APR 04	SUNNYVALE	PUBLIC	NORTH OF MATHILDA AVE.	38.60	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian walking in gage of track
	MAY 01	MOUNTAIN VIEW	PUBLIC	SOUTH OF GREENMEADOW WY	33.60	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian running in foul of track
	MAY 14	SAN JOSE	PUBLIC	SOUTH OF MENARD DR.	61.50	CALTRAIN STRUCK PEDESTRIAN		1		Pedestrian standing in gage of track
	MAY 15	PALO ALTO	PUBLIC	CHARLESTON AVE	33.40	COMMUTER TRAIN STRUCK VEHICLE	GATES			
	JULY 15	SAN JOSE	PUBLIC	AT SAN CARLOS AVE.	47.90	CALTRAIN STRUCK PEDESTRIAN			1	Pedestrian kneeled in foul of track
	SEP 06	GILROY	PUBLIC	10TH ST			GATES			
	SEP 20	MOUNTAIN VIEW	PUBLIC	CASTRO ST	35.90	TRAIN STRUCK VEHICLE STUCK ON TRACKS	GATES			Motorist turned off the roadway and bacame stuck on tracks
	OCT 28	PALO ALTO	PUBLIC	ALMA ST	29.20	CALTRAIN STRUCK PEDESTRIAN	GATES	1		Pedestrian standing in gage of track
	NOV 01	SANTA CLARA	PUBLIC	MARY AVE	37.70	CALTRAIN STRUCK PEDESTRIAN	GATES	1		Pedestrian walking across tracks
	NOV 20	GILROY	PUBLIC	LAS ANIMAS			GATES		1	

SOURCE FEDERAL RAILROAD ADMINISTRATION
http://safetydata.fra.dot.gov/officeofsafety/
Chris Payne - CALTRAIN Safety Coordinator

APPENDIX E: QUANTIFYING SAFETY IMPROVEMENTS WITH OPERATIONS

The top priority of any public transportation agency must be to ensure the safety of its riders, its employees, and the public at large. Investments in safety related infrastructure are paramount to this objective, and TRA recognizes the significant benefits transit systems gain from investing in safety enhancements. Over time, safety measures once thought to be cost prohibitive have become necessities in the overall transit infrastructure, and as a result, safer operations have become commonplace. Continued improvement to operational safety can and should continue to be made. What is often forgotten, however, is how investments in safety yield significant additional benefits to the transit system, particularly in terms of improved operational efficiencies, enhanced reputations for service, lower risk management costs, and increased capacity. TRA is proposing to quantify the effects of safety improvements on overall operational costs and operational efficiency. Transit agencies are complex systems in which components are not independent, and investments in safety undoubtedly can lead to improved operations.

Whenever an incident occurs along a rail transit or railroad line, it reverberates throughout the system, delaying or canceling trains and people's commutes, putting equipment out of service for a period of time, and affecting the agency's reputation. Operating environments in which trains may interact with individuals (e.g. through grade crossings) pose their own set of restrictions on how fast trains can travel, and as a result, the level of service capacity that can be provided. Obviously, these aspects negatively affect the cost of operation, and even though they are not the direct focus of an incident, they must be factored in along with the other costs of an incident – namely the claims to injured individuals and the repairs to infrastructure and rolling stock. For these reasons, and many more, an investment in safety enhancements to the system not only may pay for itself in reduced injuries or deaths, but can result in everyday efficiencies by reducing the number of incidents a system must plan around and introducing infrastructure improvements that allow for faster and more efficient operations.

TRA is proposing to conduct an evaluation of how safety improvements can offer far reaching benefits, particularly in terms of improved operations and reduced operating costs. TRA will review incidents that have taken place along the Caltrain Corridor and the effects those incidents have had immediately on operations, as well as longer term effects on ridership and public perception to determine how broad the cost of an incident really is and how investments in safety can not only mitigate these costs but result in more efficient operations overall. TRA will also investigate how infrastructure and technology upgrades intended to enhance safety actually provide for larger capacity, faster service, and other operating benefits.

TRA is proposing a simple methodology involving three phases. In Phase I, TRA will evaluate safety data from Caltrain and begin a review of incidents to gain a better understanding of safety issues facing Caltrain and how they affect service. TRA will also request and review studies and other information on safety improvements and on operations. TRA will also research the topic of the impacts of safety on operational efficiency at other transit systems in the United States. TRA will use this information to develop questions for interviews to be conducted on-site in Phase II. Finally, in the third Phase, TRA will add the information gained in these interviews to its research to develop a final report in which it will explain, via text and charts, how safety incidents impose costs **on** the transit system, particularly in terms of operational efficiency, and how this can affect ridership on the system. TRA will also objectively describe how various safety measures provide benefits to rail service and operations. The following paragraphs describe in greater detail the full TRA approach.

Phase I

1. Teleconference

- Identify all costs associated with an incident
- Identify potential savings related to these costs
- Identify safety technologies and infrastructure proposed/in-place/considered at Caltrain/VTA
- Discuss Approach with Caltrain/VTA
- Answer questions:
    - o What data is used to decide what crossings receive new treatments?
    - o Has Caltrain suffered from media scrutiny from minor incidents?
    - o What is effect of a stoppage in service due to a collision?

- Do Safety & Operations Department personnel work together to develop requirements along the line?

- Request Information from Caltrain
    - o Operating procedures
    - o Incident data
    - o A few select incident reports
    - o Studies used to justify making safety upgrades
    - o Studies used to increase service in the corridor (and what upgrades are needed)
    - o Grade crossing safety studies performed in house, if available
    - o Information on safety devices and infrastructure proposed

2. Review Requested Information

- TRA will begin to analyze data
- TRA will evaluate trends in incidents

3. Research & Review Outside Source Data

- Have other commuter rail or rail transit systems looked at safety data in this way?
- Have there been any studies?
- How can studies on operational efficiency be applied here?
- Are safety changes (infrastructure, technology, training, etc) evaluated for impacts on operations?

4. Prepare On-Site Interview Information

- TRA will develop interview questions for a variety of individuals
- TRA will develop a list of more information to be requested or reviewed on-site

Phase II

1. Conduct Interviews

- Interview selected individuals in organization to learn more about impacts of an incident throughout the agency and its operations to determine how an investment that improves safety would reduce these negative impacts on service.
    - o System Safety Department
    - o Operations & OCC
    - o ROW Maintenance
    - o Vehicle Maintenance
    - o Legal (claims)
    - o Engineering/Planning
    - o Public Relations
- Interview topics may include:
    - o Resources required to respond to incident
    - o Staffing required to respond to incidents
    - o Post-incident service coordination
    - o Public response to incidents
    - o Cost to respond to incidents
    - o Operational needs (e.g. can a new signal or tracking system increase safety and allow for more service?)

2. Follow-Up to Interviews Off-Site

- TRA will analyze its findings from the on-site review
- TRA will follow-up with individuals to gather any additional information

Phase III

1. Draft Report Development

- Develop series of charts explaining how operations improvements result from reducing conflicts / improving safety and how agency incurs a range of costs with any incident
    - o Average cost per incident, overall

- o Average claims per incident
- o Average length of service delay for affected train
- o Average length of service delay for other trains

o Average number of passengers delayed by each incident – aggregated over time
o Time of day prevalence for incidents

⇒ (e.g. is bus bridge even feasible?)

⇒ More riders affected

o Cause of incidents

⇒ Are modifications made in response to this?

• Detailed explanation about how reducing claims can put more money back into operations, thus earning more dividends on this investment
• Detailed explanation of how more safety improvements, such as (but not limited to) separated grade crossings, four quadrant gates, or new signal technologies, can lead to higher service levels by eliminating conflict, increasing speed, and increasing capacity
• Detailed explanation of how improved service reliability can lead to increased ridership and a better reputation
• Detailed explanation of effects on ridership that result from incidents and/or related delays and how this can affect overall service planning and operating levels.

2. Finalize Report

• Respond to VTA/Caltrain comments
• Issue final report