

CITY OF PINOLE

LOCAL ROADWAY SAFETY PLAN

FINAL REPORT

FEBRUARY 15, 2023



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EXECUTIVE SUMMARY

The City of Pinole's Local Roadway Safety Plan (LRSP) is a comprehensive plan that creates a framework to systemically identify and analyze traffic safety related issues and recommend projects and countermeasures to enhance safety for all modes of transportation for ages and abilities. The LRSP identified safety patterns throughout the City, developed a toolbox of countermeasures to address them, and proposed projects to improve safety at key locations. The plan used data-driven collision analysis of local roadways to identify transportation safety improvement needs, including pedestrian, bicycle and vehicular safety improvements. Input from stakeholders and the community played a key role in the development of the LRSP.

The LRSP takes a proactive approach to addressing safety needs. It is viewed as a guidance document that can be a source of information and ideas. The LRSP should be viewed as a living document that can be updated to reflect changing local needs and priorities. The development of the LRSP was funded by the Federal Highway Administration (FHWA) and the California Department of Transportation (Caltrans), and is a requirement for the City of Pinole to be eligible to receive federal funding for local roadway safety improvement projects in the future. This document summarizes an analysis of collisions that occurred in City of Pinole, identifies high-injury locations, and recommends countermeasures at each of these high-risk locations.

GOALS OF THE LRSP

The City and Consultant prepared the goals of the LRSP:

- Goal 1: Identify and analyze road safety issues from a systemic perspective and recommend improvements
- Goal 2: Improve pedestrian and bicyclist safety through the application of proven effective countermeasures
- Goal 3: Coordinate the actions of key stakeholders to implement road safety improvements and Emergency response in the City of Pinole
- Goal 4: Continually seek funding for safety improvements
- Goal 5: Ensure that all safety improvements are made in a fair and equitable manner for all residents of the City of Pinole

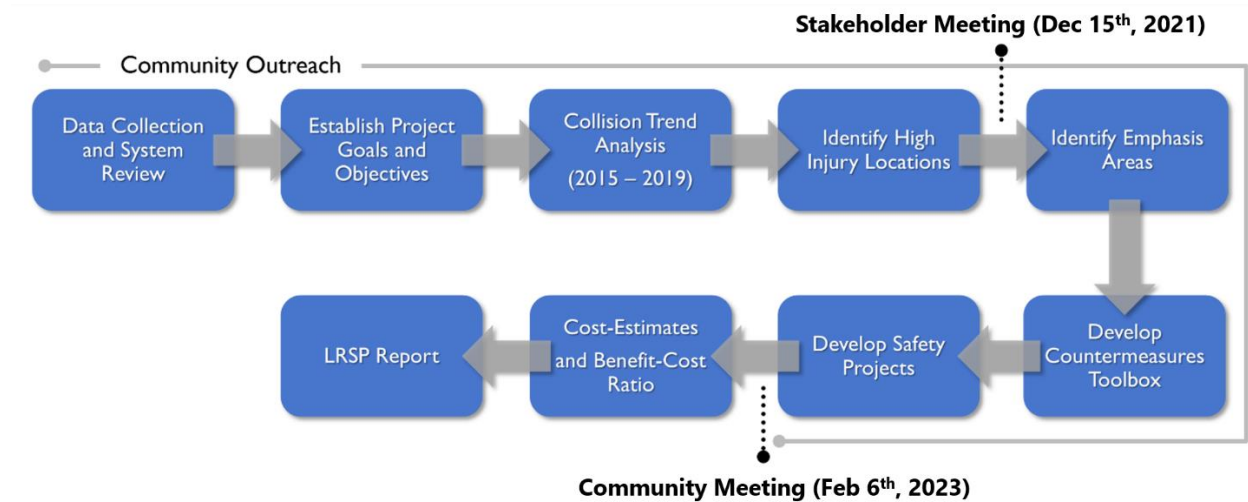
PROCESS

The City and Consultant followed the FHWA six step LRSP development process to develop the City's LRSP:

- Develop plan goals and objectives
- Analyze collision data
- Meet with stakeholders/safety partners
- Determine focus areas and identify crash reduction strategies
- Prioritize countermeasures/projects



- Prepare the LRSP



COLLISION DATA

Collision data was obtained for a five-year period from 2015 to 2019 from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) and the University of California at Berkeley SafeTREC's Transportation Injury Mapping Service (TIMS). For the purpose of this report the data was analyzed for a five-year period from 2015 to 2019 from Transportation Injury Mapping Service's Traffic Collision Database.

COLLISION TREND

Key findings on patterns and trends:

- A total of 311 collisions occurred between 2015 and 2019.
- 9 collisions resulted in severe injuries, 15 resulted in a visible injury, 48 resulted in a complaint of pain injury, and 239 resulted in PDO collisions. No fatalities are reported.
- The year 2015 had highest number of collisions with 92 collisions, and 2019 had the lowest number of collisions with 39 collisions.
- The highest number of injury collisions occurred within 250 feet of an intersection (84%).
- Rear-end and sideswipe collisions, each accounted for 31% of total collisions. 33% of broadside collisions resulted into F+SI collisions.
- Unsafe speed accounted for 24% of all collisions, followed by improper turning (21%).
- Most of the F+SI collisions occurred between 4:00 p.m. and 7:00 p.m.,
- 54% of all collisions were motor vehicle involved with other motor vehicles followed by motor vehicle involved with a parked motor vehicle (25%), and fixed objects (12%).
- There were a total of 16 bicycle and pedestrian collisions during the study period, of which 7 were bicycle and 9 pedestrian collisions.

HIGH RISK LOCATIONS

The collision analysis was performed on all City streets. The corridors were ranked to show the top 8 high-collision intersections and top 8 high-collision roadway segments.



Key findings of identifying high-risk intersections are as follows:

- There were a total of 26 injury collisions that occurred at the intersection
- 6 collisions led to F+SI
- The intersection of Appian Way and Fitzgerald Drive had the highest number of injury collisions overall (7)

Key findings of identifying high-risk roadway segment are as follows:

- There were a total of 37 injury collisions that occurred on the roadway segments
- 7 collisions led to F+SI collisions
- Pinole Valley Road between San Pablo Avenue to Collins Avenue had the highest number of injury collisions with 10, followed by San Pablo Avenue between Oak Ridge Road to Pinole Valley Road with seven injury collisions

EMPHASIS AREAS

Emphasis areas are focus areas for the LRSP that are identified through the comprehensive collision analysis of the identified high injury locations within the City of Pinole. The six emphasis area identified for the City of Pinole are:

- A. Improve Intersection Safety
- B. Reduce Nighttime Collisions
- C. Reduce Unsafe Speed Collisions
- D. Reduce Broadside (T-bone) Collisions
- E. Reduce Automobile Right-of-Way Violations
- F. Improve Pedestrian Safety

VIABLE SAFETY PROJECTS

A set of nine safety projects were created for the high-risk intersections and roadway segments.

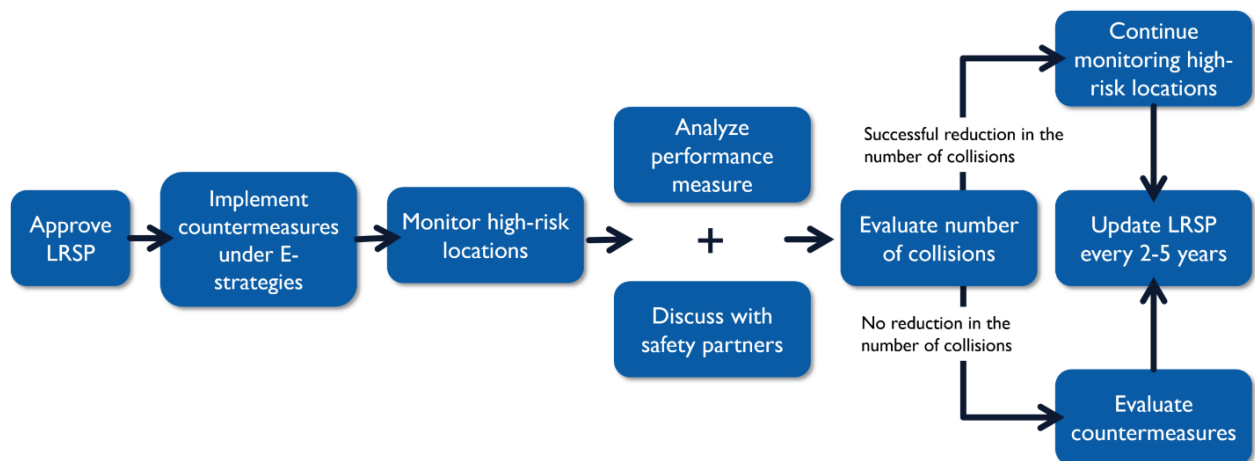
- Project 1: Signalized Intersections (Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number, Improve signal timing (coordination, phases, red, yellow, or operation), Provide protected left turn phase (left turn lane already exists))
- Project 2: Pedestrian Safety at Signalized Intersections (Install advance stop bar before crosswalk, Install raised median on approaches (S.I.), Install raised pavement markers and striping (Through Intersection))
- Project 3: Safety at Unsignalized Intersections (Add intersection lighting (NS.I.), Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs, Install Rectangular Rapid Flashing Beacon (RRFB))
- Project 4: Citywide Signal Upgrade
- Project 5: Citywide Street light Inventory



- Project 6: Roadway Segments (Add Segment Lighting, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning), Install delineators, reflectors and/or object markers)
- Project 7: Roadway Segments (Install centerline rumble strips/stripes, Install edge-lines and centerlines, Install Rectangular Rapid Flashing Beacon (RRFB))
- Project 8: Roadway Segments (Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes), Install dynamic/variable speed warning signs, Install/upgrade pedestrian crossing (with enhanced safety features))
- Project 9: Citywide Regulatory and Warning Sign Inventory

IMPLEMENTATION AND EVALUATION

The LRSP is a guidance document that is recommended to be updated every two to five years in coordination with the safety partners. The LRSP document provides engineering, education, enforcement, and emergency medical service-related countermeasures that can be implemented throughout the City to reduce F+SI collisions. It is recommended that the City of Pinole implement the selected projects in high-collision locations in coordination with other projects proposed for the City's infrastructure development in their future Capital Improvement Plans. After implementing countermeasures, the performance measures for each emphasis area should be evaluated annually. The most important measure of success of the LRSP should be reducing F+SI collisions throughout the City. If the number of F+SI collisions does not decrease over time, then the emphasis areas and countermeasures should be re-evaluated.



Report Organization

CHAPTER 1 – INTRODUCTION

The Introduction describes what an LRSP is and details the study area. It also summarizes the systemic approach involved in preparing the LRSP and goal and objectives of the plan.

CHAPTER 2 – SAFETY PARTNERS AND PUBLIC OUTREACH

Involvement of safety partners is critical in the success of the LRSP. For the City of Pinole, this included the City Department Staff from Public Works, the City of Pinole Police Department, West Contra Costa Unified School District, City of Pinole Traffic and Pedestrian Safety Committee, and City of Pinole residents. This chapter summarizes the public outreach involvement of the stakeholders in the LRSP process.

CHAPTER 3 – EXISTING PLANNING EFFORTS

This chapter summarizes City and regional planning documents and projects that are relevant to the LRSP. It ensures that the recommendations of the LRSP are in line with existing goals, objectives, policies, or projects.

CHAPTER 4 – COLLISION DATA AND ANALYSIS

This chapter summarizes the collision data analysis approach and presents preliminary as well as detailed collision analysis and findings in the study area.

CHAPTER 5 – EMPHASIS AREAS

This chapter identifies the top six emphasis areas for the City and the safety strategies for each.

CHAPTER 6 – COUNTERMEASURE IDENTIFICATION

This chapter identifies the engineering countermeasures were selected for each of the high-risk locations and for the emphasis areas. These were based off of approved countermeasures from the Caltrans Local Roadway Safety Manual (LRSM) used in HSIP grant calls for projects. The intention is to give the City potential countermeasures for each location that can be implemented either in future HSIP calls for projects, or using other funding sources, such as the City's Capital Improvement Program. Non-engineering countermeasures were also selected using the 4 E's strategies, and are included with the emphasis areas.

CHAPTER 7 – SAFETY PROJECTS

This chapter summarizes the list of viable safety projects applicable to the high-risk intersections and roadway segments, along with the cost for implementation and their benefit cost ratio.

CHAPTER 8 – IMPLEMENTATION AND EVALUATION

This chapter summarizes the process of implementation, monitoring, evaluation, and future updates.



1. INTRODUCTION

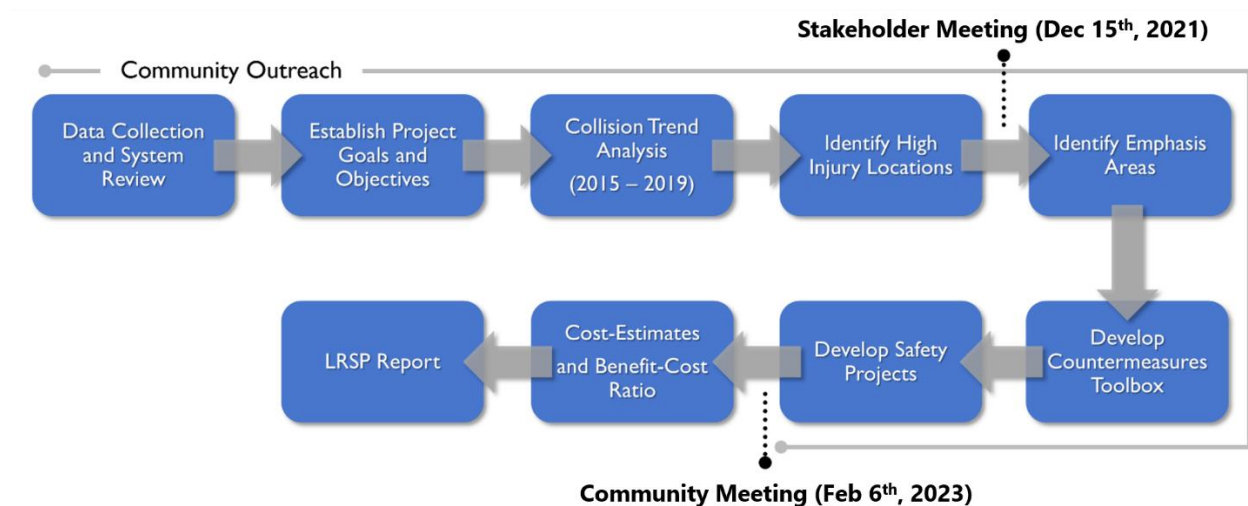
What is an LRSP?

The LRSP is a localized data-driven traffic safety plan that provides opportunities to address unique roadway safety needs and reduce the number of F+SI collisions for all modes. The LRSP creates a framework to systemically identify and analyze traffic safety-related issues, recommend safety projects, and countermeasures. It facilitates the development of local agency partnerships and collaboration, resulting in the development of a prioritized list of improvements that can qualify for HSIP funding. The LRSP is a proactive approach to addressing safety needs and is viewed as a living document that can be constantly reviewed and revised to reflect evolving trends, and community needs and priorities.

Process

The City and Consultant followed the FHWA LRSP development process to develop the City's LRSP. The systemic approach in preparing the LRSP involves the following steps:

- Develop plan goals and objectives
- Analyze collision data
- Meet with stakeholders/safety partners
- Determine focus areas and identify crash reduction strategies
- Prioritize countermeasures/projects
- Prepare the LRSP



Goals and Objectives

GOAL 1: IDENTIFY AND ANALYZE ROAD SAFETY ISSUES FROM A SYSTEMIC PERSPECTIVE AND RECOMMEND IMPROVEMENTS

Objective 1: *Determine where, when, and how F+SI collisions occur in the City of Pinole using the data-driven Systemic Safety Analysis process and implement appropriate and proven countermeasures.*

Objective 2: *Improve roadway planning, design, operations, and connectivity to enhance safety and mobility for users of all ages and abilities.*

Objective 3: *Implement traffic calming strategies on residential streets to discourage speeding and other unsafe driving behaviors.*

Objective 4: *Ensure that all recommended improvements are consistent with City, County, State, and Federal plans (such as, California Strategic Highway Safety Plan).*

GOAL 2: IMPROVE PEDESTRIAN AND BICYCLIST SAFETY THROUGH THE APPLICATION OF PROVEN EFFECTIVE COUNTERMEASURES

Objective 1: *Identify safety concerns and hot spots in the City of Pinole where bicycle and pedestrian collisions occur and address them with appropriate and effective engineering countermeasures.*

Objective 2: *Conduct educational programs to educate bicyclists, pedestrians, and motorists about the importance of sharing the public right-of-way safely. This can be accomplished through after-school programs, police department initiatives, or other public/private sponsored initiatives.*

Objective 3: *Improve the safety and efficiency of sidewalks, walkways, and crossings by eliminating hazards and minimizing conflicts with vehicular traffic.*

Objective 4: *Prioritize improvements that promote Safe Routes to School efforts or are located near schools.*



GOAL 3: COORDINATE THE ACTIONS OF KEY STAKEHOLDERS TO IMPLEMENT ROAD SAFETY IMPROVEMENTS AND EMERGENCY RESPONSE IN THE CITY OF PINOLE

Objective 1: *Coordinate efforts between Public Works, the Sheriff Department, the Fire Department, and the EMS agencies to ensure a coherent approach to traffic safety issues, including:*

- *Implementation of safety improvements*
- *Public education on safely traveling in the public right-of-way, regardless of mode*
- *Enforcement of traffic safety laws in the public right-of-way*
- *Minimizing impacts to emergency response times*

Objective 2: *Collaborate with local, regional, and state partners to identify and address traffic safety issues, and ensure a coordinated response.*

GOAL 4: CONTINUALLY SEEK FUNDING FOR SAFETY IMPROVEMENTS

Objective 1: *Ensure that the LRSP complies with HSIP guidelines to apply for funding for identified countermeasures.*

Objective 2: *Provide a prioritized list of improvements that will serve as a guide for City investments and grant applications.*

Objective 3: *Continually seek funding sources to implement engineering, education, enforcement, and emergency response solutions to road safety issues in the City of Pinole.*

GOAL 5: ENSURE THAT ALL SAFETY IMPROVEMENTS ARE MADE IN A FAIR AND EQUITABLE MANNER FOR ALL RESIDENTS OF THE CITY OF PINOLE

Objective 1: *Where feasible, conduct community outreach to inform residents about upcoming safety enhancements and solicit their input.*

Objective 2: *Provide a forum for residents to lodge complaints about traffic safety, as well as for City officials to respond to such complaints.*

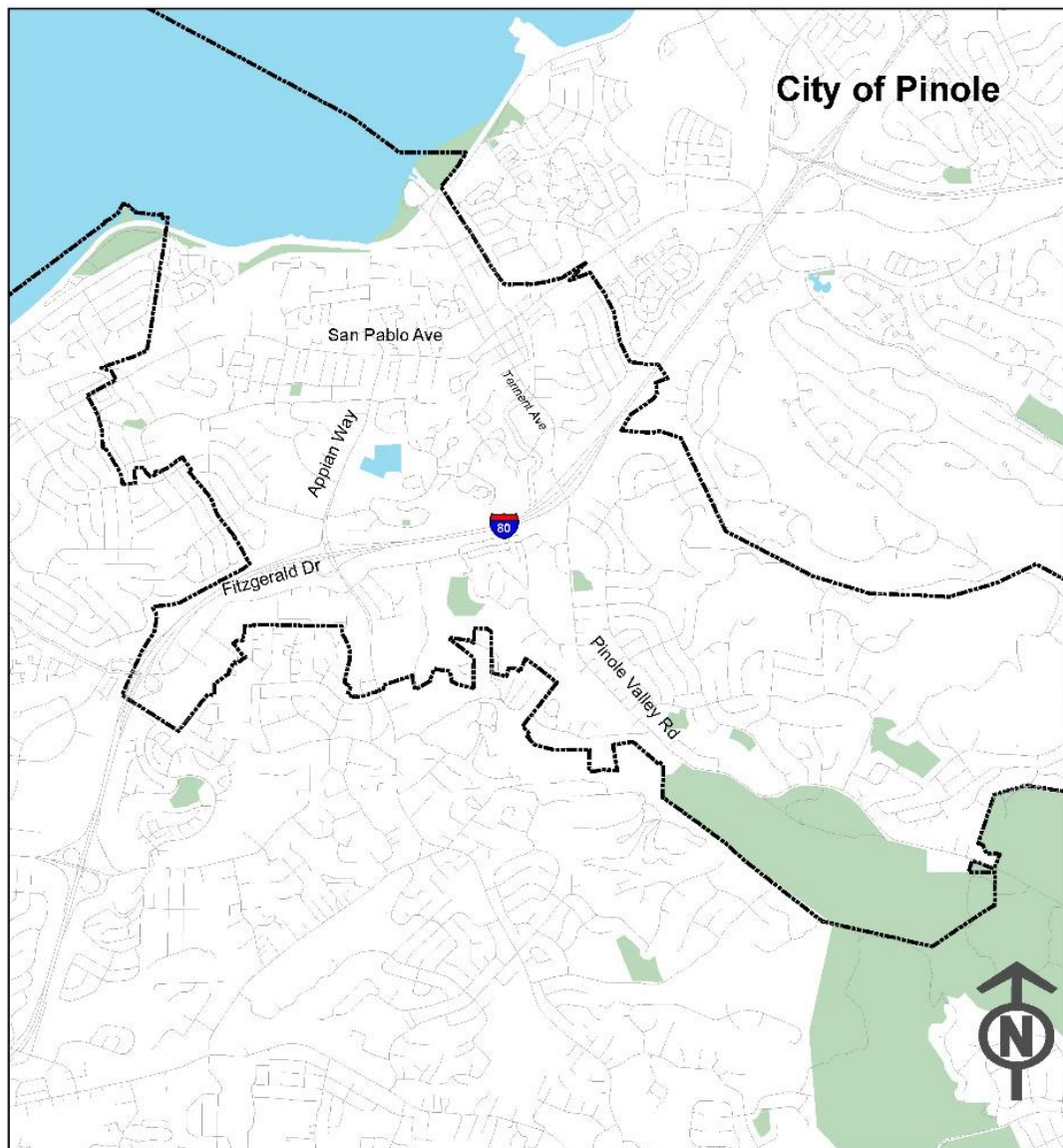
Objective 3: *Ensure that equity is a primary factor in selecting where to make traffic safety improvements.*



Study Area

The City of Pinole is located in the Contra Costa County, California. It covers a total approximate area of 18 square miles. The City's estimated population is approximately 19,022 (US Census 2020). The study area is mapped in **Figure 1** on the following page.

Figure 1. Study Area



According to five-year estimates from the American Community Survey (ACS)¹ 2019 from the U.S. Census, 73.6 percent of City of Pinole commuters get to work by driving alone, versus 73.7 percent

¹American Community Survey (ACS) 2019

<https://data.census.gov/table?q=Pinole+city,+California&t=Transportation&tid=ACSDT5Y2019.B08141>



statewide. The second most common method of commuting to work in Pinole is Carpool at 10.7 percent. The different modes of transportation used by City of Pinole residents to commute to work are shown in **Table 1** below.

Table 1. City of Pinole Commute to Work Census Data

Commute to Work	City of Pinole	California
Drive Alone	73.6%	73.7%
Carpool	10.7%	10.1%
Public Transportation	9.8%	5.1%
Walked	1.3%	2.6%
Work from Home	3.4%	5.9%
Other	1.2%	2.6%



2. SAFETY PARTNERS

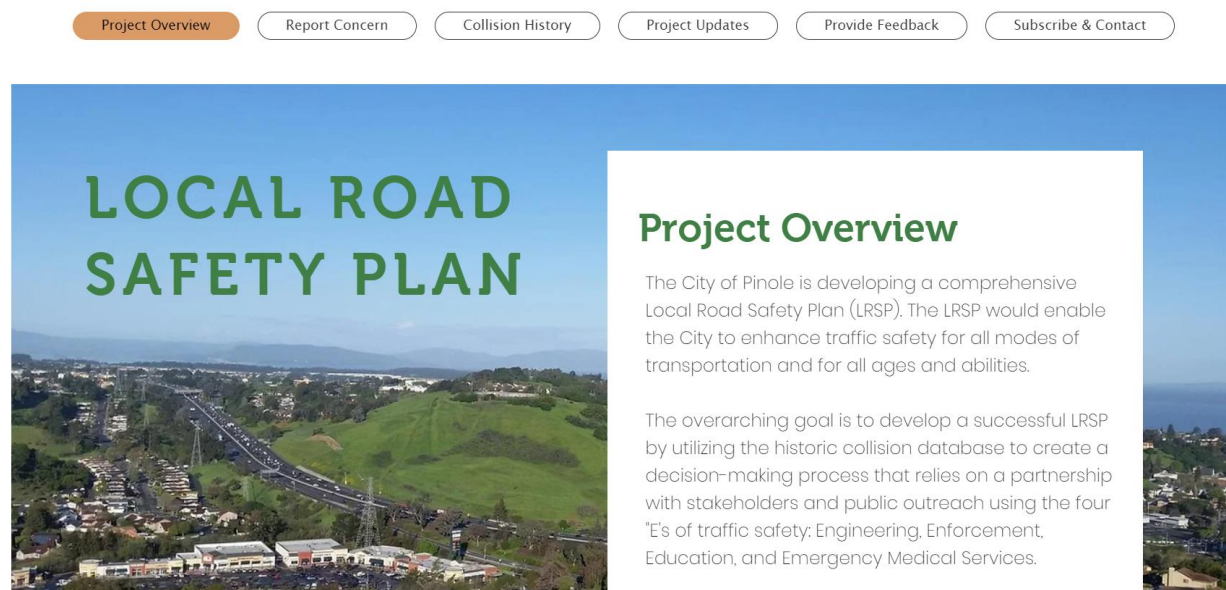
Safety partners are vital to the development and implementation of an LRSP. For City of Pinole, these include City staff, the City of Pinole Police Department, West Contra Costa Unified School District, City of Pinole Traffic and Pedestrian Safety Committee, and City of Pinole residents. A virtual Stakeholder meeting was conducted on December 15, 2021 to review project goals and findings, and to solicit feedback from the group.

Figure 2. Zoom Meeting from Stakeholder Meeting



This stakeholder outreach was supplemented by a project website with an interactive platform. The interactive map was used to solicit input from City of Pinole residents and stakeholders outside the confines of traditional meetings.

Figure 3. City of Pinole LRSP Project Website



In total, 407 comments were received through the project website for City of Pinole LRSP of which 382 comments were received using the interactive map. Pinole Valley Road received the most comments, with the main concerns being pedestrian safety, and speeding. The comments received via the interactive map are shown in **Figure 4**, and summarized in **Figure 5**. In **Figure 4**, each dot and line represents a comment provided by a community member.

Figure 4. Comments Received via Interactive Map

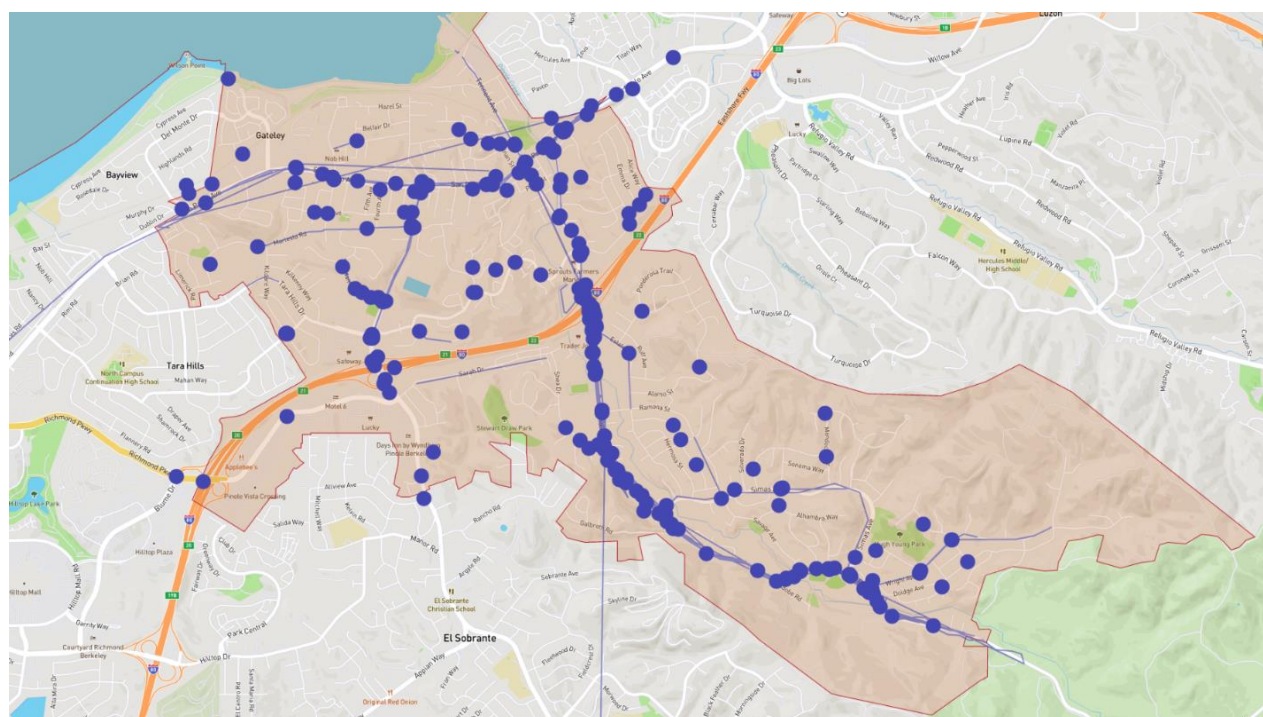
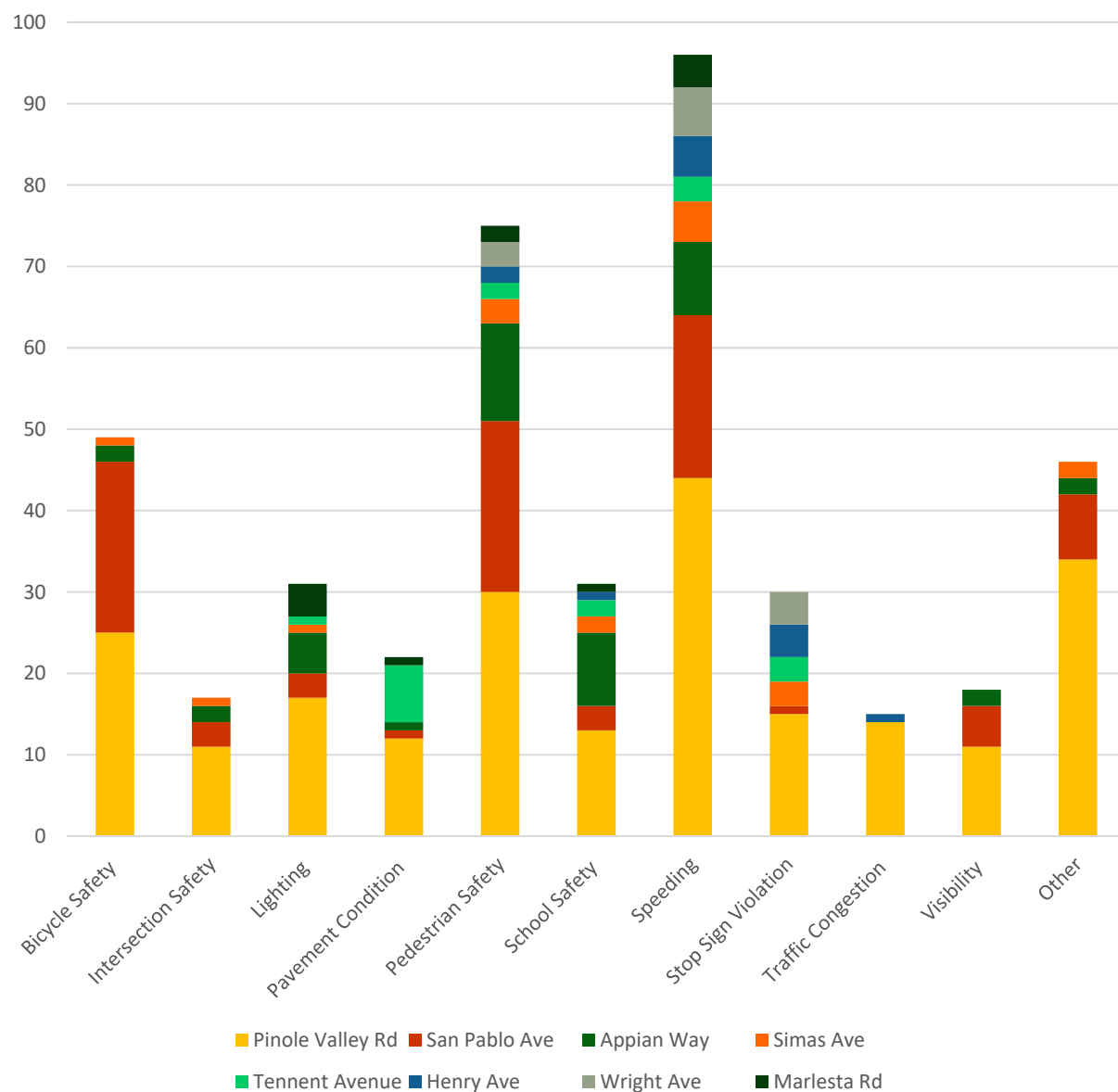


Figure 5. Public Comments on Traffic Safety by Location



Note: Top 8 corridors with most comments are included in this chart. Top 10 categories are named and remaining all categories are included in 'other'. Category was chosen based on the primary issue listed in the comment. Each comment was assigned to the major road if at an intersection.

The community comments collected through Interactive map platform is included in **Appendix A**.



3. EXISTING PLANNING EFFORTS

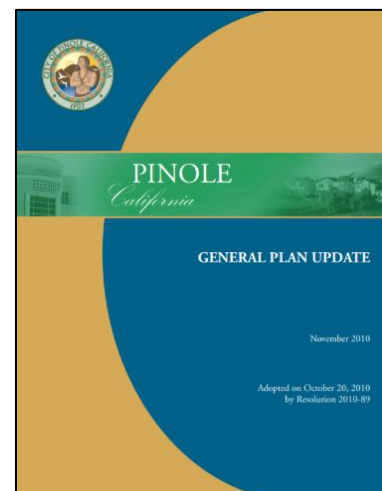
This chapter summarizes the planning documents, projects underway, and studies reviewed for the City of Pinole LRSP. The purpose of this chapter is to ensure the LRSP vision, goals, and E's strategies (Education, Enforcement, Engineering, and Emergency Medical Services (EMS)) are aligned with prior planning efforts, planned transportation projects, and non-infrastructure programs for the City. The documents reviewed are listed below:

1. City of Pinole General Plan (2010)
2. City of Pinole Neighborhood Traffic Calming Policy (2008)
3. City of Pinole Three Corridors Specific Plan (2010) Updated (2018)
4. Old Town Pinole Parking & Pedestrian Safety Study (2020)
5. Capital Improvement Plan (FY 2021/22 – 2025/26)
6. City of Pinole Operating Budget (2020-2021)
7. Contra Costa Countywide Bike and Pedestrian Plan (2018)
8. CCTA Transportation Expenditure Plan (2020)
9. CCTA Countywide Comprehensive Transportation Plan (2017)
10. Contra Costa County Transportation Analysis Guidelines (2020)
11. West County Action Plan (2017)
12. West Contra Costa High-Capacity Transit Study (2017)

The following sections include brief descriptions of these documents and how they inform the development of the LRSP. A more detailed list of relevant policies and projects is listed in **Appendix B**.

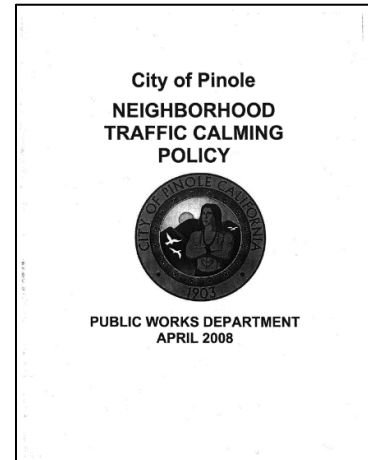
CITY OF PINOLE GENERAL PLAN (2010)

The General Plan presents a vision to make Pinole a sustainable community where the citizens act as stewards for the environment, the economy, and the social equality of the community, preserving Pinole's historic past, while maintaining a healthy economy for all members of the community now and in the future. The plan's Circulation and Transportation Element provides the data concerning existing and future conditions on a factual basis for community goals, policies, and implementing actions for existing and proposed roadway improvements and other transportation needs. These goals and policies inform City's Local Roadway Safety Plan to improve roadway safety for active transportation users while encouraging users to choose walking, bicycling, and transit as a mode of transportation in Pinole.



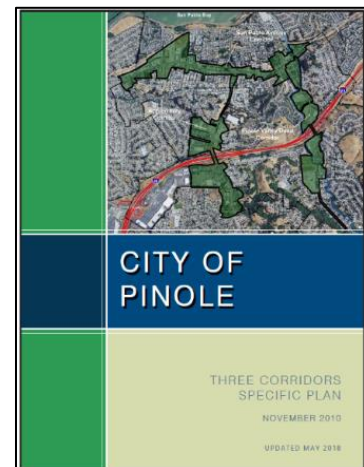
CITY OF PINOLE NEIGHBORHOOD TRAFFIC CALMING POLICY (2008)

The City of Pinole Neighborhood Traffic Calming Policy aims to improve the livability of our neighborhoods and minimize adverse impacts of vehicular traffic on residential and pedestrian safety streets through a system of education, enforcement, and engineering. The Neighborhood Traffic Calming Policy has been designed to ensure that each neighborhood with a demonstrated traffic problem has access to neighborhood traffic calming measures. This document suggests various countermeasures to elevate street safety in Pinole neighborhoods.



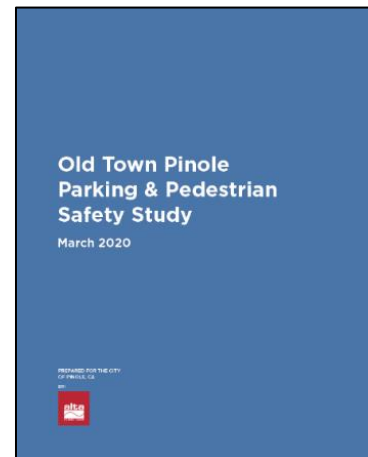
CITY OF PINOLE THREE CORRIDORS SPECIFIC PLAN (2010) UPDATED (2018)

The City of Pinole Three Corridors Specific Plan is a regulatory and economic development tool that local government uses to implement their General Plan and to guide development in a well-defined sub-area of the community. While the General Plan is the primary guide for growth and development within Pinole, this Specific Plan seeks to establish a direct connection between the City of Pinole's General Plan and economic and revitalization opportunities within the three Specific Plan corridors. An overall goal is the orderly development of three project area(s) – San Pablo Avenue, Pinole Valley Road, and Appian Way – consistent with the City's General Plan and, more specifically, with the community's vision developed through the Specific Plan public outreach process.



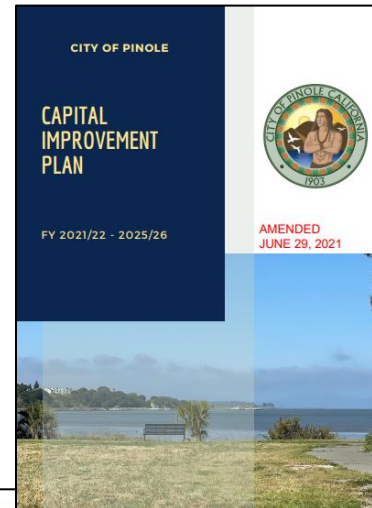
OLD TOWN PINOLE PARKING & PEDESTRIAN SAFETY STUDY (2020)

The purpose of this study is to develop recommendations for Old Town Pinole to utilize parking more effectively and improve pedestrian safety within the study area. The study goal is also to enhance the connection between Old Town Pinole and the SF Bay Trail while fostering the small town design elements that make Old Town Pinole unique will enhance the experience of those walking in Old Town Pinole. The safety element of this document recommends pedestrian safety improvements within the Old Town Pinole and highlights the scope of the further safety study.



CAPITAL IMPROVEMENT PLAN (FY 2021/22 – 2025/26)

The Capital Improvement Plan (CIP) is a multi-year planning tool used to identify and implement the City's capital needs over the upcoming five-year period. The CIP aligns the needs with appropriate funding, scheduling, and implementation. This document is a working blueprint for building and sustaining publicly funded physical infrastructure. These improvements influence Pinole's built and natural environment and help guide the trajectory of future growth or change.



CITY OF PINOLE OPERATING BUDGET (2020-21)

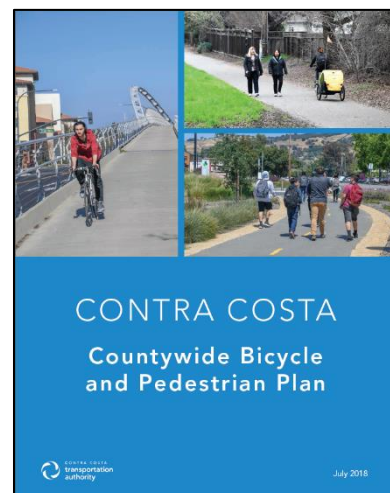
The Operating Budget is the complete budget used to finance all the day-to-day operations and obligations of the City. The budget includes general government administration and operations, debt service, capital expenditures, and transfer payments for a particular fiscal year. The fiscal year 2020-21 operating budget of the City of Pinole illustrates City's financial capabilities with ongoing and future expenditures. This budget also addresses the budget impact due to the COVID-19 situation.

CITY OF PINOLE, CALIFORNIA Fiscal Year 2020-21 Adopted Budget



CONTRA COSTA COUNTYWIDE BIKE AND PEDESTRIAN PLAN (2018)

Revised in 2018, the Contra Costa Countywide Bike and Pedestrian Plan entails new policies, best practices and standards developed over the last decade as well as newly-adopted local active transportation plans. This plan highlights the need of increased interest and support for walking and bicycling. The plan also includes the pedestrian and bicycle collision density, design for pedestrian facilities, pedestrian priority area, level of traffic stress for bicycle users, and existing and proposed bicycle facilities. The improvements identified in this plan will inform the safety improvements and strategies to be recommended in the City's Local Road Safety Plan.



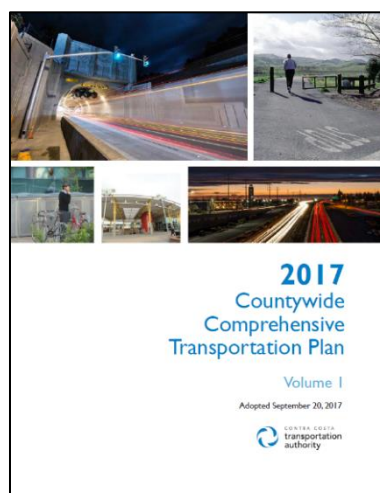
CCTA TRANSPORTATION EXPENDITURE PLAN (TEP) (2020)

The 2020 Transportation Expenditure Plan is a carefully curated set of solutions designed to bring Contra Costa's transportation system into the future by moving more people efficiently, encouraging mode shift, and promoting shared mobility options for all. The TEP is intentionally designed to be equitable across the entire County, based on population. This plan reflects the current progress of transportation projects in Contra Costa County and the commitment to pursuing transportation policies, planning, and investments.



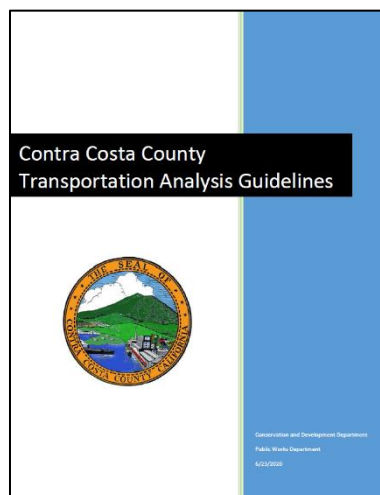
CCTA COUNTYWIDE COMPREHENSIVE TRANSPORTATION PLAN (2017)

The 2017 Countywide Comprehensive Transportation Plan (CTP) provides the policy framework and steps necessary for the CCTA to achieve its vision. It includes an analysis of challenges and opportunities; a definition of the vision, goals, and strategies; and defines how the CTP will be carried out through a Long-Range Transportation Investment Program and an Implementation Program, with defined responsibilities and a schedule of activities. The CTP outlines the various strategies for addressing transportation and growth management issues within Contra Costa County.



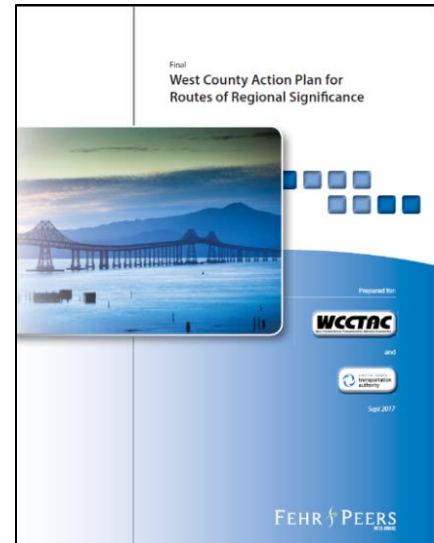
CONTRA COSTA COUNTY TRANSPORTATION ANALYSIS GUIDELINES (2020)

The Contra Costa County Transportation Analysis Guidelines (TAG) are provided to aid in the preparation of traffic analysis for project applicants and staff. The purpose of this document is to establish a uniform approach, methodology, and toolset to evaluate the impacts of land-use decisions and related transportation projects on the County's transportation system. This is a living document and is updated periodically to reflect newly acquired data and relevant policies. Capital Road Improvement and Complete Streets policies mentioned in this document will serve as a reference while developing a City's Local Road Safety Plan.



WEST COUNTY ACTION PLAN (2017)

The purpose of the West County Action Plan is for each Regional Transportation Planning Committee (RTPC) to work cooperatively to establish overall goals, set performance measures for designated Routes of Regional Significance, and outline a set of projects, programs, measures, and actions that will support the achievement of the Multi-modal Transportation Service Objectives. Action Plans are required to be prepared by the RTPC for each subarea of Contra Costa County (West, Central, East, Lamorinda, and the Tri-Valley). CCTA is responsible for funding this effort, and for coordinating and knitting together the Action Plans from each RTPC into the Countywide Comprehensive Transportation Plan (CTP).



WEST CONTRA COSTA HIGH-CAPACITY TRANSIT STUDY (2017)

West Contra Costa High-Capacity Transit Study to evaluate options for expanding transit capacity and creating a more robust transit network. The results of the study are intended to serve as a resource for the West Contra Costa County Transportation Advisory Committee (WCCTAC), the cities, the County, and transit agencies to determine which projects should be advanced for further study, with consideration given to costs, funding opportunities, and consistency with local plans and policies. It provides WCCTAC with the information necessary to determine and advance the most promising HCT alternatives to benefit a wide range of people and trip types in West County.



4. COLLISION DATA AND ANALYSIS

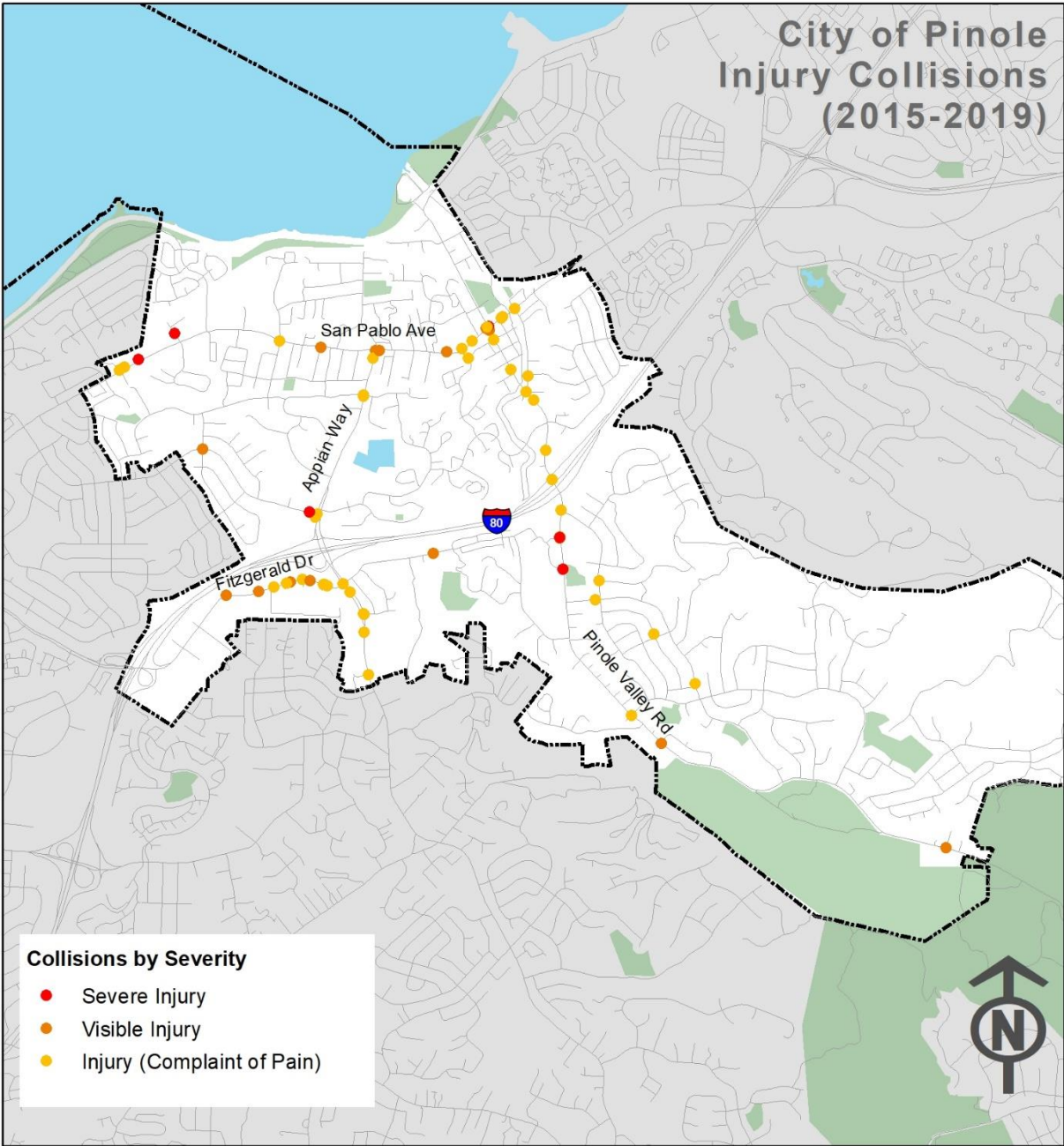
This chapter summarizes the results of the collision analysis of collisions that have occurred in the City of Pinole between January 1, 2015 and December 31, 2019, as part of the LRSP. This chapter includes the following sections:

- Data Collection
- Collision Data Analysis
- Fatal and Severe Injury Collision Analysis
- Geographic Collision Analysis
- High Injury Network
- Summary

The LRSP focuses on systemically identifying and analyzing traffic safety issues and recommends appropriate safety improvements. The chapter starts with an analysis of the collisions of all severity for the City of Pinole, including Property Damage Only (PDO) collisions. Further on, a detailed analysis was conducted for fatal and severe injury (F+SI) collisions that have occurred on the City's roadways. After this data was segregated, a comprehensive evaluation was conducted based on factors such as collision severity, type of collision, primary collision factor, lighting, weather and time of the day. **Figure 6** illustrates all the injury collisions that have occurred in the City of Pinole from 1/1/2015 to 12/31/2019.



Figure 6. Injury Collisions in the City of Pinole (2015-2019)



Data Collection

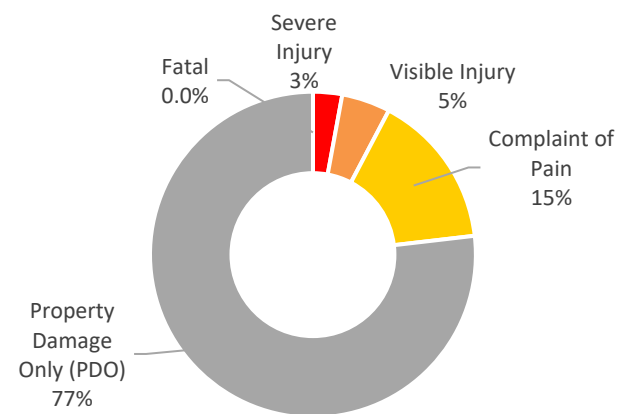
Collision data helps understand different factors that might be influencing collision patterns and various factors leading to collisions in a given area. For the purpose of this analysis, a five-year jurisdiction-wide collision data, from 2015 to 2019 was retrieved from Transportation Injury Mapping System (TIMS) and Statewide Integrated Traffic Records System (SWITRS). Collisions that occurred on state routes were excluded for this analysis. The collision data was analyzed and plotted in ArcMap to identify high-risk intersections and roadways segments.

Collision Data Analysis Results

COLLISION ANALYSIS BY SEVERITY

There were a total of 311 collisions reported City-wide from 2015 to 2019. Out of these, 239 collisions (77 percent) were PDO collisions, 48 collisions (15 percent) led to complaint of pain injury and 15 collisions (5 percent) led to a visible injury. There were 9 F+SI (fatal and severe injury) collisions, 9 collisions (3 percent) led to a severe injury and 0 collisions led to a fatality. **Figure 7** illustrates the classification of all collisions based on severity.

Figure 7. Collisions by Severity (2015-2019)



The analysis first includes a comparative evaluation between all collisions and F+SI collisions, based on various factors including but not limited to the collision trend, primary collision factor, collision type, facility type, motor vehicle involved with, weather, lighting, and time of the day. Further on, a comprehensive analysis is conducted for only F+SI collisions. F+SI collisions cause the most damage to those affected, infrastructure and the aftermath of these collisions lead to great expenses for jurisdiction administration. The LRSP process thus focuses on these collision locations to proactively identify and counter their respective safety issues.

The collision data was segregated by facility type, i.e. based on collisions occurring on intersections and roadway segments. For the purposes of the analysis, a collision was designated to have occurred at an intersection if it occurred within 250 feet of it. The reported collisions categorized by facility type and collision severity are presented in **Table**



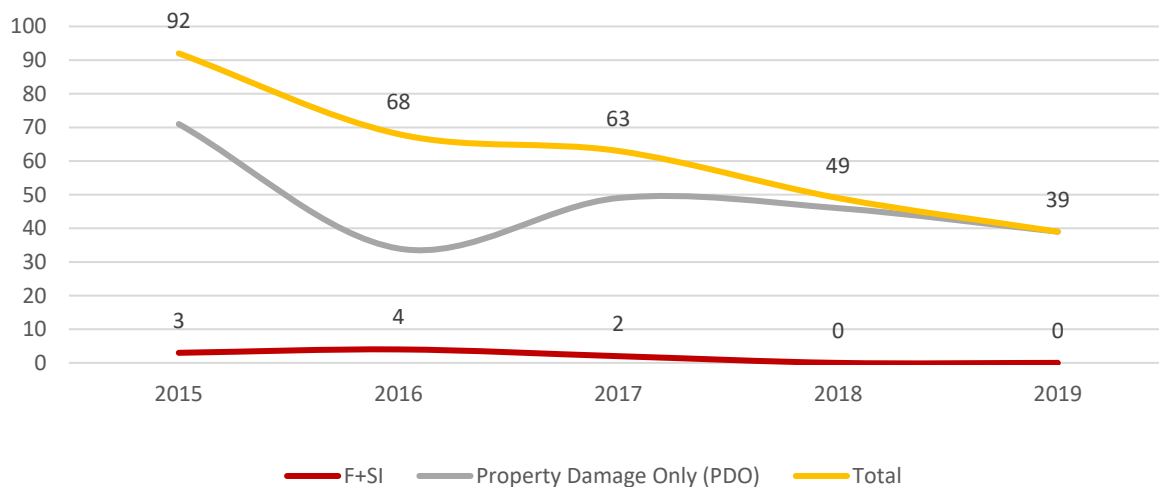
Table 2. Collisions by Severity and Facility Type

Collision Severity	Roadway Segment	Intersection	Total
Fatal	0	0	0
Severe Injury	3	6	9
Visible Injury	4	11	15
Complaint of Pain	6	42	48
Property Damage Only (PDO)	36	203	239
Total	49	262	311

TREND

For all collisions, the number of reported collisions decreased from 2015 to 2019. The highest number of collisions (92 collisions) were observed in 2015 and the lowest number of collisions (39) were observed in 2019. A total of 9 F+SI (fatal and severe injury) collisions occurred in the City of Pinole during the study period. They were observed to be the lowest (0 collision) in 2018 and 2019, and the highest in 2016 (4 collisions). **Figure 8** illustrates the five-year collision trend for all collisions, F+SI (fatal and severe injury) collisions and also PDO collisions.

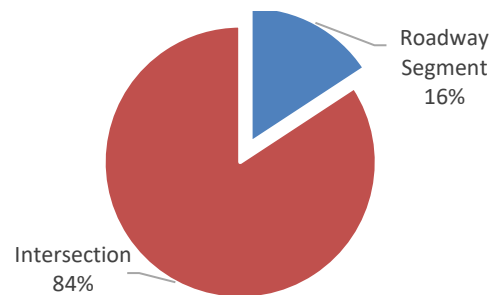
Figure 8. Five Year Collision Trend



ROADWAY SEGMENT VS. INTERSECTION

When evaluating the roadway geometry, it was observed that the majority of collisions occurred at intersections. In the City of Pinole, 84% of all collisions (262 collisions) occurred at intersections whereas 16% (49 collisions) occurred on roadway segments. This classification by facility type can be observed in **Figure 9**.

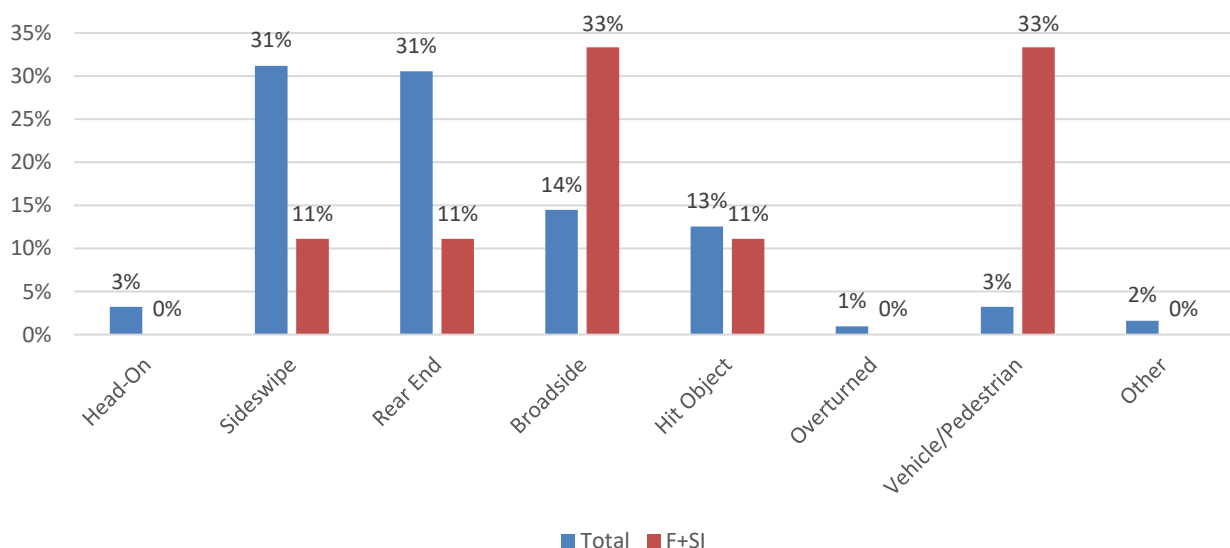
Figure 9. Intersection vs Roadway Collisions – All Collisions



COLLISION TYPE

Considering all collisions, the most commonly occurring collision type was rear end collisions (31 percent), and sideswipe collisions (31 percent). The collision type for F+SI collisions are noticeably different. For F+SI (fatal and severe injury) collisions, the most commonly occurring collision type was vehicle/pedestrian collisions (33 percent) and broadside (or T-bone) collisions (33%) in which the side of one vehicle is hit by the front or back of another vehicle. **Figure 10** illustrates the collision type for all collisions as well as F+SI (fatal and severe injury) collisions.

Figure 10. Collision Type – All Collisions vs. F+SI Collisions

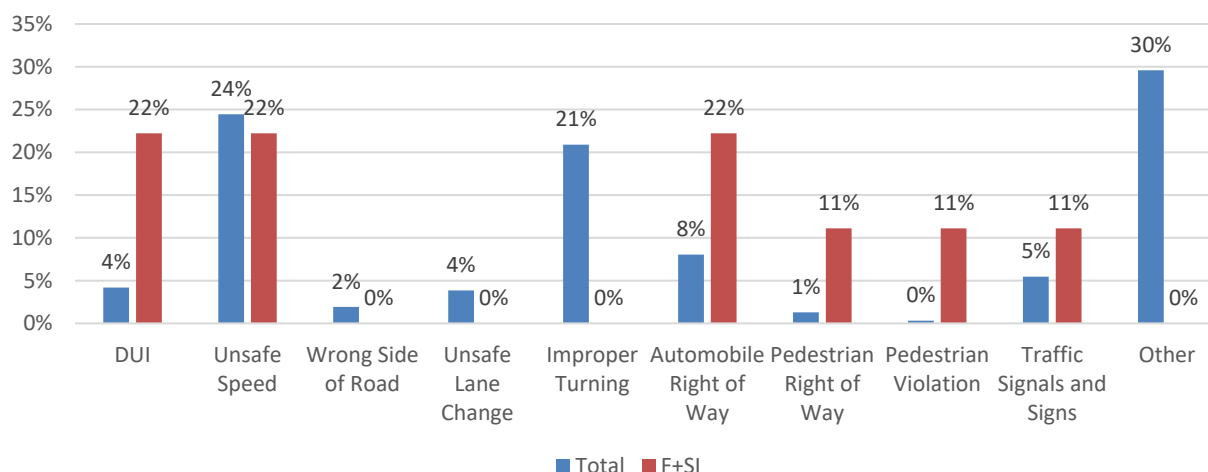


PRIMARY COLLISION FACTOR

Considering all collisions, the most common violation category was observed to be unsafe speed (24 percent) and improper turning collisions (21 percent). For F+SI (fatal and severe injury) collisions automobile right of way (22 percent), unsafe speed (22 percent) and driving under influence (22 percent) was observed to be the violation categories. **Figure 11** illustrates the violation category for all collisions and F+SI (fatal and severe injury) collisions.



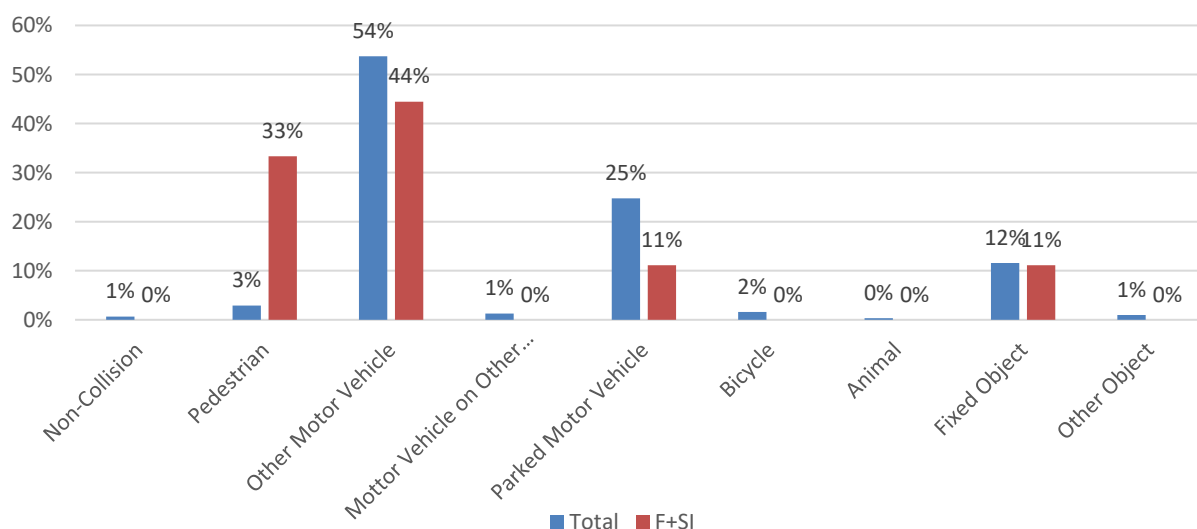
Figure 11. Violation Categories: All Collisions vs. F+SI Collisions



MOTOR-VEHICLE INVOLVED WITH

Considering all collisions, 54 percent of the collisions occurred between two motor vehicles. The remaining collisions include motor vehicle involved with parked vehicles (25 percent) and fixed object (12 percent). For F+SI (fatal and severe injury) collisions, 44 percent of the collisions involved another motor vehicle, 33 percent involved a pedestrian and 11 percent involved a fixed object/other object. **Figure 12** illustrates the percentage for all collisions as well as F+SI (fatal and severe injury) collisions.

Figure 12. Motor Vehicle Involved with: All Collisions vs. F+SI Collisions



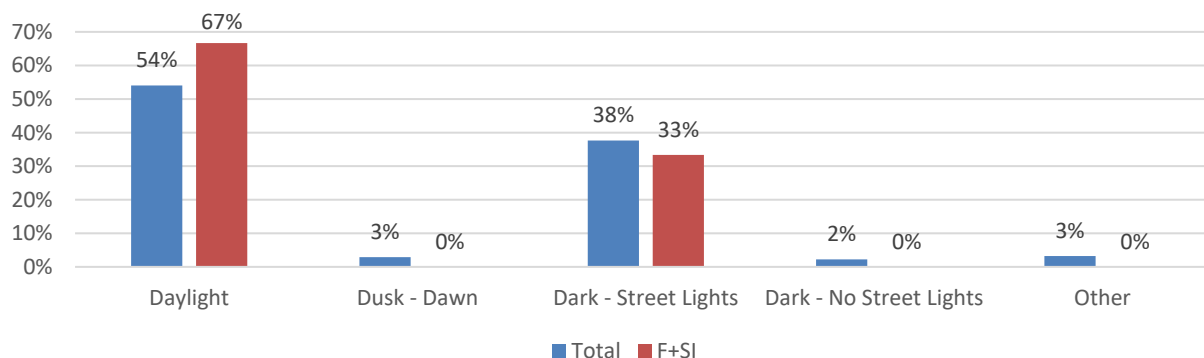
LIGHTING

For collisions of all severity, 54 percent of collisions have occurred in daylight and 38 percent of collisions have occurred in the dark on streets with street lights. For F+SI (fatal and severe injury) collisions, collision lighting conditions follows a similar trend, with 67 percent of collisions having



occurred in daylight and 33 percent of collisions occurred in the dark on streets with street lights. **Figure 13** illustrates the lighting condition for all collisions and F+SI (fatal and severe injury) collisions.

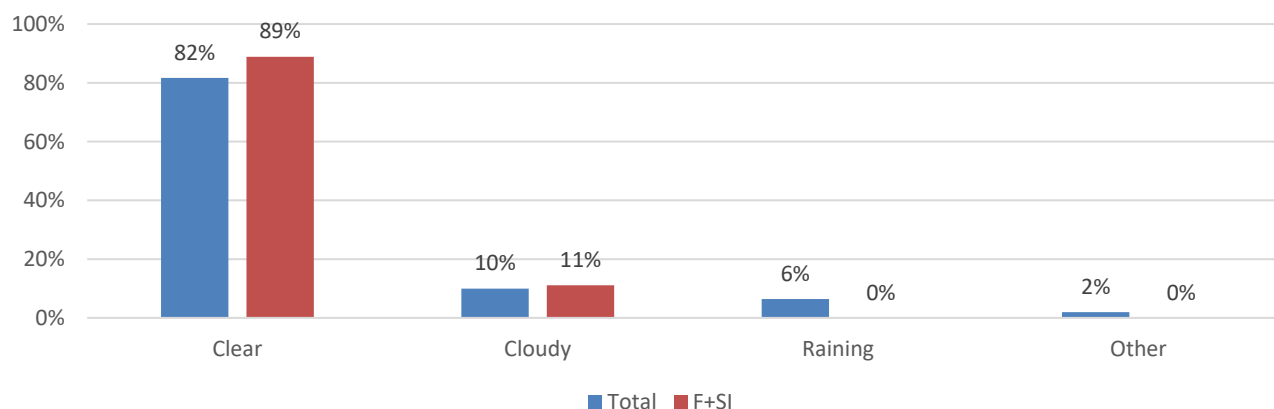
Figure 13. Lighting Conditions: All Collisions vs. F+SI Collisions



WEATHER

For all collisions, 82 percent of the collisions have occurred during clear weather conditions. For F+SI (fatal and severe injury) collisions similar trends have been observed, with 89 percent of the collisions having occurred during clear weather conditions. **Figure 14** illustrates the percentage distribution of weather conditions during occurrence of collisions of all severity as well as F+SI (fatal and severe injury) collisions.

Figure 14. Weather Conditions: All Collisions vs. F+SI Collisions

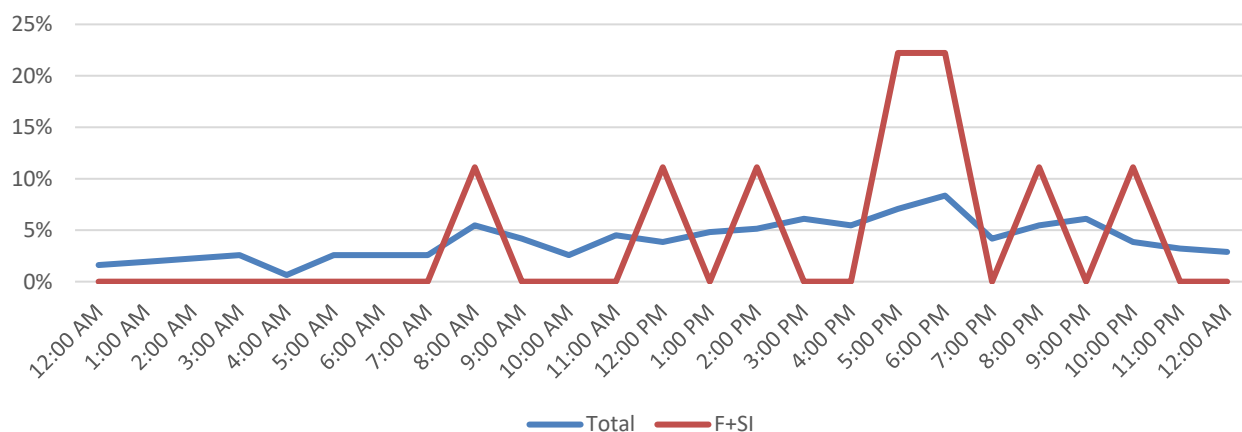


TIME OF THE DAY

For collisions of all severity, maximum number of collisions have occurred between 6:00 p.m. to 7:00 p.m. (8 percent) and the minimum number of collisions have occurred between 4:00 a.m. to 5:00 a.m. (1 percent). For all F+SI (fatal and severe injury) collisions, maximum number of collisions have been observed to occur between 5:00 p.m. to 7:00 p.m. **Figure 15** illustrates the percentage of collisions occurring during the day for all collisions as well as F+SI (fatal and severe injury) collisions.



Figure 15. Time of Day: All Collisions vs. F+SI Collisions



FATAL AND SEVERE INJURY (F+SI) COLLISIONS

This section describes a detailed collision analysis performed for F+SI (fatal and severe injury) collisions occurring at roadway segments and intersections in the City of Pinole. Of the total 9 F+SI (fatal and severe injury) collisions that occurred during the study period, 3 collisions (33 percent) occurred on roadway segments and 6 collisions (67 percent) occurred at intersections. This distribution is illustrated in **Figure 16**.

Figure 16. F+SI Collisions: Roadway Segment vs. Intersection

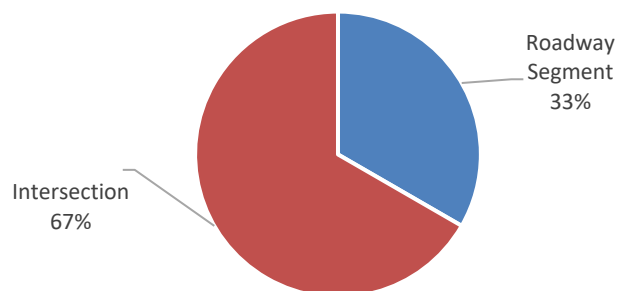
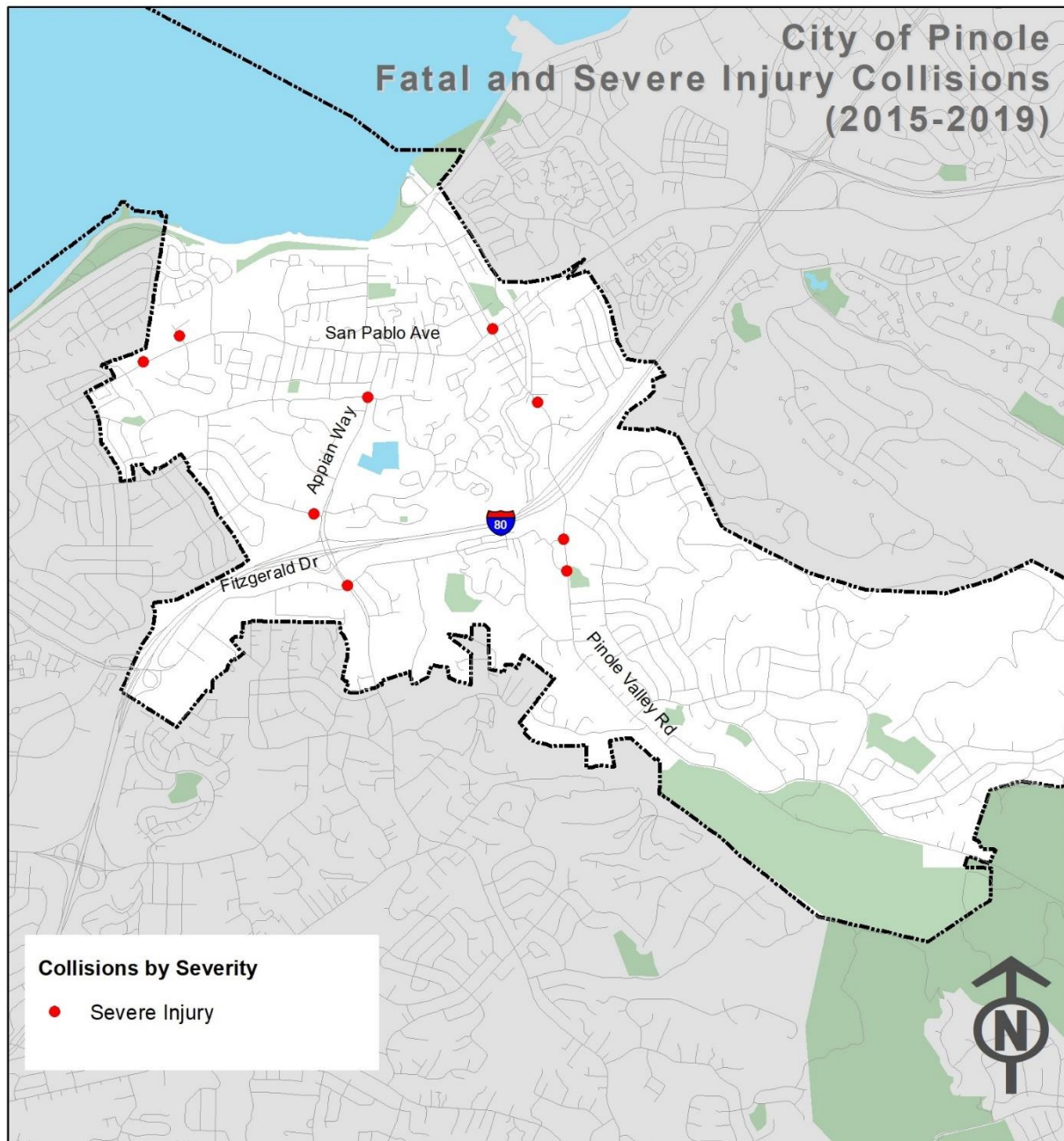


Figure 17 illustrates the F+SI (fatal and severe injury) collisions that occurred in the jurisdiction in the study period.

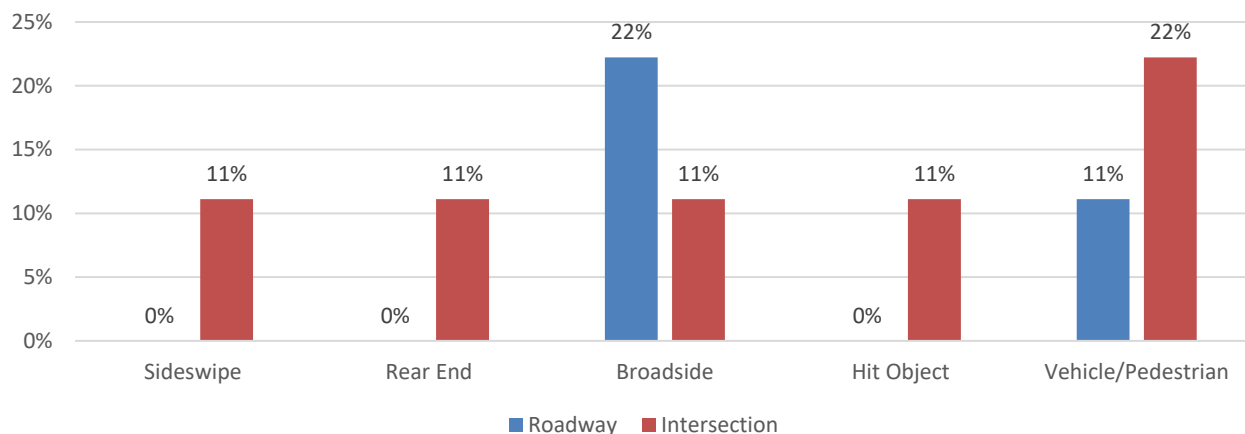
Figure 17. Severe Injury Collisions (2015-2019)



COLLISION TYPE AND LOCATION TYPE

For fatal and severe injury (F+SI) collisions, the most common collision type was broadside and vehicle/pedestrian collisions. Broadside collision types that led to a fatal or severe injury more commonly occurred on roadways, while vehicle/pedestrian collision types that led to a fatal or severe injury more commonly occurred at intersections. **Figure 18** shows fatal and severe injury collisions locations as well as the collision type.

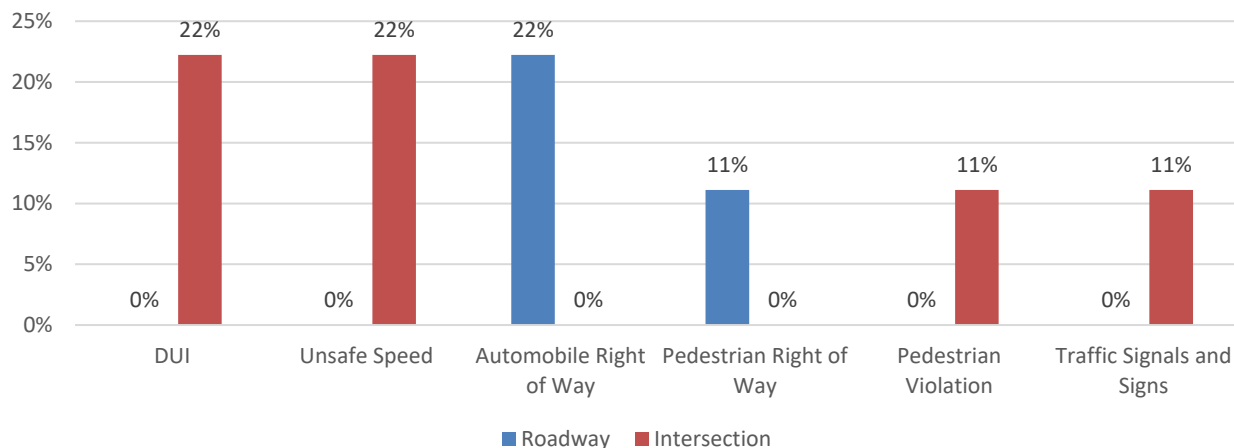
Figure 18. F+SI Collisions: Collision Type vs Location (2015-2019)



VIOLATION CATEGORY AND LOCATION TYPE

For fatal and severe injury (F+SI) collisions, the most common collision type was DUI collisions, unsafe speed collisions and automobile right of way collisions. DUI and unsafe speed F+SI collisions occurred only at intersection and automobile right of way F+SI (fatal and severe injury) collisions occurred only at roadways. **Figure 19** shows fatal and severe injury collisions as well as the location type and violation category.

Figure 19. F+SI Collisions: Collision Type vs Violation Category (2015-2019)

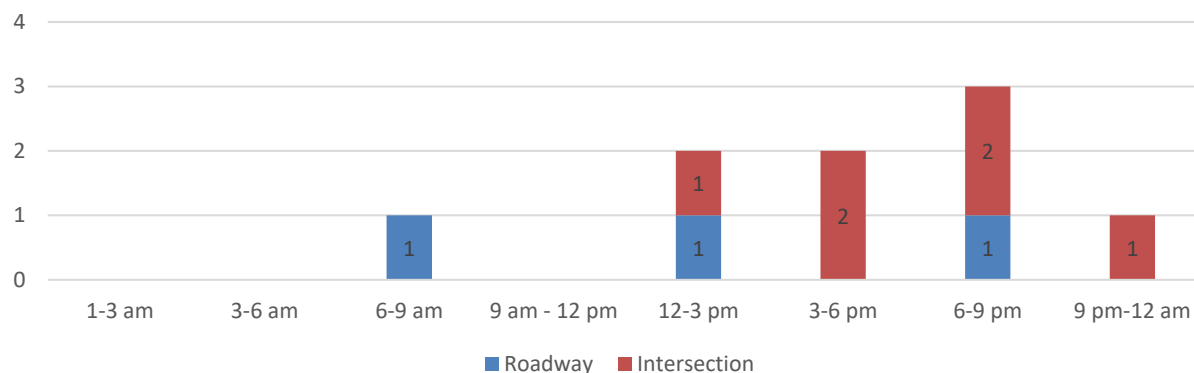


TIME OF DAY AND LOCATION TYPE

For fatal and severe injury (F+SI) collisions, collisions have been observed to occur in the afternoon/evening hours between 3-9 pm. **Figure 20** shows fatal and severe injury collisions as well as the location type and time of day.



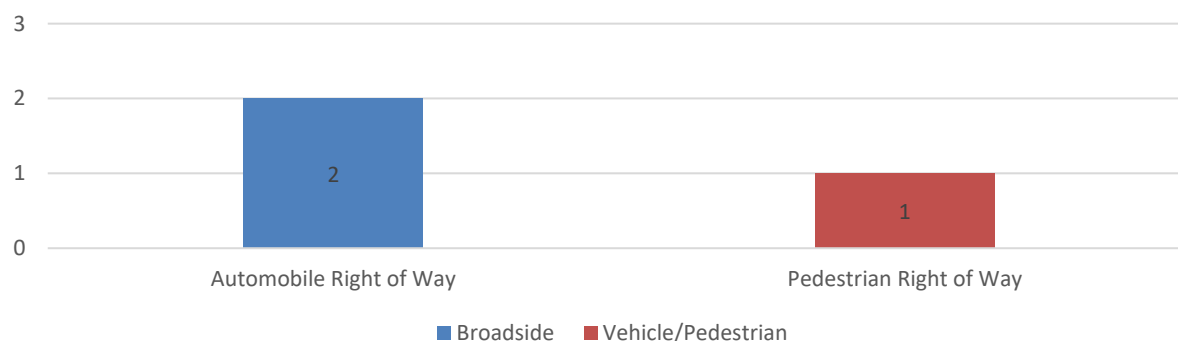
Figure 20. F+SI Collisions: Collision Type vs Severity (2015-2019)



ROADWAY COLLISION TYPE VS PRIMARY COLLISION FACTOR

For roadway fatal and severe injury (F+SI) collisions, the most common primary collision factor automobile right of way collisions, which resulted in 2 fatal and severe collisions. **Figure 21** shows fatal and severe injury collisions as well as the collision type and primary collision factor.

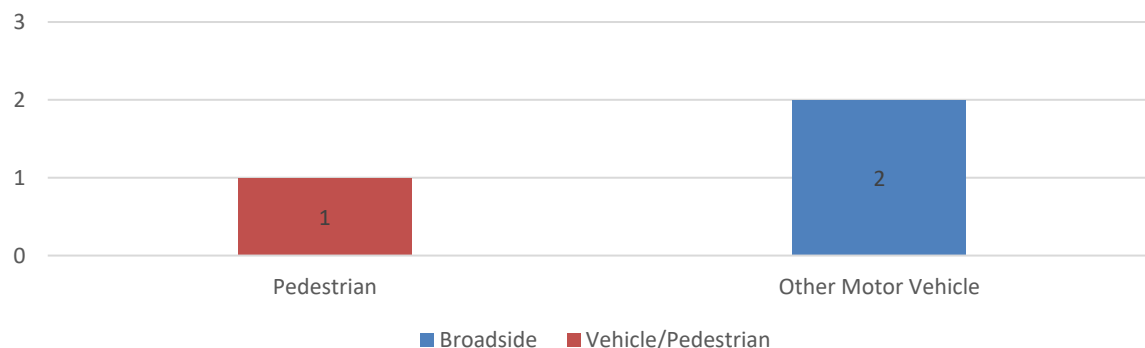
Figure 21. F+SI Roadway Collisions: Collision Type vs Primary Collision Factor (2015-2019)



ROADWAY COLLISION TYPE VS MODE

For roadway fatal and severe injury (F+SI) collisions, the most common collision type was broadside that involved another motor vehicle. **Figure 22** shows fatal and severe injury roadway collision types as well as mode.

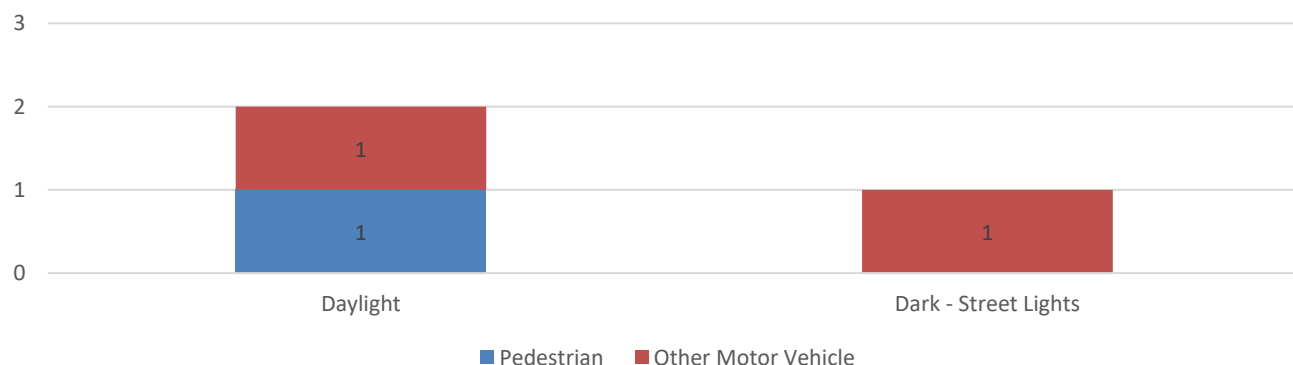
Figure 22. F+SI Roadway Collisions: Collision Type vs Mode (2015-2019)



Roadway Collision Mode vs Lighting

For roadway fatal and severe injury (F+SI) collisions, the most common collision mode was other motor vehicle. **Figure 23** shows fatal and severe injury roadway collision mode as well as lighting conditions.

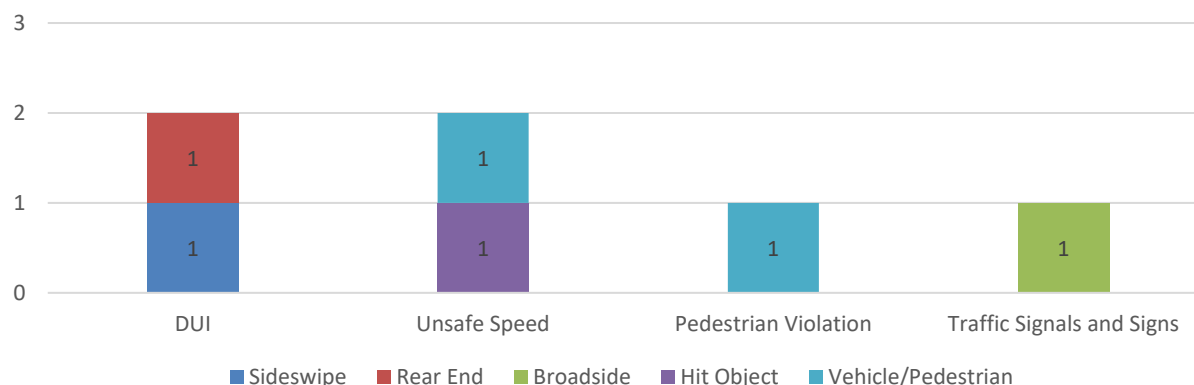
Figure 23. F+SI Roadway Collisions: Collision Mode vs Lighting (2015-2019)



INTERSECTION COLLISION TYPE VS PRIMARY COLLISION FACTOR

For intersection fatal and severe injury (F+SI) collisions, the most common primary collision factor was DUI and unsafe speed, which resulted in 2 fatal and severe collisions each. **Figure 24** shows fatal and severe injury collisions as well as the collision type and primary collision factor.

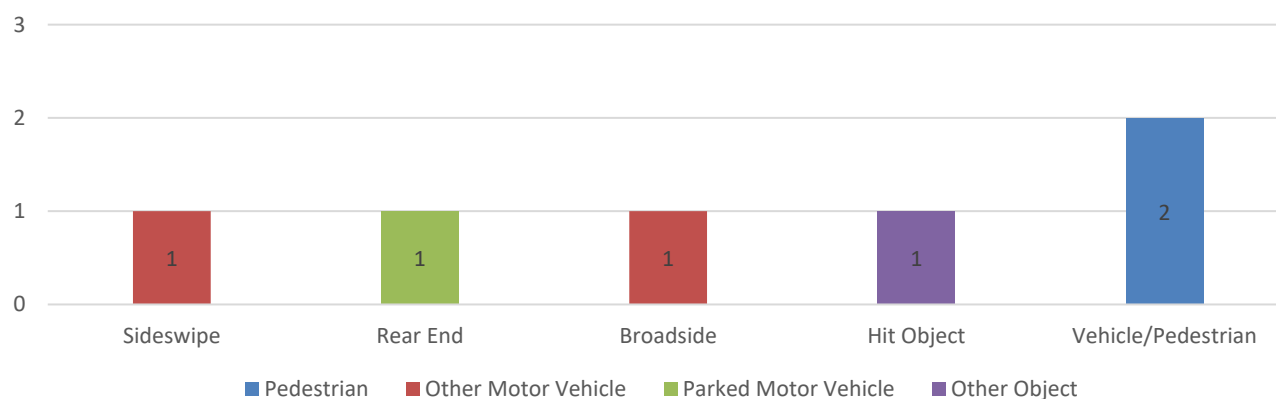
Figure 24. F+SI Intersection Collisions: Collision Type vs Primary Collision Factor (2015-2019)



INTERSECTION COLLISION TYPE VS MODE

For intersection fatal and severe injury (F+SI) collisions, the most common collision type was vehicle/pedestrian collisions. **Figure 25** shows fatal and severe injury collision mode as well as the collision type.

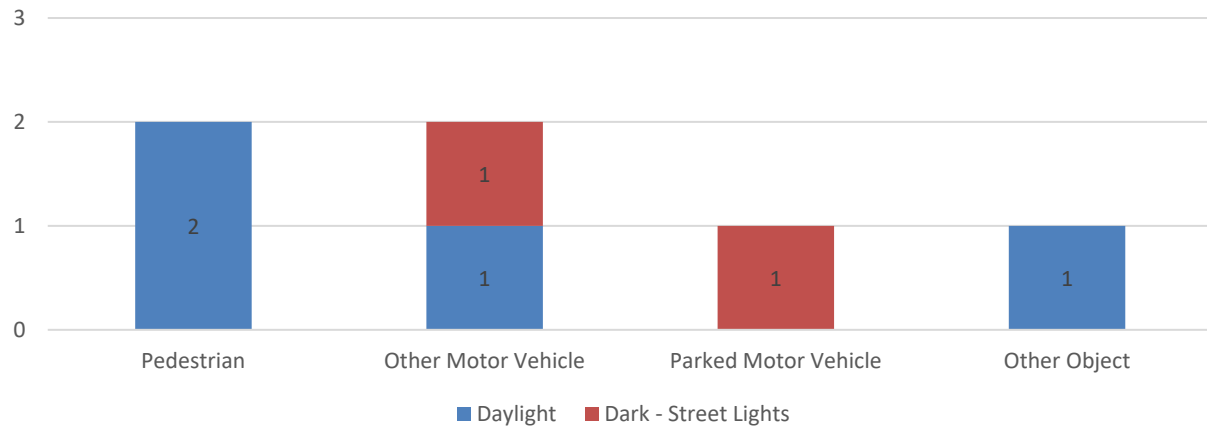
Figure 25. F+SI Intersection Collisions: Collision Type vs Mode (2015-2019)



INTERSECTION COLLISION MODE VS LIGHTING

For intersection fatal and severe injury (F+SI) collisions, the most common collision mode was pedestrians or other motor vehicles. **Figure 26** shows fatal and severe injury collisions mode as well as lighting conditions.

Figure 26. F+SI Intersection Collisions: Collision Mode vs lighting (2015-2019)



GEOGRAPHIC COLLISION ANALYSIS

This section describes a detailed geographic collision analysis performed for injury collisions occurring at roadway segments and intersections in the City of Pinole. The above collision analysis was used to identify four main collision factors that highlight the top trends among collisions in Pinole. These four collision factors were identified to be broadside collisions, pedestrian collisions, unsafe speed collisions and DUI collisions.

Broadside Collisions

Broadside collisions, also known as T-bone collisions, occur when the side of one vehicle is hit by the front or back of another vehicle. For F+SI collisions in the City of Pinole, 33 percent of collisions were broadside collisions. **Figure 27** shows the distribution of broadside collisions throughout the City of Pinole between 2015 and 2019. Appian Way, Pinole Valley Road and San Pablo Avenue have a higher concentration of broadside collisions, compared to other Pinole roads.

Pedestrian Collisions

For F+SI collisions in the City of Pinole, 33 percent of collisions were pedestrian collisions. **Figure 28** shows the distribution of pedestrian collisions throughout the City of Pinole between 2015 and 2019. Fitzgerald Drive, Tennent Avenue and Oak Ridge Road have a higher concentration of pedestrian collisions, compared to other Pinole roads. The Office of Traffic Safety ranked Pinole 91th out of 102 similarly sized cities with high levels of pedestrian collisions (one being the highest, or worst)².

Unsafe Speed Collisions

For F+SI collisions in the City of Pinole, 22 percent of collisions were unsafe speed collisions. **Figure 29** shows the distribution of unsafe speed collisions throughout the City of Pinole between 2015 and 2019. Appian Way, Fitzgerald Drive, and San Pablo Avenue have a higher concentration of unsafe speed collisions, compared to other Pinole roads. The Office of Traffic Safety ranked Pinole 90th out of 102 similarly sized cities with high levels of speed related collisions (one being the highest, or worst)³.

DUI Collisions

For F+SI (fatal and severe injury) collisions in the City of Pinole, 22 percent of collisions were due to driving under the influence (DUI) violations. **Figure 30** shows the distribution of DUI collisions

² California Office of Traffic Safety. (2018). Office of Traffic Safety Rankings 2018. https://www.ots.ca.gov/media-and-research/crash-rankings-results/?wpv-wpcf-year=2018&wpv-wpcf-city_county=Pinole&wpv_filter_submit=Submit

³ California Office of Traffic Safety. (2018). Office of Traffic Safety Rankings 2018. https://www.ots.ca.gov/media-and-research/crash-rankings-results/?wpv-wpcf-year=2018&wpv-wpcf-city_county=Pinole&wpv_filter_submit=Submit



throughout the City of Pinole between 2015 and 2019. San Pablo Avenue, Pinole Valley Road and Sarah Drive have a higher concentration of DUI collisions, compared to other Pinole roads. The Office of Traffic Safety ranked Pinole 78th out of 102 similarly sized cities with high levels of alcohol involved collisions (one being the highest, or worst)⁴.

⁴ California Office of Traffic Safety. (2018). Office of Traffic Safety Rankings 2018. https://www.ots.ca.gov/media-and-research/crash-rankings-results/?wpv-wpcf-year=2018&wpv-wpcf-city_county=Pinole&wpv_filter_submit=Submit



Figure 27. City of Pinole Broadside Collisions (2015-2019)

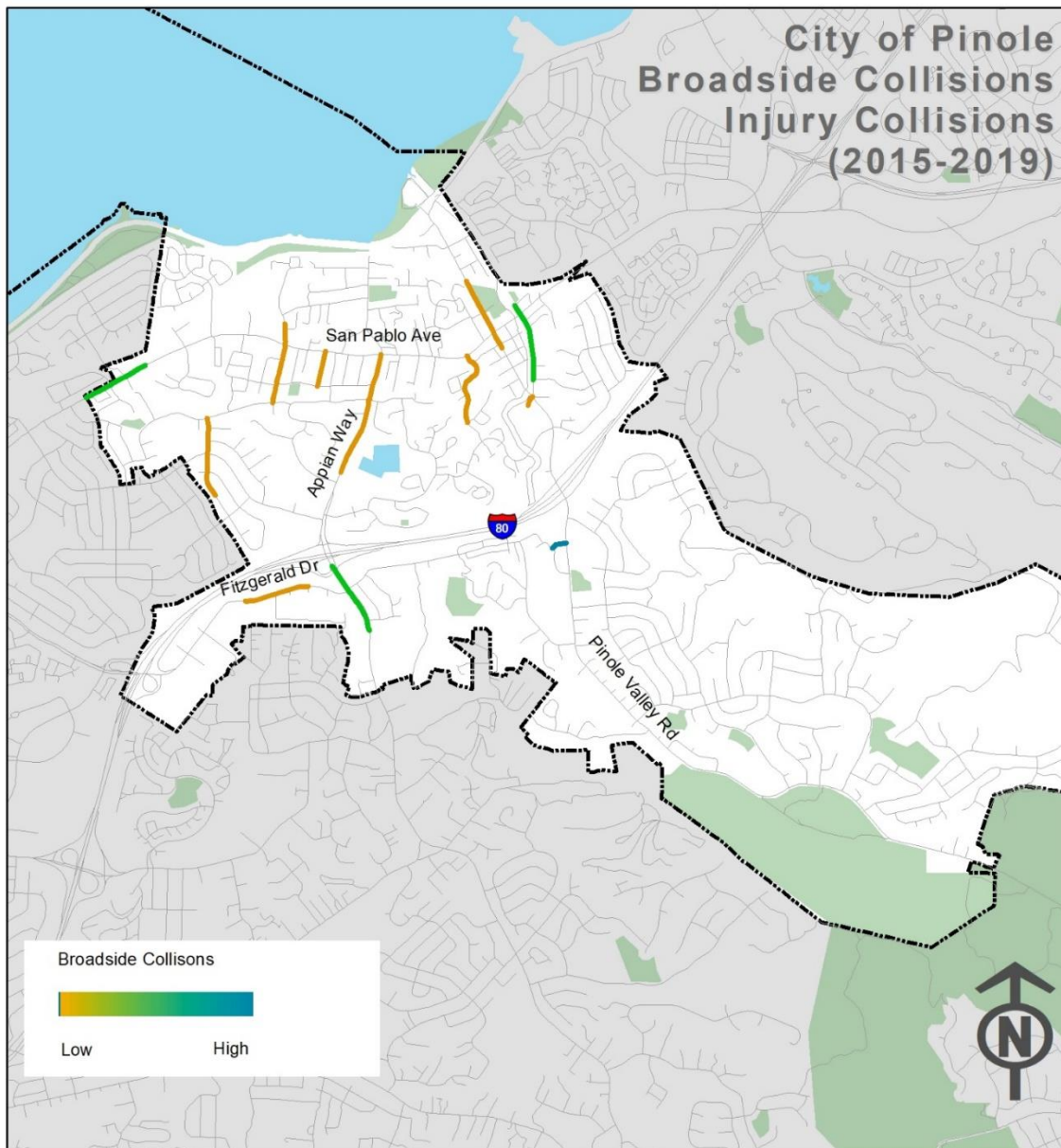


Figure 28. City of Pinole Pedestrian Collisions (2015-2019)

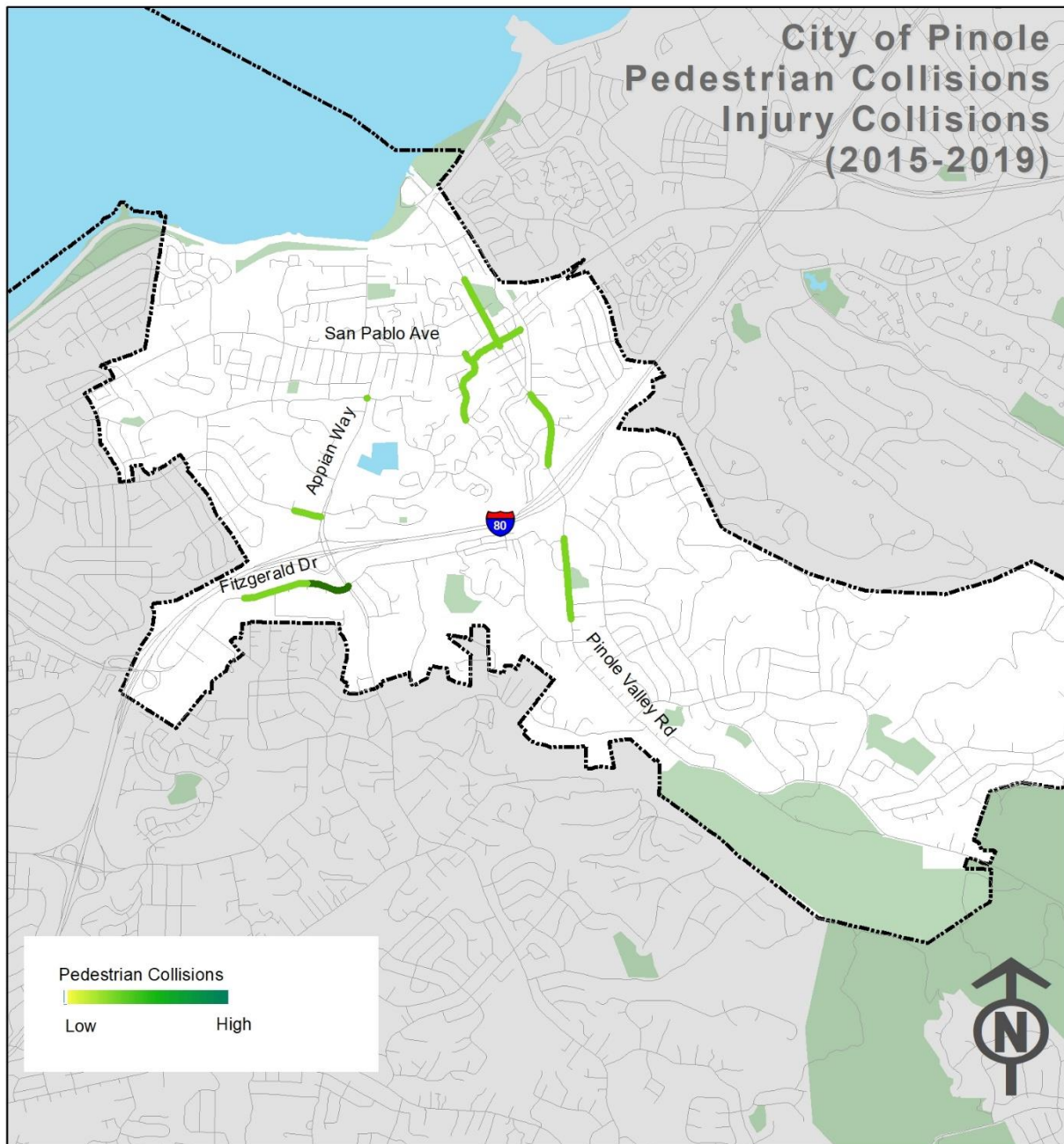


Figure 29. City of Pinole Unsafe Speed Collisions (2015-2019)

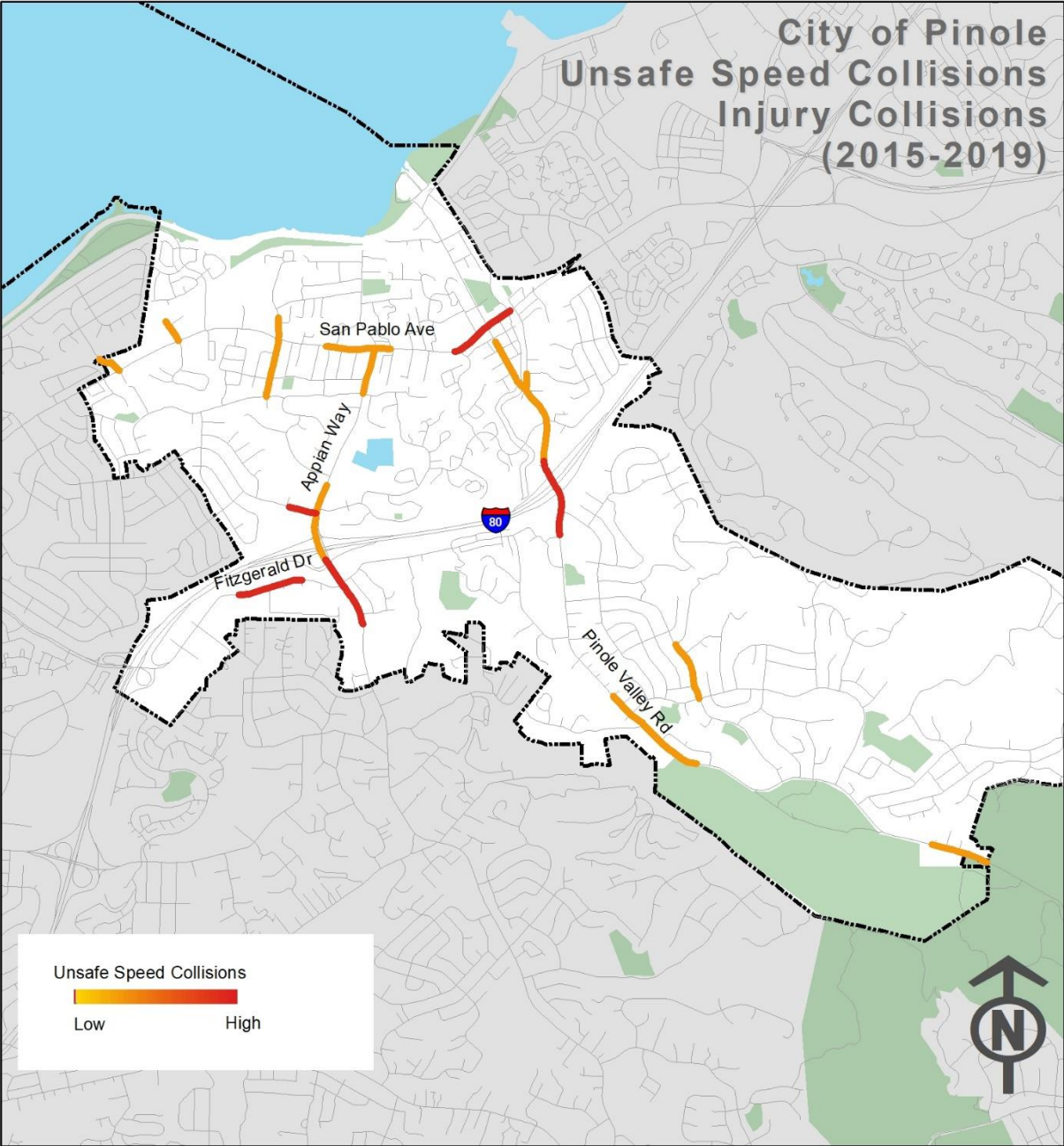
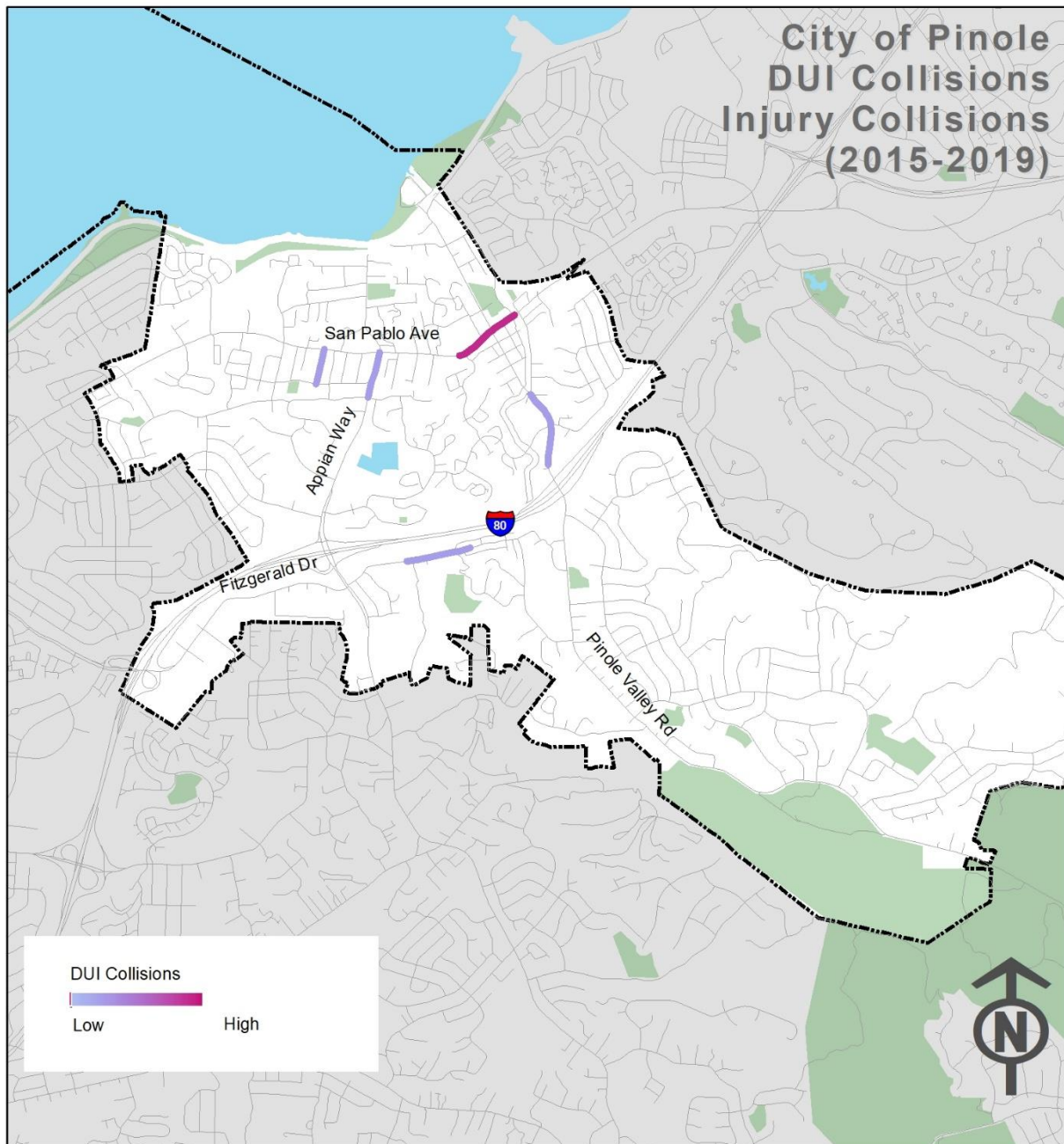


Figure 30. City of Pinole DUI Collisions (2015-2019)



COLLISION SEVERITY WEIGHT

A collision severity weight was used to identify the high severity collision network, using the Equivalent Property Damage Only (EPDO) method. The EPDO method accounts for both the severity and frequency of collisions by converting each collision to an equivalent number of property damage only (PDO) collisions. The EPDO method assigns a crash cost and score to each collision according to the severity of the crash weighted by the comprehensive crash cost. These EPDO scores are calculated using a simplified version of the comprehensive crash costs per HSIP Cycle 11 application. The weights used in the analysis are shown below in **Table 3**. The mentioned EPDO score is derived from the crash costs defined in Table 7-1 of Highway Safety Manual (HSM), First Edition, 2010. The adjusted 2022 dollar amount of crash costs is mentioned in the Appendix D of Caltrans Local Roadway Safety Manual (version 1.6).

Table 3. EPDO Score used in HSIP Cycle 11

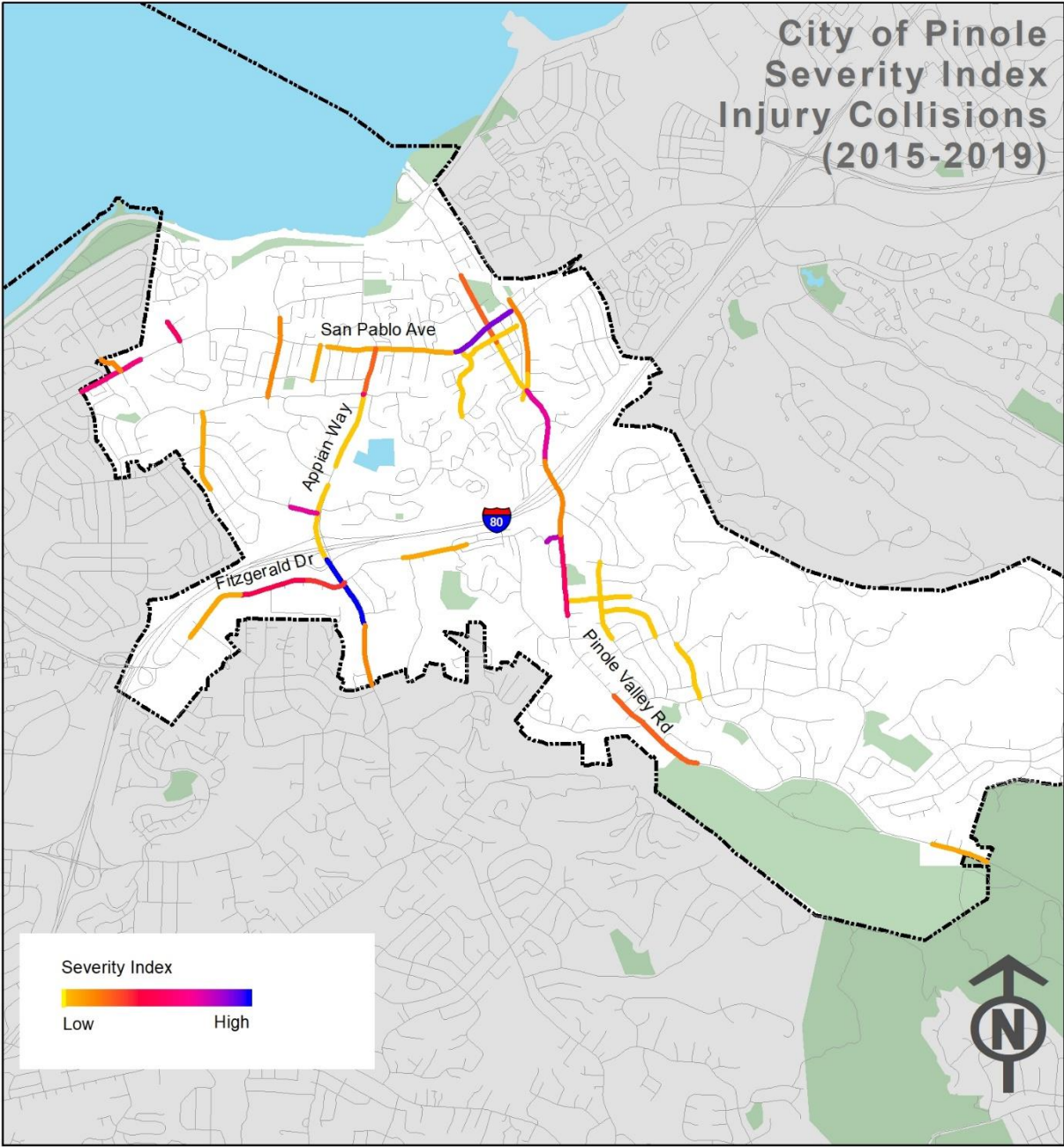
Collision Severity	EPDO Score
Fatal and Severe Injury Combined	165*
Visible Injury	11
Possible Injury	6
PDO	1

*This is the score used in Highway Safety Improvement Program (HSIP) Cycle 11 for collisions on roadways segments, to simplify the analysis this study uses the same score for all F+SI collisions regardless of location.

The EPDO scores for all collisions can then be aggregated in a variety of ways to identify collision patterns, such as location hot-spots. The weighted collisions for the City of Pinole were geolocated onto Pinole's road network. **Figure 31** shows the location and geographic concentration of collisions by their EPDO score.



Figure 31. City of Pinole Severity Index



HIGH INJURY NETWORK

Following the detailed collision analysis, the next step was to identify the high-risk roadway segments and intersections in the City of Pinole. The methodology for scoring the high injury locations is the same method as used in the severity weight section. **Figure 32** shows the top 8 high-collision roadway segments, and top 8 high-collision intersections. This high collision network has a total of 48 injury collisions and 9 F+SI collisions, which represents 65 percent of injury collisions and 100 percent of F+SI collisions in Pinole and only about 6 percent of Pinole's roadway network.

For the purposes of the high collision network analysis, intersections include collisions that occurred within 250 feet of it and roadways include all collisions that occurred along the roadway except for collisions that occurred directly at an intersection, or collisions that are assigned a 0 value in distance from intersection value column in the Statewide Integrated Traffic Records System (SWITRS).

Figure 32. City of Pinole High Injury Network



INTERSECTION RANKING

Eight intersections were identified as high injury intersections. There were a total of 6 F+SI collisions that occurred at these intersections. The intersection of Appian Way and Fitzgerald Drive has the highest EPDO score.

Table 4 lists the EPDO score of the top 8 identified high-collision intersections along with the type of collisions and the number of F+SI collisions that occurred at these locations. The extended list of High Injury Intersections is included in the **Appendix C**.

Table 4. High Injury Intersections

ID	Intersection	Total Collisions	F+SI Collisions	Broadside Collisions	Veh/Ped Collisions	Unsafe Speed Collisions	DUI Collisions	EPDO Score
1	Appian Way and Fitzgerald Dr	7	1	2	1	2	0	201
2	San Pablo Ave and Tennent Ave	4	1	1	1	0	1	193
3	Appian Way and Canyon Dr and Tara Hills	4	1	0	1	2	0	183
4	Appian Way and Marlesta Rd	3	1	2	1	0	0	177
5	Pinole Valley Rd/ Tennent Ave and Ellerhorst St	3	1	1	0	0	1	177
6	Walter Ave and San Pablo Ave	1	1	0	0	1	0	165
7	Fitzgerald Dr and Best Buy Parking Lot	2	0	0	1	0	0	17
8	San Pablo Ave and Del Monte	2	0	0	0	1	0	12



ROADWAY SEGMENT RANKING

Eight corridors were identified as high injury corridors. There was a total 7 F+SI collisions on these corridors. The corridor with the highest amount of F+SI collisions is Pinole Valley Road with 3 F+SI collisions.

Table 5 lists the collision rate of the top eight identified high-collision corridors along with the number of F+SI collisions and total collisions.

Table 5. High Injury Corridors

ID	Corridors	Total	F+SI	Broadside	Veh/ Ped	Unsafe Speed	DUI	Length (miles)	EPDO Score
Collisions									
A	Pinole Valley Rd: San Pablo Ave to Collins Ave	10	3	3	1	4	1	1.9	547
B	San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd	7	1	0	0	2	3	0.3	211
C	San Pablo Ave: Golden Gate Park to Del Monte Dr	3	1	2	0	1	0	0.3	177
D	Tara Hills: Kilkenny Way to Appian Way	2	1	0	1	2	0	0.3	171
E	Walter Ave: North Terminus to San Pablo Ave	1	1	0	0	1	0	0.1	165
F	Fitzgerald Dr: Jovita Ln to Appian Way	7	0	0	2	0	0	0.6	52
G	Appian Way: San Pablo Ave to Michael Dr	6	0	1	0	4	0	1.0	36
H	Tennent Ave: Buena Vista Dr to Plum St	1	0	1	0	0	0	0.3	11



Summary

For F+SI collisions in the City of Pinole, 33 percent of collisions were broadside collisions. This calls for evaluating broadside collisions along the high injury network and other locations throughout the City with similar characteristics. Improvements at these location may consist of improved signal hardware/larger signal heads, provide protected left turn phase, convert signal to mast arm (from pedestal-mounted), raised medians at the approach to intersections and others.

For F+SI collisions in the City of Pinole, 33 percent of collisions were pedestrian collisions. This calls for evaluating pedestrian conditions along the high injury network and throughout the City with similar characteristics that are highly unsafe for pedestrians. Improvements at these locations can include reducing pedestrian crossing distances, installing high visibility crosswalks, installing pedestrian refuge islands, installing RRFBs (rectangular rapid flashing beacons), and installing bulb outs.

In addition, TJKM also evaluated collisions near Railroad Avenue and at the rail-grade crossing. These collision reports were provided by City of Pinole Police Department. Based on report description, it is recommended for City to team up with applicable railroad operator agency to identify the countermeasures for the collisions on or near railroad. The Intersection of Tennent Avenue and Railroad Avenue is near the railroad crossing. The City has secured funding to complete preliminary engineering and design to improve the crossing conditions at the Tennent Avenue and railroad crossing which includes new flashlight signal assembly, improving pavement markings, adding rolled curbs and paved sidewalks.

The next steps include identifying strategies corresponding to the 4 Es of safety (Engineering, Enforcement, Education and EMS) to comprehensively make the roadways of the City of Pinole safer for all modes of transportation.

5. EMPHASIS AREAS

Emphasis areas are focus areas for the LRSP that are identified through the comprehensive collision analysis of the identified high injury locations within Pinole. Emphasis areas help in identifying appropriate safety strategies and countermeasures with the greatest potential to reduce collisions occurring at the high injury locations. They can include (but not be limited to): specific collision types, human behaviors, facility types, and specific locations or corridors.

This chapter summarizes the top six emphasis areas identified for Pinole. These emphasis areas were derived from the consolidated high injury collision database (**Appendix D**) where top injury factors were identified by combing the data manually. The high injury collision database contains only collisions occurring at the high injury intersections or along the high injury corridors. Along with findings from the data analysis, stakeholder input was also considered to refine the emphasis areas specific to Pinole.

The following are the identified emphasis areas –

- Improve Intersection Safety
- Reduce Nighttime Collisions
- Reduce Unsafe Speed Collisions
- Reduce Broadside Collisions
- Reduce Automobile Right-of-Way Violations
- Improve Pedestrian Safety

The 4 E's of Traffic Safety

LRSP utilizes a comprehensive approach to safety incorporating “4 E’s of traffic safety”: **E**ngineering, **E**nforcement, **E**ducation and **E**mergency Medical Services (EMS). This approach recognizes that not all locations can be addressed solely by infrastructure improvements.

Some of the common violation types that may require a comprehensive approach are speeding, failure-to-yield to pedestrians, red light running, aggressive driving, failure to wear safety belts, distracted driving, and driving while impaired. When locations are identified as having these types of violations, coordination with the appropriate law enforcement agencies is needed to arrange visible targeted enforcement to reduce the potential for future driving violations and related crashes and injuries.

To improve safety, education efforts can also be used to supplement enforcement. Additionally, education efforts can supplement enforcement to improve the efficiency of each. Education can also be employed in the short-term to address the most pertinent violations and high-risk locations until the recommended infrastructure project can be implemented, addressed under Engineering improvements and countermeasures. Similarly, Emergency Medical Services entails



strategies around supporting organizations that provide rapid response and care when responding to collisions causing injury, by stabilizing victims and transporting them to facilities.

Existing Traffic Safety Efforts in the City of Pinole

The City of Pinole has established programs and initiatives implementing safety strategies corresponding to the 4 E's of traffic safety. The strategies detailed in this memorandum can supplement these existing programs and concentrate on high injury collision locations and crash types. These initiatives are summarized in **Table 6** below.

Table 6. Existing Programs Summary

Program/Document	Description	E's Addressed
City of Pinole Neighborhood Traffic Calming Policy (2008)	The objective of the City of Pinole Neighborhood Traffic Calming Policy is to improve the livability of our neighborhoods and to minimize adverse impacts of vehicular traffic on residential and pedestrian safety streets through a system of education, enforcement, and engineering.	Education, Enforcement, Engineering
Old Town Pinole Parking & Pedestrian Safety Study	The safety element of this document contains recommendations for pedestrian safety improvements within Old Town Pinole.	Engineering
Contra Costa Countywide Bike and Pedestrian Plan (2018)	Details bicycle and pedestrian improvements on County significant corridors. Includes many detailed priority bike and pedestrian projects	Engineering
Contra Costa County Vision Zero	The County is in the process of developing a Plan to address severe and fatal collisions on County-owned roadways. The implementation strategy will include engineering, education, and/or enforcement measures	Engineering, Education, Enforcement, EMS
City of Pinole Police Department	The City of Pinole Police Department strives to enforce traffic laws throughout Pinole by concentrating on roads with the highest violations.	Enforcement
City of Pinole Traffic and Pedestrian Safety Commission	The Traffic & Pedestrian Safety Commission (TAPS) is dedicated to protecting the citizens and pedestrians of Pinole. Discussions are encouraged regarding a multimodal transportation plan as several other cities in the county have adopted a similar plan to help secure grants for pedestrian safety and improved transportation.	Engineering, Education,



Factors Considered in the Determination of Emphasis Areas

This section presents collision data analysis of collision type, collision factors, facility type, roadway geometries, and party level data, analyzed for the various emphasized areas. Emphasis areas were determined by factors that led to the highest amount of injury collisions, with a specific emphasis on F+SI injury collisions. Pinole experienced a total of 47 collisions at high injury network locations during the 2015-2019 study period, including nine F+SI collisions. The data presented below in each emphasis area is based on these collisions.

Each emphasis area is accompanied by comprehensive programs, policies and countermeasures to reduce collisions on City roads in that specific emphasis area. It will provide the basis by which the countermeasure toolbox is developed for each identified high-risk location.

Note: Engineering countermeasures are based on the Caltrans LRSM and are used in HSIP calls for projects. They are categorized as follows:

- S = Signalized Intersections Countermeasures
- NS = Non-Signalized Intersections Countermeasures
- R = Roadway Segments Countermeasures

An excerpt of the Caltrans LRSM providing additional details on each countermeasure is included in **Appendix E**.



EMPHASIS AREA 1 – INTERSECTION SAFETY

The City of Pinole experienced a total 47 reported injury collisions on the high injury network. 35 (74 percent) of these collisions occurred at intersections, including 6 fatal and severe injury (F+SI) collisions. The following collision data is based on only intersection injury collisions that occurred on the high injury network in the City of Pinole, followed by strategies to make these locations safer (**Table 7**).

33% 43% 31%
Fatal and Severe Injury Unsafe speed collisions Rear end collisions
involved a pedestrian

Table 7. Emphasis Area 1 Strategies

Objective: To reduce the number of fatal and severe injury collisions at intersections.			
	Strategies	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for intersection safety laws regarding traffic signals, stop signs, and turning left or right.	Number of education campaigns	City/ School District/ Police Department
Enforcement	Targeted enforcement at high-risk intersections to monitor traffic law violations right-of-way violations, speed limit laws and other violations that occur at intersections.	Number of tickets issued.	Police Department
Engineering	- S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number - S03, Improve signal timing (coordination, phases, red, yellow, or operation) - S08, Convert signal to mast arm (from pedestal-mounted) - S09, Install raised pavement markers and striping (Through Intersection) - NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs - NS07, Upgrade intersection pavement markings (NS.I.)	Number of intersections improved.	City
EMS	S05, Install emergency vehicle pre-emption systems	EMS vehicle response time.	City/ Health Department



EMPHASIS AREA 2 – NIGHTTIME COLLISIONS

The City of Pinole experienced a total 47 reported injury collisions on the high injury network. 18 (38 percent) of these collisions occurred at nighttime, including 3 fatal and severe injury (F+SI) collisions. The following collision data is based on only nighttime injury collisions that occurred on the high injury network in the City of Pinole, followed by strategies to make these locations safer (**Table 8**).

66%

**Fatal and Severe Injury
were DUI collisions**

28%

**Automobile right of way
collisions**

22%

Hit object collisions

Table 8. Emphasis Area 2 Strategies

Objective: To reduce the number of fatal and severe injury collisions that occur at nighttime			
Strategies		Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for safety laws regarding and the larger risk of collisions during the nighttime.	Number of outreach events and safety campaigns.	City/ School District/ Police Department
Enforcement	Targeted enforcement at high-risk locations to monitor collisions that occur at nighttime.	Number of citations issued	Police Department
Engineering	- S01, Add intersection lighting - S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size and number - S10, Install flashing beacon as warning - NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs - R01, Add segment lighting - R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) - R27, Install delineators, reflectors and/or object markers - R26, Install dynamic/ variable speed warning signs - R27, Install delineators, reflectors and/or object markers	Number of locations improved.	City
EMS	Improve resource deployment for emergency responses at collision sites.	EMS vehicle response time.	City/ Health Department



EMPHASIS AREA 3 – UNSAFE SPEED COLLISIONS

The City of Pinole experienced a total 47 reported injury collisions on the high injury network. 15 (47 percent) of these collisions were unsafe speed collisions, including 2 fatal and severe injury (F+SI) collisions. The following are major findings based on unsafe speed injury collisions that occurred on the high injury network in the City of Pinole followed by strategies to make these locations safer (Table 9).



Table 9. Emphasis Area 3 Strategies

Objective: Reduce the number of fatal and severe injury collisions that are a result of unsafe speed.			
	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for safety laws regarding unsafe speed and its dangers.	Number of education campaigns	City/ School District/ Police Department
Enforcement	Targeted enforcement at high-risk locations to monitor unsafe speed.	Number of tickets issued.	Police Department
Engineering	• S16/NS04/NS05, Convert intersection to roundabout • NS07, Upgrade intersection pavement markings (NS.I.) • R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) • R27, Install delineators, reflectors and/or object markers • R26, Install dynamic/ variable speed warning signs • R28, Install edge-lines and centerlines • R36PB, Install/upgrade pedestrian crossing (with enhanced safety features) • Decrease width of travel lanes. • Simplify turn configurations. • Decrease curb radius of intersections.	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems	EMS vehicle response time.	City/ Health Department



EMPHASIS AREA 4 – BROADSIDE COLLISIONS

The City of Pinole experienced a total 47 reported injury collisions on the high injury network. 11 (23 percent) of these collisions were broadside collisions, including 3 fatal and severe injury (F+SI) collisions. The following collision data is based on only broadside injury collisions that occurred on the high injury network in the City of Pinole, followed by strategies to make these locations safer (Table 10).

64%

Automobile right of way collisions

64%

Occurred at an intersection

27%

Occurred on Pinole Valley Rd

Table 10. Emphasis Area 4 Strategies

Objective: To reduce the number of fatal and severe injury broadside collisions.			
	Strategies	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for intersection safety laws regarding traffic lights, stop signs, and turning left or right.	Number of education campaigns	City/ School District/ Police Department
Enforcement	Targeted enforcement at high-risk locations.	Number of citations and/or warnings issued.	Police Department
Engineering	- S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number - S03, Improve signal timing (coordination, phases, red, yellow, or operation) - S08, Convert signal to mast arm (from pedestal-mounted) - S09, Install raised pavement markers and striping (Through Intersection) - S16/NS04/NS05, Convert intersection to roundabout - NS02, Convert to all-way STOP control (from 2-way or Yield control) - NS03, Install signals - NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs - NS07, Upgrade intersection pavement markings (NS.I.) - NS08, Install flashing beacons at stop controlled intersections	Number of locations improved to mitigate night-time collisions.	City
EMS	Improve resource of deployment for emergency responses to collision sites.	EMS vehicle response time at night.	City/ Health Department



EMPHASIS AREA 5 – AUTOMOBILE RIGHT OF WAY COLLISIONS

The City of Pinole experienced a total 47 reported injury collisions on the high injury network. 10 (21 percent) of these collisions were automobile right of way violations, including 2 fatal and severe injury (F+SI) collisions. The following collision data is based on only automobile right of way injury collisions that occurred on the high injury network in the City of Pinole, followed by strategies to make these locations safer (**Table 11**).

80%

**Involved another
motor vehicle**

35%

Broadside collisions

30%

**Occurred on Fitzgerald
Drive**

Table 11. Emphasis Area 5 Strategies

Objective: To reduce the number of automobile right of way collisions.			
Strategies		Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for intersection safety laws regarding traffic lights, stop signs, and turning left or right.	Number of education campaigns.	City/ School District/ Police Department
Enforcement	Targeted enforcement at locations with most automobile right of way collisions.	Number of citations issued	Police Department
Engineering	- S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number - S03, Improve signal timing (coordination, phases, red, yellow, or operation) - S08, Convert signal to mast arm (from pedestal-mounted) - S09, Install raised pavement markers and striping (Through Intersection) - S16/NS04/NS05, Convert intersection to roundabout - NS02, Convert to all-way STOP control (from 2-way or Yield control) - NS03, Install signals - NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs - NS07, Upgrade intersection pavement markings (NS.I.) - NS08, Install flashing beacons at stop controlled intersections - NS11, Improve sight distance to intersection (Clear Sight Triangles)	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems	EMS vehicle response time.	City/ Health Department



EMPHASIS AREA 6 – PEDESTRIAN COLLISIONS

The City of Pinole experienced a total 47 reported injury collisions on the high injury network. 7 (15 percent) of these collisions were pedestrian collisions, including 3 fatal and severe injury (F+SI) collisions. The following collision data is based on only pedestrian injury collisions that occurred on the high injury network in the City of Pinole, followed by strategies to make these locations safer (Table 12).



Table 12. Emphasis Area 6 Strategies

Objective: To reduce the number of fatal and severe injury pedestrian collisions			
	Strategies	Performance Measure	Agencies/ Organizations
Education	Conduct pedestrian safety campaigns and outreach to raise their awareness of pedestrian safety needs through media outlets and social media.	Number of education campaigns.	City/ School District/ Police Department
Enforcement	Targeted enforcement at high-risk locations especially near schools and downtown	Number of citations issued.	Police Department
Engineering	- S21PB, Modify signal phasing to implement a Leading Pedestrian Interval (LPI) - NS07, Upgrade intersection pavement markings (NS.I.) - NS19PB, Install raised medians (refuge islands) - NS21PB/R35PB, Install/upgrade pedestrian crossing (with enhanced safety features) - R36PB, Install raised pedestrian crossing - R37PB, Install Rectangular Rapid Flashing Beacons (RRFB) - High-visibility ladder crosswalks - Mid-block curb extension - In-road yield sign for pedestrian crossing at crosswalk - The City should apply for HSIP pedestrian set aside funds every two years	Number of locations improved.	City
EMS	Improve resource deployment for emergency responses at collision sites.	EMS vehicle response time.	City/ Health Department



6. COUNTERMEASURE SELECTION

Identification of Countermeasures

Upon the identification of high-risk locations and Emphasis Areas, the next step was to identify appropriate safety countermeasures. The Caltrans LRSM provides 82 countermeasures, of which 20 are eligible in the current HSIP call for signalized intersections, 24 for un-signalized intersections, and 38 for roadway segments. The LRSM provides guidance on where to apply the countermeasures, including the crash types each countermeasure would address, and a Crash Reduction Factor (CRF) for each countermeasure. The Federal Highway Administration (FHWA) CMF Clearinghouse and published research papers were reviewed by the project team to gain additional insight on CRFs and effectiveness of specific countermeasures.

The project team conducted a thorough review of the high-injury locations (intersections and roadway segments) using aerial photography and Google Maps Street View software. Crash characteristics of all collisions occurring on the High Injury Network were considered. After combining the physical and collision characteristics, the project team developed a table of preliminary countermeasures that address each of the six identified Emphasis Areas. The table was refined by selecting up to six countermeasures for each high-risk location that were most commonly recommended among all Emphasis Areas. By doing this, the project team was able to identify countermeasures with the greatest opportunity for systemic implementation.

Countermeasure Toolbox

Engineering countermeasures were selected for each of the high-risk locations and for the emphasis areas. These were based on approved countermeasures from the Caltrans LRSM used in HSIP grant calls for projects. The intention is to give the City potential countermeasures for each location that can be implemented either in future HSIP calls for projects, or using other funding sources, such as the CIP (Capital Improvement Program). Non-engineering countermeasures were also selected using the four E's strategies, and are included with the emphasis areas. The countermeasure toolbox in **Appendix F** details the draft countermeasures for each high-risk location and emphasis area, separated by intersections and roadway segments. While not all of these countermeasures will be included in the resulting safety projects, they are included to give the City a toolbox for implementing future safety improvements through other means, such as the CIP.

Table 13 provides a description of each countermeasure appropriate for City of Pinole along with the CRF, federal funding eligibility, and opportunity for systemic implementation. An excerpt of the LRSM, detailing each available HSIP countermeasure referenced in the recommendations tables, is included as **Appendix E**.



Table 13. Countermeasures selected for the City of Pinole

Code	Countermeasure Name	Countermeasure Description	CRF	Federal Funding	Systemic Approach Opportunity
S01	Add intersection lighting	Provision of lighting at intersection.	40%	90%	Medium
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	Includes New LED lighting, signal back plates, retro-reflective tape outlining the back plates, or visors to increase signal visibility, larger signal heads, relocation of the signal heads, or additional signal heads.	15%	90%	Very High
S03	Improve signal timing (coordination, phases, red, yellow, or operation)	Includes adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations.	15%	50%	Very High
S07	Provide protected left turn phase (left turn lane already exists)	Left turns are widely recognized as the highest-risk movements at signalized intersections. Providing Protected left-turn phases for signalized intersections with existing left turn pockets significantly improve the safety for left-turn maneuvers by removing the need for the drivers to navigate through gaps in oncoming/opposing through vehicles	30%	90%	High
S09	Install raised pavement markers and striping (Through Intersection)	Adding clear pavement markings can guide motorists through complex intersections. When drivers approach and traverse through complex intersections, drivers may be required to perform unusual or unexpected maneuvers	10%	90%	Very High
S12	Install raised median on approaches (S.I.)	Raised medians next to left turn lanes at intersections offer a cost effective means for reducing crashes and improving operations at higher volume intersections	25%	90%	Medium
S16	Convert intersection to roundabout (from signal)	Signalized intersections that have a significant crash problem and the only alternative is to change the nature of the intersection itself. Roundabouts can also be very effective at intersections with complex geometry and intersections with frequent left-turn movements.	Varies	90%	Low
S20PB	Install advance stop bar before crosswalk (Bicycle Box)	Signalized Intersections with a marked crossing, where significant bicycle and/or pedestrians volumes are known to occur.	15%	90%	Very High
NS01	Add intersection lighting (NS.I.)	Provision of lighting at intersection.	40%	90%	Medium
NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	Additional regulatory and warning signs at or prior to intersections will help enhance the ability of approaching drivers to perceive them.	15%	90%	Very High



Code	Countermeasure Name	Countermeasure Description	CRF	Federal Funding	Systemic Approach Opportunity
NS11	Improve sight distance to intersection (Clear Sight Triangles)	Unsignalized intersections with restricted sight distance and patterns of crashes related to lack of sight distance where sight distance can be improved by clearing roadside obstructions without major reconstruction of the roadway.	20%	90%	High
NS15	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)	Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection.	50%	90%	Medium
NS21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Intersections with signalized pedestrian crossing that have high turning vehicles volumes and have had pedestrian vs. vehicle crashes.	60%	90%	Very High
NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings.	35%	90%	Medium
R01	Add Segment Lighting	Provision of lighting along roadways.	35%	100%	Medium
R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)	Areas noted as having a higher frequency of head-on, left-turn, and rear-end crashes with traffic volumes that can be handled by only 2 free flowing lanes. Using this strategy in locations with traffic volumes that are too high could result in diversion of traffic to routes less safe than the original four-lane design.	30%	90%	Medium
R21	Improve pavement friction (High Friction Surface Treatments)	Improving the skid resistance at locations with high frequencies of wet road crashes and/or failure to stop crashes	55%	100%	High
R22	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	Additional or new signage can address crashes caused by lack of driver awareness or compliance of roadway signing.	15%	90%	Very High
R26	Install dynamic/variable speed warning signs	Includes the addition of dynamic speed warning signs (also known as Radar Speed Feedback Signs)	30%	100%	High
R27	Install delineators, reflectors and/or object markers	Installation of delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or	15%	90%	Very High



Code	Countermeasure Name	Countermeasure Description	CRF	Federal Funding	Systemic Approach Opportunity
		fixed object that cannot easily be removed.			
R28	Install edge-lines and centerlines	Any road with a history of run-off-road right, head-on, opposite-direction-sideswipe, or run-off-road-left crashes is a candidate for this treatment -install where the existing lane delineation is not sufficient to assist the motorist in understanding the existing limits of the roadway. Depending on the width of the roadway, various combinations of edge line and/or center line pavement markings may be the most appropriate.	25%	100%	Very High
R30	Install centerline rumble strips/strips	Center Line rumble strips/strips can be used on virtually any roadway – especially those with a history of head-on crashes.	20%	100%	High
R31	Install edgeline rumble strips/strips	Shoulder and edge line milled rumble strips/strips should be used on roads with a history of roadway departure crashes.	15%	100%	High
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)	Roadway segments with no controlled crossing for a significant distance in high-use midblock crossing areas and/or multilane roads locations. Flashing beacons, curb extensions, medians and pedestrian crossing islands and/or other safety features should be added to complement the standard crossing elements.	35%	90%	Medium
R37PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings	35%	100%	Medium

* Code: S - Signalized intersection improvements

NS - Non-signalized intersection improvements

R - Roadway segment improvements



7. VIABLE SAFETY PROJECTS

This chapter summarizes the process of selecting safety projects as part of the analysis for the City of Pinole LRSP. The next step after the identification of high-risk locations, emphasis areas and applicable countermeasures was to identify location specific safety improvements for all high-risk roadway segments and intersections.

Specific countermeasures and improvements were selected from the 2022 LRSM from Caltrans, where:

- S refers to improvements at signalized locations,
- NS refers to improvements at non-signalized locations, and
- R refers to improvements at roadway segments.

The corresponding number refers to the countermeasure number in the LRSM (2022). The countermeasures were grouped into safety projects for high-risk intersections and roadway segments. A total of five safety projects were developed. All countermeasures were identified based on the technical teams' assessment of viability that consisted of extensive analysis, observations, City staff input, and stakeholder/community input. The most applicable and appropriate countermeasures as identified have been grouped together to form projects that can help make high-injury locations safer.

Table 14 lists the safety projects for high-risk intersections and roadway segments, along with total base planning level cost (2022 dollar amounts) estimates and the resultant preliminary Benefit-Cost (B/C) Ratio. The "Total Benefit" estimates were calculated for the proposed improvements being evaluated in the proactive safety analysis. This "Total Benefit" is divided by the "Total Cost per Location" estimates for the proposed improvements, giving the resultant B/C Ratio. The B/C Ratio Calculation follows the methodology as mentioned in the LRSM (2022).

Appendix G lists the detailed methodology to calculate B/C Ratio, as well as the complete cost, benefit and B/C Ratio calculation spreadsheet.

These safety projects were chosen based on the previously completed collisions analysis, which was used to identify main collision attributes that were found to be leading factors of fatal and severe collisions in City of Pinole. These collision factors are shown below, as well as viable safety projects that can help address these factors.

Broadside Collisions represented the 14% collisions of all severity and a significant percentage of F+SI collisions (33%). Viable safety projects to help address these collisions include improving signal timing, installing raised pavement markers, installing intersection lighting, improving pavement friction, installing/upgrading larger stop signs or other intersection regulatory/warning signs, and installing flashing beacons as advance warning.

Pedestrian Collisions made up 33% of F+SI collisions as well as 3% of all injury collisions. Viable safety projects to help address these collisions include installing advance stop bar before crosswalk, modifying signal phasing to implement a Leading Pedestrian Interval (LPI) and installing Rectangular Rapid Flashing Beacon (RRFB).

Unsafe speed was the most common violation type among all injury collisions (24%), as well as the most common violation causing F+SI collisions (22%). Viable safety projects to help address these violations include installing raised pavement markers and striping (Through Intersection), improving signal timing, installing flashing beacons as advance warning, installing/upgrading signs with new fluorescent sheeting, installing dynamic/variable speed warning signs.

DUI Collisions: DUI violations represented a significant portion of F+SI collisions (22%) and 4% of all injury collisions. Viable safety projects to help address these collisions include upgrading/installing signs with new fluorescent sheeting; installing edge line and centerline; adding intersection lighting, and improving intersection pavement markings.

The next step in the process after safety projects is to prepare HSIP applications. TJKM has provided a service to prepare grant ready material for one pedestrian set aside HSIP Cycle 11 application for City of Pinole. However, it should be noted that while the LRSP projects were based on high-injury locations, HSIP applications can expanded to include many locations across the City. HSIP is a competitive grant funding source based on a benefit/cost analysis. The benefit value is calculated automatically based on crash data document by law enforcement and standard cost data. The cost of some measures may adversely impact the benefit to cost ratio making the grant application less competitive for funding.

Below is the list of identified projects for the City of Pinole, with a preliminary cost estimate for each location and the resulting benefit-cost ratio of the project (the title of each countermeasure is located in a separate table below). The cost per location includes construction costs, Plans, Specifications, and Estimates (PS&E), environmental reporting costs, construction engineering costs, and a 10% contingency in 2022 dollars. Construction costs are based on industry standards in the Bay Area and TJKM's knowledge and experience of the area. Our team is consistently updating our unit prices to match current construction costs.

Table 14. List of Viable Safety Projects

Location	CM1	CM2	CM3	Cost per Location	Total Cost	B/C Ratio
Project #1: Signalized Intersections (Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number, Improve signal timing (coordination, phases, red, yellow, or operation), Provide protected left turn phase (left turn lane already exists))						
Appian Way and Fitzgerald Dr	S02	S03		\$13,790	\$183,792	27.00
San Pablo Ave and Tennent Ave		S03		\$8,610		
Appian Way and Canyon Dr and Tara Hills	S02	S03		\$53,410		
Pinole Valley Road/ Tennent Ave/Ellerhorst St	S02	S03		\$81,060		
San Pablo Ave and Pinole Valley Rd		S03		\$8,610		
San Pablo Ave and Pinon Ave/Appian Way		S03	S07	\$9,702		
Pinole Valley Rd and Estates Ave		S03		\$8,610		
Project #2: Pedestrian Safety at Signalized Intersections (Install advance stop bar before crosswalk, Install raised median on approaches (S.I.), Install raised pavement markers and striping (Through Intersection))						
Appian Way and Fitzgerald Dr	S20PB			\$68,243	\$514,548	12.19
San Pablo Ave and Tennent Ave	S20PB			\$60,459		
Appian Way and Canyon Dr and Tara Hills	S20PB	S12		\$62,734		
Pinole Valley Road/ Tennent Ave/Ellerhorst St		S12		\$95,312		
Fitzgerald Dr and Best Buy Parking Lot	S20PB		S09	\$47,222		
San Pablo Ave and Pinole Valley Rd	S20PB	S12	S09	\$103,858		
Pinole Valley Rd and Estates Ave	S20PB		S09	\$76,720		
Project #3: Safety at Unsignalized Intersections (Add intersection lighting (NS.I.), Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs, Install Rectangular Rapid Flashing Beacon (RRFB))						
Walter Ave and San Pablo Ave	NS01	NS06	NS22PB	\$238,455	\$879,830	10.90
Pinole Valley Rd and Simas Ave		NS06	NS22PB	\$144,725		
Pinole Valley Rd and Wright Ave	NS01	NS06	NS22PB	\$241,815		
Pinole Valley Rd and Rafaela St		NS06		\$4,865		
Wright Ave and Carol St		NS06		\$6,195		
Pinole Valley Rd and Savage Ave	NS01	NS06	NS22PB	\$235,515		
Simas Ave and Moraga Dr		NS06		\$8,260		
Project #4: Citywide Signal Upgrade						
Citywide Signalized Intersections	S02			-	-	-
Project #5: Citywide Street light Inventory						
Citywide Intersections and Roadway Segments	S01	NS01	R01	-	-	-



Project #6: Roadway Segments (Add Segment Lighting, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning), Install delineators, reflectors and/or object markers)						
Pinole Valley Rd: San Pablo Ave to Collins Ave	R22	R27	R01	\$1,198,179	\$1,469,474	18.41
San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd	R22	R27		\$17,981		
San Pablo Ave: Golden Gate Park to Del Monte Dr	R22	R27		\$9,198		
Tara Hills: Kilkenny Way to Appian Way	R22	R27		\$11,588		
Walter Ave: North Terminus to San Pablo Ave	R22	R27	R01	\$88,613		
Fitzgerald Dr: Jovita Ln to Appian Way	R22	R27		\$44,050		
Appian Way: San Pablo Ave to Michael Dr	R22	R27		\$77,344		
Tennent Ave: San Pablo Ave to Pinole Valley Rd	R22	R27		\$22,523		
Project #7: Roadway Segments (Install centerline rumble strips/stripes, Install edge-lines and centerlines, Install Rectangular Rapid Flashing Beacon (RRFB))						
Pinole Valley Rd: San Pablo Ave to Collins Ave	R30		R37PB	\$339,794	\$914,375	23.18
San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd		R28		\$19,194		
San Pablo Ave: Golden Gate Park to Del Monte Dr		R28		\$6,591		
Tara Hills: Kilkenny Way to Appian Way		R28		\$22,764		
Walter Ave: North Terminus to San Pablo Ave	R30	R28		\$3,511		
Tennent Ave: San Pablo Ave to Pinole Valley Rd	R30	R28	R37PB	\$522,522		
Project #8: Roadway Segments (Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes), Install dynamic/variable speed warning signs, Install/upgrade pedestrian crossing (with enhanced safety features))						
Pinole Valley Rd: San Pablo Ave to Collins Ave		R26		\$236,845	\$1,483,510	10.82
San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd	R14			\$360,675		
Tara Hills: Kilkenny Way to Appian Way	R14			\$211,750		
Fitzgerald Dr: Jovita Ln to Appian Way	R14	R26	R35PB	\$447,440		
Appian Way: San Pablo Ave to Michael Dr		R26		\$226,800		
Project #9: Citywide Regulatory and Warning Sign Inventory						
Citywide Roadway Segments	R22			-	-	-
Project #10: Pedestrian Set-aside (Install Rectangular Rapid Flashing Beacon (RRFB))						
Tennent Ave (at Plum St & Pear St)	R37PB			\$248,300	\$248,300	-

Notes: CM – countermeasure. B/C ratio is the dollar amount of benefits divided by the cost of the countermeasure.



COUNTERMEASURE NAME

NS01	Add intersection lighting (NS.I.)
NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs
NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)
R01	Add Segment Lighting
R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)
R22	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
R26	Install dynamic/variable speed warning signs
R27	Install delineators, reflectors and/or object markers
R28	Install edge-lines and centerlines
R30	Install centerline rumble strips/stripes
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)
R37PB	Install Rectangular Rapid Flashing Beacon (RRFB)
S01	Add intersection lighting
S02	Improve signal hardware: lenses, mounting, size, and number
S03	Improve signal timing (coordination, phases, red, yellow, or operation)
S07	Provide protected left turn phase (left turn lane already exists)
S09	Install raised pavement markers and striping (Through Intersection)
S12	Install raised median on approaches (S.I.)
S20PB	Install advance stop bar before crosswalk



8. IMPLEMENTATION AND EVALUATION

This chapter describes the steps the City may take to evaluate the success of this plan and steps needed to update the plan in the future. The LRSP is a guidance document and requires periodic updates to assess its efficacy and re-evaluate potential solutions. It is recommended to update the plan every two to five years in coordination with the identified safety partners. This document was developed based on community needs, stakeholder input, and collision analysis conducted to identify priority emphasis areas throughout the City. The implementation of strategies under each emphasis area would aim to reduce F+SI collisions in the coming years.

Implementation

The LRSP is a guidance document that is recommended to be updated every two to five years in coordination with the safety partners. The LRSP document provides engineering, education, and enforcement related countermeasures that can be implemented throughout the City to reduce F+SI collisions. It is recommended that the City of Pinole implement the selected projects in high-collision locations in coordination with other projects proposed for the City’s infrastructure development in their future CIP. After implementing countermeasures, the performance measures for each emphasis area should be evaluated annually. The most important measure of success of the LRSP should be reducing F+SI collisions throughout the City. If the number of F+SI collisions does not decrease over time, then the emphasis areas and countermeasures should be re-evaluated.

Funding is a critical component of implementing any safety project. While the HSIP program is a common source of funding for safety projects, there are numerous other funding sources that could be pursued for such projects. (See **Table 15** below).

Table 15. List of Potential Funding Sources

Funding Source	Funding Agency	Amount Available	Next Estimated Call for Projects	Applicable E’s	Notes
Active Transportation Program	Caltrans, California Transportation Commission, MTC	~\$450 million per cycle (every two years)	2022	Engineering, Education	Can be used for most active transportation related safety projects as well as education programs. Funding available through Caltrans or MTC
Highway Safety Improvement Program	Caltrans		2024	Engineering	Most common grant source for safety projects

Funding Source	Funding Agency	Amount Available	Next Estimated Call for Projects	Applicable E's	Notes
Office of Traffic Safety Grants	California Office of Traffic Safety	Varies by grant	Closes January 31 st annually	Education, Enforcement, Emergency Response	10 grants available to address various components of traffic safety
Affordable Housing and Sustainable Communities Program	Strategic Growth Council and Dept. of Housing and Community Development	~\$405 million	2022	Engineering, Education	Must be connected to affordable housing projects; typically focuses on bike/pedestrian infrastructure/programs
Urban Greening	California Natural Resources Agency	\$28.5 million	2022	Engineering	Focused on bike/pedestrian infrastructure and greening public spaces
Local Streets and Road Maintenance and Rehabilitation	CTC (distributed to local agencies)	\$1.5 billion statewide	N/A; distributed by formula	Engineering	Typically pays for road maintenance type projects
RAISE Grant	USDOT	~\$1 billion	2022	Engineering	Typically used for larger infrastructure projects
Sustainable Transportation Equity Project	California Air Resources Board	~\$19.5 million	TBD; most recent call in 2020	Engineering, Education	Targets projects that will increase transportation equity in disadvantaged communities
Transformative Climate Communities	Strategic Growth Council	~\$90 million	TBD; most recent call in 2020	Engineering	Funds community-led projects that achieve major reductions in greenhouse gas emissions in disadvantaged communities
Safe Streets and Roads for All (SS4A)	USDOT	\$200k - \$50 million	2022	Engineering	Two types of SS4A grants available: Action Plan Grants and Implementation Grants

For HSIP Cycle 11, one pedestrian set aside application was submitted by the City of Pinole for RRFB at two unsignalized intersections.

The City of Pinole has planned roadway safety improvement of installation of Traffic Signal Control at the intersection of Appian Way and Marlesta Road. In addition, the City is working closely with Contra Costa Transportation Authority (CCTA) to secure funding to install smart signals at various major arterials.



Monitoring and Evaluation

For the success of the LRSP, it is crucial to monitor and evaluate the 4 E-strategies continuously. Monitoring and evaluation help provide accountability, ensure the effectiveness of the countermeasures for each emphasis area, and help make decisions needed for new strategies. The process would help the City make informed decisions regarding the implementation plan's progress and accordingly, update the goals and objectives of the plan.

After implementing countermeasures, the strategies should be evaluated annually as per their performance measures. The evaluation should be recorded in a before-after study to validate the effectiveness of each countermeasure as per the following observations:

- Number of F+SI collisions
- Number of police citations
- Number of public comments and concerns

Evaluation should be conducted during similar time periods and durations each year. The most important measure of success of the LRSP should be reduction in F+SI collisions throughout the City. If the number of F+SI collisions doesn't decrease initially, then the countermeasures should be evaluated as per the other observations, as mentioned above. The effectiveness of the countermeasures should be compared to the goals for each emphasis area.

LRSP Update

The LRSP is a guidance document and is recommended to be updated every two to five years after adoption. After monitoring performance measures focused on the status and progress of the E's strategies in each emphasis area, the next LRSP update can be tailored to resolve any continuing safety problems. An annual stakeholder meeting with the safety partners is also recommended to discuss the progress for each emphasis area and oversee the implementation plan. The document should then be updated as per the latest collision data, emerging trends, and the E's strategies' progress and implementation.



APPENDICES



APPENDIX A. LIST OF COMMUNITY FEEDBACK COMMENTS



Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
778dxw9wwt73	1	POINT (-122.290922 38.005368)	Y	San Pablo Ave	San Pablo Ave/Tennent Ave	free right turn from SPA to Tennant Ave is dangerous for pedestrians	Pedestrian	Pedestrian Safety
778dxw9wwt73	2	POINT (-122.285638 37.996686)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Congestion getting onto East Bound I-80. Metering lights cause onramp traffic to back-up to Pinole Valley Road.	Motor Vehicles	Intersection Safety
4aah7l8ezj79	4	POINT (-122.286011 37.997003)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	The Cal trans light for the I-80 signs are burnt-out.	Motor Vehicles	Lighting
9vza3ihm77la	5	POINT (-122.302286 37.99515)	Y	Appian Way	Appian Way/Canyon Dr	BIKES: Left turns to Tara Hills Dr. are extremely dangerous and difficult to merge left beforehand across the two lanes of traffic. There needs to be a true bike lane starting at the highway off-ramp that does NOT include sewer grates, and ways to make protected crossings and left turns safely. Also needs true bike access around the gas station with a dedicated bike lane for at least the block before the McDonald's.	Bicycle	Bicycle Safety
9vza3ihm77la	6	POINT (-122.298317 38.004146)	Y	Pinole Valley Rd	Pinole Ave/San Pablo Ave	This spot seems safe enough. I have seen a car vs. pedestrian fatality there, but it was basically suicide by truck, not the fault of road design.	Pedestrian	Pedestrian Safety
9vza3ihm77la	7	POINT (-122.298317 38.004146)	Y	Pinole Valley Rd	Pinole Ave/San Pablo Ave	This spot seems safe enough. I have seen a car vs. pedestrian fatality there, but it was basically suicide by truck, not the fault of road design.	Motor Vehicles	Pedestrian Safety
9vza3ihm77la	7	POINT (-122.293628 38.004264)	N	San Pablo Ave	San Pablo Ave	Buy an easement, clear this landowner's debris off the road, and create a real bike lane with adequate visibility for cars to see bikes on this blind curve.	Bicycle	Visibility
9vza3ihm77la	7	POINT (-122.293628 38.004264)	N	San Pablo Ave	San Pablo Ave	Buy an easement, clear this landowner's debris off the road, and create a real bike lane with adequate visibility for cars to see bikes on this blind curve.	Bicycle	Bicycle Safety
7e7487vow7s3	8	POINT (-122.285939 37.996741)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	It is difficult when making right turn to see oncoming traffic. If individuals are speeding there is very little time for correction and may result in an accident.	Motor Vehicles	Visibility
7e7487vow7s3	8	POINT (-122.285939 37.996741)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	It is difficult when making right turn to see oncoming traffic. If individuals are speeding there is very little time for correction and may result in an accident.	Motor Vehicles	Speeding
8gov2uba7ry9	9	POINT (-122.299344 38.001699)	Y	Appian Way	Appian Way/Marlesta Rd	High speeds coming from the I-80 direction at all hours of the day. The intersection of Appian and Marlesta is significantly dangerous for both drivers coming from Marlesta onto Appian and especially for dangerous those walking and crossing the intersection. Everyone ways drive 15 to 20 mph above the speed limit. It's especially concerning since children who attend Pinole Junior just a couple of blocks away use it as a main thoroughfare.	Motor Vehicles	Pedestrian Safety
8gov2uba7ry9	9	POINT (-122.299344 38.001699)	Y	Appian Way	Appian Way/Marlesta Rd	High speeds coming from the I-80 direction at all hours of the day. The intersection of Appian and Marlesta is significantly dangerous for both drivers coming from Marlesta onto Appian and especially for dangerous those walking and crossing the intersection. Everyone ways drive 15 to 20 mph above the speed limit. It's especially concerning since children who attend Pinole Junior just a couple of blocks away use it as a main thoroughfare.	Motor Vehicles	Visibility
8gov2uba7ry9	9	POINT (-122.299344 38.001699)	Y	Appian Way	Appian Way/Marlesta Rd	High speeds coming from the I-80 direction at all hours of the day. The intersection of Appian and Marlesta is significantly dangerous for both drivers coming from Marlesta onto Appian and especially for dangerous those walking and crossing the intersection. Everyone ways drive 15 to 20 mph above the speed limit. It's especially concerning since children who attend Pinole Junior just a couple of blocks away use it as a main thoroughfare.	Pedestrian	Pedestrian Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
8gov2uba7ry9	9	POINT (-122.299344 38.001699)	Y	Appian Way	Appian Way/Marlesta Rd	High speeds coming from the I-80 direction at all hours of the day. The intersection of Appian and Marlesta is significantly dangerous for both drivers coming from Marlesta onto Appian and especially for dangerous those walking and crossing the intersection. Everyone ways drive 15 to 20 mph above the speed limit. It's especially concerning since children who attend Pinole Junior just a couple of blocks away use it as a main thoroughfare.	Pedestrian	Visibility
8gov2uba7ry9	10	POINT (-122.29938 38.001821)	Y	Appian Way	Appian Way/Marlesta Rd	High speeds coming from the I-80 direction at all hours of the day. The intersection of Appian and Marlesta is significantly dangerous for both drivers coming from Marlesta onto Appian and especially for dangerous those walking and crossing the intersection. Everyone ways drive 15 to 20 mph above the speed limit. It's especially concerning since children who attend Pinole Junior just a couple of blocks away use it as a main thoroughfare.	Motor Vehicles	Pedestrian Safety
8gov2uba7ry9	10	POINT (-122.29938 38.001821)	Y	Appian Way	Appian Way/Marlesta Rd	High speeds coming from the I-80 direction at all hours of the day. The intersection of Appian and Marlesta is significantly dangerous for both drivers coming from Marlesta onto Appian and especially for dangerous those walking and crossing the intersection. Everyone ways drive 15 to 20 mph above the speed limit. It's especially concerning since children who attend Pinole Junior just a couple of blocks away use it as a main thoroughfare.	Pedestrian	Pedestrian Safety
3i3cx4pxl3d7	11	POINT (-122.290822 38.005533)	Y	San Pablo Ave	San Pablo Ave/Tennent Ave	People driving recklessly and running the red lights through Old town	Motor Vehicles	Red Light Violation
3i3cx4pxl3d7	11	POINT (-122.290822 38.005533)	Y	San Pablo Ave	San Pablo Ave/Tennent Ave	People driving recklessly and running the red lights through Old town	Motor Vehicles	Speeding
7ive6pbx6wd3	12	POINT (-122.300528 38.00429)	Y	San Pablo Ave	San Pablo Ave/Third Street	Sidewalk ends, crosswalk uncontrolled and people come over a blind crest in the Western direction often accelerating from the light at high speed. It would be nice to have a full sidewalk or at least a crosswalk with a light.	Pedestrian	Pavement Condition
7ive6pbx6wd3	13	POINT (-122.305169 38.004504)	Y	San Pablo Ave	San Pablo Ave/Sunnyview Dr	Many signal light posts in Pinole are installed directly in the middle of the narrow sidewalk, forcing people in wheelchairs and parents with strollers into the street as there is no other way around. These poles should be relocated to the dirt behind the sidewalk and the sidewalks widened	Pedestrian	Intersection Safety
9g4kim2d34j7	16	POINT (-122.314351 38.004248)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	Wish this stretch of San Pablo was more pedestrian friendly. Longer cross walk times and reduced speed limits. We like to walk from Nob Hill Rd to San Pablo and then cross San Pablo to the shore line. It's always pretty intimidating, especially with small children and elderly people who don't walk that fast.	Pedestrian	Pedestrian Safety
9g4kim2d34j7	17	POINT (-122.316604 38.002765)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	People drive extremely fast along San Pablo. The crossing time for pedestrians to get across the road is very short. Kids and older folks should be able to access the bay trail from the Nob Hill area safely! On this stretch of San Pablo Ave I would like to see wider side walks, longer crossing times, protected bike lanes, and more public transit. Pinole is a great place to live. Let's prioritize walking, biking, public transit and other options that are healthy and good for the environment. Thanks!	Pedestrian	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
9g4kim2d34j7	17	POINT (-122.316604 38.002765)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	People drive extremely fast along San Pablo. The crossing time for pedestrians to get across the road is very short. Kids and older folks should be able to access the bay trail from the Nob Hill area safely! On this stretch of San Pablo Ave I would like to see wider side walks, longer crossing times, protected bike lanes, and more public transit. Pinole is a great place to live. Let's prioritize walking, biking, public transit and other options that are healthy and good for the environment. Thanks!	Pedestrian	Pedestrian Safety
9g4kim2d34j7	17	POINT (-122.316604 38.002765)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	People drive extremely fast along San Pablo. The crossing time for pedestrians to get across the road is very short. Kids and older folks should be able to access the bay trail from the Nob Hill area safely! On this stretch of San Pablo Ave I would like to see wider side walks, longer crossing times, protected bike lanes, and more public transit. Pinole is a great place to live. Let's prioritize walking, biking, public transit and other options that are healthy and good for the environment. Thanks!	Pedestrian	Bicycle Safety
9g4kim2d34j7	17	POINT (-122.316604 38.002765)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	People drive extremely fast along San Pablo. The crossing time for pedestrians to get across the road is very short. Kids and older folks should be able to access the bay trail from the Nob Hill area safely! On this stretch of San Pablo Ave I would like to see wider side walks, longer crossing times, protected bike lanes, and more public transit. Pinole is a great place to live. Let's prioritize walking, biking, public transit and other options that are healthy and good for the environment. Thanks!	Bicycle	Speeding
9g4kim2d34j7	17	POINT (-122.316604 38.002765)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	People drive extremely fast along San Pablo. The crossing time for pedestrians to get across the road is very short. Kids and older folks should be able to access the bay trail from the Nob Hill area safely! On this stretch of San Pablo Ave I would like to see wider side walks, longer crossing times, protected bike lanes, and more public transit. Pinole is a great place to live. Let's prioritize walking, biking, public transit and other options that are healthy and good for the environment. Thanks!	Bicycle	Pedestrian Safety
9g4kim2d34j7	17	POINT (-122.316604 38.002765)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	People drive extremely fast along San Pablo. The crossing time for pedestrians to get across the road is very short. Kids and older folks should be able to access the bay trail from the Nob Hill area safely! On this stretch of San Pablo Ave I would like to see wider side walks, longer crossing times, protected bike lanes, and more public transit. Pinole is a great place to live. Let's prioritize walking, biking, public transit and other options that are healthy and good for the environment. Thanks!	Bicycle	Bicycle Safety
6bd9g2iwf6va	18	POINT (-122.28601 37.996721)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Traffic signal/irrigation boxes obstruct clear of sight	Motor Vehicles	Visibility
6bd9g2iwf6va	19	POINT (-122.285917 37.996495)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Traffic signal/irrigation control obstructs line of site of pedestrians	Motor Vehicles	Visibility
9g4kim2d34j7	16	POINT (-122.314351 38.004248)	Y	San Pablo Ave	San Pablo Ave/ Del Monte Dr	Wish this stretch of San Pablo was more pedestrian friendly. Longer cross walk times and reduced speed limits. We like to walk from Nob Hill Rd to San Pablo and then cross San Pablo to the shore line. It's always pretty intimidating, especially with small children and elderly people who don't walk that fast.	Pedestrian	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7zm4xwt9l487	22	POINT (-122.289114 38.006615)	Y	San Pablo Ave	San Pablo Ave/Pinole Valley Rd	Its very dangerous to cross pinole valley road at SP ave (as a pedestrian) heading west. The drivers trying to turn left from SP ave onto PV road dont notice pedestrians, and the drivers turning right onto SP ave from PV barely stop for the light. Very dangerous for walkers. Also, (not as important) Rafaela is a short cut to by pass that light (for motorists heading east) at commute times. They rarely look when they zip down Rafaela and make a quick left on John St to get to SP ave.	Pedestrian	Pedestrian Safety
2yo73jn7cgs2	23	POINT (-122.286602 37.997543)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Drivers roll through the lights without looking for pedestrians or bicycles at this location.	Pedestrian	Pedestrian Safety
2yo73jn7cgs2	23	POINT (-122.286602 37.997543)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Drivers roll through the lights without looking for pedestrians or bicycles at this location.	Pedestrian	Bicycle Safety
2yo73jn7cgs2	23	POINT (-122.286602 37.997543)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Drivers roll through the lights without looking for pedestrians or bicycles at this location.	Bicycle	Pedestrian Safety
2yo73jn7cgs2	23	POINT (-122.286602 37.997543)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Drivers roll through the lights without looking for pedestrians or bicycles at this location.	Bicycle	Bicycle Safety
2yo73jn7cgs2	24	POINT (-122.264991 37.980285)	Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	Drivers fail to look to the right when they come to the stop sign. They only look to the left to look for cars. I have almost been hit many, many times as I am walking in this area. Typically, I don't trust the cars so I walk up further on Wright and walk behind the cars.	Pedestrian	Pedestrian Safety
2yo73jn7cgs2	25	POINT (-122.271257 37.980909)	Y	Pinole Valley Rd	Pinole Valley Rd/Savage Ave	It would be nice if speed bumps can be put in this general location. Many children are getting out of vehicles to get into the school. Parents have stopped their cars and they don't always have 100% control of their children. This bend in the road, coming from Savage Ave. towards the school, is a speed demon's delight.	Pedestrian	School Safety
2yo73jn7cgs2	25	POINT (-122.271257 37.980909)	Y	Pinole Valley Rd	Pinole Valley Rd/Savage Ave	It would be nice if speed bumps can be put in this general location. Many children are getting out of vehicles to get into the school. Parents have stopped their cars and they don't always have 100% control of their children. This bend in the road, coming from Savage Ave. towards the school, is a speed demon's delight.	Pedestrian	Speeding
2yo73jn7cgs2	26	POINT (-122.285044 37.99088)	Y	Pinole Valley Rd	Pinole Valley Rd/Ramona St	When drivers are stopped at this intersection, they often don't look to the right to see if someone is about to cross the road. Students cross here and they are at risk.	Pedestrian	Curve Unsafe
2ul2y3cle3ra	27	POINT (-122.299193 38.001681)	Y	Marlesta Rd	Marlesta Road/Appian Way	This crosswalk should be lit up for when a pedestrian needs to cross the street. It is a wide, busy street and as a pedestrian I don't feel safe crossing the street pushing my baby with a stroller. Also, I walk my son from soccer practice from Pinole Middle to my home on Marlesta and Appian Way is very dark at dawn. There needs to be more light post along Appian Way from the middle school all the way to San Pablo Ave.	Pedestrian	Lighting
3na88w28anf6	28	POINT (-122.308006 38.005208)	Y	San Pablo Ave	San Pablo Ave/Meadow Ave	Can we have markers illuminating the crosswalk or flashing lights so people can cross safely?	Pedestrian	Pedestrian Safety
3na88w28anf6	29	POINT (-122.303396 38.00442)	Y	San Pablo Ave	San Pablo Ave/Madrone Ave	Can we have illuminated markers or flashing lights to help people cross safely?	Pedestrian	Pedestrian Safety
3na88w28anf6	30	POINT (-122.29932 38.001717)	Y	Appian Way	Appian Way/Marlesta Rd	Can we have illuminated markers or flashing lights to help people cross safely? This one is probably the most dangerous/urgent	Pedestrian	Pedestrian Safety
4oa64meh2sf4	32	POINT (-122.286771 38.000734)	N	Pinole Valley Rd	Pinole Valley Rd	Cars traveling at 45-55 mph in a school zone causing accidents more than 2/3 times a year. From Hwy 80 to downtown Pinole on Tennant Ave.	Pedestrian	Speeding
6ni2ygv2cpl8	33	POINT (-122.285904 37.99659)	N	Pinole Valley Rd	Pinole Valley Rd- Near Eastshore Fwy	Limited sight distance when turning right onto Pinole Valley Road from Pinole Valley Road exit ramp off I-80E.	Motor Vehicles	Visibility

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6ni2ygv2cpl8	34	POINT (-122.285759 37.995704)	N	Pinole Valley Rd	Pinole Valley Rd	Driveway out of Trader Joe's Shopping Center onto Pinole Valley Road is very steep, impeding good traffic flow in and out of parking lot.	Motor Vehicles	Pavement Condition
27ac26i9o7b8	36	POINT (-122.283726 37.98679)	N	Pinole Valley Rd	Pinole Valley Rd/ Johanna Court	EXCESSIVE SPEEDING IN THE RESIDENTIAL AREA OF PINOLE VALLEY ROAD BETWEEN SHEA DRIVE, GRANADA COURT, AND SIMAS AVENUE	Motor Vehicles	Speeding
73vzt9is2a96	38	POINT (-122.291572 37.999643)	Y	Henry Ave	Henry Ave/Oak Ridge Rd	Henry Avenue traffic in both directions often does not come to near a complete stop and occasionally stop signs are run at speeds of 25+ mph. This is not an exaggeration. Rolling at 2 mph with eye contact is NOT what I am describing and what most folks do and I'm ok with that if not the letter of the law. It's the dangerous drivers that need to be stopped. Add speed bumps on both sides of Henry?	Pedestrian	Stop Sign Violation
73vzt9is2a96	38	POINT (-122.291572 37.999643)	Y	Henry Ave	Henry Ave/Oak Ridge Rd	Henry Avenue traffic in both directions often does not come to near a complete stop and occasionally stop signs are run at speeds of 25+ mph. This is not an exaggeration. Rolling at 2 mph with eye contact is NOT what I am describing and what most folks do and I'm ok with that if not the letter of the law. It's the dangerous drivers that need to be stopped. Add speed bumps on both sides of Henry?	Pedestrian	Speeding
73vzt9is2a96	38	POINT (-122.291572 37.999643)	Y	Henry Ave	Henry Ave/Oak Ridge Rd	Henry Avenue traffic in both directions often does not come to near a complete stop and occasionally stop signs are run at speeds of 25+ mph. This is not an exaggeration. Rolling at 2 mph with eye contact is NOT what I am describing and what most folks do and I'm ok with that if not the letter of the law. It's the dangerous drivers that need to be stopped. Add speed bumps on both sides of Henry?	Bicycle	Stop Sign Violation
73vzt9is2a96	38	POINT (-122.291572 37.999643)	Y	Henry Ave	Henry Ave/Oak Ridge Rd	Henry Avenue traffic in both directions often does not come to near a complete stop and occasionally stop signs are run at speeds of 25+ mph. This is not an exaggeration. Rolling at 2 mph with eye contact is NOT what I am describing and what most folks do and I'm ok with that if not the letter of the law. It's the dangerous drivers that need to be stopped. Add speed bumps on both sides of Henry?	Bicycle	Speeding
73vzt9is2a96	38	POINT (-122.291572 37.999643)	Y	Henry Ave	Henry Ave/Oak Ridge Rd	Henry Avenue traffic in both directions often does not come to near a complete stop and occasionally stop signs are run at speeds of 25+ mph. This is not an exaggeration. Rolling at 2 mph with eye contact is NOT what I am describing and what most folks do and I'm ok with that if not the letter of the law. It's the dangerous drivers that need to be stopped. Add speed bumps on both sides of Henry?	Motor Vehicles	Stop Sign Violation
73vzt9is2a96	38	POINT (-122.291572 37.999643)	Y	Henry Ave	Henry Ave/Oak Ridge Rd	Henry Avenue traffic in both directions often does not come to near a complete stop and occasionally stop signs are run at speeds of 25+ mph. This is not an exaggeration. Rolling at 2 mph with eye contact is NOT what I am describing and what most folks do and I'm ok with that if not the letter of the law. It's the dangerous drivers that need to be stopped. Add speed bumps on both sides of Henry?	Motor Vehicles	Speeding
6r8s3hxxh8m78	40	POINT (-122.288147 38.00744)	N	San Pablo Ave	San Pablo Avenue/ John St	I recently had to use west cat on Sam Pablo Ave and change keys the west at stop has absolutely No lighting the trees are all over grown . It is very dark and unsafe . Lights need to be added immediately.	Pedestrian	Lighting
28aff33f7ce9	42	POINT (-122.295785 38.007469)	N	Primrose Lane	Primrose Lane	opening this right of way between cul-de-sacs for pedestrian/bike access would allow much safer and shorter routes across the neighborhood into downtown Pinole, without needing to bike on San Pablo Ave.	Bicycle	Pedestrian Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
28aff33f7ce9	42	POINT (-122.295785 38.007469)	N	Primrose Lane	Primrose Lane	opening this right of way between cul-de-sacs for pedestrian/bike access would allow much safer and shorter routes across the neighborhood into downtown Pinole, without needing to bike on San Pablo Ave.	Bicycle	Bicycle Safety
28aff33f7ce9	43	POINT (-122.285861 38.008867)	N	San Pablo Ave	San Pablo Ave	Would be great to continue a safe bike route here	Bicycle	Bicycle Safety
28aff33f7ce9	44	POINT (-122.288864 38.008153)	N	Charles Ave	Charles Ave	possible connection between bike paths here? Anything to get off San Pablo Ave which does not feel safe for bikes anywhere.	Bicycle	Bicycle Safety
3av8u2h4bxi3	45	POINT (-122.302306 37.993768)	Y	I80	I80/Appian Way	Used to be I80 west lane before 2nd bridge built. Traffic backs up on Tara Hills as most drivers use curb lane to make right turn on to Appian. Then drivers jockey for lane position on Appian. Ideally lane can be added to Appian as I80W entry. But painting I80W only suggestion on curb lane on Appian and I80E/Appian suggestion on Tara Hills would improve traffic flow.	Motor Vehicles	Curve Unsafe
3av8u2h4bxi3	45	POINT (-122.302306 37.993768)	Y	I80	I80/Appian Way	Used to be I80 west lane before 2nd bridge built. Traffic backs up on Tara Hills as most drivers use curb lane to make right turn on to Appian. Then drivers jockey for lane position on Appian. Ideally lane can be added to Appian as I80W entry. But painting I80W only suggestion on curb lane on Appian and I80E/Appian suggestion on Tara Hills would improve traffic flow.	Motor Vehicles	Pavement Condition
7ieI9gig6u93	47	POINT (-122.29848 38.00402)	Y	San Pablo Ave	San Pablo Ave/Appian Way	Drivers coming up Pinon towards San Pablo, there is a winding road curves becomes a blind spot right before the stoplight. Drivers turning left from Appian way onto San Pablo Avenue, can't see drivers from Pinon until really late.	Motor Vehicles	Visibility
7ieI9gig6u93	47	POINT (-122.29848 38.00402)	Y	San Pablo Ave	San Pablo Ave/Appian Way	Drivers coming up Pinon towards San Pablo, there is a winding road curves becomes a blind spot right before the stoplight. Drivers turning left from Appian way onto San Pablo Avenue, can't see drivers from Pinon until really late.	Motor Vehicles	Curve Unsafe
7ieI9gig6u93	47	POINT (-122.29848 38.00402)	Y	San Pablo Ave	San Pablo Ave/Appian Way	Drivers coming up Pinon towards San Pablo, there is a winding road curves becomes a blind spot right before the stoplight. Drivers turning left from Appian way onto San Pablo Avenue, can't see drivers from Pinon until really late.	Motor Vehicles	Intersection Safety
8ae34666ryw4	48	POINT (-122.31315 38.010473)	N	San Francisco Bay Trail	San Francisco Bay Trail	LACK OF ENFORCEMENT ANYWHERE. THE 4 E's = ENFORCEMENT ENFORCEMENT ENFORCEMENT	Motor Vehicles	Enforcement
8ae34666ryw4	48	POINT (-122.31315 38.010473)	N	San Francisco Bay Trail	San Francisco Bay Trail	LACK OF ENFORCEMENT ANYWHERE. THE 4 E's = ENFORCEMENT ENFORCEMENT ENFORCEMENT	Bicycle	Enforcement
8ae34666ryw4	48	POINT (-122.31315 38.010473)	N	San Francisco Bay Trail	San Francisco Bay Trail	LACK OF ENFORCEMENT ANYWHERE. THE 4 E's = ENFORCEMENT ENFORCEMENT ENFORCEMENT	Pedestrian	Enforcement
3yx9ye8cuz26	49	POINT (-122.299194 38.001696)	Y	Appian Way	Appian Way/Marlesta Rd	pedestrian crosswalk. The actual speed limit is 35, drivers constantly speed above 50. It's very dangerous people cannot cross here	Pedestrian	Pedestrian Safety
8k3e4ux3zh96	50	POINT (-122.28407 37.987394)	N	Pinole Valley Rd	Pinole Valley Rd	Dangerous speeding traffic in Residential Area on Pinole Valley Road between Shea Drive, Granada Court and Simas Avenue	Bicycle	Speeding
8k3e4ux3zh96	50	POINT (-122.28407 37.987394)	N	Pinole Valley Rd	Pinole Valley Rd	Dangerous speeding traffic in Residential Area on Pinole Valley Road between Shea Drive, Granada Court and Simas Avenue	Pedestrian	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
9f9mcf8w7778	57	POINT (-122.299358 38.001697)	Y	Appian Way	Appian Way/Marlesta Rd	This area is super dangerous the speed limit is 35mph drivers constantly speeding above 50mph. There are tons of people that ride the bus from here and there are also children. If you are a pedestrian even if you try to cross the street at the crosswalk cars do not stop because of speeding. The sidewalks are super skinny here and no one in their right mind would ride a bike around. It would be nice to have a roundabout here that way pedestrians can cross, cars wouldn't speed as fast and the city could plant trees in the center of the roundabout to add a little bit more character.	Pedestrian	Intersection Improvement
9f9mcf8w7778	57	POINT (-122.299358 38.001697)	Y	Appian Way	Appian Way/Marlesta Rd	This area is super dangerous the speed limit is 35mph drivers constantly speeding above 50mph. There are tons of people that ride the bus from here and there are also children. If you are a pedestrian even if you try to cross the street at the crosswalk cars do not stop because of speeding. The sidewalks are super skinny here and no one in their right mind would ride a bike around. It would be nice to have a roundabout here that way pedestrians can cross, cars wouldn't speed as fast and the city could plant trees in the center of the roundabout to add a little bit more character.	Pedestrian	Speeding
9f9mcf8w7778	57	POINT (-122.299358 38.001697)	Y	Appian Way	Appian Way/Marlesta Rd	This area is super dangerous the speed limit is 35mph drivers constantly speeding above 50mph. There are tons of people that ride the bus from here and there are also children. If you are a pedestrian even if you try to cross the street at the crosswalk cars do not stop because of speeding. The sidewalks are super skinny here and no one in their right mind would ride a bike around. It would be nice to have a roundabout here that way pedestrians can cross, cars wouldn't speed as fast and the city could plant trees in the center of the roundabout to add a little bit more character.	Pedestrian	Pedestrian Safety
87epx7pla9p3	58	POINT (-122.297727 37.988411)	N	Appian Way	Appain Way	Sidewalk access is constantly overgrown by weeds making it nearly inaccessible for pedestrians to safely utilize and in some cases totally inaccessible to those using wheelchairs, walkers etc.Telephone poles add to this.	Pedestrian	Pavement Condition
87epx7pla9p3	59	POINT (-122.293025 38.00471)	N	San Pablo Ave	San Pablo Ave	Referred to as Shale (Shell) Hill. This might be in the CIP, but funding was never identified. There is no passable pedestrian walkway, nor is it safe for a bicyclists because it is also on a curve.	Pedestrian	Pedestrian Safety
87epx7pla9p3	59	POINT (-122.293025 38.00471)	N	San Pablo Ave	San Pablo Ave	Referred to as Shale (Shell) Hill. This might be in the CIP, but funding was never identified. There is no passable pedestrian walkway, nor is it safe for a bicyclists because it is also on a curve.	Bicycle	Bicycle Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
2rj7j4ufk9l6	60	POINT (-122.285728 37.996634)	Y	I80	I80/Pinole Valley Rd	First , the useless signage that I have already emailed cal trans on regarding the two lanes accessing south bound I80. Better surface/lane marking would improve things as well. Two, for the amount of usage this intersection gets, both morning and late afternoon/evening, it needs to have a dedicated right turn lane for I-80 north bound and some solution that will help traffic to move more efficiently and with less cluelessness by drivers. Ideally the entrances to both jack in the box and chevron would be accessible by estates drive only. I've had people make right turns across the front end of my car when they get tired of waiting in line to access the freeway on ramp. You also need to somehow make it impossible, or at least glaringly obvious, that the outer left turn lane does not go straight, when, and if, they actually utilize that lane but disregard the signage.	Motor Vehicles	Curve Unsafe
2rj7j4ufk9l6	60	POINT (-122.285728 37.996634)	Y	I80	I80/Pinole Valley Rd	First , the useless signage that I have already emailed cal trans on regarding the two lanes accessing south bound I80. Better surface/lane marking would improve things as well. Two, for the amount of usage this intersection gets, both morning and late afternoon/evening, it needs to have a dedicated right turn lane for I-80 north bound and some solution that will help traffic to move more efficiently and with less cluelessness by drivers. Ideally the entrances to both jack in the box and chevron would be accessible by estates drive only. I've had people make right turns across the front end of my car when they get tired of waiting in line to access the freeway on ramp. You also need to somehow make it impossible, or at least glaringly obvious, that the outer left turn lane does not go straight, when, and if, they actually utilize that lane but disregard the signage.	Motor Vehicles	Intersection Safety
2rj7j4ufk9l6	61	POINT (-122.288198 38.002362)	Y	Tennet Avenue	Tennet Avenue/Peach Street	The intersection of PVR and tenant needs re-painting. Drivers seem to believe that the right turn from PVR to PVR is a two lane turn lane. Very scary when a big suv turns left in the outer lane, and there are cars parked on PVR, so the suv swerves into your path, or you.	Motor Vehicles	Stop Sign Violation
2rj7j4ufk9l6	62	POINT (-122.280602 37.984809)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Surface needs repainting, more obvious signage that only one of those lanes goes straight. Accident waiting to happen. Better yet, take a cue from Richmond and make it a two lane road with a center lane for turns. Then plant some trees or something, it's really ugly there.	Pedestrian	Pavement Condition
2rj7j4ufk9l6	62	POINT (-122.280602 37.984809)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Surface needs repainting, more obvious signage that only one of those lanes goes straight. Accident waiting to happen. Better yet, take a cue from Richmond and make it a two lane road with a center lane for turns. Then plant some trees or something, it's really ugly there.	Pedestrian	Pedestrian Safety
2rj7j4ufk9l6	62	POINT (-122.280602 37.984809)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Surface needs repainting, more obvious signage that only one of those lanes goes straight. Accident waiting to happen. Better yet, take a cue from Richmond and make it a two lane road with a center lane for turns. Then plant some trees or something, it's really ugly there.	Pedestrian	Stop Sign Violation

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Speeding
7ii2ulg8uxx8	65	POINT (-122.271177 37.980953)	N	Pinole Valley Rd	Pinole Valley Rd	Cars come at high speed westbound near school, around blind corner. Families use that area for pick up of students for nearby school with no crosswalk or signs for cars to slow.	Pedestrian	School Safety
7ii2ulg8uxx8	65	POINT (-122.271177 37.980953)	N	Pinole Valley Rd	Pinole Valley Ave	Cars come at high speed westbound near school, around blind corner. Families use that area for pick up of students for nearby school with no crosswalk or signs for cars to slow.	Motor Vehicles	Speeding
7ii2ulg8uxx8	65	POINT (-122.271177 37.980953)	N	Pinole Valley Rd	Pinole Valley Rd	Cars come at high speed westbound near school, around blind corner. Families use that area for pick up of students for nearby school with no crosswalk or signs for cars to slow.	Pedestrian	School Safety
7ii2ulg8uxx8	65	POINT (-122.271177 37.980953)	N	Pinole Valley Rd	Pinole Valley Ave	Cars come at high speed westbound near school, around blind corner. Families use that area for pick up of students for nearby school with no crosswalk or signs for cars to slow.	Motor Vehicles	Speeding
7ii2ulg8uxx8	66	POINT (-122.286356 37.997725)	Y	I80	I80/Pinole Valley Rd	Cars blow through red light often, resulting in accidents	Motor Vehicles	Red Light Violation
7ii2ulg8uxx8	66	POINT (-122.286356 37.997725)	Y	I80	I80/Pinole Valley Rd	Cars blow through red light often, resulting in accidents	Motor Vehicles	Speeding
7ii2ulg8uxx8	67	POINT (-122.280652 37.984773)	Y	Pinole Valley Rd	Pinole Valley Ave/Simas Ave	cars driving eastbound on Pinole Valley Road from the left turn lane (turning to Simas) instead drive straight, causing dangerous situations with cars in lane designated to go straight.	Motor Vehicles	Curve Unsafe
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Pedestrian Safety
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Bicycle Safety
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Stop Sign Violation

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Speeding
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Pedestrian Safety
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Bicycle Safety
3co8y62idu87	63	POINT (-122.280489 37.9848)	Y	Pinole Valley Rd	Pinole Valley Ave/ Simas Ave	Speeding on Pinole Valley Rd has always been an issue. I walk this street twice a day. Between Simas and Wright Ave the speeding has increased even in the school zone. I have witnessed cars going over the speed limit and cars passing other cars into oncoming traffic. On the corner of Pinole Valley Rd and Savage Ave there is a cross walk that cars rarely low down for. I've seen a dead deer, raccoons and most recently the valley resident peacock hit by speeding cars.	Pedestrian	Stop Sign Violation
7ii2ulg8uxx8	68	POINT (-122.277963 37.987667)	N	Colusa St	Colusa St	high speed endangering children playing in the street	Pedestrian	School Safety
7ii2ulg8uxx8	69	POINT (-122.279696 37.990016)	N	Colusa St	Colusa St	cars travel at high speed around corners and with cars parked on each side, the space to pass is limited, and dangerous	Pedestrian	Speeding
7ii2ulg8uxx8	70	POINT (-122.279139 37.989161)	N	Colusa St	Colusa St	camper parked on street, creating blind corner for cars traveling west on Lucas unable to see speeding cars coming south on Colusa.	Motor Vehicles	Visibility
8an2rjf6va6a	71	POINT (-122.286426 37.997482)	N	Pinole Valley Rd	Pinole Vally Rd	Traffic back up, lights out of sync between CalTrans and signal maintenance	Motor Vehicles	Lighting
8an2rjf6va6a	72	POINT (-122.301525 37.997295)	Y	Appian Way	Appain Way/Maan Drive	School traffic and parking,	Motor Vehicles	School Safety
8an2rjf6va6a	73	POINT (-122.263246 37.978701)	N	Pinole Valley Rd	Pinole Vally Rd	Speed	Motor Vehicles	Speeding
8an2rjf6va6a	74	POINT (-122.30873 37.99051)	N	Fitzgerald Rd	Fitzgerald Rd	Speed	Motor Vehicles	Speeding
9cv8dpl7hsb6	75	POINT (-122.29845 38.004257)	Y	Appian Way	Appian Way/Pinole Ave	Vehicles driving north on Appian Way, fail to yield to vehicles making a left from Pinion onto San Pablo Ave.	Motor Vehicles	Curve Unsafe
8366ega4alk3	76	POINT (-122.279684 37.983888)	Y	Pinole Valley Rd	Pinole Valley Rd	People speeding right through cross walk as I'm crossing w my baby. Every day this happens. It's terrifying. Maybe we can add flashing lights or something??	Pedestrian	Speeding
8366ega4alk3	78	POINT (-122.279295 37.983854)	Y	Pinole Valley Rd	Pinole Valley Rd/ Sarita Court	Suggestions of no parking on the corner of sarita where the stop sign is. Cars park there and block the view of the sidewalk and people who are crossing street. Safety hazard when turning blindly.	Pedestrian	Visibility
9xvy6ueb88f3	79	POINT (-122.301442 37.992464)	N	Appian Way	Appain Way/ I80	Time of light needs to be changed at this intersection. At the exact same time light turns red the other is green. It should be a couple seconds before changing green to avoid accidents due to people running red lights.	Motor Vehicles	Lighting

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6hmv33gmj2y3	80	POINT (-122.285736 37.99559)	Y	Pinole Valley Rd	Pinole Valley Rd/ Estates Avenue	Traffic in right lane of PVR stopped up by traffic in Trader Joe's parking, plus backup of traffic waiting at the light to turn left onto Estates. PVR becomes essentially one lane at that point, PVR traffic sometimes backing up onto PVR exit from eastbound I80	Motor Vehicles	Road too Narrow
6hmv33gmj2y3	81	POINT (-122.286447 37.997663)	Y	Pinole Valley Rd	Pinole Valley Rd	Morning commute traffic from westbound I80 bombing through the intersection at Pinole Valley Rd to continue westbound on I80	Motor Vehicles	Intersection Safety
6hmv33gmj2y3	82	POINT (-122.286 37.996715)	Y	Pinole Valley Rd	Pinole Valley Rd	Some kind of utility box obstructs view of traffic approaching on Pinole Valley Road	Motor Vehicles	Visibility
6hmv33gmj2y3	83	POINT (-122.301326 37.992707)	N	Appian Way	Appian Way/ I80	Afternoon commute traffic eastbound on I80 blowing through the intersection to continue eastbound on I80	Motor Vehicles	Speeding
6hmv33gmj2y3	84	POINT (-122.285713 37.995101)	Y	Pinole Valley Rd	Pinole Valley Rd/ Estates Avenue	Jaywalking, Pinole Valley Road between Estates and Pinole Valley High School, all times of the day	Pedestrian	Pedestrian Safety
6hmv33gmj2y3	85	POINT (-122.285561 37.992993)	N	Pinole Valley Rd	Pinole Valley Rd	Commercial vehicle double parking on PVR to make deliveries to businesses in that strip	Motor Vehicles	Large Trucks
6hmv33gmj2y3	85	POINT (-122.285561 37.992993)	N	Pinole Valley Rd	Pinole Valley Rd	Commercial vehicle double parking on PVR to make deliveries to businesses in that strip	Pedestrian	Large Trucks
6hmv33gmj2y3	86	POINT (-122.314988 37.986684)	N	Richmond Parkway	Richmond Parkway	Afternoon commute: extremely late merge from Richmond Parkway into lane for on ramp to eastbound I80	Motor Vehicles	Intersection Safety
4ix8lt9pai3a	88	POINT (-122.308085 38.004335)	N	Meadow Avenue	Meadow Avenue	Cars come off of San Pablo fast and there is no stop sign where Meadow and Meadow meet. We live on the corner and cars come tearing through there.	Motor Vehicles	Speeding
37vyp98xch24	89	POINT (-122.286487 37.997574)	N	Pinole Valley Rd	Pinole Valley Rd	Please consider adding a several second delay between light changes. This would be especially effective between the ramp exiting hwy 80 west and the left turn arrow from PV Road to the entrance ramp to how 80 west.	Motor Vehicles	Lighting
8r7urx7pyw9a	90	POINT (-122.286555 38.000249)	Y	Pinole Valley Rd	Pinole Valley Rd/ Hendry Ave	The speed driven at this point is far above the posted limit- many times 45-50 mph - causing many bad accidents on Pinole Valley Rd. School speed limits are not observed and the turning right lane at Henry Ave. creates confusion and cars vie for a place going to one lane on PVR.	Motor Vehicles	School Safety
8r7urx7pyw9a	90	POINT (-122.286555 38.000249)	Y	Pinole Valley Rd	Pinole Valley Rd/ Hendry Ave	The speed driven at this point is far above the posted limit- many times 45-50 mph - causing many bad accidents on Pinole Valley Rd. School speed limits are not observed and the turning right lane at Henry Ave. creates confusion and cars vie for a place going to one lane on PVR.	Motor Vehicles	Speeding
3ex7anp6xmv4	91	POINT (-122.271623 37.986243)	Y	Simas Ave	Simas Ave/Moraga Dr	We live at 2601 Moraga Drive a corner house at the intersection of Simas Ave and Moraga Dr and is now a 4 way stop for approximately 10 years. When this neighborhood was originally built it was not. I assume the 4 way stop was added to slow vehicle traffic down but this has only increased problems as a lot of drivers either ignore the stop signs completely or the speed up after making a quick stop or speed quickly to a stop. This causes a lot of vehicle traffic noise for all the homes within the intersection area that wasn't present before the 4 way stop was put in. The 4 way stop has done little to aid in vehicle traffic obeying the residential speed limit and certainly isn't monitored by police traffic enforcement. I would ask that the 2 stop signs on Simas Ave. be removed so traffic can resume unimpeded reducing traffic noise levels and the constant rapidly slowing down and speeding up of those vehicles that do actually stop.	Motor Vehicles	Intersection Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
3ex7anp6xmv4	91	POINT (-122.271623 37.986243)	Y	Simas Ave	Simas Ave/Moraga Dr	We live at 2601 Moraga Drive a corner house at the intersection of Simas Ave and Moraga Dr and is now a 4 way stop for approximately 10 years. When this neighborhood was originally built it was not. I assume the 4 way stop was added to slow vehicle traffic down but this has only increased problems as a lot of drivers either ignore the stop signs completely or the speed up after making a quick stop or speed quickly to a stop. This causes a lot of vehicle traffic noise for all the homes within the intersection area that wasn't present before the 4 way stop was put in. The 4 way stop has done little to aid in vehicle traffic obeying the residential speed limit and certainly isn't monitored by police traffic enforcement. I would ask that the 2 stop signs on Simas Ave. be removed so traffic can resume unimpeded reducing traffic noise levels and the constant rapidly slowing down and speeding up of those vehicles that do actually stop.	Motor Vehicles	Stop Sign Violation
3ex7anp6xmv4	91	POINT (-122.271623 37.986243)	Y	Simas Ave	Simas Ave/Moraga Dr	We live at 2601 Moraga Drive a corner house at the intersection of Simas Ave and Moraga Dr and is now a 4 way stop for approximately 10 years. When this neighborhood was originally built it was not. I assume the 4 way stop was added to slow vehicle traffic down but this has only increased problems as a lot of drivers either ignore the stop signs completely or the speed up after making a quick stop or speed quickly to a stop. This causes a lot of vehicle traffic noise for all the homes within the intersection area that wasn't present before the 4 way stop was put in. The 4 way stop has done little to aid in vehicle traffic obeying the residential speed limit and certainly isn't monitored by police traffic enforcement. I would ask that the 2 stop signs on Simas Ave. be removed so traffic can resume unimpeded reducing traffic noise levels and the constant rapidly slowing down and speeding up of those vehicles that do actually stop.	Motor Vehicles	Speeding
3ig9faw8wbj4	92	POINT (-122.261106 37.981424)	Y	Wright Ave	Wright Avenue/ Carol St	Kids being hit by cars who do not stop. Constant Speeding.	Pedestrian	Speeding
3ig9faw8wbj4	93	POINT (-122.261185 37.981272)	Y	Wright Ave	Wright Avenue/ Carol St	Cars don't stop. Need to traffic countermeasures.	Motor Vehicles	Speeding
3ig9faw8wbj4	93	POINT (-122.261185 37.981272)	Y	Wright Ave	Wright Avenue/ Carol St	Cars don't stop. Need to traffic countermeasures.	Pedestrian	Speeding
3ovo3xtr3se4	94	POINT (-122.303475 38.006797)	Y	Bay View Farm Rd	Bay View Farm Rd/ Hemleb Court	Thank you for this opportunity to speak. Traffic speeds up to approximately 50mph between Sunnyview Drive and Hemleb Court on Bay View Farm Road. Cars regularly make 'donuts' where Belfair Drive intersects Bay View Farm Road on this stretch of the street. We need traffic bumps or something similar to promote safety and to protect animals, people and other drivers. Gathering signatures to start the process to request traffic bumps is not a safe option during the COVID outbreak. Sincerely, Laurie Mason	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
3ovo3xtr3se4	94	POINT (-122.303475 38.006797)	Y	Bay View Farm Rd	Bay View Farm Rd/ Hemleb Court	Thank you for this opportunity to speak. Traffic speeds up to approximately 50mph between Sunnyview Drive and Hemleb Court on Bay View Farm Road. Cars regularly make 'donuts' where Belfair Drive intersects Bay View Farm Road on this stretch of the street. We need traffic bumps or something similar to promote safety and to protect animals, people and other drivers. Gathering signatures to start the process to request traffic bumps is not a safe option during the COVID outbreak. Sincerely, Laurie Mason	Pedestrian	Stop Sign Violation
3ovo3xtr3se4	94	POINT (-122.303475 38.006797)	Y	Bay View Farm Rd	Bay View Farm Rd/ Hemleb Court	Thank you for this opportunity to speak. Traffic speeds up to approximately 50mph between Sunnyview Drive and Hemleb Court on Bay View Farm Road. Cars regularly make 'donuts' where Belfair Drive intersects Bay View Farm Road on this stretch of the street. We need traffic bumps or something similar to promote safety and to protect animals, people and other drivers. Gathering signatures to start the process to request traffic bumps is not a safe option during the COVID outbreak. Sincerely, Laurie Mason	Motor Vehicles	Pedestrian Safety
3ovo3xtr3se4	94	POINT (-122.303475 38.006797)	Y	Bay View Farm Rd	Bay View Farm Rd/ Hemleb Court	Thank you for this opportunity to speak. Traffic speeds up to approximately 50mph between Sunnyview Drive and Hemleb Court on Bay View Farm Road. Cars regularly make 'donuts' where Belfair Drive intersects Bay View Farm Road on this stretch of the street. We need traffic bumps or something similar to promote safety and to protect animals, people and other drivers. Gathering signatures to start the process to request traffic bumps is not a safe option during the COVID outbreak. Sincerely, Laurie Mason	Pedestrian	Speeding
3ovo3xtr3se4	94	POINT (-122.303475 38.006797)	Y	Bay View Farm Rd	Bay View Farm Rd/ Hemleb Court	Thank you for this opportunity to speak. Traffic speeds up to approximately 50mph between Sunnyview Drive and Hemleb Court on Bay View Farm Road. Cars regularly make 'donuts' where Belfair Drive intersects Bay View Farm Road on this stretch of the street. We need traffic bumps or something similar to promote safety and to protect animals, people and other drivers. Gathering signatures to start the process to request traffic bumps is not a safe option during the COVID outbreak. Sincerely, Laurie Mason	Motor Vehicles	Stop Sign Violation
3ovo3xtr3se4	94	POINT (-122.303475 38.006797)	Y	Bay View Farm Rd	Bay View Farm Rd/ Hemleb Court	Thank you for this opportunity to speak. Traffic speeds up to approximately 50mph between Sunnyview Drive and Hemleb Court on Bay View Farm Road. Cars regularly make 'donuts' where Belfair Drive intersects Bay View Farm Road on this stretch of the street. We need traffic bumps or something similar to promote safety and to protect animals, people and other drivers. Gathering signatures to start the process to request traffic bumps is not a safe option during the COVID outbreak. Sincerely, Laurie Mason	Pedestrian	Pedestrian Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
8b3jwu8sa4b7	95	POINT (-122.289149 38.006573)	Y	Pinole Valley Rd	Pinole Valley Rd/ San Pablo Ave	Traffic light at San Pablo and Pinole Valley should have a left turn arrow. Traffic can back up on San Pablo waiting for cars to turn and often, on-going traffic must stop to allow for left turns.	Motor Vehicles	Lighting
8b3jwu8sa4b7	96	POINT (-122.288282 38.002245)	Y	Tennet Avenue	Tennet Avenue/ Pinole Valley Rd	Traffic is backed up at the traffic light on Pinole Valley Road at Tennent. During peak dismissal times for the elementary school, the light does not allow for enough cars to leave the school's parking lot, thus backing traffic inside and outside the school. Can we get a right turn only lane on Tennent (turning right into the school) and have the lights adjusted to a longer green for those exiting the school. Times of excess traffic is between 2:20 and 2:40 pm M, T, Thur, F). Wednesday dismissal is at 1:45 to 2:00.	Motor Vehicles	Lighting
8b3jwu8sa4b7	96	POINT (-122.288282 38.002245)	Y	Tennet Avenue	Tennet Avenue/ Pinole Valley Rd	Traffic is backed up at the traffic light on Pinole Valley Road at Tennent. During peak dismissal times for the elementary school, the light does not allow for enough cars to leave the school's parking lot, thus backing traffic inside and outside the school. Can we get a right turn only lane on Tennent (turning right into the school) and have the lights adjusted to a longer green for those exiting the school. Times of excess traffic is between 2:20 and 2:40 pm M, T, Thur, F). Wednesday dismissal is at 1:45 to 2:00.	Motor Vehicles	Pavement Condition
8b3jwu8sa4b7	97	POINT (-122.286783 37.998056)	N	Pinole Valley Rd	Pinole Valley Rd	Traffic lights between Henry and I-80 are not synced to allow for ease of traffic getting onto I-80 East. Those cars turning left under the freeway can block the path of those cars going straight and those trying to enter I-80 going west. Lights should be synced.	Motor Vehicles	Curve Unsafe
8b3jwu8sa4b7	97	POINT (-122.286783 37.998056)	N	Pinole Valley Rd	Pinole Valley Rd	Traffic lights between Henry and I-80 are not synced to allow for ease of traffic getting onto I-80 East. Those cars turning left under the freeway can block the path of those cars going straight and those trying to enter I-80 going west. Lights should be synced.	Motor Vehicles	Lighting
3ig9faw8wbj4	92	POINT (-122.261106 37.981424)	Y	Wright Ave	Wright Avenue/ Carol St	Kids being hit by cars who do not stop. Constant Speeding.	Pedestrian	Pedestrian Safety
83lkg7tz86s6	98	POINT (-122.261178 37.981256)	Y	Wright Ave	Wright Avenue/ Carol St	Everyone speeds up and rolls this stop sign in both directions . There have been numerous crashes right after this sign coming from Pinole valley road . I live right by this sign and watch cars do it everyday .	Pedestrian	Speeding
83lkg7tz86s6	98	POINT (-122.261178 37.981256)	Y	Wright Ave	Wright Avenue/ Carol St	Everyone speeds up and rolls this stop sign in both directions . There have been numerous crashes right after this sign coming from Pinole valley road . I live right by this sign and watch cars do it everyday .	Pedestrian	Stop Sign Violation
3nt2nnx7hk8a	99	POINT (-122.258742 37.983236)	Y	Wright Ave	Wright Avenue/Victor Street	This stop sign is ignored by too many. Something too encourage people not to fly through it. i have 2 kids at 2435 wright ave. & it's a little scary how fast some people drive through. thank you!	Pedestrian	Stop Sign Violation
4m647cx9wr7a	100	POINT (-122.285633 37.993467)	N	Pinole Valley Rd	Pinole Valley Rd	massive traffic jam on schooldays on Pinole Valley rd in front of Trader Joe shopping center	Motor Vehicles	Stop Sign Violation
6yzu4w3ap347	101	POINT (-122.3017 38.003929)	Y	San Pablo Ave	San Pablo Ave/ 4th Avenue	People go extremely fast on our street to cut around the traffic light on appian and San Pablo. We would like a speed bump put in on 4th, close to where it meets San pablo	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
94jm3bzd99x6	102	POINT (-122.280666 37.98479)	Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	In the 5 years we've lived here I have seen numerous people use the left turn lane to go straight heading towards Pinole Valley Park. Also witnessed several cars fail to stop at all. In one incident, I witnessed a young driver swerve around several cars in the right lane, into the left turn lane, run the stop sign and continue straight, ending up in the oncoming traffic lane headed straight for me. Thankfully, he went to the correct lane just in time. Clearer signs/road markings, and possibly a stop light could help.	Motor Vehicles	Speeding
94jm3bzd99x6	102	POINT (-122.280666 37.98479)	Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	In the 5 years we've lived here I have seen numerous people use the left turn lane to go straight heading towards Pinole Valley Park. Also witnessed several cars fail to stop at all. In one incident, I witnessed a young driver swerve around several cars in the right lane, into the left turn lane, run the stop sign and continue straight, ending up in the oncoming traffic lane headed straight for me. Thankfully, he went to the correct lane just in time. Clearer signs/road markings, and possibly a stop light could help.	Motor Vehicles	Stop Sign Violation
94jm3bzd99x6	103	POINT (-122.273359 37.981426)	N	Pinole Valley Rd	Pinole Valley Rd	Cars travel well over the 25mph school zone when children are present. I've nearly been rear ended several times when pulling into a parking spot to pick up my child, even though I always signal. My child has only been at this school for five months and I can't count how many times it's happened. Cars also often drive well over the posted 35mph at all times of the day/night.	Motor Vehicles	School Safety
94jm3bzd99x6	103	POINT (-122.273359 37.981426)	N	Pinole Valley Rd	Pinole Valley Rd	Cars travel well over the 25mph school zone when children are present. I've nearly been rear ended several times when pulling into a parking spot to pick up my child, even though I always signal. My child has only been at this school for five months and I can't count how many times it's happened. Cars also often drive well over the posted 35mph at all times of the day/night.	Pedestrian	School Safety
98ije3v32f68	104	POINT (-122.285317 37.988837)	N	Shea Dr	Shea Dr	Red zone needs to be repainted on Shea and Pinole Valley Road. Pinole High parents park in red zone prior to end of school and block cars from being able to turn right, so traffic backs up hill and congests area.	Motor Vehicles	Pavement Condition
98ije3v32f68	104	POINT (-122.285317 37.988837)	N	Shea Dr	Shea Dr	Red zone needs to be repainted on Shea and Pinole Valley Road. Pinole High parents park in red zone prior to end of school and block cars from being able to turn right, so traffic backs up hill and congests area.	Pedestrian	Pavement Condition
98ije3v32f68	105	POINT (-122.285538 37.996435)	N	Pinole Valley Rd	Pinole Valley Rd	Traffic backs up at the east bound hwy 80 on ramp in the mornings Mon-Fri, when the metering lights are on and when Pinole Valley High lets out. Can this corner be made into a free right to alleviate the congestion?	Motor Vehicles	Traffic Congestion
98ije3v32f68	106	POINT (-122.270185 37.981463)	Y	Pinole Valley Rd	Pinole Valley Rd/Savage Ave	Can we get lighted crosswalks at the crosswalk by Savage Dr? People driving southbound, coming around turn by Ellerhorst Elem. have difficulty seeing people trying to cross.	Pedestrian	Lighting
98ije3v32f68	107	POINT (-122.268047 37.981513)	N	Pinole Valley Rd	Pinole Valley Rd	Can we get a lighted crosswalk in front of park for children trying to cross?	Pedestrian	Lighting
98ije3v32f68	108	POINT (-122.266449 37.981211)	Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	Can we get a lighted crosswalk for people trying to cross into south end of park by baseball field? Need better visibility and advanced notice for people trying to cross over Pinole Valley Rd.	Pedestrian	Lighting

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
98ije3v32f68	108	POINT (-122.266449 37.981211)	Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	Can we get a lighted crosswalk for people trying to cross into south end of park by baseball field? Need better visibility and advanced notice for people trying to cross over Pinole Valley Rd.	Pedestrian	Visibility
6962cb9g9n6a	109	POINT (-122.280267 37.984753)	Y	Pinole Valley Rd	Pinole Valley St/Simas Ave	crossing pinole valley road to go to the dog park is treacherous. the speed limit is 35. many cars do not stop for pedestrians. i don't understand why you have so many traffic lights by the high school and a lower speed limit when older children cross there. where young children cross to go to the park, soccer or baseball fields cars go speeding without restraint. it is more common for a car not to slow down or stop for pedestrians than have a car with a courteous driver. please reduce the speed limit and put more stop signs to make crossing easier. thank you.	Pedestrian	Speeding
6962cb9g9n6a	109	POINT (-122.280267 37.984753)	Y	Pinole Valley Rd	Pinole Valley St/Simas Ave	crossing pinole valley road to go to the dog park is treacherous. the speed limit is 35. many cars do not stop for pedestrians. i don't understand why you have so many traffic lights by the high school and a lower speed limit when older children cross there. where young children cross to go to the park, soccer or baseball fields cars go speeding without restraint. it is more common for a car not to slow down or stop for pedestrians than have a car with a courteous driver. please reduce the speed limit and put more stop signs to make crossing easier. thank you.	Pedestrian	Pedestrian Safety
6cw74c7sxb9r	111	POINT (-122.286688 37.989118)	N	Shea Dr	Shea Dr	This has 3-way traffic with 2 stop signs at the intersection of Shea Dr. & Avis Way. The traffic driving up hill on Shea Dr. does NOT have a stop sign. The traffic going downhill on Shea Dr. fails to stop at the stop sign 8+ times out of 10. This is extremely dangerous as there are children walking to both Stewart Elementary School & Pinole Valley High School. The Our Saviour Lutheran Church is located on Avis Way so there is more much more traffic than just residential. I can't tell you how many times cars coming up Shea Dr. that are turning left on to Avis Way (no stop sign) have had to slam on their brakes or barely miss being hit by people running the Stop Sign on Shea Dr. at Avis Way. I live on Avis Way and have watched car after car run this stop sign for hours at a time. This is very dangerous!	Pedestrian	Stop Sign Violation
6cw74c7sxb9r	111	POINT (-122.286688 37.989118)	N	Shea Dr	Shea Dr	This has 3-way traffic with 2 stop signs at the intersection of Shea Dr. & Avis Way. The traffic driving up hill on Shea Dr. does NOT have a stop sign. The traffic going downhill on Shea Dr. fails to stop at the stop sign 8+ times out of 10. This is extremely dangerous as there are children walking to both Stewart Elementary School & Pinole Valley High School. The Our Saviour Lutheran Church is located on Avis Way so there is more much more traffic than just residential. I can't tell you how many times cars coming up Shea Dr. that are turning left on to Avis Way (no stop sign) have had to slam on their brakes or barely miss being hit by people running the Stop Sign on Shea Dr. at Avis Way. I live on Avis Way and have watched car after car run this stop sign for hours at a time. This is very dangerous!	Pedestrian	Curve unsafe

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6cw74c7sxb9r	111	POINT (-122.286688 37.989118)	N	Shea Dr	Shea Dr	This has 3-way traffic with 2 stop signs at the intersection of Shea Dr. & Avis Way. The traffic driving up hill on Shea Dr. does NOT have a stop sign. The traffic going downhill on Shea Dr. fails to stop at the stop sign 8+ times out of 10. This is extremely dangerous as there are children walking to both Stewart Elementary School & Pinole Valley High School. The Our Saviour Lutheran Church is located on Avis Way so there is more much more traffic than just residential. I can't tell you how many times cars coming up Shea Dr. that are turning left on to Avis Way (no stop sign) have had to slam on their brakes or barely miss being hit by people running the Stop Sign on Shea Dr. at Avis Way. I live on Avis Way and have watched car after car run this stop sign for hours at a time. This is very dangerous!	Pedestrian	Speeding
6zy4u87lxz78	112	POINT (-122.29931 38.001766)	Y	Marlesta Rd	Marlesta Road/Appian Way	Cars driving too fast. No stop light. Not pedestrian safe because cars drive so fast. No middle space as you're crossing the streets. No bike lanes.	Pedestrian	Speeding
6zy4u87lxz78	112	POINT (-122.29931 38.001766)	Y	Marlesta Rd	Marlesta Road/Appian Way	Cars driving too fast. No stop light. Not pedestrian safe because cars drive so fast. No middle space as you're crossing the streets. No bike lanes.	Pedestrian	Pedestrian Safety
6zy4u87lxz78	112	POINT (-122.29931 38.001766)	Y	Marlesta Rd	Marlesta Road/Appian Way	Cars driving too fast. No stop light. Not pedestrian safe because cars drive so fast. No middle space as you're crossing the streets. No bike lanes.	Pedestrian	Lighting
6zy4u87lxz78	113	POINT (-122.2993 38.002581)	Y	Nob Hill	Nob Hill/Appian Way	There is little to no lighting right here. The turn is too sharp and short. We need some type of middle grass lane here.	Motor Vehicles	Lighting
6zy4u87lxz78	114	POINT (-122.30566 38.002497)	Y	Nob Hill	Nob Hill Ave/ Sunny View Dr	It's a bit unsafe right here to turn right.	Motor Vehicles	Curve Unsafe
6zy4u87lxz78	115	POINT (-122.305291 38.004655)	Y	San Pablo Ave	San Pablo Ave	Not safe for bikes. We need bike lanes!	Bicycle	Bicycle Safety
23z84w4ke8v3	116	POINT (-122.289059 38.006561)	Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	Pedestrian crossing SPA unsafe with right turn vehicles heading towards Hercules. Vehicles spreading eastward towards Hercules.	Bicycle	Curve unsafe
23z84w4ke8v3	117	POINT (-122.287743 38.007551)	N	San Pablo Ave	San Pablo Ave	Red light running. Speeding traffic both directions. Right turn green light on John Street only functions in the am hours.	Motor Vehicles	Red Light Violation
23z84w4ke8v3	117	POINT (-122.287743 38.007551)	N	San Pablo Ave	San Pablo Ave	Red light running. Speeding traffic both directions. Right turn green light on John Street only functions in the am hours.	Motor Vehicles	Speeding
23z84w4ke8v3	117	POINT (-122.287743 38.007551)	N	San Pablo Ave	San Pablo Ave	Red light running. Speeding traffic both directions. Right turn green light on John Street only functions in the am hours.	Motor Vehicles	Lighting
3dc6wj9j7lp3	118	POINT (-122.266338 37.981085)	Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	Crosswalk from Simas to the Pinole Valley Park should have Reflector dots/buttons.	Pedestrian	Pedestrian Safety
3dc6wj9j7lp3	119	POINT (-122.264683 37.98005)	Y	Pinole Valley Rd	Pinole Valley Rd/ Wright Ave	Crosswalk from Wright Ave to the Pinole Valley Park should have reflector dots/buttons on pavement.	Pedestrian	Pedestrian Safety
3fsz84rm434d	120	POINT (-122.267593 37.98158)	Y	Pinole Valley Rd	Pinole Valley Rd/ Monte Verde Dr	There is no street sign at the intersection of Pinole Valley Road and Monte Verde Drive. Also, the crosswalk from Monte Verde Drive to Pinole Valley Park needs reflectors in the pavement.	Motor Vehicles	Lighting
3fsz84rm434d	120	POINT (-122.267593 37.98158)	Y	Pinole Valley Rd	Pinole Valley Rd/ Monte Verde Dr	There is no street sign at the intersection of Pinole Valley Road and Monte Verde Drive. Also, the crosswalk from Monte Verde Drive to Pinole Valley Park needs reflectors in the pavement.	Pedestrian	Lighting
3fsz84rm434d	121	POINT (-122.264493 37.982614)	N	Carol St	Carol St	Raised sidewalk at 3718 Carol Street due to roots.	Pedestrian	Pavement Condition

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7lg279rm8no3	122	POINT (-122.286299 37.997483)	N	Pinole Valley Rd	Pinole Valley Rd/ I80	when NB on PVR at the intersection of Hwy 80 - the light for the turn onto WB 80 - you can't see what color the light is when the morning sun is hitting the light. So, when the cars come off EB 80 exit to PVR - this is setting up a dangerous situation	Motor Vehicles	Lighting
34tpw4cps866	123	POINT (-122.294784 38.003964)	Y	San Pablo Ave	San Pablo Ave/Alvarez Ave	on Sampablo and Alvarez cross-section, we need a traffic light. drivers never stop for pedestrians.	Pedestrian	Lighting
6pw2nxxn6ybe6	124	POINT (-122.285262 37.988867)	Y	Shea Dr	Shea Dr	At the end of the Pinole High School day, parents line up to pick up their children at the turn right lane at the corner of PV Road & Shea. This blocks and back ups vehicle traffic. Can the city post a "no parking" during these pick up time?	Motor Vehicles	School Safety
9zp7k2con6c9	125	POINT (-122.299344 38.001657)	Y	Marlesta Rd	Marlesta Road/Appian Way	High speed traffic both ways do not stop for pedestrians! sidewalks narrow, overgrown by weeds do not give any protection.	Pedestrian	Pavement Condition
9zp7k2con6c9	125	POINT (-122.299344 38.001657)	Y	Marlesta Rd	Marlesta Road/Appian Way	High speed traffic both ways do not stop for pedestrians! sidewalks narrow, overgrown by weeds do not give any protection.	Pedestrian	Speeding
7ro9dty3omx7	126	POINT (-122.282019 37.996726)	Y	Ponderosa Trail	Ponderosa Trail/ Faria Ave	Traffic coming downhill on Faria to intersection with Ponderosa Trail, due to the blind spot, driver coming up from Faria making left turn into Ponderosa often miss fast traffic coming down the hill. Recommend a stop sign be installed on Faria at the intersection.	Motor Vehicles	Speeding
7ro9dty3omx7	126	POINT (-122.282019 37.996726)	Y	Ponderosa Trail	Ponderosa Trail/ Faria Ave	Traffic coming downhill on Faria to intersection with Ponderosa Trail, due to the blind spot, driver coming up from Faria making left turn into Ponderosa often miss fast traffic coming down the hill. Recommend a stop sign be installed on Faria at the intersection.	Motor Vehicles	Intersection Safety
7d7o7n2mvy96	127	POINT (-122.271475 37.986289)	Y	Moraga Dr	Moraga Dr/Simas Ave	This intersection needs a crosswalk as it is used by kids going to Ellerhorst via Amber Schwartz Park.	Pedestrian	Pedestrian Safety
6io486i624j7	128	POINT (-122.302297 37.995304)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	The signal phasing keeps getting changed and it is dangerous. When Appian has the red the Tara Hills leg should get the green followed by the Canyon leg. When it is reverse and Canyon goes first you cannot see red light runners due to the topography of the intersection.	Motor Vehicles	Red Light Violation
6io486i624j7	128	POINT (-122.302297 37.995304)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	The signal phasing keeps getting changed and it is dangerous. When Appian has the red the Tara Hills leg should get the green followed by the Canyon leg. When it is reverse and Canyon goes first you cannot see red light runners due to the topography of the intersection.	Pedestrian	Lighting
6io486i624j7	128	POINT (-122.302297 37.995304)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	The signal phasing keeps getting changed and it is dangerous. When Appian has the red the Tara Hills leg should get the green followed by the Canyon leg. When it is reverse and Canyon goes first you cannot see red light runners due to the topography of the intersection.	Motor Vehicles	Speeding
6io486i624j7	128	POINT (-122.302297 37.995304)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	The signal phasing keeps getting changed and it is dangerous. When Appian has the red the Tara Hills leg should get the green followed by the Canyon leg. When it is reverse and Canyon goes first you cannot see red light runners due to the topography of the intersection.	Pedestrian	Red Light Violation
6io486i624j7	128	POINT (-122.302297 37.995304)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	The signal phasing keeps getting changed and it is dangerous. When Appian has the red the Tara Hills leg should get the green followed by the Canyon leg. When it is reverse and Canyon goes first you cannot see red light runners due to the topography of the intersection.	Motor Vehicles	Lighting

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6io486i624j7	128	POINT (-122.302297 37.995304)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	The signal phasing keeps getting changed and it is dangerous. When Appian has the red the Tara Hills leg should get the green followed by the Canyon leg. When it is reverse and Canyon goes first you cannot see red light runners due to the topography of the intersection.	Pedestrian	Speeding
6io486i624j7	129	POINT (-122.299205 38.001708)	Y	Marlesta Rd	Marlesta Road/Appian Way	We are on the list to get a pedestrian activated signal installed and it needs to happen. There should not be an uncontrolled crossing across six lanes of traffic on a grade.	Pedestrian	Pedestrian Safety
82cty8et9sia	130	POINT (-122.285723 37.995601)	N	Pinole Valley Rd	Pinole Valley Rd	The design of the parking lot at the Pinole Valley Shopping Center is terrible. The driveway at PVR@Estates should be made and exit only with the driveway at the other end enter only, and the flow of the parking lot needs to be improved as it is impossible to get in and out without having to wait through many signal cycles	Motor Vehicles	Road too Narrow
8ix69nk4hwr9	131	POINT (-122.293729 38.004204)	N	San Pablo Ave	San Pablo Ave	Erosion - no shoulder for bikes on this blind corner	Bicycle	Bicycle Safety
7pi2niu7ab68	132	POINT (-122.298662 38.003747)	N	Appian Way	Appain Way	I live in the neighborhood and like to walk as much as possible. I have frequent issues when trying to cross the street at that intersection. Cars driving down Appian way making a left hand turn on to San Pablo are NOT watching for pedestrians. The light should have a delay so that pedestrians can safely cross without risk from cars turning left.	Pedestrian	Pedestrian Safety
7pi2niu7ab68	132	POINT (-122.298662 38.003747)	N	Appian Way	Appain Way	I live in the neighborhood and like to walk as much as possible. I have frequent issues when trying to cross the street at that intersection. Cars driving down Appian way making a left hand turn on to San Pablo are NOT watching for pedestrians. The light should have a delay so that pedestrians can safely cross without risk from cars turning left.	Pedestrian	Lighting
7pi2niu7ab68	133	POINT (-122.292191 38.003888)	Y	Oak Ridge Rd	Oak Ridge Rd/School St	I was hit by a car in while walking in the crosswalk by a car turning left from Oak Ridge. It was dark, and the lighting at the cross walk is poor. Better lighting would make it safer and easier for cars to see pedestrians. Also - the car that hit me did not stop. I was shocked by the whole thing, but fortunately not injured.	Pedestrian	Lighting
84tze6eek9o6	134	POINT (-122.288681 38.006175)	Y	Rafaela Street	Rafaela Street/ Pinole Valley Rd	There needs to be a red painted blocked off no parking area of a minimum of 2 car lengths at the corner of Rafaela	Motor Vehicles	Pavement Condition
84tze6eek9o6	135	POINT (-122.288672 38.006255)	Y	Rafaela Street	Rafaela Street/ Pinole Valley Rd	Emerging from Rafaela Street and attempting to head left or right onto Pinole Valley Road has the sight line severely blocked by cars parked on the east side of PVR at the corner of RS. There needs to be at least 2 spaces blocked off in red so that one may see cars flying around a blind curve. The odds of getting T-boned are huge and both physical and financial harm are quite inevitable, regardless of one's safe approach inching out. The loss of 2 parking spaces is of minimal concern, while preserving life + financial security is the HIGHEST priority! I have driven for 58 years with no ticket on my record, nor have I hit anyone, yet that record will come to a crashing end soon, NOT due to any malfeasance on my part. It's truly an accident waiting to happen! Please solve the problem with a simple coat of paint and get important priorities in order. 64 seniors coming and going from Pinole Grove Housing make this a well traveled corner and others have remarked about its scary aspect.	Motor Vehicles	Pavement Condition

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7xn3x4smo7m3	136	POINT (-122.28874 38.006178)	Y	Rafaela Street	Rafaela St/ Pinole Valley Rd	The view of oncoming traffic on Pinole Valley Road as one emerges from Rafaela Street to turn onto PVR is constantly obscured due to cars parking right up to the corner, especially SUV's and tinted windows, as the corner coming around is nearly a blind one with speeders. The east side curb on PVR at the RS corner needs to have a red no parking area painted for a minimum of 2 spaces in order to eradicate the problem. The odds of getting T-boned are HUGE, regardless of the care taken in creeping out, as the view is blocked, likely resulting in an accident through no fault of a driver emerging slowly from Rafaela Street to get at least a minimum view before proceeding. With cars parked right on the corner, it's often impossible to not have a close call or get hit. 64 residents coming and going from Pinole Grove Housing means that the corner is usually busy. A loss of 2 parking spots pales in comparison to the potential loss of a life or permanent maiming, let alone the financial loss.	Motor Vehicles	Pavement Condition
7xn3x4smo7m3	136	POINT (-122.28874 38.006178)	Y	Rafaela Street	Rafaela St/ Pinole Valley Rd	The view of oncoming traffic on Pinole Valley Road as one emerges from Rafaela Street to turn onto PVR is constantly obscured due to cars parking right up to the corner, especially SUV's and tinted windows, as the corner coming around is nearly a blind one with speeders. The east side curb on PVR at the RS corner needs to have a red no parking area painted for a minimum of 2 spaces in order to eradicate the problem. The odds of getting T-boned are HUGE, regardless of the care taken in creeping out, as the view is blocked, likely resulting in an accident through no fault of a driver emerging slowly from Rafaela Street to get at least a minimum view before proceeding. With cars parked right on the corner, it's often impossible to not have a close call or get hit. 64 residents coming and going from Pinole Grove Housing means that the corner is usually busy. A loss of 2 parking spots pales in comparison to the potential loss of a life or permanent maiming, let alone the financial loss.	Motor Vehicles	Visibility
8s227og7akk4	137	POINT (-122.271608 37.986268)	Y	Simas Ave	Simas Ave/ Moraga Dr	People are going 50 mph down Simas Ave and running the stop sign on Simas Ave and Moraga Ave.	Motor Vehicles	Stop Sign Violation
8s227og7akk4	137	POINT (-122.271608 37.986268)	Y	Simas Ave	Simas Ave/ Moraga Dr	People are going 50 mph down Simas Ave and running the stop sign on Simas Ave and Moraga Ave.	Motor Vehicles	Speeding
6vyw8vy2ngf8	139	POINT (-122.301288 37.997337)	N	Appian Way	Appain Way	Elementary and middle school location. Cars speed by on Appian Way. Need traffic slowing during school pickup/drop off.	Motor Vehicles	Speeding
6vyw8vy2ngf8	139	POINT (-122.301288 37.997337)	N	Appian Way	Appain Way	Elementary and middle school location. Cars speed by on Appian Way. Need traffic slowing during school pickup/drop off.	Motor Vehicles	School Safety
6vyw8vy2ngf8	139	POINT (-122.301288 37.997337)	N	Appian Way	Appain Way	Elementary and middle school location. Cars speed by on Appian Way. Need traffic slowing during school pickup/drop off.	Motor Vehicles	Speeding
6vyw8vy2ngf8	139	POINT (-122.301288 37.997337)	N	Appian Way	Appain Way	Elementary and middle school location. Cars speed by on Appian Way. Need traffic slowing during school pickup/drop off.	Motor Vehicles	School Safety
6vyw8vy2ngf8	140	POINT (-122.298765 37.99556)	N	Canyon Dr	Canyon Drive	Residential street at bottom of hill. Many families with young children live there. There is also a park. Cars speed down the street. Speed bumps needed	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6vyw8vy2ngf8	140	POINT (-122.298765 37.99556)	N	Canyon Dr	Canyon Drive	Residential street at bottom of hill. Many families with young children live there. There is also a park. Cars speed down the street. Speed bumps needed	Motor Vehicles	Pedestrian Safety
7ye2bdj3nuf9	142	POINT (-122.287882 38.007342)	Y	San Pablo Ave	San Pablo Ave/John St	This is a major crossing for pedestrians to the WestCat bus stop. I regularly observe cars blowing the red light as they are driving south down San Pablo Ave.	Pedestrian	Red Light Violation
7ye2bdj3nuf9	143	POINT (-122.28902 38.006549)	Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	With the opening of the East Bay Coffee shop, parking cars, pedestrians and jay walkers are crossing San Pablo Ave in heavy traffic. Cars turning north (right) onto San Pablo Ave from Pinole Vally Road make the turn quickly into the cross walk. This has created a very unsafe intersection.	Motor Vehicles	Curve unsafe
7ye2bdj3nuf9	143	POINT (-122.28902 38.006549)	Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	With the opening of the East Bay Coffee shop, parking cars, pedestrians and jay walkers are crossing San Pablo Ave in heavy traffic. Cars turning north (right) onto San Pablo Ave from Pinole Vally Road make the turn quickly into the cross walk. This has created a very unsafe intersection.	Pedestrian	Curve unsafe
8td68bze28p8	145	POINT (-122.300639 37.99341)	Y	I80	I80/ Appain Way	Very dangerous blockage of view by cars parked on Pinole Valley road at corner of Rafaela Street! View is blocked 3-5 days each week by SUV's and trucks with tinted windows so that cars flying around a blind corner may not be seen until it's too late! Even inching out is no protection! The spot nearest the corner could be saved, but the 2nd-3rd spots behind it need to be painted RED! Every resident at Pinole Grove Housing I've spoken with has commented on the terror experienced. A mere can of paint would prevent any mayhem! Please act soon! Easy solution doable and losing two spots is better than losing two lives!	Motor Vehicles	Visibility
8td68bze28p8	145	POINT (-122.300639 37.99341)	Y	I80	I80/ Appain Way	Very dangerous blockage of view by cars parked on Pinole Valley road at corner of Rafaela Street! View is blocked 3-5 days each week by SUV's and trucks with tinted windows so that cars flying around a blind corner may not be seen until it's too late! Even inching out is no protection! The spot nearest the corner could be saved, but the 2nd-3rd spots behind it need to be painted RED! Every resident at Pinole Grove Housing I've spoken with has commented on the terror experienced. A mere can of paint would prevent any mayhem! Please act soon! Easy solution doable and losing two spots is better than losing two lives!	Pedestrian	Pavement Condition
8td68bze28p8	145	POINT (-122.300639 37.99341)	Y	I80	I80/ Appain Way	Very dangerous blockage of view by cars parked on Pinole Valley road at corner of Rafaela Street! View is blocked 3-5 days each week by SUV's and trucks with tinted windows so that cars flying around a blind corner may not be seen until it's too late! Even inching out is no protection! The spot nearest the corner could be saved, but the 2nd-3rd spots behind it need to be painted RED! Every resident at Pinole Grove Housing I've spoken with has commented on the terror experienced. A mere can of paint would prevent any mayhem! Please act soon! Easy solution doable and losing two spots is better than losing two lives!	Motor Vehicles	Visibility

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
8td68bze28p8	145	POINT (-122.300639 37.99341)	Y	I80	I80/ Appain Way	Very dangerous blockage of view by cars parked on Pinole Valley road at corner of Rafaela Street! View is blocked 3-5 days each week by SUV's and trucks with tinted windows so that cars flying around a blind corner may not be seen until it's too late! Even inching out is no protection! The spot nearest the corner could be saved, but the 2nd-3rd spots behind it need to be painted RED! Every resident at Pinole Grove Housing I've spoken with has commented on the terror experienced. A mere can of paint would prevent any mayhem! Please act soon! Easy solution doable and losing two spots is better than losing two lives!	Pedestrian	Pavement Condition
29x2kkn3tl36	147	POINT (-122.302306 37.995364)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	Red light runners every single day of the week.	Motor Vehicles	Red Light Violation
29x2kkn3tl36	148	POINT (-122.301908 37.994044)	N	I80	I80/ Appain Way	People come off the ramp onto Appian Way and then cross over three lanes to go to Safeway directions, often coming close to crashing into people because they are in a hurry.	Motor Vehicles	Pedestrian Safety
2lw3g3d9kkw6	150	POINT (-122.279811 37.98414)	N	Pinole Valley Rd	Pinole Valley Rd	The stretch of road between the Simas stop sign and Ellenhorst School is like a raceway, especially Fri-Sat. Traffic does NOT stop at the crosswalk for pedestrians, cars and motorcycles driving unsafely and at excessive speeds	Pedestrian	Speeding
7dx7ubw72ni3	151	POINT (-122.288716 38.006162)	Y	Pinole Valley Rd	Pinole Vally Rd/Rafaela St	Extremely dangerous intersection as one attempts to emerge from Rafaela Street onto Pinole Valley Road due to parked cars, often SUV's with tinted windshields blocking the view south, so that inching out offers ZERO protection from getting T-boned. One marked off parked spot needs to be painted (red?) The second spot from the corner would provide a safe view. I have detailed photos and diagrams to prove my point and show my solution. Please contact me to provide evidence. Physical and financial harm await any driver due to no fault of their own, yet they'd be cited! Joel Kuechle (510) 529-4979 joelkuechle@yahoo.com. Every day=another possible calamity. One lost parking spot is better than a lost life or maiming. Please reply!	Motor Vehicles	Pavement Condition
7dx7ubw72ni3	151	POINT (-122.288716 38.006162)	Y	Pinole Valley Rd	Pinole Vally Rd/Rafaela St	Extremely dangerous intersection as one attempts to emerge from Rafaela Street onto Pinole Valley Road due to parked cars, often SUV's with tinted windshields blocking the view south, so that inching out offers ZERO protection from getting T-boned. One marked off parked spot needs to be painted (red?) The second spot from the corner would provide a safe view. I have detailed photos and diagrams to prove my point and show my solution. Please contact me to provide evidence. Physical and financial harm await any driver due to no fault of their own, yet they'd be cited! Joel Kuechle (510) 529-4979 joelkuechle@yahoo.com. Every day=another possible calamity. One lost parking spot is better than a lost life or maiming. Please reply!	Motor Vehicles	Curve unsafe
7yhi7j49jcv3	152	POINT (-122.302473 37.995165)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	People are making a right turn on RED from Tara Hill Dr to Appian way. A bright lighted sign would be helpful in getting the driver's attention	Motor Vehicles	Curve unsafe
7yhi7j49jcv3	152	POINT (-122.302473 37.995165)	Y	Tara Hills Dr	Tara Hills Dr/Canyon Dr	People are making a right turn on RED from Tara Hill Dr to Appian way. A bright lighted sign would be helpful in getting the driver's attention	Motor Vehicles	Lighting

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7yhi7j49jcv3	153	POINT (-122.294696 37.997838)	Y	Henry Ave	Henry Ave/Ridgecrest Rd	Drivers are not always stopping at the Three-way stop. I have had to be extra careful of non-stopping drivers. Maybe a stopsign warning sign 200-300 feet would alert the driver and hopefully get a positive reaction. I have seen many times drivers make a right onto Henry Ave from Ridgecrest without stopping, I would hate to be the person crossing the street	Pedestrian	Pedestrian Safety
7yhi7j49jcv3	153	POINT (-122.294696 37.997838)	Y	Henry Ave	Henry Ave/Ridgecrest Rd	Drivers are not always stopping at the Three-way stop. I have had to be extra careful of non-stopping drivers. Maybe a stopsign warning sign 200-300 feet would alert the driver and hopefully get a positive reaction. I have seen many times drivers make a right onto Henry Ave from Ridgecrest without stopping, I would hate to be the person crossing the street	Pedestrian	Speeding
3f8vw33j2a74	154	POINT (-122.291617 38.006609)	Y	Tennet Avenue	Tennent Ave/Park St	Drivers traveling northbound on Tennent ave. often do not see pedestrians crossing in the crosswalk from Park st. towards Fernandez park. I have almost been hit two times while legally crossing in the crosswalk and have seen dozens of cars completely roll through the stop sign without looking left. I think it's because drivers are bad at three way stops, four way stops they look both ways, but for some reason at three way stops they don't look left/right. I suggest better signage for pedestrians with a button to trigger flashing lights, like many towns/cities have.	Pedestrian	Speeding
3f8vw33j2a74	154	POINT (-122.291617 38.006609)	Y	Tennet Avenue	Tennent Ave/Park St	Drivers traveling northbound on Tennent ave. often do not see pedestrians crossing in the crosswalk from Park st. towards Fernandez park. I have almost been hit two times while legally crossing in the crosswalk and have seen dozens of cars completely roll through the stop sign without looking left. I think it's because drivers are bad at three way stops, four way stops they look both ways, but for some reason at three way stops they don't look left/right. I suggest better signage for pedestrians with a button to trigger flashing lights, like many towns/cities have.	Pedestrian	Pedestrian Safety
29ep2c23i9f3	155	POINT (-122.288178 38.00408)	N	Pinole Valley Rd	Pinole Valley Rd	Pedestrian Safety Issue: Limited visibility for pedestrians/bikers crossing the street from the Pinole Creek Bridge side. Cars speeding down Pinole Valley Road add to this concern.	Pedestrian	Speeding
29ep2c23i9f3	155	POINT (-122.288178 38.00408)	N	Pinole Valley Rd	Pinole Valley Rd	Pedestrian Safety Issue: Limited visibility for pedestrians/bikers crossing the street from the Pinole Creek Bridge side. Cars speeding down Pinole Valley Road add to this concern.	Pedestrian	Visibility
4sn7psp7vbi7	156	POINT (-122.289997 38.00424)	N	Tennet Avenue	Tennent Ave	No stop sign to allow families to cross the street safely or flashing lights to let speeding cars know there are kids in the crosswalk. It's so close to the school and I've personally have had close encounters with speeding cars while trying to cross.	Pedestrian	Pedestrian Safety
4sn7psp7vbi7	156	POINT (-122.289997 38.00424)	N	Tennet Avenue	Tennent Ave	No stop sign to allow families to cross the street safely or flashing lights to let speeding cars know there are kids in the crosswalk. It's so close to the school and I've personally have had close encounters with speeding cars while trying to cross.	Pedestrian	Speeding
2hu6886xex87	157	POINT (-122.270208 37.981354)	Y	San Pablo Ave	Savage Ave/ Pinole Valley Rd	Speeding traffic at crosswalk to PV Park	Pedestrian	Speeding
2hu6886xex87	158	POINT (-122.308003 38.005169)	N	San Pablo Ave	San Pablo Ave	Uncontrolled Crosswalk makes crossing the street very dangerous	Pedestrian	Speeding
2hu6886xex87	159	POINT (-122.298553 38.004345)	Y	Pinole Valley Rd	Pinole Ave/San Pablo Ave	Southbound Pinion needs its own through light, northbound Appian left turn lane is uncontrolled	Pedestrian	Lighting
2hu6886xex87	159	POINT (-122.298553 38.004345)	Y	Pinole Valley Rd	Pinole Ave/San Pablo Ave	Southbound Pinion needs its own through light, northbound Appian left turn lane is uncontrolled	Motor Vehicles	Lighting
6s9tar3hd93a	160	POINT (-122.285795 37.994288)	N	Pinole Valley Rd	Pinole Valley Rd	Lord help anyone trying to get out of this center if anything happens	Pedestrian	Speeding

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6s9tar3hd93a	160	POINT (-122.285795 37.994288)	N	Pinole Valley Rd	Pinole Valley Rd	Lord help anyone trying to get out of this center if anything happens	Motor Vehicles	Speeding
3euu9rtd9bf4	161	POINT (-122.308037 38.005238)	Y	San Pablo Ave	San Pablo Ave/Meadow Ave	A lot of times drivers don't see pedestrians crossing the street here. A crosswalk alert system would be great here.	Pedestrian	Pedestrian Safety
3euu9rtd9bf4	162	POINT (-122.299351 38.001685)	Y	Marlesta Rd	Marlesta Road/Appian Way	This crosswalk needs lights. Or maybe even a stop sign at this intersection, people drive entirely too fast on this stretch of Appian way. I've nearly been hit more than once crossing the street here.	Pedestrian	Speeding
4r4uwl7bbl33	163	POINT (-122.266025 37.982201)	Y	Simas Ave	Simas Ave/Remuda Way	Making this intersection a 3-way stop sign. There has been accidents due to poor visibility when making a left turn onto Simas Ave.	Motor Vehicles	Curve unsafe
4r4uwl7bbl33	163	POINT (-122.266025 37.982201)	Y	Simas Ave	Simas Ave/Remuda Way	Making this intersection a 3-way stop sign. There has been accidents due to poor visibility when making a left turn onto Simas Ave.	Pedestrian	Curve unsafe
64v9rg926v27	164	POINT (-122.264968 37.980188)	Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	The stop sign is constantly neglected. Cars drive above the speed limit (circa 60 mph) emanating from this intersection heading out of town towards Alhambra. A few individuals use this intersection as well as the nearby parking lot of the soccer field to spin donuts or to have slideshow activities. Because this location is in the heart of the valley, the toxic smoke completely blocks 100% of the visibility. Also, the toxic smoke enters into the nearby homes creating a toxic environmental hazard.	Motor Vehicles	Stop Sign Violation
64v9rg926v27	165	POINT (-122.280675 37.984808)	Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	The intersection of Pinole Valley Road and Simas has a left turn only lane. Cars continually use the left lane to continue straight on Pinole Valley Road creating a very hazardous condition as two cars must merge into one lane, in thee intersection and creates a hazard for the vehicle that has thee right of way. Similarly, the car that does not have the right of way is forced to move into the oncoming traffic lane.	Motor Vehicles	Intersection Safety
64v9rg926v27	166	POINT (-122.285744 37.996702)	N	Pinole Valley Rd	Pinole Valley Rd/I80	The two lanes that merge into three lanes heading towards the two freeway entrances is not very clear for many motorists. Dotted stripe through the intersection is not very visible. Cars still battle for the center lane through the underpass.	Motor Vehicles	Pavement Condition
669tdd2m32z8	167	POINT (-122.298568 38.004386)	Y	Pinole Valley Rd	Pinole Ave/San Pablo Ave	Adjust traffic light to delay Eastbound traffic (hill and blind spot) from merging into oncoming traffic going westbound and turning left onto San Pablo Ave.	Motor Vehicles	Lighting
669tdd2m32z8	168	POINT (-122.298154 38.004168)	N	San Pablo Ave	San Pablo Ave	Move the bus stop further down to the next block. Bus is obstructing visibility for oncoming traffic (numerous collisions) merging from San Pablo Ave. and Appian Way heading North.	Motor Vehicles	Visibility
669tdd2m32z8	168	POINT (-122.298154 38.004168)	N	San Pablo Ave	San Pablo Ave	Move the bus stop further down to the next block. Bus is obstructing visibility for oncoming traffic (numerous collisions) merging from San Pablo Ave. and Appian Way heading North.	Transit	Visibility
3y9ddk2fls44	169	POINT (-122.283001 38.002507)	Y	Alice Way	Alice Way/Henry Ave	Cars running through store sign.	Motor Vehicles	Stop Sign Violation
3y9ddk2fls44	170	POINT (-122.281762 38.003608)	N	Alice Way	Alice Way	Cars parking on corners block view around winding roadways	Motor Vehicles	Visibility
3y9ddk2fls44	171	POINT (-122.282992 38.001872)	N	Henry Ave	Henry Ave	Cars driving too fast on downhill around winding road often around service vehicles	Motor Vehicles	Speeding
3y9ddk2fls44	172	POINT (-122.286703 38.00005)	N	Pinole Valley Rd	Pinole Valley Rd	Traffic back ups during commute	Motor Vehicles	Traffic Congestion
3y9ddk2fls44	173	POINT (-122.286262 37.998288)	N	Pinole Valley Rd	Near Pinole Valley Rd	Line to Starbucks backs up but trying to prevent patrons going in this way makes no sense. This is the main access for Pinole citizens	Motor Vehicles	Traffic Congestion
3y9ddk2fls44	174	POINT (-122.286712 38.000134)	N	Pinole Valley Rd	Pinole Valley Rd	Traffic bAckup during commit hours	Motor Vehicles	Traffic Congestion
3y9ddk2fls44	175	POINT (-122.289649 37.998897)	N	Henry Ave	Henry Ave	Increased traffic on this road since Sprouts opened.	Motor Vehicles	Traffic Congestion
3y9ddk2fls44	176	POINT (-122.294537 37.997848)	N	Henry Ave	Henry Ave	Drivers running stop sign	Motor Vehicles	Stop Sign Violation

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
3y9ddk2fls44	178	POINT (-122.293583 38.006673)	N	Buena Vista Dr	Buena Vista Dr	People come from Emma and turn right onto Alice without stopping. There is. Curve so they cannot see oncoming cars. Lots of near misses.	Motor Vehicles	Curve unsafe
8vs869rub4n3	179	POINT (-122.285627 37.995215)	N	Fraser Court	Pinole Valley Rd	Between school letting and commuters coming from San Pablo dam road the traffic is horrible. Just about everyone blocks the intersection	Motor Vehicles	Traffic Congestion
93cpm2bt9th6	180	POINT (-122.29076 38.005537)	Y	Estates Ave	Sab Pablo Ave/ Tennent Ave	Pedestrians crossing north (toward Tina's) from this corner are in the blind spot (caused by roof support at corner of windshield) of vehicles turning left from Tennant (by antlers) into northbound San Pablo Ave.	Pedestrian	Pedestrian Safety
93cpm2bt9th6	180	POINT (-122.29076 38.005537)	Y	Estates Ave	Sab Pablo Ave/ Tennent Ave	Pedestrians crossing north (toward Tina's) from this corner are in the blind spot (caused by roof support at corner of windshield) of vehicles turning left from Tennant (by antlers) into northbound San Pablo Ave.	Pedestrian	Curve unsafe
2mc62nle7a49	182	POINT (-122.289099 38.006601)	Y	Victor St	Pinole Valley Rd/ San Pablo Ave	Patrons running across the street and motorists attempting to park in front of or near East Bay Coffee	Motor Vehicles	Traffic Congestion
2mc62nle7a49	183	POINT (-122.289099 38.006484)	Y	Diablo Ct	Pinole Valley Rd/ San Pablo Ave	Motorists rushing and patrons leaving East Bay Coffee in attempts to get to their vehicles parked across the street, in front of or nearby. Sometimes while haphazardly walking with hot coffee and cell phone. Dangerous intersection.	Pedestrian	Traffic Congestion
23zy2fc3wrw3	184	POINT (-122.294925 38.006925)	Y	Quinan St	Summit Dr/ Buena Vista Dr	No one stops at this stop sign when coming from summit to Buenavista, and many coming from Buenavista come very fast and cut the corner when entering Summit. I suggest a speed bump on the summit drive segment, two or three car-lengths west of the Buenavista intersection.	Motor Vehicles	Speeding
23zy2fc3wrw3	184	POINT (-122.294925 38.006925)	Y	Helena Ct	Summit Dr/ Buena Vista Dr	No one stops at this stop sign when coming from summit to Buenavista, and many coming from Buenavista come very fast and cut the corner when entering Summit. I suggest a speed bump on the summit drive segment, two or three car-lengths west of the Buenavista intersection.	Motor Vehicles	Stop Sign Violation
9zf9ce2km8i9	185	POINT (-122.268163 37.988166)	Y	Shawn Dr	Tamalpais Dr/Mendocino Dr	People commonly run the stop sign. Both streets have considerable traffic.	Motor Vehicles	Stop Sign Violation
9zf9ce2km8i9	186	POINT (-122.268257 37.990689)	Y	Goularte Dr	Goularte Dr/Mendocino Dr	People run the stop sign on Mendocino often. This is the main entrance to this major housing development, and the traffic on Goulart moves at a higher speed.	Motor Vehicles	Speeding
9zf9ce2km8i9	186	POINT (-122.268257 37.990689)	Y	Goularte Dr	Goularte Dr/Mendocino Dr	People run the stop sign on Mendocino often. This is the main entrance to this major housing development, and the traffic on Goulart moves at a higher speed.	Motor Vehicles	Stop Sign Violation
7ib7vp6m2cra	189	POINT (-122.291575 38.006549)	Y	Tennet Avenue	Tennant Ave/ Park St	Whole road is bumpy & needs to be repaved and smooth.	Motor Vehicles	Pavement Condition
7ib7vp6m2cra	189	POINT (-122.291575 38.006549)	Y	Tennet Avenue	Tennant Ave/ Park St	Whole road is bumpy & needs to be repaved and smooth.	Pedestrian	Pavement Condition
7ib7vp6m2cra	189	POINT (-122.291575 38.006549)	Y	Tennet Avenue	Tennant Ave/ Park St	Whole road is bumpy & needs to be repaved and smooth.	Bicycle	Pavement Condition
7ib7vp6m2cra	190	POINT (-122.290335 38.004766)	Y	Tennet Avenue	Tennent Ave/ Pear St	Whole road is bumpy & needs to be repaved and smooth. Was paved in 2020 & I see no difference! Still bumpy and feels like ur off roading. Roads need to be straight and smooth.	Motor Vehicles	Pavement Condition
7ib7vp6m2cra	190	POINT (-122.290335 38.004766)	Y	Tennet Avenue	Tennent Ave/ Pear St	Whole road is bumpy & needs to be repaved and smooth. Was paved in 2020 & I see no difference! Still bumpy and feels like ur off roading. Roads need to be straight and smooth.	Pedestrian	Pavement Condition
7ib7vp6m2cra	190	POINT (-122.290335 38.004766)	Y	Tennet Avenue	Tennent Ave/ Pear St	Whole road is bumpy & needs to be repaved and smooth. Was paved in 2020 & I see no difference! Still bumpy and feels like ur off roading. Roads need to be straight and smooth.	Bicycle	Pavement Condition
7ib7vp6m2cra	191	POINT (-122.28571 37.995634)	N	Pinole Valley Rd	Pinole Valley Rd	Potholes in this intersection.	Motor Vehicles	Pavement Condition
7ib7vp6m2cra	191	POINT (-122.28571 37.995634)	N	Pinole Valley Rd	Pinole Valley Rd	Potholes in this intersection.	Pedestrian	Pavement Condition
7ib7vp6m2cra	191	POINT (-122.28571 37.995634)	N	Pinole Valley Rd	Pinole Valley Rd	Potholes in this intersection.	Bicycle	Pavement Condition
7ib7vp6m2cra	192	POINT (-122.285685 37.996662)	N	Pinole Valley Rd	Pinole Valley Rd	Again road is bumpy with potholes. Don't understand why Pinole roads are bumpy and not smooth as other cities (Walnut Creek for example)	Motor Vehicles	Pavement Condition

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7ib7vp6m2cra	192	POINT (-122.285685 37.996662)	N	Pinole Valley Rd	Pinole Valley Rd	Again road is bumpy with potholes. Don't understand why Pinole roads are bumpy and not smooth as other cities (Walnut Creek for example)	Pedestrian	Pavement Condition
7ib7vp6m2cra	192	POINT (-122.285685 37.996662)	N	Pinole Valley Rd	Pinole Valley Rd	Again road is bumpy with potholes. Don't understand why Pinole roads are bumpy and not smooth as other cities (Walnut Creek for example)	Bicycle	Pavement Condition
6ba4y6opk2k6	193	POINT (-122.276051 37.985689)	N	Simas Ave	Simas Ave	Many vehicles rush through this stop sign without stopping. There is a daycare on Simas and I walk everyday morning at 8am and evening at 5:30pm to drop off and pick up my children. There are numerous instances where the vehicles drive past without stopping. I was almost hit twice while walking across the street within the parameters of the street walking lines. Please put a blinking stop sign here.	Pedestrian	Stop Sign Violation
6ba4y6opk2k6	194	POINT (-122.270093 37.981367)	N	Pinole Valley Rd	Pinole Valley Rd	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light or timed street light for pedestrian safety.	Pedestrian	Lighting
6ba4y6opk2k6	194	POINT (-122.270093 37.981367)	N	Pinole Valley Rd	Pinole Valley Rd	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light or timed street light for pedestrian safety.	Pedestrian	Speeding
6ba4y6opk2k6	194	POINT (-122.270093 37.981367)	N	Pinole Valley Rd	Pinole Valley Rd	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light or timed street light for pedestrian safety.	Pedestrian	Pedestrian Safety
6ba4y6opk2k6	195	POINT (-122.268015 37.981482)	Y	Pinole Valley Rd	Pinole Valley Rd/ Monte Verde Dr	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light along the walking paint for pedestrian safety.	Pedestrian	Lighting
6ba4y6opk2k6	195	POINT (-122.268015 37.981482)	Y	Pinole Valley Rd	Pinole Valley Rd/ Monte Verde Dr	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light along the walking paint for pedestrian safety.	Pedestrian	Speeding
6ba4y6opk2k6	195	POINT (-122.268015 37.981482)	Y	Pinole Valley Rd	Pinole Valley Rd/ Monte Verde Dr	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light along the walking paint for pedestrian safety.	Pedestrian	Pedestrian Safety
6ba4y6opk2k6	196	POINT (-122.266493 37.981153)	Y	Simas Ave	Simas Ave/ Pinole Valley Rd	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light along the walking paint for pedestrian safety.	Pedestrian	Lighting
6ba4y6opk2k6	196	POINT (-122.266493 37.981153)	Y	Simas Ave	Simas Ave/ Pinole Valley Rd	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light along the walking paint for pedestrian safety.	Pedestrian	Speeding

Respondent ID	#	Lat Long	Intersect on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6ba4y6opk2k6	196	POINT (-122.266493 37.981153)	Y	Simas Ave	Simas Ave/ Pinole Valley Rd	This is a highly footed traffic area for walkers, joggers and those going to the park. The vehicles crossing Pinole Valley Road often drive too fast and do not stop even if there are pedestrians waiting to cross. Please put in a flashing light along the walking paint for pedestrian safety.	Pedestrian	Pedestrian Safety
7ms8rtp7mfx8	197	POINT (-122.299327 38.001664)	N	Appian Way	Appain Way	This area needs flashing lights or something to alert drivers someone needs to cross. I've witnessed multiple people almost get hit here.	Pedestrian	Lighting
7ms8rtp7mfx8	198	POINT (-122.302143 37.993501)	N	Appian Way	Appain Way	Something needs to be done to protect this guardrail from having cars hit it and go off onto the freeway. Over the years it's happened numerous times and just fixed back the way it was before someone hit it.	Motor Vehicles	Speeding
8esa7ycn8r76	199	POINT (-122.285856 37.996838)	N	Pinole Valley Rd	Pinole Valley Rd	People from the right straight line merging into turning lane	Motor Vehicles	Curve unsafe
8esa7ycn8r76	200	POINT (-122.287752 37.989841)	N	Shea Dr	Shea Dr	Stop sign needed for kids to cross	Pedestrian	Pedestrian Safety
2j47fxg2tw77	201	POINT (-122.28325 37.986611)	N	Pinole Valley Rd	Pinole Valley Rd	A large pickup-truck with trailer is consistently parked here with an additional trailer a few houses down from this location. Trailers are often times filled with junk. Other than giving the neighborhood a trashy look obscure the view for people trying to enter traffic safely.	Motor Vehicles	Visibility
2j47fxg2tw77	201	POINT (-122.28325 37.986611)	N	Pinole Valley Rd	Pinole Valley Rd	A large pickup-truck with trailer is consistently parked here with an additional trailer a few houses down from this location. Trailers are often times filled with junk. Other than giving the neighborhood a trashy look obscure the view for people trying to enter traffic safely.	Motor Vehicles	Large Trucks
4t3ukz7yzl63	202	POINT (-122.28666 38.00467)	N	Fraser Court	Fraser Court	If Linda Heights needs to be evacuated in an emergency, this gate should be able to be opened REMOTELY from the Pinole Dispatch center providing an additional pathway to safety.	Pedestrian	Pavement Condition
4vb6kox2pyb8	204	POINT (-122.285741 37.996961)	N	Pinole Valley Rd	Pinole Valley Rd	The on-/off-ramps intersection is not efficient. It is the choke-point and causes back-up all the way to Ramona during some parts of the day. Need a right-turn lane onto EB 80. Better signage/lane striping for getting into the two left turn lanes to WB 80 from one lane. Drivers don't always understand there are two left-turn lanes and don't go through the intersection when one lane is full (and one open).	Motor Vehicles	Traffic Congestion
4vb6kox2pyb8	204	POINT (-122.285741 37.996961)	N	Pinole Valley Rd	Pinole Valley Rd	The on-/off-ramps intersection is not efficient. It is the choke-point and causes back-up all the way to Ramona during some parts of the day. Need a right-turn lane onto EB 80. Better signage/lane striping for getting into the two left turn lanes to WB 80 from one lane. Drivers don't always understand there are two left-turn lanes and don't go through the intersection when one lane is full (and one open).	Motor Vehicles	Intersection Safety
4vb6kox2pyb8	205	POINT (-122.285774 37.995608)	Y	Pinole Valley Rd	Pinole Valley Rd/ Estates Ave	Left turn pocket to Estates Ave fills up. One problem is that drivers often don't pull forward far enough, thus drivers can't get into the left turn pocket and wait in the though-lane, backing it up. Can you add signage that tells drivers to pull forward in the left turn pocket?	Motor Vehicles	Traffic Congestion
4vb6kox2pyb8	205	POINT (-122.285774 37.995608)	Y	Pinole Valley Rd	Pinole Valley Rd/ Estates Ave	Left turn pocket to Estates Ave fills up. One problem is that drivers often don't pull forward far enough, thus drivers can't get into the left turn pocket and wait in the though-lane, backing it up. Can you add signage that tells drivers to pull forward in the left turn pocket?	Motor Vehicles	Intersection Safety
4vb6kox2pyb8	206	POINT (-122.286486 37.997745)	Y	Pinole Valley Rd	Pinole Valley Rd	The red-light running through-out the city is out of control. Need to crack down.	Motor Vehicles	Red Light Violation

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
4vb6kox2pyb8	207	POINT (-122.284907 37.988841)	Y	Pinole Valley Rd	Pinole Valley Rd/ Granagda Ct	Need to eliminate the new left-turn pockets to Shea and Granada. These lanes take up too much road width. There is no shoulder and the through traffic is too close to pedestrians on the sidewalk.	Motor Vehicles	Pedestrian Safety
6hkm7ndf9xg3	209	POINT (-122.283016 37.994249)	N	Estates Ave	Estates Ave	There is a light pole but no street light at this point on Estates Ave. There is a speed bump close to it. Having a street light on the electric pole will make it easier to see the speed bump.	Motor Vehicles	Lighting
6hkm7ndf9xg3	209	POINT (-122.283016 37.994249)	N	Estates Ave	Estates Ave	There is a light pole but no street light at this point on Estates Ave. There is a speed bump close to it. Having a street light on the electric pole will make it easier to see the speed bump.	Motor Vehicles	Visibility
69l8e2wkl9xa	210	POINT (-122.298493 38.004317)	Y	Pinole Valley Rd	Pinole Ave/San Pablo Ave	There are no turn lights and we live in the area off of Piñon. We almost get hit everytime we drive straight onto Appian so please put in a turn light arrow in both directions on the Appian, Piñon axis. There is one on San Pablo in both directions but the Piñon Appian drive is risking our lives daily.	Pedestrian	Pedestrian Safety
69l8e2wkl9xa	210	POINT (-122.298493 38.004317)	Y	Pinole Valley Rd	Pinole Ave/San Pablo Ave	There are no turn lights and we live in the area off of Piñon. We almost get hit everytime we drive straight onto Appian so please put in a turn light arrow in both directions on the Appian, Piñon axis. There is one on San Pablo in both directions but the Piñon Appian drive is risking our lives daily.	Pedestrian	Lighting
4gt6bk8jad44	211	POINT (-122.264987 37.98026)	Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	NO ONE stops at this stop sign at the corner of Wright Avenue and PV Road. Very dangerous for pedestrians crossing the street here because it is a blind corner.	Motor Vehicles	Stop Sign Violation
2o9jxz7dcx39	212	POINT (-122.285726 37.995749)	N	Pinole Valley Rd	Pinole Valley Rd	Very poorly designed intersection with many people ignoring traffic laws to yield to uphill traffic and not turn left towards I-80 in front of traffic coming downhill on Estates. All directions continuously block intersection/run red lights, etc and do not utilize the middle lane under I=80 for left turn, instead blocking the intersection	Motor Vehicles	Red Light Violation
2o9jxz7dcx39	212	POINT (-122.285726 37.995749)	N	Pinole Valley Rd	Pinole Valley Rd	Very poorly designed intersection with many people ignoring traffic laws to yield to uphill traffic and not turn left towards I-80 in front of traffic coming downhill on Estates. All directions continuously block intersection/run red lights, etc and do not utilize the middle lane under I=80 for left turn, instead blocking the intersection	Motor Vehicles	Intersection Safety
2o9jxz7dcx39	212	POINT (-122.285726 37.995749)	N	Pinole Valley Rd	Pinole Valley Rd	Very poorly designed intersection with many people ignoring traffic laws to yield to uphill traffic and not turn left towards I-80 in front of traffic coming downhill on Estates. All directions continuously block intersection/run red lights, etc and do not utilize the middle lane under I=80 for left turn, instead blocking the intersection	Motor Vehicles	Traffic Congestion
2o9jxz7dcx39	213	POINT (-122.265381 37.98035)	N	Pinole Valley Rd	Pinole Valley Rd	constant stop sign runners, if area were more frequently patrolled and up Wright ave at Carol St., same thing. Ticketing income would triple if stop sign runs and speeders were tagged.	Motor Vehicles	Stop Sign Violation
2o9jxz7dcx39	214	POINT (-122.301025 37.991931)	Y	I80	I80/Appain Way	People not realizing both right lanes turn onto I-80 and trying to cut you off making the Fitzgerald left turn and pushing into the far right I-80 entrance land, there are two lanes for this.	Motor Vehicles	Curve Unsafe
2o9jxz7dcx39	215	POINT (-122.277733 37.993458)	N	Ponderosa Trail	Ponderosa Trail	more trespassing than traffic. our HOA had the curb at top of Ponderosa Trail painted red to avoid loiterers there and we are always seeing people parked up there, not just to quickly enjoy the sunset, but eating, doing whatever, and dumping their trash & fast food garbage on our HOA property.	Motor Vehicles	Pavement Condition
99mkf6cn7fz3	216	POINT (-122.284057 37.98735)	N	Pinole Valley Rd	Pinole Valley Rd	Too much speeding. Have witnessed drivers going past cars on the right side of the road near the sidewalk, while speeding down Pinole Valley Road and running the Red Lights.	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersect on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
99mkf6cn7fz3	218	POINT (-122.259505 37.980467)	N	Doidge Ave	Doidge Ave	Speeding and running the Stop Sign	Motor Vehicles	Stop Sign Violation
99mkf6cn7fz3	218	POINT (-122.259505 37.980467)	N	Doidge Ave	Doidge Ave	Speeding and running the Stop Sign	Motor Vehicles	Speeding
99mkf6cn7fz3	218	POINT (-122.259505 37.980467)	N	Doidge Ave	Doidge Ave	Speeding and running the Stop Sign	Motor Vehicles	Speeding
99mkf6cn7fz3	219	POINT (-122.260906 37.984169)	N	Victor St	Victor St	Too much speeding on Wright Avenue. Cars not stopping for Stop Signs	Motor Vehicles	Stop Sign Violation
99mkf6cn7fz3	220	POINT (-122.275076 37.986182)	N	Diablo Ct	Diablo Ct	Speeding	Motor Vehicles	Speeding
99mkf6cn7fz3	221	POINT (-122.283974 38.009555)	N	San Pablo Ave	San Pablo Ave	Too much speeding and cutting in and out of traffic without regard for the other cars	Motor Vehicles	Speeding
8wl878dnw7b8	223	POINT (-122.292689 38.006618)	N	Quinan St	Quinan St	No traffic related concern but road needs to be repaved, rough pavement.	Motor Vehicles	Pavement Condition
8wl878dnw7b8	224	POINT (-122.285959 37.996548)	N	Pinole Valley Rd	Pinole Valley Rd/180	Right turn NEEDS to be a "NO TURN ON RED" I have seen too many accidents here due too the fact at traffic turning right into Pinole valley rd exiting I-80 E cannot see oncoming traffic from the left side of Pinole valley Rd.	Motor Vehicles	Curve Unsafe
8fi8bee7wop6	225	POINT (-122.301475 37.9973)	Y	Appian Way	Appian Way/ Mann Drive	The addition of WCMS to pinole middle school has created traffic congestion. We need help reworking the turn signal to Mann Dr and adding crosswalks closer to the school	Motor Vehicles	School Safety
8fi8bee7wop6	225	POINT (-122.301475 37.9973)	Y	Appian Way	Appian Way/ Mann Drive	The addition of WCMS to pinole middle school has created traffic congestion. We need help reworking the turn signal to Mann Dr and adding crosswalks closer to the school	Motor Vehicles	Lighting
7iv6mhh6rlc4	226	POINT (-122.285511 37.995942)	N	Pinole Valley Rd	Pinole Valley Rd	No bike lanes, lots of cars pulling in and out of shopping areas without checking for bikes	Bicycle	Bicycle Safety
7iv6mhh6rlc4	227	POINT (-122.286006 37.99718)	N	Pinole Valley Rd	Pinole Valley Rd	Difficult and dangerous to navigate on a bike	Bicycle	Bicycle Safety
7iv6mhh6rlc4	228	POINT (-122.287366 38.001516)	N	Pinole Valley Rd	Pinole Valley Rd	No bike lane, only one travel lane and cars often parked on the curb forcing bikes into the travel lane	Bicycle	Bicycle Safety
7iv6mhh6rlc4	229	POINT (-122.288159 38.004499)	N	Pinole Valley Rd	Pinole Valley Rd	Cars going fast, cars parked in shoulder forcing bikes into the travel lane	Bicycle	Speeding
7iv6mhh6rlc4	229	POINT (-122.288159 38.004499)	N	Pinole Valley Rd	Pinole Valley Rd	Cars going fast, cars parked in shoulder forcing bikes into the travel lane	Bicycle	Bicycle Safety
7iv6mhh6rlc4	230	POINT (-122.28794 38.007316)	Y	San Pablo Ave	San Pablo Ave/John St	No bike lane	Bicycle	Bicycle Safety
7iv6mhh6rlc4	231	POINT (-122.286181 38.008343)	N	San Pablo Ave	San Pablo Ave	No bike lane, this is practically a highway with wide lanes and cars traveling at high speeds	Bicycle	Speeding
7iv6mhh6rlc4	231	POINT (-122.286181 38.008343)	N	San Pablo Ave	San Pablo Ave	No bike lane, this is practically a highway with wide lanes and cars traveling at high speeds	Bicycle	Bicycle Safety
7iv6mhh6rlc4	232	POINT (-122.279678 38.011713)	N	San Pablo Ave	San Pablo Ave	Extremely narrow bike lane often with debris, this is practically a highway with wide lanes and cars traveling at high speeds	Motor Vehicles	Road too Narrow
7iv6mhh6rlc4	232	POINT (-122.279678 38.011713)	N	San Pablo Ave	San Pablo Ave	Extremely narrow bike lane often with debris, this is practically a highway with wide lanes and cars traveling at high speeds	Motor Vehicles	Speeding
7iv6mhh6rlc4	233	POINT (-122.298628 37.986998)	N	Appian Way	Appian Way	cars parked in shoulder forcing bikes into the travel lane	Bicycle	Speeding
7iv6mhh6rlc4	233	POINT (-122.298628 37.986998)	N	Appian Way	Appian Way	cars parked in shoulder forcing bikes into the travel lane	Bicycle	Bicycle Safety
7r8eh79328n8	234	POINT (-122.301784 37.997486)	N	Mann Dr	Mann Dr	There is so much foot and car traffic here due to two schools at the same site. There needs to be crosswalks put in across from the entries into the school on Mann Dr. There also needs to be more parking available along appian way. There is a huge congestion and safety issue here.	Pedestrian	School Safety
7r8eh79328n8	234	POINT (-122.301784 37.997486)	N	Mann Dr	Mann Dr	There is so much foot and car traffic here due to two schools at the same site. There needs to be crosswalks put in across from the entries into the school on Mann Dr. There also needs to be more parking available along appian way. There is a huge congestion and safety issue here.	Pedestrian	Pedestrian Safety
46v49672tud8	235	POINT (-122.303612 37.998062)	N	Mann Dr	Mann Dr	Should not allow cars turning left into driveway from Mann - should be one way traffic into school driveway	Motor Vehicles	School Safety
46v49672tud8	236	POINT (-122.302433 37.997557)	N	Mann Dr	Mann Dr	Need a crosswalk and consistent timed crossing for pedestrians, cars on Mann, and cars coming out of school driveway	Pedestrian	Pedestrian Safety
8m9344atn2r8	237	POINT (-122.28205 37.985858)	N	Pinole Valley Rd	Pinole Valley Rd	Speeding/drag racing	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6k8i2agw6ha3	238	POINT (-122.260168 37.978155)	N	Pinole Valley Rd	Pinole Valley Rd	Speeding, cars passing each other by crossing over the double yellow line, this is a major bike and pedestrian route and people are at risk, property damage resulting from vehicle accidents, large industrial size trucks use this small country road that is not designed to handle the heavy loads causing the ground to shudder as they go by resulting in property damage to the homes adjacent to the street.	Motor Vehicles	Speeding
6k8i2agw6ha3	238	POINT (-122.260168 37.978155)	N	Pinole Valley Rd	Pinole Valley Rd	Speeding, cars passing each other by crossing over the double yellow line, this is a major bike and pedestrian route and people are at risk, property damage resulting from vehicle accidents, large industrial size trucks use this small country road that is not designed to handle the heavy loads causing the ground to shudder as they go by resulting in property damage to the homes adjacent to the street.	Motor Vehicles	Industrial Safety
6k8i2agw6ha3	238	POINT (-122.260168 37.978155)	N	Pinole Valley Rd	Pinole Valley Rd	Speeding, cars passing each other by crossing over the double yellow line, this is a major bike and pedestrian route and people are at risk, property damage resulting from vehicle accidents, large industrial size trucks use this small country road that is not designed to handle the heavy loads causing the ground to shudder as they go by resulting in property damage to the homes adjacent to the street.	Motor Vehicles	Large Trucks
97pln2uj3gv6	239	POINT (-122.284787 37.988641)	N	Helena Ct	Helena Ct	Huge safety concern. There is a utility pole in the middle of the sidewalk. It blocks wheelchairs users and they cannot access the sidewalk cutout. This obstacle causes the wheelchair user to have to drive in the street.	Pedestrian	Visibility
97pln2uj3gv6	240	POINT (-122.28485 37.989361)	N	Estrella Ct	Estrella Ct	Dangerous safety concern regarding accessibility for wheelchair users. There is a utility pole in the middle of the sidewalk. This obstacle results in the wheelchair user having to drive in the street and not being able to access the sidewalk cutout.	Pedestrian	Pedestrian Safety
97pln2uj3gv6	240	POINT (-122.28485 37.989361)	N	Estrella Ct	Estrella Ct	Dangerous safety concern regarding accessibility for wheelchair users. There is a utility pole in the middle of the sidewalk. This obstacle results in the wheelchair user having to drive in the street and not being able to access the sidewalk cutout.	Pedestrian	Visibility
67jhi3p7z7sa	241	POINT (-122.289988 38.004299)	Y	Tennet Avenue	Tennent Ave/ Plum St	There is a school on Plum street, it is very busy during mornings and afternoon. Cars DO NOT stop for the parents or kids. There needs to be a stop sign or flashing lights installed to help pedestrians cross the street. Cars speed down Tennent, something needs to be done in order to prevent a horrible accident from happening. This area also needs to be policed in the mornings. The parents disregard the No Left turn and tickets need to be issued. This causes a bigger traffic jam with parents not following the No left turn on Plum during morning and afternoon hours of school.	Motor Vehicles	School Safety
67jhi3p7z7sa	241	POINT (-122.289988 38.004299)	Y	Tennet Avenue	Tennent Ave/ Plum St	There is a school on Plum street, it is very busy during mornings and afternoon. Cars DO NOT stop for the parents or kids. There needs to be a stop sign or flashing lights installed to help pedestrians cross the street. Cars speed down Tennent, something needs to be done in order to prevent a horrible accident from happening. This area also needs to be policed in the mornings. The parents disregard the No Left turn and tickets need to be issued. This causes a bigger traffic jam with parents not following the No left turn on Plum during morning and afternoon hours of school.	Pedestrian	Stop Sign Violation

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
67jhi3p7z7sa	241	POINT (-122.289988 38.004299)	Y	Tennet Avenue	Tennent Ave/ Plum St	There is a school on Plum street, it is very busy during mornings and afternoon. Cars DO NOT stop for the parents or kids. There needs to be a stop sign or flashing lights installed to help pedestrians cross the street. Cars speed down Tennent, something needs ti be done in order to prevent a horrible accident from happening. This area also needs to be policed in the mornings. The parents disregard the No Left turn and tickets need to be issued. This causes a bigger traffic jam with parents not following the No left turn on Plum during morning and afternoon hours of school.	Motor Vehicles	School Safety
67jhi3p7z7sa	241	POINT (-122.289988 38.004299)	Y	Tennet Avenue	Tennent Ave/ Plum St	There is a school on Plum street, it is very busy during mornings and afternoon. Cars DO NOT stop for the parents or kids. There needs to be a stop sign or flashing lights installed to help pedestrians cross the street. Cars speed down Tennent, something needs ti be done in order to prevent a horrible accident from happening. This area also needs to be policed in the mornings. The parents disregard the No Left turn and tickets need to be issued. This causes a bigger traffic jam with parents not following the No left turn on Plum during morning and afternoon hours of school.	Pedestrian	Stop Sign Violation
72o6jo9l7jtf	243	POINT (-122.308652 37.995403)	N	Shawn Dr	Shawn Dr	Please put a stop sign at Kildare Way and Shawn Dr. Shawn Dr. and Kildare Way is very dangerous for pedestrians to cross because cars are speeding on Shawn Dr. from both directions. There is also a hill that tops at the next intersection (Cornelius Dr. and Shawn Dr.) and when at the corner of Kildare Way and Shawn Dr, you are not able to see the incoming car because the hill creates a blind spot. By the time you notice the car, it is too late since that block is so short and people speed down that short hill. Cars also speed on Shawn Dr. coming from the corner of Tara Hills and Shawn Dr. By the time they reach Shawn Dr. and Kildare Way, cars have reached high speeds and since there are some bushy trees from homes, you are not able to see the car until you have stepped into the street. Having a stop sign will protect the pedestrians, pets and other drivers crossing Shawn Dr. My neighbor's dog got run over on that intersection. Please put a stop sign at Kildare and Shawn.	Pedestrian	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
72o6jo9l7jtf	243	POINT (-122.308652 37.995403)	N	Shawn Dr	Shawn Dr	Please put a stop sign at Kildare Way and Shawn Dr. Shawn Dr. and Kildare Way is very dangerous for pedestrians to cross because cars are speeding on Shawn Dr. from both directions. There is also a hill that tops at the next intersection (Cornelius Dr. and Shawn Dr.) and when at the corner of Kildare Way and Shawn Dr, you are not able to see the incoming car because the hill creates a blind spot. By the time you notice the car, it is too late since that block is so short and people speed down that short hill. Cars also speed on Shawn Dr. coming from the corner of Tara Hills and Shawn Dr. By the time they reach Shawn Dr. and Kildare Way, cars have reached high speeds and since there are some bushy trees from homes, you are not able to see the car until you have stepped into the street. Having a stop sign will protect the pedestrians, pets and other drivers crossing Shawn Dr. My neighbor's dog got run over on that intersection. Please put a stop sign at Kildare and Shawn.	Pedestrian	Pedestrian Safety
72o6jo9l7jtf	245	POINT (-122.308779 37.99546)	Y	Shawn Dr	Shawn Dr/Kildare Way	Please put a stop sign at the corner of Kildare way and Shawn Dr. Cars speed coming from both directions on Shawn Dr. There is also a blind spot at this intersection because you are not able to see the cars coming from Cornelius and Shawn Dr. since the hill tops off at that intersection. By the time you see the car, it is too late and it's already almost halfway down the block. There are bushy trees on the other direction of Shawn Dr. so you are not able to see the cars coming from Tara Hills on Shawn Dr. My neighbor's pet got run over at Kildare Way and Shawn Dr. Please make this corner safe for residents and pets. Please put a stop sign at Kildare Way and Shawn Dr.	Pedestrian	Pedestrian Safety
72o6jo9l7jtf	245	POINT (-122.308779 37.99546)	Y	Shawn Dr	Shawn Dr/Kildare Way	Please put a stop sign at the corner of Kildare way and Shawn Dr. Cars speed coming from both directions on Shawn Dr. There is also a blind spot at this intersection because you are not able to see the cars coming from Cornelius and Shawn Dr. since the hill tops off at that intersection. By the time you see the car, it is too late and it's already almost halfway down the block. There are bushy trees on the other direction of Shawn Dr. so you are not able to see the cars coming from Tara Hills on Shawn Dr. My neighbor's pet got run over at Kildare Way and Shawn Dr. Please make this corner safe for residents and pets. Please put a stop sign at Kildare Way and Shawn Dr.	Pedestrian	Speeding
873b8yxj4t7a	246	POINT (-122.30268 38.001618)	N	Marlesta Rd	Marlesta Rd	More street lighting on Marlesta Rd as it is very poor	Motor Vehicles	Lighting
873b8yxj4t7a	246	POINT (-122.30268 38.001618)	N	Marlesta Rd	Marlesta Rd	More street lighting on Marlesta Rd as it is very poor	Pedestrian	Lighting
873b8yxj4t7a	247	POINT (-122.306625 38.002599)	Y	Patrick Dr	Patrick Dr/ Nob Hill Ave	More street lighting and STOP signs on Nob Hill	Pedestrian	Lighting
32sfy49fo9m9	248	POINT (-122.303085 37.997833)	N	Mann Dr	Mann Dr	Pinole Middle School + West County Mandarin School: dangerous conditions particularly in morning when children are arriving at school. Heavy traffic, motorists in a hurry, poor visibility. Area needs traffic calming urgently	Pedestrian	Speeding
32sfy49fo9m9	248	POINT (-122.303085 37.997833)	N	Mann Dr	Mann Dr	Pinole Middle School + West County Mandarin School: dangerous conditions particularly in morning when children are arriving at school. Heavy traffic, motorists in a hurry, poor visibility. Area needs traffic calming urgently	Pedestrian	Visibility
32sfy49fo9m9	248	POINT (-122.303085 37.997833)	N	Mann Dr	Mann Dr	Pinole Middle School + West County Mandarin School: dangerous conditions particularly in morning when children are arriving at school. Heavy traffic, motorists in a hurry, poor visibility. Area needs traffic calming urgently	Pedestrian	School Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
32sfy49fo9m9	248	POINT (-122.303085 37.997833)	N	Mann Dr	Mann Dr	Pinole Middle School + West County Mandarin School: dangerous conditions particularly in morning when children are arriving at school. Heavy traffic, motorists in a hurry, poor visibility. Area needs traffic calming urgently	Pedestrian	Pedestrian Safety
32sfy49fo9m9	249	POINT (-122.301868 37.997537)	N	Mann Dr	Mann Dr	Pinole Middle: Dangerous area with many children on foot. Needs traffic calming	Pedestrian	Pedestrian Safety
32sfy49fo9m9	249	POINT (-122.301868 37.997537)	N	Mann Dr	Mann Dr	Pinole Middle: Dangerous area with many children on foot. Needs traffic calming	Pedestrian	School Safety
7hx8pib76hw4	250	POINT (-122.280163 37.984315)	N	Pinole Valley Rd	Pinole Valley Rd	no bike lane or safe way for bicyclists to traverse the narrow roadway.	Bicycle	Bicycle Safety
7hx8pib76hw4	250	POINT (-122.280163 37.984315)	N	Pinole Valley Rd	Pinole Valley Rd	no bike lane or safe way for bicyclists to traverse the narrow roadway.	Bicycle	Road too Narrow
7hx8pib76hw4	251	POINT (-122.277183 37.982412)	N	Pinole Valley Rd	Pinole Valley Rd	no shoulder for bicyclists.	Bicycle	Bicycle Safety
7hx8pib76hw4	251	POINT (-122.277183 37.982412)	N	Pinole Valley Rd	Pinole Valley Rd	no shoulder for bicyclists.	Bicycle	Road too Narrow
7hx8pib76hw4	252	POINT (-122.264163 37.979282)	N	Pinole Valley Rd	Pinole Valley Rd	vegetation overgrown and not safe for bicyclists to pass without riding in the roadway.	Bicycle	Bicycle Safety
7hx8pib76hw4	253	POINT (-122.270645 37.981057)	N	Pinole Valley Rd	Pinole Valley Rd	why does the bike lane just stop? There are no bike lane markings at all east to the city limits.	Bicycle	Bicycle Safety
7hx8pib76hw4	254	POINT (-122.293283 38.00421)	N	San Pablo Ave	San Pablo Ave	the blind roadway is very unsafe for bicyclists and there's no bike lane or shoulder.	Bicycle	Bicycle Safety
7hx8pib76hw4	255	POINT (-122.314837 38.003129)	N	San Pablo Ave	San Pablo Ave	hillside falling onto and over the sidewalk. Makes it unsafe for pedestrians to use the sidewalk.	Pedestrian	Pedestrian Safety
7hx8pib76hw4	256	POINT (-122.306058 38.004827)	N	San Pablo Ave	San Pablo Ave	neglected service access panels on the sidewalk. It's not flat and is a significant trip hazard.	Pedestrian	Pedestrian Safety
8tc832s9zcm8	257	POINT (-122.285696 37.994281)	N	Pinole Valley Rd	Pinole Valley Rd	People making unprotected lefts out of the parking lot. This should probably be a right turn only out of the parking lot and or if lefts are wanted to be allowed you probably need a light here.	Motor Vehicles	Curve unsafe
8tc832s9zcm8	258	POINT (-122.285526 37.993161)	N	Pinole Valley Rd	Pinole Valley Rd	Unprotected lefts out of the parking lot. This also should be a right turn only out of the parking lot.	Motor Vehicles	Curve unsafe
8tc832s9zcm8	259	POINT (-122.273701 37.987425)	N	Tamalpais Dr	Tamalpais Dr	People go zooming up and down this part of Tamalpais sometimes going about 35-40 mph despite this being a residential neighborhood. I've seen a few near misses. Wondering if a speed bump or two might be helpful.	Motor Vehicles	Speeding
9zg6der37zr9	260	POINT (-122.265004 37.980147)	Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	No one ever stops at this stop sign and it's right near a park	Motor Vehicles	Stop Sign Violation
9voz4dri4s99	262	POINT (-122.289457 38.006383)	Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	I think it would be really helpful to have a crosswalk here for the path!	Pedestrian	Pedestrian Safety
8nt3nf92ind7	263	POINT (-122.28907 38.006442)	Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	Because there is no turn lane here or at Tennent Avenue, people coming down to Pablo Avenue from Hercules speed around this corner to get in front of cars coming up the hill toward Hercules. I have almost been hit in this crosswalk over a dozen times. One gentleman decided to park and get out and curse me out for being in the crosswalk when I had the light. People do not pay attention and they are always speeding. If there is anyway to make a designated turn lane here or at Tennett Avenue on San Pablo Ave., it would greatly reduce the amount of quick turns people make without looking for pedestrians in the crosswalk.	Pedestrian	Speeding

Respondent ID	#	Lat Long	Intersect on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
8nt3nf92ind7	263	POINT (-122.28907 38.006442)	Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	Because there is no turn lane here or at Tennent Avenue, people coming down to Pablo Avenue from Hercules speed around this corner to get in front of cars coming up the hill toward Hercules. I have almost been hit in this crosswalk over a dozen times. One gentleman decided to park and get out and curse me out for being in the crosswalk when I had the light. People do not pay attention and they are always speeding. If there is anyway to make a designated turn lane here or at Tennett Avenue on San Pablo Ave., it would greatly reduce the amount of quick turns people make without looking for pedestrians in the crosswalk.	Pedestrian	Pedestrian Safety
6r8efo7nee48	264	POINT (-122.28914 38.006584)	Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	A left turn arrow on to Pinole Valley Road from San Pablo would be nice.	Motor Vehicles	Intersection Safety
4ob3dua2scc9	265	POINT (-122.310899 38.000538)	Y	Marlesta Rd	Local Road/ Marlesta Rd	This area needs better school zone safety. People often speed through the stop signs.	Motor Vehicles	Speeding
4ob3dua2scc9	265	POINT (-122.310899 38.000538)	Y	Marlesta Rd	Local Road/ Marlesta Rd	This area needs better school zone safety. People often speed through the stop signs.	Motor Vehicles	School Safety
4ob3dua2scc9	266	POINT (-122.29935 38.001667)	Y	Appian Way	Appian Way/Marlesta Rd	This area needs a safer way for pedestrians to cross. Possibly traffic light for when some is there to safely make it. Theirs often people speeding down the hill.	Motor Vehicles	Speeding
4ob3dua2scc9	266	POINT (-122.29935 38.001667)	Y	Appian Way	Appian Way/Marlesta Rd	This area needs a safer way for pedestrians to cross. Possibly traffic light for when some is there to safely make it. Theirs often people speeding down the hill.	Motor Vehicles	School Safety
8zf9nal6dzt9	267	POINT (-122.25755 37.981936)	Y	Doidge Ave	Doidge Ave/Victor St	People always run these stop signs. There are a lot of young children in this neighborhood and it's a safety concern.	Motor Vehicles	School Safety
8zf9nal6dzt9	267	POINT (-122.25755 37.981936)	Y	Doidge Ave	Doidge Ave/Victor St	People always run these stop signs. There are a lot of young children in this neighborhood and it's a safety concern.	Motor Vehicles	Stop Sign Violation
8zf9nal6dzt9	268	POINT (-122.265012 37.980134)	Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	People always run the stop signs here on PV Road and Wright Ave both coming from the backroads and coming from town.	Motor Vehicles	Stop Sign Violation
8zf9nal6dzt9	268	POINT (-122.265012 37.980134)	Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	People always run the stop signs here on PV Road and Wright Ave both coming from the backroads and coming from town.	Motor Vehicles	School Safety
4tm3uf87lf86	270	POINT (-122.271753 37.985247)	Y	Alhambra Way	Alhambra Way/ Moraga Dr	There is no stop sign at this intersection which means right of way is confusing and potentially dangerous.	Motor Vehicles	Intersection Safety
4tm3uf87lf86	271	POINT (-122.268912 37.981543)	Y	Pinole Valley Rd	Pinole Valley Rd/Monte Vista Dr	I would recommend another pedestrian crosswalk here as many go to the fields from here and cross PVR here which is dangerous given the speed of the cars on PVR.	Pedestrian	Pedestrian Safety
4tm3uf87lf86	272	POINT (-122.267942 37.981487)	Y	Pinole Valley Rd	Pinole Valley Rd/Monte Vista Dr	I would suggest a Stop Sign here to slow down the traffic on PVR. Given how popular this park is there is a lot of pedestrian foot traffic and children and the cars on PVR go much too fast to stop.	Pedestrian	Speeding
4tm3uf87lf86	272	POINT (-122.267942 37.981487)	Y	Pinole Valley Rd	Pinole Valley Rd/Monte Vista Dr	I would suggest a Stop Sign here to slow down the traffic on PVR. Given how popular this park is there is a lot of pedestrian foot traffic and children and the cars on PVR go much too fast to stop.	Pedestrian	Pedestrian Safety
4tm3uf87lf86	273	POINT (-122.271933 37.980804)	Y	Pinole Valley Rd	Pinole Valley Rd	At the end of Adobe Road is the dog park so a lot of foot traffic. However, there are a few dangerous aspects of this intersection. There is no sidewalk on the Firehouse/Adobe Road side of PVR. So if you're walking you have to cross PVR here which is difficult. Could there be a pedestrian cross walk here? Or a sidewalk built?	Pedestrian	Pedestrian Safety
9bo2ra3gl9v6	274	POINT (-122.264378 37.979595)	Y	Pinole Valley Rd	Pinole Valley Rd	Cars don't stop at stop signs, speeding	Motor Vehicles	Stop Sign Violation
9bo2ra3gl9v6	274	POINT (-122.264378 37.979595)	Y	Pinole Valley Rd	Pinole Valley Rd	Cars don't stop at stop signs, speeding	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6cv4nd8bfh98	275	POINT (-122.264735 37.98035)	y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	Curbs need to be red just in first half- block as children & Pedestrians frequently cross to head to out ball field, soccer field & climbing structure parks, so when cars are parked it's hard to see; cars coming down Doidge must pull way out to see due to angle and parked cars. Highly recommend WestCat Bus 16 easily resume old patterns: go up Doidge here at West junction of Wright and Doidge, to again circle around at top of loop and come down Victor St for equity and ease of those in many blocks riding bus east of Wright. It's more equitable, makes shorter walks for those with groceries... and there's less traffic on Doidge than Wright.	Pedestrian	Pedestrian Safety
6cv4nd8bfh98	276	POINT (-122.258771 37.983233)	y	Wright Ave	Wright Ave/Victor St	Traffic ignores stop sign here	Motor Vehicles	Stop Sign Violation
6cv4nd8bfh98	276	POINT (-122.258771 37.983233)	y	Wright Ave	Wright Ave/Doidge Ave	Traffic ignores stop sign here, speeding	Pedestrian	Pedestrian Safety
629ti2nkw6x7	1		N	Sunnyview Court	Sunnyview Court	Unsafe for bicyclists	Bicycle	Bicycle Safety
8sll8ck6ols3	2		N	Pinole Valley Rd	Pinole Valley Rd	Pinole Valley Rd from San Pablo to Alhambra. Cycling safety is a major concern. Perhaps lanes much like on Castro Ranch road. Green lanes and pylons for riders. Also, a stop sign at the corner of PVR and Collins Dr at Elmhurst Elementary.	Bicycle	Bicycle Safety
22wru8sc6awf	3		N	Pinole Valley Rd	Pinole Valley Rd	Fitzgerald Dr and Appain Way people run the red lights. Pinole Valley Rd - people having been going at least 50mph or greater.	Motor Vehicles	Speeding
22wru8sc6awf	3		N	Pinole Valley Rd	Pinole Valley Rd	Fitzgerald Dr and Appain Way people run the red lights. Pinole Valley Rd - people having been going at least 50mph or greater.	Motor Vehicles	Red Light Violation
4aah7l8ezj79	4		Y	Pinole Valley Rd	Pinole Valley Rd/ Simas	Speeding here is out of control. The noise from the speeders echoes throughout the valley because this is next to the hill. Need traffic calming and/or enforcement. We also need a noise ordinance to curb the intentionally loud engines.	Motor Vehicles	Enforcement
4aah7l8ezj79	4		Y	Pinole Valley Rd	Pinole Valley Rd/ Simas	Speeding here is out of control. The noise from the speeders echoes throughout the valley because this is next to the hill. Need traffic calming and/or enforcement. We also need a noise ordinance to curb the intentionally loud engines.	Motor Vehicles	Speeding
4aah7l8ezj79	5		N	Pinole Valley Rd	Pinole Valley Rd	The school and city made a mistake in the design of this segment of the road. The traffic lane to too close to the sidewalk. There is no shoulder. The residents cant even put their garbage out at the curb. Consider eliminating the left turn lane to Shea Drive.	Motor Vehicles	Road too Narrow
9vza3ihm77la	6		N	Pinole Valley Rd	Pinole Valley Rd	Sharrows are not safe enough for bikes on this stretch of road. Bikes need the dedicated lane to continue, and green paint is needed in the block approaching the freeway so that cars know to expect bikes.	Bicycle	Intersection Safety
9vza3ihm77la	6		N	Pinole Valley Rd	Pinole Valley Rd	Sharrows are not safe enough for bikes on this stretch of road. Bikes need the dedicated lane to continue, and green paint is needed in the block approaching the freeway so that cars know to expect bikes.	Bicycle	Bicycle Safety
9vza3ihm77la	7		Y	San Pablo Ave	San Pablo Ave and Belmont Way	This is an absolute death trap for cyclists in both directions. Cars are going too fast for us to not have a dedicated bike lane both directions. There are several pedestrian crossings where pedestrian crossing lights should be added that can be activated with a button press.	Pedestrian	Pedestrian Safety

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
9vza3ihm77la	7		Y	San Pablo Ave	San Pablo Ave and Belmont Way	This is an absolute death trap for cyclists in both directions. Cars are going too fast for us to not have a dedicated bike lane both directions. There are several pedestrian crossings where pedestrian crossing lights should be added that can be activated with a button press.	Bicycle	Bicycle Safety
9vza3ihm77la	8		N	San Pablo Ave	San Pablo Ave	These two bike/ped path sections need to be connected more safely across San Pablo Ave. A crosswalk with distinctive paving and/or pedestrian-activated crossing lights would increase trail usage on both sides and help businesses by enabling another safe crossing through downtown.	Bicycle	Bicycle Safety
9vza3ihm77la	8		N	San Pablo Ave	San Pablo Ave	These two bike/ped path sections need to be connected more safely across San Pablo Ave. A crosswalk with distinctive paving and/or pedestrian-activated crossing lights would increase trail usage on both sides and help businesses by enabling another safe crossing through downtown.	Pedestrian	Pedestrian Safety
9vza3ihm77la	9		N	Rail Road Ave	Rail Road Ave	This stretch isn't terrible for bikes because of the low traffic, but I think it would help downtown if the road from the EBRPD bridge and path looked a bit more appealing and welcoming into town.	Bicycle	Bicycle Safety
7e7487vow7s3	10		N	Pinole Valley Rd	Pinole Valley Rd	This area needs traffic humps. There are always cars speeding down this stretch of road and these humps are a cost effective way to slow them.	Motor Vehicles	Speeding
4om66buj4u84	11		N	Marlen Court	Marlen Court	Speed. In the early AM and late PM, there are vehicles that are driving way too fast to be within speed limits - especially near Ellerhorst Elementary. There have been multiple crashes on multiple houses on this street due to speed in the past. Recommend more stop signs to slow the traffic down.	Motor Vehicles	Speeding
7ive6pbx6wd3	12		N	San Pablo Ave	San Pablo Ave	This section of San Pablo is a defacto freeway because our freeways are clogged due to lack of available public transit. I would love to see all of San Pablo reduced to one lane of motor vehicle traffic in each direction with guarded bike lanes on each side and light rail or dedicated bus lanes in the center.	Bicycle	Bicycle Safety
7ive6pbx6wd3	13		Y	San Pablo Ave	San Pablo Ave/ Appian Way	Let's bring Pinole into a sustainable future not dependent on motor vehicles by converting some of our fast, dangerous 2 lane roads into slower moving streets with bike lanes. Offer public transit that works and give people alternatives to driving like safe lanes for commuting by bike.	Bicycle	Bicycle Safety
2xnf2s7d6ps6	14		N	San Pablo Ave	San Pablo Ave	All of San Pablo. There are tons of potholes, there aren't sidewalks on both sides of the roads in some areas. It's impossible to ride on the street if you're a on a bicycle. Bike lanes are necessary	Bicycle	Bicycle Safety
3o28zat2p3g8	15		Y	San Pablo Ave	San Pablo Ave/ Appian Way	It is difficult for both cars and pedestrians to distinguish when it is ok to cross/pass. Perhaps making the cross-walk light up when a pedestrian is crossing to increase visibility would be helpful.	Pedestrian	Visibility
3o28zat2p3g8	15		Y	San Pablo Ave	San Pablo Ave/ Appian Way	It is difficult for both cars and pedestrians to distinguish when it is ok to cross/pass. Perhaps making the cross-walk light up when a pedestrian is crossing to increase visibility would be helpful.	Pedestrian	Pedestrian Safety
36njo6kzp6k4	16		Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	No bike lane, no sidewalk, no shoulder.	Pedestrian	Pedestrian Safety
36njo6kzp6k4	16		Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	No bike lane, no sidewalk, no shoulder.	Bicycle	Bicycle Safety
36njo6kzp6k4	17		Y	Pinole Valley Rd	Pinole Valley Rd/ Simas Ave	Unprotected walking path	Pedestrian	Pedestrian Safety
36njo6kzp6k4	18		N	Pinole Valley Rd	Pinole Valley Rd	Terrible path/trail conditions. Unsafe, usually sketchy people hanging out	Pedestrian	Pedestrian Safety

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
4i8tgz9m6e37	19		Y	Pinole Valley Rd	Pinole Valley Rd/Helena Ct	for cyclists, this is incredibly dangerous as the lane narrows in such a way that it cannot accommodate both a car and a bike. It narrows on a curve. Putting in a green bike lane to tell cars that bikes can use the entire lane might be helpful. This wasn't a problem before the PVHS work.	Bicycle	Curve unsafe
4i8tgz9m6e37	19		Y	Pinole Valley Rd	Pinole Valley Rd/Helena Ct	for cyclists, this is incredibly dangerous as the lane narrows in such a way that it cannot accommodate both a car and a bike. It narrows on a curve. Putting in a green bike lane to tell cars that bikes can use the entire lane might be helpful. This wasn't a problem before the PVHS work.	Bicycle	Bicycle Safety
4i8tgz9m6e37	20		N	Pinole Valley Rd	Pinole Valley Rd	for cyclists, coming from the light at the library, this is dangerous because it is narrow before the first sharrow appears. Cars do not expect bikes to be in the lane.	Bicycle	Bicycle Safety
4i8tgz9m6e37	20		N	Pinole Valley Rd	Pinole Valley Rd	for cyclists, coming from the light at the library, this is dangerous because it is narrow before the first sharrow appears. Cars do not expect bikes to be in the lane.	Bicycle	Road too Narrow
2yo73jn7cgs2	21		N	Pinole Valley Rd	Pinole Valley Rd	Walkers cross near the fire station to get to Adobe Road. A pedestrian crosswalk should be put in this area. It might also slow down the traffic that's headed towards the elementary school.	Pedestrian	Pedestrian Safety
2yo73jn7cgs2	21		N	Pinole Valley Rd	Pinole Valley Rd	Walkers cross near the fire station to get to Adobe Road. A pedestrian crosswalk should be put in this area. It might also slow down the traffic that's headed towards the elementary school.	Pedestrian	School Safety
6hp4923sya96	22		Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	This intersection continues to be extremely dangerous for pedestrians. Cars that turn left from SPA (coming from Hercules) onto PVA and cars turning on to SPA from PVA often do not see pedestrians.	Pedestrian	Pedestrian Safety
6hp4923sya96	23		Y	San Pablo Ave	San Pablo Ave/ Pinole Valley Rd	traffic speeds down the hill from Hercules and the intermittent stop light does not seem to help. Also, fast traffic on SPA going up the hill.	Motor Vehicles	Speeding
2ul2y3cle3ra	24		N	Appian Way	Appain Way	In need of more light posts for pedestrians to walk safely once it gets dark. Cars drive too fast down this road.	Pedestrian	Pedestrian Safety
2ul2y3cle3ra	24		N	Appian Way	Appain Way	In need of more light posts for pedestrians to walk safely once it gets dark. Cars drive too fast down this road.	Pedestrian	Lighting
6e4h7c6s4w28	25		N	Pinole Valley Rd	Pinole Valley Rd	People seem to forget this is a neighborhood where old people live they use it as a shortcut to get to Hercules	Motor Vehicles	Pedestrian Safety
69sm7yg94aj4	26		Y	Simas Ave	Simas Ave/Moraga Dr	Kids often cross the street here to go through Amber Schwartz Park on their way to Ellerhorst Elementary School. There is a stop sign but no crosswalk. Please paint a crosswalk.	Pedestrian	Pedestrian Safety
69sm7yg94aj4	26		Y	Simas Ave	Simas Ave/Moraga Dr	Kids often cross the street here to go through Amber Schwartz Park on their way to Ellerhorst Elementary School. There is a stop sign but no crosswalk. Please paint a crosswalk.	Pedestrian	School Safety
69sm7yg94aj4	27		N	Pinole Valley Rd	Pinole Valley Rd	There is no bike lane on this side of Pinole Valley road, yet it is the route many students take to the high school.	Bicycle	Bicycle Safety
69sm7yg94aj4	28		N	Shea Dr	Shea Dr	This area is not bike friendly although it is the main route from Pinole Valley to the junior high school and shops on Fitzgerald.	Bicycle	Bicycle Safety
3lw7ksy4xko4	29		N	Pinole Valley Rd	Pinole Valley Rd	bike lane and car traffic lanes suddenly narrow and merge together with no warning - suprising both the car driver and the bicyclist if they happen to be adjacent to one another at the point where this narrowing occurs.	Bicycle	Bicycle Safety
3lw7ksy4xko4	29		N	Pinole Valley Rd	Pinole Valley Rd	bike lane and car traffic lanes suddenly narrow and merge together with no warning - suprising both the car driver and the bicyclist if they happen to be adjacent to one another at the point where this narrowing occurs.	Bicycle	Road too Narrow

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7w7sxc4c7fo9	31		Y	Shea Dr	Shea Dr/ Pinole Valley Rd	Dangerous speeding traffic on Pinole Valley Road in both directions between Shea Drive and Simas Avenue!	Motor Vehicles	Speeding
83kge643lwh6	32		Y	Pinole Valley Rd	Pinole Valley Rd/ Helena Ct	Speed limit is 35 mph. Please reduce the speed to 25 mph for safety of the residents.	Motor Vehicles	Speeding
3zf44722as98	34		Y	Pinole Valley Rd	Pinole Valley Rd/ Collis Ave	Speeding. After the stop sign at simas cars accelerate all the way down pinole valley til about the dog park. Perhaps another stop sign would slow them down.	Motor Vehicles	Speeding
3zf44722as98	34		Y	Pinole Valley Rd	Pinole Valley Rd/ Collis Ave	Speeding. After the stop sign at simas cars accelerate all the way down pinole valley til about the dog park. Perhaps another stop sign would slow them down.	Motor Vehicles	Stop Sign Violation
7iel9gig6u93	35		N	San Pablo Ave	San Pablo Ave	No bike path or sidewalk	Pedestrian	School Safety
7iel9gig6u93	35		N	San Pablo Ave	San Pablo Ave	No bike path or sidewalk	Bicycle	Bicycle Safety
9f9mcf8w7778	36		N	San Pablo Ave	San Pablo Ave	This area is not good for pedestrians or bike riders there are no bike lanes and the sidewalks are extremely skinny. Cars speed down this road constantly despite the police speed signs they try to put every day. This city needs more walkable bike-friendly locations that bring people into town maybe something that connects better to the bay trail	Pedestrian	School Safety
9f9mcf8w7778	36		N	San Pablo Ave	San Pablo Ave	This area is not good for pedestrians or bike riders there are no bike lanes and the sidewalks are extremely skinny. Cars speed down this road constantly despite the police speed signs they try to put every day. This city needs more walkable bike-friendly locations that bring people into town maybe something that connects better to the bay trail	Bicycle	Bicycle Safety
7ii2ulg8uxx8	37		N	Pinole Valley Rd	Pinole Valley Rd	From bridge to Marlin Court and past (both directions) is like a racetrack, resulting in many accidents	Pedestrian	School Safety
7ii2ulg8uxx8	37		N	Pinole Valley Rd	Pinole Valley Rd	From bridge to Marlin Court and past (both directions) is like a racetrack, resulting in many accidents	Bicycle	Bicycle Safety
37vyp98xch24	39		Y	Lucas Ave	Lucas Ave/Ramona St	Ramona St gets a lot of through traffic. Vehicles travel much to fast in this residential area (well over 25 mph). There are many walkers, runners, dog walkers, children, etc. here every day. I'd like to see a couple of stop signs or speed bumps as well as some speed limit signage.	Pedestrian	School Safety
37vyp98xch24	39		Y	Lucas Ave	Lucas Ave/Ramona St	Ramona St gets a lot of through traffic. Vehicles travel much to fast in this residential area (well over 25 mph). There are many walkers, runners, dog walkers, children, etc. here every day. I'd like to see a couple of stop signs or speed bumps as well as some speed limit signage.	Bicycle	Bicycle Safety
37vyp98xch24	40		N	Pinole Valley Rd	Pinole Valley Rd	All of the street markings/painting along Estates Drive needs to be redone. The speed bumps are nearly impossible to see as are any lane markings or stops at intersections!	Motor Vehicles	Pavement Condition
9h2pd7e3ikv4	41		Y	Tennet Avenue	Tennet Ave/San Pablo Ave	Speed! Cars, trucks, buses, motorcycles! From the Pinole Valley/Tennent split to San Pablo Ave, there is nothing to slow down the traffic. We live on Tennent and I sometimes clock different vehicles (my own "research") up to over 40mph. It's dangerous (church/school crossings, fire station, bikes, etc.) and noisy. It's also hard on the road, itself, which was finally mostly smoothed out, recently (our mini-"earthquakes" have subsided some since vehicles at least aren't hitting potholes as they rush to beat the signal at San Pablo). Seriously, it would greatly enhance safety AND quality of life in our little Old Town--make it less like a freeway!	Motor Vehicles	Speeding
9h2pd7e3ikv4	42		Y	San Pablo Ave	San Pablo Ave/ Charles Ave	Speed! Such a narrow road--even mitigated by a stop sign--on which the speed limit is only a weak suggestion!	Motor Vehicles	Stop Sign Violation
9h2pd7e3ikv4	42		Y	San Pablo Ave	San Pablo Ave/ Charles Ave	Speed! Such a narrow road--even mitigated by a stop sign--on which the speed limit is only a weak suggestion!	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
9h2pd7e3ikv4	43		N	San Pablo Ave	San Pablo Ave	Speed! I understand that it's a major thoroughfare. And there IS traffic mitigation (signals/electronic signage). But I, as I shepherd my grandkids across the road to the Park, and my husband, who crosses to get to the Senior Center, are amazed at how so many cars have to brake heavily to stop or accelerate quickly when the light turns, in a big hurry to get through the Old Town area. One feels the frustration. Don't know the answer. But it doesn't feel safe...	Motor Vehicles	Speeding
3ig9faw8wbj4	44		N	Pinole Valley Rd	Pinole Valley Rd	Need for bike path/road share	Bicycle	Bicycle Safety
2td4v8x8kxb6	45		N	San Pablo Ave	San Pablo Ave	Hazardous road for walking and biking (narrow sidewalk and no bicycle lane)	Bicycle	Bicycle Safety
2td4v8x8kxb6	45		N	San Pablo Ave	San Pablo Ave	Hazardous road for walking and biking (narrow sidewalk and no bicycle lane)	Pedestrian	School Safety
3ovo3xtr3se4	46		N	Bay Farm Rd	Bay Farm Rd	Speeding traffic and cars making 'donuts' where the rubber tires squeal and create clouds of smoke over the houses.	Motor Vehicles	Donuts
8e4o7gga3949	47		N	Tara Hills Dr	Tara Hill Dr	Very high speed traffic at all times of day. Intersection of Kildare and Tara Hills Drive used for spinning donuts. Not a safe situation when school is in session at Shannon School.	Motor Vehicles	Donuts
6tl2foa92mk4	48		Y	Pinole Valley Rd	Pinole Valley Rd/Downer St	At the intersection of Downer Street and Pinole Valley Road! Every day I see so many cars not stopping at any of the stop signs!	Motor Vehicles	Stop Sign Violation
79pdj9fk63ut	49		Y	Pinole Valley Rd	Pinole Valley Rd/Monte Verde Dr	Cars do not stop at all at these crosswalks across pinole valley road right near the park and soccer field where many children and pedestrians need to cross. I have almost been hit several times walking my dog. We need to install flashing crosswalk lights or at least put up more reflective xwalk signs for drivers.	Pedestrian	Speeding
79pdj9fk63ut	49		Y	Pinole Valley Rd	Pinole Valley Rd/Monte Verde Dr	Cars do not stop at all at these crosswalks across pinole valley road right near the park and soccer field where many children and pedestrians need to cross. I have almost been hit several times walking my dog. We need to install flashing crosswalk lights or at least put up more reflective xwalk signs for drivers.	Pedestrian	Pedestrian Safety
77n9emu7y7y9	50		N	Pinole Valley Rd	Pinole Valley Rd	Cars that are going to or from San Pablo Dam Road drive way over the speed limit on this stretch of road and don't pay attention to the pedestrian crosswalks. This is especially dangerous because there are lots of elementary school aged and younger children who are crossing the street either to get to Ellerhorst Elementary or to get to Pinole Valley Park.	Pedestrian	Pedestrian Safety
77n9emu7y7y9	51		N	Doidge Ave	Doidge Ave	Cars drive way over the speed limit on this residential street, and the majority of cars don't even stop at the stop signs, they just briefly slow down.	Motor Vehicles	Speeding
9twf6wbt2is9	52		Y	Pinole Valley Rd	Pinole Valley Rd	extremely large trucks travel through this corridor to bypass the I80. This is creating seismic activity and creating dangerous situations for elementary school and high school along this route. Propose limiting large semi trailers to certain tonnage along this route. Posting signs or speed bumps will help slow down the traffic as well.	Motor Vehicles	School Safety
9twf6wbt2is9	52		Y	Pinole Valley Rd	Pinole Valley Rd	extremely large trucks travel through this corridor to bypass the I80. This is creating seismic activity and creating dangerous situations for elementary school and high school along this route. Propose limiting large semi trailers to certain tonnage along this route. Posting signs or speed bumps will help slow down the traffic as well.	Motor Vehicles	Large Trucks

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
98ije3v32f68	53		Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	Area has had a problem with vehicles doing "donuts"/"sideshows" on Pinole Valley Road from Wright Ave to Taper Court. Problem has been reported repeatedly and is on-going for the last few years. Can we get dips or speed bumps put in?	Motor Vehicles	Speeding
98ije3v32f68	53		Y	Pinole Valley Rd	Pinole Valley Rd/Wright Ave	Area has had a problem with vehicles doing "donuts"/"sideshows" on Pinole Valley Road from Wright Ave to Taper Court. Problem has been reported repeatedly and is on-going for the last few years. Can we get dips or speed bumps put in?	Motor Vehicles	Donuts
3bf22c8rd6h4	54		N	Pinole Valley Rd	Pinole Valley Rd	Direction: N/B PVR starting at the signal South of the E/B HY 80 on ramp. There are 2 left turn lanes getting onto W/B Hy80 and one lane going thru the intersection. During busy traffic, cars approaching the intersection (before the signal) are all trying to get into their desired lanes. Cars in the right lane, speeding up to get into the left turn lanes, and cars in the left lane trying to get into the single lane to go through the intersection. There is no transition space for either lanes. There is also a solid white line between the left lanes and the single lane, which is illegal to cross but people have to do it because there is no transition. 2nd issue is cars caught in the left turn lanes who really want to go thru the intersection, will go straight from the left turn lane to continue N/B PVR. Since the right lane phases out into the left lane, there is a natural conversion of the cars in the one lane North of the freeway overpass.	Motor Vehicles	Intersection Safety
3bf22c8rd6h4	54		N	Pinole Valley Rd	Pinole Valley Rd	Direction: N/B PVR starting at the signal South of the E/B HY 80 on ramp. There are 2 left turn lanes getting onto W/B Hy80 and one lane going thru the intersection. During busy traffic, cars approaching the intersection (before the signal) are all trying to get into their desired lanes. Cars in the right lane, speeding up to get into the left turn lanes, and cars in the left lane trying to get into the single lane to go through the intersection. There is no transition space for either lanes. There is also a solid white line between the left lanes and the single lane, which is illegal to cross but people have to do it because there is no transition. 2nd issue is cars caught in the left turn lanes who really want to go thru the intersection, will go straight from the left turn lane to continue N/B PVR. Since the right lane phases out into the left lane, there is a natural conversion of the cars in the one lane North of the freeway overpass.	Motor Vehicles	Curve unsafe
7t9vzb7gm4t8	55		Y	Wright Ave	Wright Ave/Victor St	Speeding is out of control. It is not uncommon to see people exceeding 50mph in this unregulated stretch of Wright Ave between Victor and Doidge. Recently a woman lost control of her car, totaled her car and 2 others parked and did almost \$4k damage to my truck. There needs to be stop signs at Towns Ct and Marcas where they intersect with Wright Ave. There are stop signs at all similar intersections on Doidge. I feel that this would slow people down and make it safer for my kids, me, and my neighbors who walk frequently.	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersecti on? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7t9vzb7gm4t8	55		Y	Wright Ave	Wright Ave/Victor St	Speeding is out of control. It is not uncommon to see people exceeding 50mph in this unregulated stretch of Wright Ave between Victor and Doidge. Recently a woman lost control of her car, totaled her car and 2 others parked and did almost \$4k damage to my truck. There needs to be stop signs at Towns Ct and Marcas where they intersect with Wright Ave. There are stop signs at all similar intersections on Doidge. I feel that this would slow people down and make it safer for my kids, me, and my neighbors who walk frequently.	Motor Vehicles	Pedestrian Safety
7lg279rm8no3	56		N	Pinole Valley Rd	Pinole Valley Rd	the two stop lights ... at Estrella and Shea on Southbound PVR are lined up such that the line of sight leads the driver to "see" the first light - but not realize that there is a second light until driver is right up on it. The drivers coming down Shea on a green light are in jeopardy of people running the red light on SB PVR.	Motor Vehicles	Speeding
7lg279rm8no3	56		N	Pinole Valley Rd	Pinole Valley Rd	the two stop lights ... at Estrella and Shea on Southbound PVR are lined up such that the line of sight leads the driver to "see" the first light - but not realize that there is a second light until driver is right up on it. The drivers coming down Shea on a green light are in jeopardy of people running the red light on SB PVR.	Motor Vehicles	Red Light Violation
8zt9vl2ww8t6	57		N	San Pablo Ave	San Pablo Ave	Crossing the street is very dangerous and driving is to this don't make since cars don't stop for people crossing the street need a light somebody gonna get hurt	Pedestrian	Pedestrian Safety
8zt9vl2ww8t6	57		N	San Pablo Ave	San Pablo Ave	Crossing the street is very dangerous and driving is to this don't make since cars don't stop for people crossing the street need a light somebody gonna get hurt	Pedestrian	Speeding
3kgs8zrb24x9	58		N	San Pablo Ave	San Pablo Ave	cars don't stop don't make since somebody gonna get hurt need a light	Pedestrian	Pedestrian Safety
3kgs8zrb24x9	58		N	San Pablo Ave	San Pablo Ave	cars don't stop don't make since somebody gonna get hurt need a light	Pedestrian	Speeding
9zp7k2con6c9	59		Y	Appian Way	Appian Way/Mann Dr	Cars are coming down AND up the hill with very high speed. Unsafe for pedestrians, children and animals. Many pedestrian accidents in the past, including fatal.	Pedestrian	Pedestrian Safety
9zp7k2con6c9	59		Y	Appian Way	Appian Way/Mann Dr	Cars are coming down AND up the hill with very high speed. Unsafe for pedestrians, children and animals. Many pedestrian accidents in the past, including fatal.	Pedestrian	Speeding
7d7o7n2mvy96	60		N	Pinole Valley Rd	Pinole Valley Rd	Pinole Valley Road needs better bike lanes on each side to support kids riding to Ellerhorst Elementary and to Pinole Valley High School	Bicycle	Bicycle Safety
7d7o7n2mvy96	61		N	Simas Ave	Simas Ave	Simas Ave needs better bike lanes to support kids (and others) riding to school and around town.	Bicycle	School Safety
7d7o7n2mvy96	61		N	Simas Ave	Simas Ave	Simas Ave needs better bike lanes to support kids (and others) riding to school and around town.	Bicycle	Bicycle Safety
8ix69nk4hwr9	62		N	San Pablo Ave	San Pablo Ave	speeding	Motor Vehicles	Speeding
7ye2bdj3nuf9	63		N	San Pablo Ave	San Pablo Ave	The south bound lane on San Pablo Ave, including the railroad bridge, is a major source of speeding vehicles coming into downtown Pinole, creating unsafe conditions for pedestrians, parking cars, and bicycles. There needs to be some significant traffic calming devices included into the construction of the replacement bridge.	Pedestrian	Pedestrian Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
7ye2bdj3nuf9	63		N	San Pablo Ave	San Pablo Ave	The south bound lane on San Pablo Ave, including the railroad bridge, is a major source of speeding vehicles coming into downtown Pinole, creating unsafe conditions for pedestrians, parking cars, and bicycles. There needs to be some significant traffic calming devices included into the construction of the replacement bridge.	Bicycle	Bicycle Safety
6cu4sft3jnz4	64		N	Pinole Valley Rd	Pinole Valley Rd	Traffic using Tennent/Pinole Valley Rd from San Pablo Ave to and from I-80 on and off ramps poses a risk to cyclists and pedestrians when drivers disregard speed limits. Increasingly, those drivers appear when there is a traffic accident on I-80 and drivers use Pinole Valley Rd/Tennent as an alternate route to the next on/off ramps or San Pablo Valley Rd to continue their travel. There are also frequent backups from I-80 onto Pinole Valley Rd. at the Eastbound offramp -- whether or not there is an accident on the freeway.	Pedestrian	Pedestrian Safety
6cu4sft3jnz4	64		N	Pinole Valley Rd	Pinole Valley Rd	Traffic using Tennent/Pinole Valley Rd from San Pablo Ave to and from I-80 on and off ramps poses a risk to cyclists and pedestrians when drivers disregard speed limits. Increasingly, those drivers appear when there is a traffic accident on I-80 and drivers use Pinole Valley Rd/Tennent as an alternate route to the next on/off ramps or San Pablo Valley Rd to continue their travel. There are also frequent backups from I-80 onto Pinole Valley Rd. at the Eastbound offramp -- whether or not there is an accident on the freeway.	Bicycle	Bicycle Safety
6cu4sft3jnz4	65		N	Pinole Valley Rd	Pinole Valley Rd	See prior comment about regular traffic backups fro I-80 Eastbound at the Pinole Valley Rd. offramp toward Pinole Valley. Ugh!	Motor Vehicles	Traffic Congestion
8vr3tbv3yga8	66		N	Pinole Valley Rd	Pinole Valley Rd	PINOLE VALLEY ROAD BETWEEN SHEA DRIVE AND SIMAS AVENUE.	Motor Vehicles	Traffic Congestion
8vr3tbv3yga8	67		N	Pinole Valley Rd	Pinole Valley Rd	SPEEDING TRAFFIC IN BOTH DIRECTIONS	Motor Vehicles	Speeding
4zu3wwp3i6f9	68		N	San Pablo Ave	San Pablo Ave	It is difficult for people on bicycles to safely pass through here. A dedicated bike lane would help.	Bicycle	Bicycle Safety
4zu3wwp3i6f9	69		N	San Pablo Ave	San Pablo Ave	A dedicated bike lane would be helpful here.	Bicycle	Bicycle Safety
3y82dfi83ap9	71		N	Pinole Valley Rd	Pinole Valley Rd	Although there is a crosswalk here, drivers still fly through it even when my small children and I are clearly waiting to cross. It often appears that they don't even see us. There have also been times when one car has stopped to let us by, and a car goes around them on the right shoulder to drive straight through the crosswalk. It's quite dangerous and would benefit from a traffic light or a blinking crosswalk light.	Pedestrian	Pedestrian Safety
3y82dfi83ap9	71		N	Pinole Valley Rd	Pinole Valley Rd	Although there is a crosswalk here, drivers still fly through it even when my small children and I are clearly waiting to cross. It often appears that they don't even see us. There have also been times when one car has stopped to let us by, and a car goes around them on the right shoulder to drive straight through the crosswalk. It's quite dangerous and would benefit from a traffic light or a blinking crosswalk light.	Bicycle	Bicycle Safety
7wr84fmc8nm4	72		N	San Pablo Ave	San Pablo Ave	Speeding on San Pablo Avenue specially in afternoon rush hour has become dangerous.	Motor Vehicles	Speeding
7i6b9t3uea93	73		N	Pinole Valley Rd	Pinole Valley Rd	Traffic is horrendous trying to get out of the valley and backs up from PVHS to I80. Should there be a wildfire in the valley, people won't be able to get out! I talked with a city official and they said it would only cost \$500k to add another lane near Taco Bell to widen a way out onto 180. I feel if the city is asking for citizen's input on roads/traffic they need to address which are of highest safety concern.	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
4cv4xtc8gdm8	74		N	Appian Way	Appian Way	Elementary and middle school located here. The speed and quantity along along Appian Way during school drop-off and pick-up hours is intense. Aside from a couple of signs (which are hidden behind trees), there is little to protect young children walking to school. In addition, with the planned development at Doctor's Medical Center, the traffic situation will only worsen. More traffic controls -- such as radar detectors, speed bumps, additional crosswalks -- are needed.	Motor Vehicles	School Safety
4cv4xtc8gdm8	74		N	Appian Way	Appian Way	Elementary and middle school located here. The speed and quantity along along Appian Way during school drop-off and pick-up hours is intense. Aside from a couple of signs (which are hidden behind trees), there is little to protect young children walking to school. In addition, with the planned development at Doctor's Medical Center, the traffic situation will only worsen. More traffic controls -- such as radar detectors, speed bumps, additional crosswalks -- are needed.	Motor Vehicles	Speeding
4cv4xtc8gdm8	75		N	Canyon Dr	Canyon Dr	Cars come very quickly down Canyon Drive. While the top of the hill has some white markings to slow cars, there is nothing once cars pass the stop sign. This is a residential neighborhood with children and a park. Speed bumps or similar control measures are needed.	Motor Vehicles	Stop Sign Violation
4cv4xtc8gdm8	75		N	Canyon Dr	Canyon Dr	Cars come very quickly down Canyon Drive. While the top of the hill has some white markings to slow cars, there is nothing once cars pass the stop sign. This is a residential neighborhood with children and a park. Speed bumps or similar control measures are needed.	Motor Vehicles	Speeding
2bk3vsc4f2w8	76		N	Pinole Valley Rd	Pinle Valley Rd	The shrubbery and utility box blocks the view of oncoming traffic when making a right hand turn from E/B 80 onto PVR.	Motor Vehicles	Visibility
2zuo6kmp3776	77		N	Pinole Valley Rd	Pinle Valley Rd	Left lane dividing into two left turn lanes to drive into 80W - have better signage and ground paint that the left lane feeds into two left turning lanes. This will prevent significant backup that occurs on the left lane on Pinole Valley Rd.	Motor Vehicles	Traffic Congestion
2zuo6kmp3776	77		N	Pinole Valley Rd	Pinle Valley Rd	Left lane dividing into two left turn lanes to drive into 80W - have better signage and ground paint that the left lane feeds into two left turning lanes. This will prevent significant backup that occurs on the left lane on Pinole Valley Rd.	Motor Vehicles	Intersection Safety
2zuo6kmp3776	78		N	Pinole Valley Rd	Pinole Valley Rd	Repaint stop sign line on Pinole Valley Rd at Wright Ave. Also improve pedestrian sidewalk along Pinole Valley Park to Wright Ave	Pedestrian	Pavement Condition
4r4uw17bbl33	79		N	Remuda Way	Remuda Way	Left turn traffic here has terrible line of sight. Traffic will speed down southbound Simas and is difficult to see traffic going northbound on Simas Ave.	Motor Vehicles	Speeding
4r4uw17bbl33	79		N	Remuda Way	Remuda Way	Left turn traffic here has terrible line of sight. Traffic will speed down southbound Simas and is difficult to see traffic going northbound on Simas Ave.	Motor Vehicles	Traffic Congestion
4r4uw17bbl33	79		N	Remuda Way	Remuda Way	Left turn traffic here has terrible line of sight. Traffic will speed down southbound Simas and is difficult to see traffic going northbound on Simas Ave.	Motor Vehicles	Intersection Safety
4r4uw17bbl33	80		N	Shea Dr	Shea Dr	Traffic making a left turn can backup this street when school is out. Make this section NO PARKING. and have a dedicated Left Turn lane.	Motor Vehicles	Intersection Safety
4r4uw17bbl33	80		N	Shea Dr	Shea Dr	Traffic making a left turn can backup this street when school is out. Make this section NO PARKING. and have a dedicated Left Turn lane.	Motor Vehicles	School Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
64v9rg926v27	82		N	Pinole Valley Rd	Pinole Valley Dr	The 25 mph speed limit while students are present is constantly is constantly violated. Also, speeding above the speed limit when students are not present.	Motor Vehicles	School Safety
93cpm2bt9th6	83		N	Henry Ave	Henry Ave	Need crosswalk to connect trail, and traffic calling for downhill traffic.	Motor Vehicles	School Safety
93cpm2bt9th6	83		N	Henry Ave	Henry Ave	Need crosswalk to connect trail, and traffic calling for downhill traffic.	Motor Vehicles	Pedestrian Safety
23zy2fc3wrw3	84		N	San Pablo Ave	San Pablo Ave	These existing flashing lights are helpful, but this is still dangerous because cars from southwest direction are fast and don't always stop. Want a full stoplight with pedestrian activation.	Motor Vehicles	Pedestrian Safety
23zy2fc3wrw3	84		N	San Pablo Ave	San Pablo Ave	These existing flashing lights are helpful, but this is still dangerous because cars from southwest direction are fast and don't always stop. Want a full stoplight with pedestrian activation.	Motor Vehicles	Speeding
667pb6b3e6k7	85		N	Pinole Valley Rd	Pinole Valley Dr	Oversized pickup trucks with large trailers attached filled with 'junk' obscure view for safely entering traffic from driveways	Motor Vehicles	Visibility
667pb6b3e6k7	85		N	Pinole Valley Rd	Pinole Valley Dr	Oversized pickup trucks with large trailers attached filled with 'junk' obscure view for safely entering traffic from driveways	Motor Vehicles	Large Trucks
9ou48ljs9oa	86		N	Simas Ave	Simas Ave	many drivers going way too fast through here	Motor Vehicles	Speeding
3bab3xfw3jm4	87		N	Pinole Valley Rd	Pinole Valley Rd	Biking along this road is near impossible and dangerous due to the high speeds of vehicles and how close they get to bicyclists. A more obvious and protected bike lane is needed here to connect the Pinole Valley neighborhood to Old Town Pinole and the Bay Trail's bike path.	Bicycle	Bicycle Safety
4p2rf1439s96	88		N	Simas Ave	Simas Ave	Cross walk is subject to fast drivers who are not always paying attention. there is a home daycare on this corner. I think we should have a flashing lights to get drivers attention when crossing the street.	Pedestrian	Pedestrian Safety
4p2rf1439s96	88		N	Simas Ave	Simas Ave	Cross walk is subject to fast drivers who are not always paying attention. there is a home daycare on this corner. I think we should have a flashing lights to get drivers attention when crossing the street.	Pedestrian	Speeding
8esa7ycn8r76	89		N	Pinole Valley Rd	Pinole Valley Rd	No yeilding, blocking intersection	Pedestrian	Pedestrian Safety
8esa7ycn8r76	89		N	Pinole Valley Rd	Pinole Valley Rd	No yeilding, blocking intersection	Pedestrian	Traffic Congestion
8esa7ycn8r76	90		N	Pinole Valley Rd	Pinole Valley Rd	People from the left lane drifting into the right lane	Motor Vehicles	Intersection Safety
6ha7w4vme6d9	91		N	Appian Way	Appian Way	Students from both West County Mandarin School (elementary aged kids) and Pinole Middle School are using this cross walk to get to school in the mornings and in the afternoons. Cars are often speeding on Appian Way. There should be flashing pedestrian cross walk lights here and more obvious signage that kids are crossing at this intersection. I also think the left turn from Appian onto Mann Drive should be a no left turn during school morning traffic hours, so that families are forced to do the a one way loop by driving further down Appian Way, turning left onto Marlesta, left on McDonald, and right onto Mann Drive. This would help alleviate congestion and unsafe driving practices.	Motor Vehicles	School Safety

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
6ha7w4vme6d9	91		N	Appian Way	Appian Way	Students from both West County Mandarin School (elementary aged kids) and Pinole Middle School are using this cross walk to get to school in the mornings and in the afternoons. Cars are often speeding on Appian Way. There should be flashing pedestrian cross walk lights here and more obvious signage that kids are crossing at this intersection. I also think the left turn from Appian onto Mann Drive should be a no left turn during school morning traffic hours, so that families are forced to do the a one way loop by driving further down Appian Way, turning left onto Marlesta, left on McDonald, and right onto Mann Drive. This would help alleviate congestion and unsafe driving practices.	Motor Vehicles	Pedestrian Safety
6ha7w4vme6d9	92		N	Appian Way	Appian Way	A traffic barrier should go up on Appian Drive between the cross-directional lanes to prevent illegal and dangerous u-turns from the middle of the street. Frequently during the Pinole Middle School morning traffic hours (when the left turn lane onto Mann Drive is backed up), I have seen cars pass the intersection, then stop traffic in the middle of the road to flip a u-turn and go back up Appian Way to make a right turn onto Mann Drive. This is so unsafe and also creates congestion on Appian Way. Some kind of barrier preventing middle of the road u-turns would be so helpful here.	Motor Vehicles	Intersection Safety
4vb6kox2pyb8	93		N	Pinole Valley Rd	Pinole Valley Rd	ALL of Pinole Valley Road should be 25-30 MPH speed limit. We need to get the speeding under control.	Motor Vehicles	Speeding
2dz9dj2ja4a	94		N	Pinole Valley Rd	Pinole Valley Rd	Difficult merging conditions especially when there is queuing.	Motor Vehicles	Intersection Safety
2dz9dj2ja4a	95		N	Rail Road Ave	Rail Road Ave	Unsafe crossing conditions	Pedestrian	Pedestrian Safety
2dz9dj2ja4a	96		N	Rail Road Ave	Rail Road Ave	Difficulty crossing railroad crossing due to poor visibility and no crossing controls.	Motor Vehicles	Visibility
7np3uz7olu26	97		N	Pinole Valley Rd	Pinole Valley Rd	Drivers come through way too quickly in both directions cutting from the San Pablo Dam Road to the 80 freeway. They are driving over the speed limit and don't stop at the crosswalks by Pinole Valley Park. There are a lot of elementary school students who walk to school or home, and it is very unsafe.	Motor Vehicles	Speeding
7np3uz7olu26	97		N	Pinole Valley Rd	Pinole Valley Rd	Drivers come through way too quickly in both directions cutting from the San Pablo Dam Road to the 80 freeway. They are driving over the speed limit and don't stop at the crosswalks by Pinole Valley Park. There are a lot of elementary school students who walk to school or home, and it is very unsafe.	Motor Vehicles	School Safety
7np3uz7olu26	98		Y	Wright Ave	Wright Ave/Victor St	Drivers speed down Wright and don't stop at the stop sign.	Motor Vehicles	Speeding
7np3uz7olu26	98		Y	Wright Ave	Wright Ave/Victor St	Drivers speed down Wright and don't stop at the stop sign.	Motor Vehicles	Stop Sign Violation
2ak9hag2r9i3	99		Y	Appian Way	Appian Way/Mann Dr	Parents picking up their kids are making illegal u-turns past the Appian/Mann intersection on the Appian hill to get to both schools. Cars are double parked and making u-turns on Mann because of picking up kids. Kids running out between double parked cars and cars driving through isn't safe for children. I can't even drive down Mann to get to my own house without waiting in a line of jammed cars. It's very frustrating and unsafe.	Motor Vehicles	Intersection Safety
37gzm7iea9e7	100		N	Pinole Valley Rd	Pinole Valley Ave	Heavy traffic most days, on and out of trader Joe's parking lot	Motor Vehicles	Traffic Congestion
729x38yim288	101		N	Marlesta Rd	Marlesta Rd	Speeding, school traffic,	Motor Vehicles	Speeding
729x38yim288	101		N	Marlesta Rd	Marlesta Rd	Speeding, school traffic,	Motor Vehicles	School Safety
43jmu3vo4rhy	103		N	Pinole Valley Rd	Pinole Valley Ave	Traffic back up when school is letting out	Motor Vehicles	Traffic Congestion
9bo2ra3gl9v6	105		N	Doidge Ave	Doidge Ave	Speeding problems	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
Email	1		N	Appian Way	Appian Way	Hi there, I just found out today (closing date for comments) about the traffic safety program. I'm sure other parents at Pinole Middle and West County Mandarin School have similar concerns about traffic safety at the school campus. It is important for the city to be aware of this issue because child safety is extremely important	Motor Vehicles	School Safety
Email	2		Y	I80		Concerns not addressed about drivers being able to quickly, safely evacuate - see state evaluation sent 18 months-two years ago. Also daily jams to get onto I-80, either direction, increase collision danger to pedestrians, bicyclists, new or distracted drivers in area near I-80 intersections. These are ongoing priorities that have not yet been successfully addressed; they need full attention that involves various agencies- CalTrans, WestCat bus stops, etc.	Motor Vehicles	Intersection Safety
Email	3		Y	I80		Concerns not addressed about drivers being able to quickly, safely evacuate - see state evaluation sent 18 months-two years ago. Also daily jams to get onto I-80, either direction, increase collision danger to pedestrians, bicyclists, new or distracted drivers in area near I-80 intersections. These are ongoing priorities that have not yet been successfully addressed; they need full attention that involves various agencies- CalTrans, WestCat bus stops, etc.	Bicycle	Bicycle Safety
Email	4		Y	I80		Concerns not addressed about drivers being able to quickly, safely evacuate - see state evaluation sent 18 months-two years ago. Also daily jams to get onto I-80, either direction, increase collision danger to pedestrians, bicyclists, new or distracted drivers in area near I-80 intersections. These are ongoing priorities that have not yet been successfully addressed; they need full attention that involves various agencies- CalTrans, WestCat bus stops, etc.	Pedestrian	Pedestrian Safety
Email	5					Thank you for your efforts. My wife, kids and myself are avid bike riders and pedestrians here in Pinole. We love walking down town and riding to nearby cities for events and dining. We can definitely use safer routes to get around.		
Email	6		Y			Need update in signage, traffic cameras at dangerous intersections, speed monitors, and bumps to force slowdown.		
Email	7		Y	Pinole Valley Rd	Pinole Valley Rd	The intersection of Pinole Valley Road & Estates is especially a mess when PV High lets out in the afternoon. There is gridlock with cars coming out of the shopping center, cars driving down Pinole Valley Road and cars trying to turn from Estates. It is dangerous and time consuming. A fire engine or ambulance would not be able to get through the area in an emergency. Tickets should be issued. Perhaps U-Turns should not be allowed during that time.	Motor Vehicles	Intersection Improvement
Email	8		Y	Pinole Valley Rd	Pinole Valley Rd	The intersection of Pinole Valley Road & Estates is especially a mess when PV High lets out in the afternoon. There is gridlock with cars coming out of the shopping center, cars driving down Pinole Valley Road and cars trying to turn from Estates. It is dangerous and time consuming. A fire engine or ambulance would not be able to get through the area in an emergency. Tickets should be issued. Perhaps U-Turns should not be allowed during that time.	Motor Vehicles	Traffic Congestion

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
Email	9					Concerns - to help increase pedestrian safety at intersections: 1) accessible pedestrian signals (APS) should be considered at all major intersections 2) consider "no right on red" at intersections where vehicle/ped conflict occurred in the crosswalks 3) curb cuts should not be installed on the diagonal - each line of travel should have it's own ramp - this is especially important for people who are blind and visually impaired as well as for those who use wheelchairs 4) tactile warning surfaces should be at all corners (truncated domes) 5) the principles of universal design should be used at all times to make Pinole more ped friendly and walkable		
Email	10					Instead of only focusing on car collisions, I'd like to see the city focus on making it safer for pedestrians, including children, to be able to safely walk to school/the park/shops etc.		
Email	11					Bike lanes please!!!		
Email	12		Y	San Pablo Ave	San Pablo Ave	To whom it may concern, There's a very dangerous corner at 5th Ave. and San Pablo. Cars are aloud to park in front of 1149 San Pablo Ave. all the way to the corner of 5th Ave. making it difficult to make a left or right turn onto San Pablo Ave. In front of 1139 there is a red curb painted to prohibit parking in that spot. Is it possible to paint the red curb in front of 1149 San Pablo Ave. and remove the paint in front of 1139 San Pablo Ave.? That way it will allow drivers to see East bound oncoming traffic.		
Email	13							
Email	14		N	Appian Way	Appian Way	High traffic during the usual commutes and school drop offs and pick up is a concern. Often there is a line of cars not moving but is not understood by those trying to get on the freeways or major streets. There seems to be more speeding on those and surrounding streets especially by young drivers.	Motor Vehicles	School Safety
Email	15		Y	Pinole Valley Rd	Pinole Valley Rd	The lights that were installed on PV Rd. after the HS completion are atrocious. Getting down PV rd. is a slog. You ruined a good road. You also caused speeding to increase as people no longer have to stop at the former stop sign and, due to the capricious lights, they(me, too) speed up to make the next one if it's green. Lastly, there is NO enforcement of speeding on PV. Rd. A speed gun is not enforcement. What do the police do?	Motor Vehicles	Traffic Congestion
Email	16		Y	Pinole Valley Rd	Pinole Valley Rd	The lights that were installed on PV Rd. after the HS completion are atrocious. Getting down PV rd. is a slog. You ruined a good road. You also caused speeding to increase as people no longer have to stop at the former stop sign and, due to the capricious lights, they(me, too) speed up to make the next one if it's green. Lastly, there is NO enforcement of speeding on PV. Rd. A speed gun is not enforcement. What do the police do?	Motor Vehicles	Speeding
Email	17		Y	Pinole Valley Rd	Pinole Valley Rd	The lights that were installed on PV Rd. after the HS completion are atrocious. Getting down PV rd. is a slog. You ruined a good road. You also caused speeding to increase as people no longer have to stop at the former stop sign and, due to the capricious lights, they(me, too) speed up to make the next one if it's green. Lastly, there is NO enforcement of speeding on PV. Rd. A speed gun is not enforcement. What do the police do?	Motor Vehicles	Stop Sign Violation

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
Email	18		Y	Sarah Drive	Sarah Drive	Sarah Drive stop signs are notoriously ignored. As younger families continue to populate these older neighborhoods, it's important to enforce the existing signage and speed limits that are commonly ignored. I would recommend installing raised intersections or speed humps/cushions with cutaways in the middle to continue to promote bike riding.	Motor Vehicles	Stop Sign Violation
Email	19		Y	Sarah Drive	Sarah Drive	Sarah Drive stop signs are notoriously ignored. As younger families continue to populate these older neighborhoods, it's important to enforce the existing signage and speed limits that are commonly ignored. I would recommend installing raised intersections or speed humps/cushions with cutaways in the middle to continue to promote bike riding.	Motor Vehicles	Stop Sign Violation
Email	20		Y	Sarah Drive	Sarah Drive	Sarah Drive stop signs are notoriously ignored. As younger families continue to populate these older neighborhoods, it's important to enforce the existing signage and speed limits that are commonly ignored. I would recommend installing raised intersections or speed humps/cushions with cutaways in the middle to continue to promote bike riding.	Motor Vehicles	Intersection Safety
Email	21		Y	Sarah Drive	Sarah Drive	Sarah Drive stop signs are notoriously ignored. As younger families continue to populate these older neighborhoods, it's important to enforce the existing signage and speed limits that are commonly ignored. I would recommend installing raised intersections or speed humps/cushions with cutaways in the middle to continue to promote bike riding.	Bicycle	Bicycle Safety
Email	22		Y	Sarah Drive	Sarah Drive	Sarah Drive stop signs are notoriously ignored. As younger families continue to populate these older neighborhoods, it's important to enforce the existing signage and speed limits that are commonly ignored. I would recommend installing raised intersections or speed humps/cushions with cutaways in the middle to continue to promote bike riding.	Pedestrian	Pedestrian Safety
Email	23		Y	Pinole Valley Rd	Pinole Valley Rd	Pinole's roads have fallen into disrepair in several locations. the most noticeable and quickest fix would be to improve the signage and painting up to State standards. Many signs aren't visible due to foliage. Some signs are weathered to the point of not being adequate. The road painting is terrible in many locations - Lines have disappeared, markings on speed bumps are missing, and in some cases too many signs. Thank you	Motor Vehicles	Stop Sign Violation
Email	24		Y	Pinole Valley Rd	Pinole Valley Rd	Pinole's roads have fallen into disrepair in several locations. the most noticeable and quickest fix would be to improve the signage and painting up to State standards. Many signs aren't visible due to foliage. Some signs are weathered to the point of not being adequate. The road painting is terrible in many locations - Lines have disappeared, markings on speed bumps are missing, and in some cases too many signs. Thank you	Motor Vehicles	Intersection Improvement
Email	25		Y	Pinole Valley Rd	Pinole Valley Rd	Excessive and dangerous speeding traffic on Pinole Valley Road between Shea Drive, Granada Court, and Simas Avenue in both directions since last year 2020 when the City of Pinole replaced the Stop Signs at Shea Drive and Granada Court with Traffic Lights that are always on Green and a higher speed limit from 25 mph to 35 mph that everybody now exceeds when the City turned this once safe neighborhood into a racetrack and freeway for no good reason! And the City put the people who live here on Pinole Valley Road at risk and in harm's way for a life-threatening disaster here every day because there are no longer any traffic safeguards or restrictions or police enforcement!	Motor Vehicles	Speeding

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
Email	26		Y	Pinole Valley Rd	Pinole Valley Rd	Driver are going to fast on PVR	Motor Vehicles	Speeding
Email	27		Y	Pinole Valley Rd	Pinole Valley Rd	Driver are going to fast on PVR	Motor Vehicles	Speeding
Email	28		Y	Pinole Valley Rd	Pinole Valley Rd	Driver are going to fast on PVR	Motor Vehicles	Speeding
Email	29		Y	Pinole Valley Rd	Pinole Valley Rd	I urge to you expand your Local Road Safety Plan to consider not only collision history, but current dangerous driver behaviors that present a potential for future accidents. Vehicles race at high speed down Pinole Valley Road; and while the added traffic lights in front of Pinole Valley High School have helped that situation somewhat, it still happens frequently enough to be of concern. An added annoyance is the noise from unmuffled vehicles and motorcycles travelling at high speed. Two areas of ongoing concern are the red-light violations at the westbound Pinole Valley Road freeway exit (onto Pinole Valley Road), and the intersection of Fitzgerald Drive and Appian Way. Vehicles turning left from Fitzgerald Drive onto Appian Way ignore the red light and keep proceeding forward and turning left. How about installing a camera at these locations and issuing fines for violations? Finally, if the City has any authority for traffic and parking behavior in the Trader Joe's shopping center, it's time to cite vehicles (including commercial delivery vehicles) that are double-parked, parked in red-marked areas, and blocking traffic. I have had numerous close-calls and near-collisions trying to get around a delivery truck or private van/SUV blocking the 2-lane south entrance/exit of the shopping center. The worst spot is in the area of Jamba Juice. Vehicles regularly park right in the cross-walk, blocking the path of wheelchair users.	Motor Vehicles	School Safety
Email	30		Y	Pinole Valley Rd	Pinole Valley Rd	I urge to you expand your Local Road Safety Plan to consider not only collision history, but current dangerous driver behaviors that present a potential for future accidents. Vehicles race at high speed down Pinole Valley Road; and while the added traffic lights in front of Pinole Valley High School have helped that situation somewhat, it still happens frequently enough to be of concern. An added annoyance is the noise from unmuffled vehicles and motorcycles travelling at high speed. Two areas of ongoing concern are the red-light violations at the westbound Pinole Valley Road freeway exit (onto Pinole Valley Road), and the intersection of Fitzgerald Drive and Appian Way. Vehicles turning left from Fitzgerald Drive onto Appian Way ignore the red light and keep proceeding forward and turning left. How about installing a camera at these locations and issuing fines for violations? Finally, if the City has any authority for traffic and parking behavior in the Trader Joe's shopping center, it's time to cite vehicles (including commercial delivery vehicles) that are double-parked, parked in red-marked areas, and blocking traffic. I have had numerous close-calls and near-collisions trying to get around a delivery truck or private van/SUV blocking the 2-lane south entrance/exit of the shopping center. The worst spot is in the area of Jamba Juice. Vehicles regularly park right in the cross-walk, blocking the path of wheelchair users.	Motor Vehicles	Improper Parking

Respondent ID	#	Lat Long	Intersection? (Y/N)	Major Road	Name	Comment Received	Mode	Pertinent Issue
Email	31		Y	Pinole Valley Rd	Pinole Valley Rd	I urge to you expand your Local Road Safety Plan to consider not only collision history, but current dangerous driver behaviors that present a potential for future accidents. Vehicles race at high speed down Pinole Valley Road; and while the added traffic lights in front of Pinole Valley High School have helped that situation somewhat, it still happens frequently enough to be of concern. An added annoyance is the noise from unmuffled vehicles and motorcycles travelling at high speed. Two areas of ongoing concern are the red-light violations at the westbound Pinole Valley Road freeway exit (onto Pinole Valley Road), and the intersection of Fitzgerald Drive and Appian Way. Vehicles turning left from Fitzgerald Drive onto Appian Way ignore the red light and keep proceeding forward and turning left. How about installing a camera at these locations and issuing fines for violations? Finally, if the City has any authority for traffic and parking behavior in the Trader Joe's shopping center, it's time to cite vehicles (including commercial delivery vehicles) that are double-parked, parked in red-marked areas, and blocking traffic. I have had numerous close-calls and near-collisions trying to get around a delivery truck or private van/SUV blocking the 2-lane south entrance/exit of the shopping center. The worst spot is in the area of Jamba Juice. Vehicles regularly park right in the cross-walk, blocking the path of wheelchair users.	Motor Vehicles	Intersection Improvement
Email	32		Y	Appian Way	Appian Way	I recall when pedestrians pressed walk buttons (e.g., Appian Way and Sarah Drive) it also activated bird chirps to alert motorists of crossing pedestrians. Bird chirp alerts should be reactivated for major pedestrian crosswalks.	Pedestrian	Pedestrian Safety
Email	33		Y	Sarah Drive	Sarah Drive	I recall when pedestrians pressed walk buttons (e.g., Appian Way and Sarah Drive) it also activated bird chirps to alert motorists of crossing pedestrians. Bird chirp alerts should be reactivated for major pedestrian crosswalks.	Pedestrian	Pedestrian Safety
Community Meeting	1		Y	Appian Way	Appian Way/Tara Hills Dr	An eastbound right turn lane should be dedicated for traffic merging to WB I-80 to avoid conflict between traffic at the intersection.	Motor Vehicles	Intersection Improvement
Community Meeting	2		N			Add traffic calming projects on residential streets.	Motor Vehicles	Speeding
Community Meeting	3		N	Pinole Valley Rd	Pinole Valley Rd	Add bike lane on northbound side of roadway on Pinole Valley Road between Shea Dr and Simas Ave.	Bicycle	Bicycle Safety
Community Meeting	4		Y	Marlesta Rd	Marlesta Rd/Kildare Wy	Improve Traffic Safety near Shannon Elementary school especially at Kildare and Marlesta intersection	Pedestrian	School Safety
Community Meeting	5		Y	San Pablo Ave	San Pablo Ave/John St	On San Pablo Avenue there have been more accidents, including a pedestrian vehicle accident at Pinole Valley Rd., a powered pole hit in front of my house, a vehicle rear ender at John Street, vehicle collisions at Fernandez Ave. and at John Street intersections, a tree knocked over near John Street, street poles at Fernandez corner by a vehicle, etc. I have been documenting these photos since San Pablo Avenue is "out of control,"	Motor Vehicles	Intersection Improvement
Community Meeting	6		Y	San Pablo Ave	San Pablo Ave/Pinole Valley Rd	Add left turn arrow at San Pablo/Pinole Valley Road intersections and readjust yellow-red timings.	Motor Vehicles	Signal Improvement

APPENDIX B. SUMMARY OF PLANNING DOCUMENTS





Table 1: Matrix of Planning Goals, Policies, and Projects

Document	Highlights
City of Pinole General Plan (2010)	• Goal CE.1: Reduce vehicle miles traveled and encourage the use of public transit. • Goal CE.2: Achieve a coordinated regional and local transportation system that minimizes traffic congestion and efficiently serves users. • Goal CE.3: Provide timely input and effective means (as appropriate) of programming street and highway improvements to maintain the objective peak hour level of service without detrimentally impacting community character or commercial activity. • Goal CE.4: Establish programs to support sidewalk, trail and street enhancements, where feasible. • Goal CE.5: Provide adequate parking and loading facilities while encouraging alternative means of transportation. • Goal CE.6: Reduce the amount of peak hour automobile congestion on city streets, as appropriate. • Goal CE.7: Support bicycle use as a mode of transportation by enhancing infrastructure to accommodate bicycles and riders. • Policy CE 7.1: Enhance the City's bikeway network through the use of Class I, II and III bikeways. • Policy CE 7.2: Establish standards for new development and redevelopment projects to support bicycle use. • Policy CE 7.3: Establish a network of multi-use paths to facilitate safe and direct off-street bicycle and pedestrian travel. • Policy CE 7.4: Establish bicycle safety as a priority through ongoing public education. • Goal CE.8: Provide a safe network of well-maintained pedestrian walkways throughout Pinole that encourages walking as a form of non-motorized transportation. • Policy CE 8.1: Require development to provide pedestrian walkways that are safe, interconnected and accessible by all members of the community • Policy CE 8.2: Encourage the community to take advantage of Pinole's pedestrian facilities and recreational opportunities and increase non-motorized modes of transportation.



Document	Highlights
	• Policy CE 8.3: Design access ways to school facilities that will ensure public safety. • Policy CE 8.4: Encourage the location of basic shopping and services within walkable distances to residential areas.

Goals

- Reduce the speed of vehicles on residential streets, with demonstrated speeding problems, to levels consistent with speeds on more typical City of Pinole residential streets.
- Increase safety by reducing demonstrated accident patterns on impacted residential streets to levels consistent with those of typical City of Pinole residential streets.
- Develop and emphasize focused neighborhood educational programs, which address residential traffic problems.
- Implement selective enforcement actions in neighborhoods with demonstrated or perceived traffic-related problems.
- Eliminate, or discourage, non-local, cut-through traffic on residential streets.

The following measures support the implementation of program goals:

- Encourage citizen participation throughout the Program by seeking the input of affected residents and non-resident property owners through neighborhood meetings, written communication, and open forum opportunities with Traffic Committee and with City Council.
- Minimize impacts on emergency vehicle response times caused by the implementation of neighborhood traffic calming measures.
- Limit the potential for shifting traffic problems from one residential neighborhood to another when implementing traffic calming measures.
- Respond to complaints in a timely manner.

Recommended Traffic Calming Tools:

- Higher Visibility Crosswalks
- Entrance Treatment
- Speed Humps
- Curb Extensions or Chokers (Bulb-Outs)
- Traffic Circles
- Roundabout

City of Pinole Neighborhood Traffic Calming Policy (2008)



Document	Highlights
City of Pinole Three Corridors Specific Plan (2010) updated (2018)	• One-Way Streets • Median Barriers • Semi-Diverted or Half Closures • Diagonal Diverters • Cul-de-sac or Street Closure • Traffic Calming Signs Goals • To facilitate the transition of the San Pablo, Pinole Valley Road, and Appian Way corridors so that they complement the land uses and development pattern planned for the corridors through the implementation of this specific plan • To maintain and improve vehicular traffic circulation within the Specific Plan Areas to safely and efficiently move both local and through traffic to its destination • Accommodate future demand for circulation by all modes of transportation • To implement traffic calming techniques in specific areas to improve traffic and pedestrian safety • To create attractive urban streetscapes with design and amenities that are visually compatible with and enhance planned private development pursuant to this specific plan, and that support pedestrian use and outdoor activities Policies • The City will implement a comprehensive plan for a coordinated street circulation system that will provide for the safe and efficient movement of people and goods within and through the Specific Plan Areas. • All future roadway and intersection improvements will consider pedestrian and traffic safety first and foremost. Modifications to the standards, regulations, and/or guidelines contained herein are permitted in those instances where safety is at issue. • The City will implement traffic calming measures, as designated in this Specific Plan, to facilitate the creation of a pedestrian friendly environment throughout the Specific Plan Area in general, and in specified pedestrian-oriented retail, mixed-use and residential development areas along San Pablo Avenue. • The City will continue to oversee circulation system improvements within the Specific Plan Areas that is capable of

Document	Highlights
	adequately accommodating a reasonable increase in future traffic demands • The City will discourage through traffic and truck traffic for those roadway segments that are not designed to handle such traffic • The City will employ measures that will discourage through traffic on local streets • The City will ensure that there are clear rights-of-way for safe passage of pedestrians and bicyclists using San Pablo Avenue, Pinole Valley Road and Appian Way • The City will provide access for people who are disabled or impaired at all pedestrian crosswalks, and will include audible pedestrian crossing signal devices, and other appropriate safety measures at signalized pedestrian crosswalks where the City Engineer deems them appropriate • Any future roadway and intersection improvements undertaken by the City shall be in conformance to, and consistent with, this specific plan. • The City will continue to analyze traffic congestion and evaluate strategies to improve the efficiency of the local transportation and circulation system Corridor 1 circulation element concepts: Sab Pablo Avenue • Strengthen bicycle connections between Old Town and Appian Way • Strengthen pedestrian connections between Tennent Avenue by widening and making existing sidewalks continuous within the corridor, adding bike routes and paths along the corridor • Narrow San Pablo Avenue in Old Town to improve walkability Corridor 2 circulation element concepts: Pinole Valley Road • Strengthen pedestrian connections between Pinole Valley Shopping Center and the Valley (south of Interstate 80) by widening and making existing sidewalks continuous within the corridor, adding bike routes and paths along the corridor • Improve public transportation connections between the Valley (south of I-80) and the Pinole Valley Shopping Center and maximize safety through shelter, lighting, signage, and visibility • Improve and create visual and physical linkages to Pinole Valley Creek via bike paths, pedestrian walkways, and amenities and



Document	Highlights
Old Town Pinole Parking & Pedestrian Safety Study (2020)	by orienting commercial uses toward the creek and to the edge of Pinole Valley Road Corridor 3 circulation element concepts: Appian Way - Strengthen bicycle connections along the Appian Way corridor between Old Town and the Appian Way shopping centers - Strengthen pedestrian connections between the junior high school and the Appian Way shopping centers
	Goals - Completing a parking study to determine parking utilization in accordance with the General Plan and in response to Old Town Pinole business concerns - Improving pedestrian safety in arriving to their destinations in Old Town Pinole, especially from underutilized parking lots - Increasing connectivity between parking and destinations, including the Bayfront - Enhancing Old Town Pinole's unique character as both a destination and as a pedestrian experience Priority Pedestrian Facility Improvement Recommendations: - Tennent at San Pablo - Extend sidewalk to the intersection to remove gap - Reduced corner radius - Curb extension - High-Vis crossing markings - Street trees and planting - On-street parking - Consolidate additional driveways - Pinole Creek Trail and Pinole Valley Rd at San Pablo Ave - Pedestrian signal, synced with Pinole Valley - Curb extension - High Vis crossing markings - Match dimensions from Fernandez Ave - Relocate driveway to Rafaela St. - Bayfront Park 8'-10' wide Shared Use Path - High Visibility Crossing markings - Re-orient existing crossing - Curb Extension - Maintain 22'-24' wide driveway



Document	Highlights
Capital Improvement Plan (FY 2021/22 – 2025/26)	• Existing RR tracks and crossing arms • Signage & Wayfinding Opportunity
	Project Priority and Selection Criteria • Consistency with community plans and policies • Public and political support • Sustainability • Cost savings or revenue generation • Project demand, determined by inventory of existing land, equipment, and facility conditions • Economic, environmental, aesthetic or social impacts • Public health, safety or other legal concerns
	Road Projects: City Street Improvement Funding sources • Arterial Streets Rehabilitation 377 • Rule 20A • Gas Tax • Measure J Funded Projects • Pavement Maintenance and Rehabilitation Program – road maintenance and rehabilitation. • Pinole Valley Road Improvements – Improvements on Pinole Valley Road at completion of Pinole Valley High School construction. • Pinole Road Underground District – Underground utilities on Pinole Valley Road to complement the Pinole Valley High School Project • San Pablo Avenue Bridge over BNSF Railroad – Replace San Pablo Ave bridge • San Pablo Avenue Rehabilitation – Cold mill 2 ½ inches of asphalt concrete pavement and replace with new HMA, reconstruct 13 curb ramps, replace damaged sidewalk and close sidewalk gap • Installation of a HAWK at Appian and Marlesta • Hazel Street Gap Closure – Hazel Street four-lot subdivision project roadway improvements • Pedestrian improvements at Tennent near RXR –Improvements to Tennent Ave at the Railroad crossing to facilitate the movement of bicycles and pedestrians adjacent to vehicle traffic



Document	Highlights
Contra Costa Countywide Bike and Pedestrian Plan (2018)	Goals
	• Encourage more people to walk and bicycle • Increase safety and security for pedestrians and bicyclists • Create a safe, connected, and comfortable network of bikeways and walkways for all ages and abilities • Increase the livability and attractiveness of Contra Costa's communities and districts • Equitably serve all of Contra Costa's communities while ensuring that public investments are focused on projects with the greatest benefits
	Objectives
	• Increase the share of trips made by walking and bicycling in Contra Costa • Reduce the rate of pedestrian and bicycle fatalities and injuries per capita • Increase the number of miles of low-stress bikeways in Contra Costa • Increase the number of jurisdictions in Contra Costa with bicycle, pedestrian, or active transportation plans • Integrate complete street principles and best practices into Authority funding and design guidance
	Low-Stress Bikeway (Class I) facilities in Pinole:
	• Along Pinole Creek north of I-80 (Existing) • Along Pinole Creek south of I-80 (Proposed) • San Francisco Bay Trail (Proposed) • Along San Pablo Avenue (Proposed) • Along Appian Way (Proposed)
	Goals
	• Relieve Traffic Congestion on Highways and Interchanges • Make Bus, Ferry, Passenger Train, and BART Rides Safer, Cleaner, and More Reliable • Provide Accessible and Safe Transportation for Children, Seniors, Veterans, and People with Disabilities • Improve Transportation in Our Communities
CCTA Transportation Expenditure Plan (2020)	Projects
	• Enhance I-80, I-580 (Richmond-San Rafael Bridge), Transit, and BART Corridor • Improve Transit Reliability Along the I-80 Corridor



Document	Highlights
	• Relieve Congestion and Improve Local Access Along the I-80 Corridor • Improve Traffic Flow on Major Roads in West County • Enhance Ferry Service and Commuter Rail in West County • Improve Traffic Flow and Local Access to Richmond-San Rafael Bridge Along I-580 and Richmond Parkway • Seamless Connected Transportation Options
CCTA Countywide Comprehensive Transportation Plan (2017)	• GOAL 1: Support the efficient, safe, and reliable movement of people and goods using all available travel modes • GOAL 2: Manage growth to sustain Contra Costa's economy, preserve its environment and support its communities • GOAL 3: Expand safe, convenient and affordable alternatives to the single-occupant vehicle • GOAL 4: Maintain the transportation system • GOAL 5: Continue to invest wisely to maximize the benefits of available funding Routes of Regional Significance in Pinole: • Interstate 80 • Appian Way from San Pablo Ave to city limit • San Pablo Avenue within the city limits
Contra Costa County Transportation Analysis Guidelines (2020)	Transportation Policy Framework • Senate Bill 743 – California Environmental Quality Act • County General Plan • Growth Management Element • Transportation and Circulation Element • Capital Road Improvement & Preservation Program • Complete Streets • Contra Costa County Complete Streets Principles • Contra Costa County Complete Streets Implementation Measures • Vision Zero Contra Costa County • County Ordinance Code • Section 74-4.006 – Electric Vehicle ("EV") Charging • Chapter 82-16 – Off-Street Parking • Chapter 82-32 – Transportation Demand Management • Title 9 - Subdivisions • Contra Costa Transportation Authority



Document	Highlights
	• CCTA Technical Procedures • CCTA Countywide Bicycle and Pedestrian Plan • CCTA Action Plans for Routes of Regional Significance
	Goals • Provide efficient and effective local and regional transit services • Expand high-capacity transit in West County • Increase use of active transportation modes • Complete and expand the regional trail system • Pursue and sponsor transportation demand management programs to reduce single occupant vehicle travel • Actively manage growth to support regional land use and transportation goals • Improve the efficiency of highway and arterial operations • Maintain existing transportation facilities in adequate condition to provide safe and effective service • Support and improve quality of life in communities impacted by rail transport Actions for West County Routes of Regional Significance within the City of Pinole: • Implement the recommendations of the Complete Streets plans that affect San Pablo Avenue • Implement the recommendations of the Appian Way Alternatives Analysis and Complete Streets Study • Implement Pinole San Pablo Avenue Bridge Replacement over BNSF Railroad – Complete Street
West County Action Plan (2017)	
	Goals • Increase transit ridership by providing efficient, frequent, and reliable service • Improve connections between transit systems and services • Expand transit in competitive corridors to new and underserved travel markets • Protect and enhance the environment and maintain a high quality of life • Support sustainable urban growth • Provide equitable access for residents and businesses • Make efficient use of public financial resources
West Contra Costa High-Capacity Transit Study (2017)	

APPENDIX C. EXTENDED LIST OF HIGH INJURY INTERSECTIONS RANKING IN CITY OF PINOLE



City of Pinole LRSP - High Injury Intersection Ranking			
ID	Intersection	EPDO Score	Traffic Control
I-1	San Pablo Ave and Tennet	193	Signalized
I-2	Appian Way and Fitzgerald	183	Signalized
I-3	Appian Way and Canyon Dr and Tara Hills	183	Signalized
I-4	Appian Way and Marlesta Rd	177	Two Way Stop Controlled
I-5	Pinole Valley Road, Tennet Ave Ellerhorst St	171	Signalized
I-6	Walter and San Pablo	165	Two Way Stop Controlled
I-7	San Pablo Ave and Appian Way/Pinon Ave	28	Signalized
I-8	San Pablo Ave and Del Monte Dr/Belmont Wa	18	Signalized
I-9	Fitzgerald Dr and Best Buy	17	Signalized
I-10	Appian Way and Michael Drive	12	Two Way Stop Controlled
I-11	San Pablo Ave and Fernandez Ave	12	Signalized
I-12	San Pablo Ave and Sunnyview Dr	12	Signalized
I-13	San Pablo Ave and Pinole Valley Road	12	Signalized
I-14	Fitzgerald Dr and KFC Driveway	12	One Way Stop Controlled
I-15	Sarah Dr and Geoffrey Ct	11	One Way Stop Controlled

APPENDIX D. CONSOLIDATED HIGH INJURY COLLISION DATABASE



CASE_ID	HIN	ACCIDENT_YEAR	PROC_DATE	JURIS	COLLISION_DATE	COLLISION_TII	Hour
6869718	6869718	2015	4/13/2015	707	3/11/2015	829	8
6869722	6869722	2015	4/13/2015	707	3/10/2015	1443	14
6928141	6928141	2015	6/2/2015	707	5/9/2015	2345	23
6934070	6934070	2015	6/9/2015	707	4/27/2015	2250	22
6936250	6936250	2015	10/15/2015	707	5/15/2015	1218	12
7189422	7189422	2016	2/25/2016	707	1/27/2016	2011	20
7097553	7097553	2015	10/21/2015	707	10/8/2015	1809	18
7121523	7121523	2015	11/20/2015	707	10/7/2015	1818	18
7131881	7131881	2015	1/5/2016	707	11/22/2015	1240	12
7131882	7131882	2015	12/24/2015	707	11/25/2015	1740	17
8179452	8179452	2016	1/25/2017	707	11/8/2016	1815	18
7141244	7141244	2015	12/28/2015	707	11/21/2015	2028	20
7148105	7148105	2015	1/4/2016	707	11/5/2015	1330	13
6988028	6988028	2015	7/20/2015	707	6/2/2015	1717	17
8005917	8005917	2016	3/24/2016	707	2/27/2016	1704	17
8014853	8014853	2016	4/8/2016	707	3/15/2016	600	6
8016532	8016532	2016	4/13/2016	707	3/24/2016	832	8
8018204	8018204	2016	8/29/2016	707	4/4/2016	1720	17
8022527	8022527	2016	4/21/2016	707	3/9/2016	1405	14
8037499	8037499	2016	5/17/2016	707	4/25/2016	1807	18
8067599	8067599	2016	7/5/2016	707	3/31/2016	1018	10
8054456	8054456	2016	6/17/2016	707	5/12/2016	1716	17
7159792	7159792	2015	3/4/2016	707	12/18/2015	1516	15
8101439	8101439	2016	8/17/2016	707	7/3/2016	700	7
8110253	8110253	2016	8/31/2016	707	7/30/2016	2142	21
8110285	8110285	2016	8/31/2016	707	7/31/2016	2100	21
8112104	8112104	2016	8/31/2016	707	8/5/2016	2242	22
8115007	8115007	2016	9/1/2016	707	7/30/2016	1914	19
8172629	8172629	2016	11/29/2016	707	9/28/2016	1757	17
8160712	8160712	2016	11/29/2016	707	9/8/2016	1654	16
8172457	8172457	2016	11/23/2016	707	10/14/2016	1025	10
8124920	8124920	2016	9/21/2016	707	9/13/2016	2032	20
8179220	8179220	2016	12/9/2016	707	10/28/2016	1523	15
8087431	8087431	2016	7/25/2016	707	7/11/2016	1506	15
8189170	8189170	2016	1/10/2017	707	11/20/2016	217	2
8192557	8192557	2016	12/22/2016	707	10/15/2016	1834	18
8201460	8201460	2017	3/29/2017	707	3/5/2017	406	4
8316110	8316110	2017	3/3/2017	707	2/10/2017	2145	21
8324971	8324971	2017	3/20/2017	707	3/2/2017	1910	19
8333049	8333049	2017	4/3/2017	707	3/13/2017	1808	18
8394245	8394245	2017	6/28/2017	707	6/8/2017	932	9
8394320	8394320	2017	6/22/2017	707	6/9/2017	2119	21
8395856	8395856	2017	7/10/2017	707	5/1/2017	1410	14
8401052	8401052	2017	7/31/2017	707	6/10/2017	1259	12
8733814	8733814	2018	12/5/2018	707	10/19/2018	1553	15
8757533	8757533	2018	12/17/2018	707	11/21/2018	2356	23
90611633	90611633	2017	12/6/2017	9320	11/30/2017	750	7

CASE_ID	OFFICER_ID	REPORTING_DISTRICT	DAY_OF_WEEK	CHP_SHIFT	POPULATION	CNTY_CITY	SPECIAL_CODE
6869718	349		3	5	3	707	0
6869722	349		2	5	3	707	0
6928141	207		6	5	3	707	0
6934070	379		1	5	3	707	0
6936250	377		5	5	3	707	0
7189422	349		3	5	3	707	0
7097553	207		4	5	3	707	0
7121523	358		3	5	3	707	0
7131881	214/381		7	5	3	707	0
7131882	341	PINOW	3	5	3	707	0
8179452	219		2	5	3	707	0
7141244	216	PINOL	6	5	3	707	0
7148105	213		4	5	3	707	0
6988028	2051333		2	5	3	707	0
8005917	377	BAY	6	5	3	707	0
8014853	2171388	BAY	2	5	3	707	0
8016532	214		4	5	3	707	0
8018204	369		1	5	3	707	0
8022527	P380		3	5	3	707	0
8037499	213		1	5	3	707	0
8067599	213		4	5	3	707	0
8054456	213380		4	5	3	707	0
7159792	349		5	5	3	707	0
8101439	217	BAY	7	5	3	707	0
8110253	P375		6	5	3	707	0
8110285	379		7	5	3	707	0
8112104	202		5	5	3	707	0
8115007	375		6	5	3	707	0
8172629	211		3	5	3	707	0
8160712	377	BAY	4	5	3	707	0
8172457	217	BAY	5	5	3	707	0
8124920	214		2	5	3	707	0
8179220	217	BAY	5	5	3	707	0
8087431	213		1	5	3	707	0
8189170	375		7	5	3	707	0
8192557	388	RAY	6	5	3	707	0
8201460	202		7	5	3	707	0
8316110	214		5	5	3	707	0
8324971	214		4	5	3	707	0
8333049	375		1	5	3	707	0
8394245	332		4	5	3	707	0
8394320	210		5	5	3	707	0
8395856	210	BAY	1	5	3	707	0
8401052	332		6	5	3	707	0
8733814	384		5	5	3	707	0
8757533	201		3	5	3	707	0
90611633	18525		4	1	3	707	1

CASE_ID	BEAT_TYPE	CHP_BEAT	CITY_DIVIS	CHP_BEAT	BEAT_NUMBER	PRIMARY_RD
6869718	0	0		0		2 PINOLE VALLEY RD
6869722	0	0		0		TENNENT AV
6928141	0	0		0		3 APPIAN WAY
6934070	0	0		0		1 SAN PABLO AV
6936250	0	0		0		1 APPIAN WAY
7189422	0	0		0		2 PINOLE VALLEY RD
7097553	0	0		0		3 APPIAN WY
7121523	0	0		0		1 SAN PABLO AV
7131881	0	0		0		1 SAN PABLO AV
7131882	0	0		0		3 FITZGERALD DR
8179452	0	0		0		1 PINOLE VALLEY RD
7141244	0	0		0		2 PINOLE VALLEY RD
7148105	0	0		0		2 PINOLE VALLEY RD
6988028	0	0		0		1 PINOLE VALLEY RD
8005917	0	0		0		WALTER AV
8014853	0	0		0		1 APPIAN WY
8016532	0	0		0		3 FITZGERALD DR
8018204	0	0		0		1 APPIAN WY
8022527	0	0		0		3 APPIAN WY
8037499	0	0		0		3 FITZGERALD DR
8067599	0	0		0		1 SAN PABLO AV
8054456	0	0		0		1 SAN PABLO AV
7159792	0	0		0		2 PINOLE VALLEY RD
8101439	0	0		0		1 TENNENT AV
8110253	0	0		0		1 APPIAN WY
8110285	0	0		0		1 APPIAN WY
8112104	0	0		0		2 APPIAN WAY
8115007	0	0		0		1 SAN PABLO AV
8172629	0	0		0		3 FITZGERALD DR
8160712	0	0		0		APPIAN WY
8172457	0	0		0		1 APPIAN WY
8124920	0	0		0		3 FITZGERALD DR
8179220	0	0		0		1 APPIAN WY
8087431	0	0		0		2 PINOLE VALLEY RD
8189170	0	0		0		1 SAN PABLO AV
8192557	0	0		0		1 TENNENT AV
8201460	0	0		0		SAN PABLO AV
8316110	0	0		0		3 FITZGERALD DR
8324971	0	0		0		3 FITZGERALD DR
8333049	0	0		0		3 FITZGERALD DR
8394245	0	0		0		3 APPIAN WY
8394320	0	0		0		3 FITZGERALD DR
8395856	0	0		0		1 TARA HILLS DR
8401052	0	0		0		1 SAN PABLO AV
8733814	0	0		0		1 SAN PABLO AV
8757533	0	0		0		1 SAN PABLO AV
90611633	4 S			2		901 PINOLE VALLEY RD

CASE_ID	SECONDARY_RD	DISTANCE	DIRECTION	INTERSECTION	TJKM_INT	COLLISION	PCF_CODE
6869718	RAMONA AV	654	N	N	N	2	-
6869722	SAN PABLO AV	75	S	N	Y	3	-
6928141	MICHAEL DR	363	S	N	N	4	-
6934070	TENNENT AV	19	N	N	Y	2	-
6936250	CANYON DR	15	S	N	Y	4	-
7189422	ESTATES AV	472	S	N	N	2	-
7097553	FITZGERALD DR	0		Y	Y	2	-
7121523	DEL MONTE DR	104	E	N	Y	4	-
7131881	TENNENT AV	37	W	N	Y	3	-
7131882	FITZGERALD DR 1490	0		Y	Y	3	-
8179452	ELLERHORST ST	218	S	N	Y	2	-
7141244	COLLINS AV	20	N	N	Y	3	-
7148105	ESTATES AV	487	S	N	N	3	-
6988028	DOWNER ST	34	S	N	Y	4	-
8005917	SAN PABLO AV	168	N	N	Y	2	-
8014853	CANYON DR	0		Y	Y	4	-
8016532	JOVITA LN	853	E	N	N	3	-
8018204	MARLESTA RD	0		Y	Y	2	-
8022527	SARAH DR	219	S	N	Y	4	-
8037499	APPIAN WY	0		Y	Y	4	-
8067599	OAK RIDGE RD	279	W	N	N	3	-
8054456	FERNANDEZ AV	96	E	N	Y	4	-
7159792	ESTATES AV	471	S	N	N	4	-
8101439	PINOLE VALLEY RD	0		Y	Y	4	-
8110253	TARA HILLS DR	75	S	N	Y	4	-
8110285	MARLESTA RD	0		Y	Y	4	-
8112104	FITZGERALD DR	0		Y	Y	4	-
8115007	DEL MONTE DR	15	W	N	Y	4	-
8172629	APPIAN WY	687	W	N	N	3	-
8160712	MICHAEL DR	13	S	N	Y	4	-
8172457	MARLESTA RD	21	S	N	Y	4	-
8124920	FITZGERALD DR 1501	24	W	N	Y	4	-
8179220	SAN PABLO AV	159	S	N	Y	4	-
8087431	ESTATES AV	67	N	N	Y	4	-
8189170	OAK RIDGE LN	282	E	N	N	4	-
8192557	COLLINS SCHOOL	220	S	N	Y	4	-
8201460	OAKRIDGE AV	30	E	N	Y	4	-
8316110	FITZGERALD DR 1550	7	W	N	Y	4	-
8324971	KFC DRWY	22	E	N	Y	4	-
8333049	PINOLE VISTA	300	W	N	N	4	-
8394245	FITZGERALD DR	0		Y	Y	4	-
8394320	APPIAN WY	388	W	N	N	4	-
8395856	APPIAN WY	157	W	N	Y	2	-
8401052	DEL MONTE DR	415	E	N	N	2	-
8733814	FERNANDEZ AV	70	E	N	Y	4	-
8757533	TENNENT AV	0		Y	Y	4	-
90611633	I-80	70	W	N	Y	4	-

CASE_ID	PCF_VIOL	PCF_VIOLA	PCF_VIOL_HIT_AND_I	TYPE_OF_C	MVIW	PED_ACTIC	ROAD_SUR	ROAD_COM
6869718	10	21950 A	N	G	B	C	B	H
6869722	9	21801 B	N	D	G	A	A	H
6928141	5	21650	1 N	-	-	A	A	H
6934070	1	23152 A	N	B	C	A	A	H
6936250	3	22350	N	C	C	A	A	H
7189422	9	21804 A	N	D	C	A	A	H
7097553	12	21453 A	N	D	C	A	A	H
7121523	9	21804 A	N	D	C	A	A	H
7131881	0	21760 C	M	B	G	A	A	H
7131882	10	21950 A	F	G	B	B	A	H
8179452	1	23152	N	C	E	A	A	H
7141244	3	22350	N	E	I	A	A	H
7148105	8	22107	N	D	C	A	A	H
6988028	3	22350	N	C	C	A	A	H
8005917	3	22350	M	E	I	A	A	H
8014853	12	21453 A	M	B	C	A	A	H
8016532	18		N	A	I	A	A	H
8018204	11	21950 B	N	G	B	B	A	H
8022527	3	22350	N	C	C	A	B	H
8037499	8	22107	F	D	C	A	A	H
8067599	8	22107	N	A	I	A	A	H
8054456	3	22350	N	C	C	A	A	H
7159792	9	21804 A	N	D	C	A	A	H
8101439	12	21453 A	N	D	C	A	A	H
8110253	3	22350	N	C	C	A	A	H
8110285	9	21802 A	N	D	C	A	A	H
8112104	12	21453 A	N	A	C	A	A	H
8115007	3	22350	M	C	C	A	A	H
8172629	10	21950 A	N	G	B	C	A	H
8160712	3	22350 A	N	-	C	A	A	H
8172457	9	21802 A	N	D	C	A	B	H
8124920	9	21804 A	N	H	C	A	A	H
8179220	3	22350	F	C	C	A	B	H
8087431	3	22350	N	C	C	A	A	H
8189170	1	23152	N	E	I	A	A	H
8192557	5	21460 A	N	A	C	A	B	H
8201460	1	23152 A	N	E	I	A	B	H
8316110	22		N	G	B	B	A	H
8324971	9	21801 A	N	H	C	A	A	H
8333049	7	21658 A	N	E	-	A	A	H
8394245	3	22350	N	B	C	A	B	H
8394320	9	21804 B	N	E	G	A	A	H
8395856	3	22350	N	G	B	A	A	H
8401052	9	21804	N	D	C	A	A	H
8733814	3	22350	F	C	C	A	A	H
8757533	12	21453 A	F	G	B	B	B	H
90611633	3	22350	N	C	C	A	A	H

CASE_ID	ROAD_CON	LIGHTING	CONTROL	CHP	ROAD	PEDESTRIA	BICYCLE_A	MOTORCY	TRUCK_AC	NOT_PRIV
6869718 -	A	A	0	Y						Y
6869722 -	A	D	0		Y					Y
6928141 -	C	-	0		Y					Y
6934070 -	C	A	0							Y
6936250 -	A	A	0							Y
7189422 -	C	D	0					Y		Y
7097553 -	A	A	0					Y		Y
7121523 -	B	D	0							Y
7131881 -	A	A	0		Y					Y
7131882 -	C	A	0	Y						Y
8179452 -	C	D	0							Y
7141244 -	C	D	0							Y
7148105 -	A	D	0							Y
6988028 -	A	A	0							Y
8005917 -	A	D	0							Y
8014853 -	C	A	0							Y
8016532 -	A	D	0							Y
8018204 -	A	D	0	Y						Y
8022527 -	A	A	0							Y
8037499 -	A	A	0					Y		Y
8067599 -	A	D	0							Y
8054456 -	A	A	0							Y
7159792 -	A	D	0							Y
8101439 -	A	A	0							Y
8110253 -	C	D	0							Y
8110285 -	C	D	0							Y
8112104 -	C	A	0					Y		Y
8115007 -	A	A	0							Y
8172629 -	A	A	0	Y						Y
8160712 -	A	D	0					Y		Y
8172457 -	A	D	0							Y
8124920 -	C	D	0							Y
8179220 -	A	A	0							Y
8087431 -	A	A	0							Y
8189170 -	C	A	0							Y
8192557 -	C	D	0							Y
8201460 -	C	A	0							Y
8316110 -	C	D	0	Y						Y
8324971 -	C	D	0					Y		Y
8333049 -	A	D	0							Y
8394245 -	A	A	0							Y
8394320 -	C	D	0		Y					Y
8395856 -	A	D	0							Y
8401052 -	A	D	0					Y		Y
8733814 -	A	A	0							Y
8757533 -	C	A	0	Y						Y
90611633 -	A	A	0							Y

CASE_ID	ALCOHOL_	STWD_VEH	CHP_VEH	COUNT_SE	COUNT_VI	COUNT_CC	COUNT_PE	COUNT_PE	COUNT_BI	
6869718	A			1	1	0	0	0	1	0
6869722	L			4	0	1	0	0	0	0
6928141	L			4	0	0	1	0	0	0
6934070 Y	-	-			1	1	0	0	0	0
6936250	A			1	0	0	1	0	0	0
7189422	A			7	1	0	0	0	0	0
7097553	-	-			1	0	0	0	0	0
7121523	-				0	0	2	0	0	0
7131881	-		99		0	1	0	0	0	0
7131882 Y	A			1	0	1	0	0	1	0
8179452 Y	A			1	1	0	1	0	0	0
7141244	A			1	0	1	0	0	0	0
7148105	A			1	0	2	0	0	0	0
6988028	A			1	0	0	1	0	0	0
8005917	A			7	1	0	0	0	0	0
8014853	-				0	0	1	0	0	0
8016532	-	-			0	1	0	0	0	0
8018204	A			1	1	0	0	0	1	0
8022527	A			1	0	0	1	0	0	0
8037499 Y	D		22		0	0	1	0	0	0
8067599	A			1	0	1	0	0	0	0
8054456	A			7	0	0	2	0	0	0
7159792	A			1	0	0	1	0	0	0
8101439	A			7	0	0	2	0	0	0
8110253	A			1	0	0	1	0	0	0
8110285	D		22		0	0	1	0	0	0
8112104	C			2	0	0	1	0	0	0
8115007 Y	A			1	0	0	1	0	0	0
8172629	A			1	0	1	0	0	1	0
8160712	C			2	0	0	1	0	0	0
8172457	A			1	0	0	1	0	0	0
8124920 Y	A			8	0	0	1	0	0	0
8179220 Y	A			8	0	0	3	0	0	0
8087431	D		22		0	0	1	0	0	0
8189170 Y	A			1	0	0	1	0	0	0
8192557	-	-			0	0	1	0	0	0
8201460 Y	A			1	0	0	1	0	0	0
8316110	A			1	0	0	1	0	1	0
8324971	C			6	0	0	2	0	0	0
8333049	A			1	0	0	1	0	0	0
8394245	A			1	0	0	1	0	0	0
8394320	L			4	0	0	1	0	0	0
8395856	A			1	1	0	0	0	0	0
8401052	A			1	1	0	0	0	0	0
8733814 Y	-				0	0	1	0	0	0
8757533 Y	A			1	0	0	1	0	1	0
90611633	H		13		0	0	1	0	0	0

CASE_ID	COUNT_BI	COUNT_M	COUNT_M PRIMARY	SECONDAR	LATITUDE	LONGITUDE
6869718	0	0	0 -	-		
6869722	1	0	0 -	-		
6928141	1	0	0 -	-		
6934070	0	0	0 -	-		
6936250	0	0	0 -	-		
7189422	0	0	1 -	-		
7097553	0	0	1 -	-		
7121523	0	0	0 -	-		
7131881	1	0	0 -	-		
7131882	0	0	0 -	-		
8179452	0	0	0 -	-		
7141244	0	0	0 -	-		
7148105	0	0	0 -	-		
6988028	0	0	0 -	-		
8005917	0	0	0 -	-		
8014853	0	0	0 -	-		
8016532	0	0	0 -	-		
8018204	0	0	0 -	-		
8022527	0	0	0 -	-		
8037499	0	0	1 -	-		
8067599	0	0	0 -	-		
8054456	0	0	0 -	-		
7159792	0	0	0 -	-		
8101439	0	0	0 -	-		
8110253	0	0	0 -	-		
8110285	0	0	0 -	-		
8112104	0	0	1 -	-		
8115007	0	0	0 -	-		
8172629	0	0	0 -	-		
8160712	0	0	1 -	-		
8172457	0	0	0 -	-		
8124920	0	0	0 -	-		
8179220	0	0	0 -	-		
8087431	0	0	0 -	-		
8189170	0	0	0 -	-		
8192557	0	0	0 -	-		
8201460	0	0	0 -	-		
8316110	0	0	0 -	-		
8324971	0	0	1 -	-		
8333049	0	0	0 -	-		
8394245	0	0	0 -	-		
8394320	1	0	0 -	-		
8395856	0	0	0 -	-		
8401052	0	0	1 -	-		
8733814	0	0	0 -	-		
8757533	0	0	0 -	-		
90611633	0	0	0 -	-	37.9977	-122.28663

CASE_ID	COUNTY	CITY	POINT_X	POINT_Y
6869718	CONTRA COSTA	PINOLE	-122.285	37.99257
6869722	CONTRA COSTA	PINOLE	-122.291	38.00537
6928141	CONTRA COSTA	PINOLE	-122.299	37.98897
6934070	CONTRA COSTA	PINOLE	-122.291	38.00558
6936250	CONTRA COSTA	PINOLE	-122.302	37.99525
7189422	CONTRA COSTA	PINOLE	-122.286	37.99429
7097553	CONTRA COSTA	PINOLE	-122.3	37.99156
7121523	CONTRA COSTA	PINOLE	-122.316	38.003
7131881	CONTRA COSTA	PINOLE	-122.291	38.00548
7131882	CONTRA COSTA	PINOLE	-122.306	37.99105
8179452	CONTRA COSTA	PINOLE	-122.288	38.00166
7141244	CONTRA COSTA	PINOLE	-122.279	37.98327
7148105	CONTRA COSTA	PINOLE	-122.286	37.99425
6988028	CONTRA COSTA	PINOLE	-122.288	38.00295
8005917	CONTRA COSTA	PINOLE	-122.312	38.0049
8014853	CONTRA COSTA	PINOLE	-122.302	37.99529
8016532	CONTRA COSTA	PINOLE	-122.308	37.99079
8018204	CONTRA COSTA	PINOLE	-122.299	38.00175
8022527	CONTRA COSTA	PINOLE	-122.3	37.9911
8037499	CONTRA COSTA	PINOLE	-122.3	37.99156
8067599	CONTRA COSTA	PINOLE	-122.294	38.00416
8054456	CONTRA COSTA	PINOLE	-122.29	38.0061
7159792	CONTRA COSTA	PINOLE	-122.286	37.99429
8101439	CONTRA COSTA	PINOLE	-122.288	38.00211
8110253	CONTRA COSTA	PINOLE	-122.302	37.99511
8110285	CONTRA COSTA	PINOLE	-122.299	38.00175
8112104	CONTRA COSTA	PINOLE	-122.3	37.99156
8115007	CONTRA COSTA	PINOLE	-122.316	38.00284
8172629	CONTRA COSTA	PINOLE	-122.303	37.99169
8160712	CONTRA COSTA	PINOLE	-122.299	37.98992
8172457	CONTRA COSTA	PINOLE	-122.299	38.00169
8124920	CONTRA COSTA	PINOLE	-122.305	37.99129
8179220	CONTRA COSTA	PINOLE	-122.299	38.00376
8087431	CONTRA COSTA	PINOLE	-122.286	37.99576
8189170	CONTRA COSTA	PINOLE	-122.292	38.00478
8192557	CONTRA COSTA	PINOLE	-122.288	38.00165
8201460	CONTRA COSTA	PINOLE	-122.293	38.00436
8316110	CONTRA COSTA	PINOLE	-122.302	37.99143
8324971	CONTRA COSTA	PINOLE	-122.302	37.99149
8333049	CONTRA COSTA	PINOLE	-122.304	37.99151
8394245	CONTRA COSTA	PINOLE	-122.3	37.99156
8394320	CONTRA COSTA	PINOLE	-122.302	37.99148
8395856	CONTRA COSTA	PINOLE	-122.303	37.99538
8401052	CONTRA COSTA	PINOLE	-122.315	38.00344
8733814	CONTRA COSTA	PINOLE	-122.29	38.00607
8757533	CONTRA COSTA	PINOLE	-122.291	38.00555
90611633	CONTRA COSTA	PINOLE	-122.286	37.99738

APPENDIX E. LRSM EXCERPT



Local Roadway Safety

A Manual for California's Local Road Owners

Version 1.6
April 2022



Created by Caltrans in conjunction with FHWA and SafeTREC
for the express benefit of California Local Agencies.



U. S. Department of Transportation
Federal Highway Administration

Safe Transportation
Research & Education Center

SafeTREC

Document History

Version 1.0: 4/20/2012

The California Department of Transportation - Division of Local Assistance developed the first version of the Local Roadway Safety Manual (Version 1.0) in 2012 to support the Cycle 5 HSIP call-for-projects.

Version 1.1: 4/26/2013

Based on feedback and lessons learned from Cycle 5, Caltrans updated Appendix B: “Table of Countermeasures and Crash Reduction Factors” to better clarify text in “Where to use”, “Why it works”, and “General Qualities” for several of the countermeasures included in the original manual.

No other changes were made to the Local Roadway Safety Manual as part of Version 1.1

Version 1.2: 03/10/2015

Based on feedback and lessons learned from Cycle 6, Caltrans made minor updates to the text of the document as needed for achieving consistency with overall Caltrans local HSIP guidance documents. The following sections were updated: 1.2, 4.2, 5.1, 6.2, and Appendix B, E, F & G.

Version 1.3: 04/29/2016

Caltrans made updates to the text of the document as needed in the following sections: 4.2, 5.1 and Appendix B.

Version 1.4: 06/08/2018

3/30/18 - Caltrans made updates to the crash costs in Appendix D, some of the website links in Appendix G, and some other texts of the document.

6/8/18 - Countermeasure S22 (“Modify signal phasing to implement a Leading Pedestrian Interval (LPI)”) is added.

Version 1.5: April 2020

Caltrans added a few more countermeasures (e.g. Pedestrian Scramble, Install Separated Bike Lanes, Reduced Left-Turn Conflict Intersections, and Curve Shoulder widening), renumbered the countermeasures and updated the crash costs in Appendix D.

Version 1.6: April 2022

For Cycle 11 Call-for-projects, Countermeasure S04 (Provide Advanced Dilemma Zone Detection for high-speed approaches) was deleted and Countermeasure NS05mr (Convert intersection to mini-roundabout) added. The HSIP Funding Eligibility was changed to 90% except for S03, of which the HSIP Funding Eligibility stays at 50%. The crash costs in Appendix D were updated.

Future Updates:

In the future, Caltrans anticipates that additional changes will be needed to keep the Local Roadway Safety Manual consistent with future Calls-for-Projects’ Guidelines and Application Instructions. In addition, new local HSIP programs, improvements to California data on local roadways, data analysis tools, and the latest safety research and methodologies may give rise to the need to make more significant changes to this manual.

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Foreword

Why was this manual developed?

The California Department of Transportation - Division of Local Assistance's goal in developing this manual is to maximize the safety benefits for local roadways by encouraging all local agencies to proactively identify and analyze their safety issues and to position themselves to compete effectively in Caltrans' statewide, data-driven call-for-projects.

This goal is complicated by California's wide variety of local agencies, roadway types, and project types, including: rural vs. urban, low-volume vs. high-volume, and intersection vs. roadway segment vs. network-wide. This variety makes it difficult to administer a single program and provide one set of guidelines that meets the needs of all California's local roadway owners and users. Many of California's local agencies are also challenged by the lack of a basic safety analysis framework and analysis tools specifically designed for local roadway managers with widely varying responsibilities and safety training. Currently, there is a vast range of safety documents, program guidance, and analysis tools with a wide variety of complexity and applications. Without clear and simple safety guidance for locals, many agencies take a 'reactive' approach to safety, even when research has shown 'proactive' safety analysis of roadways is more effective in making system-wide safety improvements.

The Federal Highway Administration (FHWA) Office of Safety provides national leadership in identifying, developing, and delivering safety programs and products to local governments to improve highway safety on local and rural roads.¹ In 2010, FHWA published a set of three manuals designed specifically for rural road owners; Roadway Departure Safety, Intersection Safety, and Road Safety Information Analysis.² These manuals present a simple, data driven safety analysis framework for rural agencies across the nation. These manuals, in conjunction with Caltrans' ongoing short-term research and development contract with the Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley, provided a unique opportunity for Caltrans to pursue development of this document as a mirror of FHWA's new Manuals for Local Rural Road Owners. Much of the wording, formatting and references from these FHWA manuals have been directly incorporated into this manual for California's local road owners. Individual references to the FHWA manuals have not been included; instead these documents are intended to be referenced on a wholesale basis.

With FHWA's and SafeTREC's support and expertise, Caltrans was able to expedite the completion of this manual and can now offer California's local agencies a new tool intended to provide focused roadway safety information in one manual.

1. Introduction and Purpose

The information in this document is geared towards local road managers and other practitioners with responsibility for operating and maintaining local roads, regardless of safety-specific highway training. The primary goal of this document is to provide an easy-to-use and comprehensive framework of the steps and analysis tools needed to identify locations with roadway safety issues and the appropriate countermeasures. For novice practitioners, the concepts and framework will be new, while experienced safety practitioners may find this manual to be mostly review. In both cases, the manual will provide the practitioners with a good understanding of how to complete a proactive safety analysis and ensure they have the best opportunity to secure HSIP safety funding during Caltrans calls-for-projects.

It's expected that novice and experienced practitioners will utilize this manual to help position their local agency to better compete in future Caltrans' calls-for-projects for safety programs. Inexperienced local roadway practitioners are also a target audience for this manual to gain exposure to the basic concepts that make up a proactive safety analysis of a local agency's roadway network.

The intent of this manual is to focus on key safety activities that every local agency should conduct on an annual basis (or as established by the agency) with the objective of reducing the number and severity of crashes within their jurisdiction. This manual defines this overall process as a "proactive safety analysis" approach to roadway safety. The Highway Safety Manual (HSM), documents a very similar process and refers to it as the "Roadway Safety Management Process." While the process in this document is similar and suggests the same primary elements, the HSM goes into significantly more detail, focuses more on scientific and mathematical equations behind the process, and intends to provide a comprehensive understanding of the overall processes to be applied by individual agencies across the nation. In contrast, this manual attempts to streamline the discussion; and make accommodations for the more novice safety practitioners, provide an adequate understanding of the process to complete an initial safety analysis of their roadway network, and instruct them on how to prepare applications that will compete well in Caltrans' statewide calls-for-projects. In general, this manual is intended to follow the research and methodologies presented in the HSM; however, to support Caltrans' statewide calls-for-projects process, it is important to note this manual deviates from the HSM in areas related to countermeasure selection and benefit / cost calculations. The logic behind these deviations is explained at the specific topic sections.

This manual is not intended to cover many of the day-to-day basics of traffic engineering including: maintain standard signage per the Manual on Uniform Traffic Control Devices; maintain sight distance (cut vegetation, remove parking); maintain a recovery zone; work with local traffic law enforcement; monitor collisions; address complaints; and manage litigation. These activities are understood to be critical elements of a local agency's traffic engineering responsibilities, but are not within the intended scope of this document.

1.1 California Local Roadway Safety Challenges and Opportunities

California's local roads are managed by more than 600 local agencies, including: cities, counties, and tribal governments. These local roads vary from flat multi-lane urban arterials to rural gravel roads in mountainous areas. California local agencies invest extensive resources on roadway safety every year, yet many roadways operate with outdated or insufficient safety features. A portion of these roadways even lack basic signing, pavement markings, alignment, and traffic control devices. Limited funding often prevents agencies from constructing safety projects, which can be expected. At the same time, the lack of safety data, design challenges, and lack of adequate training also hinder local agencies' accurate evaluation of their roadway network safety issues, which is more preventable.

Many small California local agencies are challenged by a lack of crash data. Without data, they have no way to identify High Crash Concentration Locations (HCCLs) or high risk roadway features, which can leave them "flying blind" with respect to the safety of their overall roadway network. Without data and analysis results, local officials may overreact when a tragic crash occurs, resulting in resources being spent in areas that will not maximize the overall application of safety funds. In conjunction with the collision mapping and analysis tools developed by UC Berkeley's SafeTREC, this document helps ensure all California local agencies have direct access to data on fatal and injury crashes within their jurisdictions and the analysis tools to effectively assess and prioritize future safety projects.

1.2 Safe System Approach

The Infrastructure Investment and Jobs Act (IIJA), aka Bipartisan Infrastructure Law (BIL), was signed into law on November 15, 2021. Under IIJA, the Highway Safety Improvement Program (HSIP), codified as Section 148 of Title 23, United States Code (23 U.S.C §148), is a core federal-aid program to States for the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. The IIJA emphasizes the "safe system approach":

Safe system approach means a roadway design that emphasizes minimizing the risk of injury or fatality to road users; and that (i) takes into consideration the possibility and likelihood of human error; (ii) accommodates human injury tolerance by taking into consideration likely accident types, resulting impact forces, and the ability of the human body to withstand impact forces; and (iii) takes into consideration vulnerable road users. (23 U.S.C. 148(a)(9)).

FHWA recognizes that the funding available through HSIP alone will not achieve the goal of zero fatalities on the Nation's roads. The Safe System approach addresses the safety of all road users, including those who walk, bike, drive, ride transit, and travel by other modes. It involves a paradigm shift to improve safety culture, increase collaboration across all safety stakeholders, and refocus transportation system design and operation on anticipating human mistakes and lessening impact forces

to reduce crash severity and save lives. FHWA encourages States to prioritize safety in all Federal-aid investments and in all appropriate projects, using not only HSIP funding but also other Federal-aid funding.

The IIJA emphasizes the importance of vulnerable road user (non-motorized road user) safety in the HSIP by adding a definition for vulnerable road users, creating a vulnerable road user special rule, and requiring States to develop and update a vulnerable road user safety assessment. All of these provisions address the increasing number of fatalities involving vulnerable road users on U.S. roads. It is imperative that States consider the needs of all road users as part of the HSIP. Investment in highway safety improvement projects that promote and improve safety for all road users, particularly vulnerable road users, aligns with the IIJA and will help Build a Better America. States and other funding recipients should prioritize projects that maximize the existing right-of-way for accommodation of non-motorized modes and transit options that increase safety, equity, accessibility, and connectivity. Projects that separate users in time and space, match vehicle speeds to the built environment, and increase visibility (e.g., lighting) advance implementation of a Safe System approach and improve safety for vulnerable road users.

1.3 The State's Role in Local Roadway Safety

The California Department of Transportation (Caltrans)—Division of Local Assistance is responsible for administering California's HSIP safety funding intended for local roadway safety improvements. This funding primarily comes to the state through two federal programs: Highway Safety Improvement Program (HSIP)—a federal-aid program focused on reducing fatalities and serious injuries on all public roads; and the Active Transportation Program (ATP)—a federal aid and state funded program focused on improving safety and the overall use of non-motorized, active transportation modes of travel. Under SAFETEA-LU, High Risk Rural Roads Program (HR3) was established to focus on addressing rural road safety needs but in MAP-21 and FAST, it is now a 'special rule' under HSIP that if triggered, directs that a certain amount of HSIP funds will need to be allocated for those rural roads that meet the definition.

Caltrans' administration of these programs encompasses many responsibilities, including: establishing program guidance; reviewing applications for improvements on local roadways; ranking applications/projects on a statewide basis; selecting projects for funding based on the greatest potential for reducing fatalities and injuries; programming the selected projects in the Federal Statewide Transportation Improvement Program (FSTIP); and assisting with programming and delivery issues throughout the delivery of the local agency projects. One goal for developing this document is to improve Caltrans' overall data-driven approach to statewide project selection of safety projects and to maximize the long-term safety improvements across California. To show the relationship between Caltrans' project selection process and this manual, a diagram showing the HSIP Call-for-Projects Process is provided in Appendix A.

Many State Departments are also actively engaged in California's Strategic Highway Safety Plan (SHSP). Caltrans developed the SHSP in a cooperative process with local, State, federal, and private sector safety stakeholders. The SHSP is a data-driven, comprehensive plan that established statewide goals, objectives, integrated the five E's of traffic safety— engineering, enforcement, education, emergency response, and emerging technologies. This manual directly supports many of the emphasis areas of the California SHSP. Local agencies are encouraged to participate in ongoing SHSP update efforts and can find more information on the SHSP at the following website: <https://dot.ca.gov/programs/safety-programs/shsp>.

Local Roadway Safety Plan (LRSP) and Systemic Safety Analysis Report Program (SSARP)

The state-funded Systemic Safety Analysis Report Program (SSARP) was established in 2016. The intent of the SSARP was to assist local agencies in performing a collision analysis, identifying safety issues on their roadway networks, and developing a list of systemic low-cost countermeasures that can be used to prepare future HSIP and other safety program applications. Late 2019, the program was evolved to Local Roadway Safety Plan (LRSP) so that the focus is not just engineering solutions but also include safety improvements in other areas such as enforcement, Education and emergency response.

The state funding for the LRSP/SSARP program is made available by exchanging the local Highway Safety Improvement Program (HSIP) federal funds for State Highway Account (SHA) funds.

For more information, please visit the LRSP/SSARP webpage at <https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program/local-roadway-safety-plans>.

1.4 The Local Roadway Crash Problem

Approximately 3,000 people die in California traffic crashes every year, representing nearly 10% of all traffic fatalities in the United States. Fifty-seven percent of these fatalities occur on local roadways, while only forty-three percent occur on the California State Highway System. A comparison of rural and urban roadways shows that local rural roadways have fatality rates 2 to 3 times higher than urban roadways per vehicle miles traveled. Based on these statistics, the total annual cost of local roadway fatal crashes to California is over \$6 billion, while only \$100 million is available annually in HSIP safety funds.

These statistics demonstrate the large and complex safety issues facing California. Through the development of this document, Caltrans is striving to help local agencies proactively identify high risk roadway features, roadway network locations/corridors with the highest safety needs, and encourage them to select effective low-cost improvements, whenever appropriate.

1.5 Reactive vs. Proactive Safety Issue Identification

Safety issues are identified on local roadways through a wide range of approaches. Although no single approach works best for all local agencies, some are far more effective at improving long-term roadway safety. Many agencies, often larger ones, have staff whose full-time job is dedicated to roadway safety; allowing them to focus on safety initiatives, be trained in the latest safety research, and have access to safety analysis data, tools and procedures. These agencies often utilize a 'proactive' approach to analyze their roadway network and identify safety issues.

At the same time many agencies, often the smaller ones, lack the financial ability to dedicate large portions of their staff resources to analyze safety issues and their staff has limited access to roadway safety training, safety expertise, and the latest safety analysis tools and procedures. Unfortunately, this can often result in identifying their safety issues in 'reaction' to tragic events.

The following is a basic outline of the differences in proactive vs. reactive identification approaches used by local agencies:

Reactive Approach

For this document, an agency is considered to be utilizing a reactive approach to roadway safety if they primarily identify safety improvements in reaction to:

- Recent crashes triggering safety investigations
- Specific crash concentrations triggering safety investigations
- Stakeholder identification of locations with safety issues and requests for improvements
- New funding becoming available

Crash concentrations and crash trends may be missed if local agencies rely exclusively on these identifiers for their roadway safety effort. They may also miss many opportunities to effectively utilize low-cost, systemic type improvements. This document encourages local agencies to adopt a more proactive approach to their roadway safety.

Proactive Approach

An agency is considered to be using a proactive approach to roadway safety if they go beyond the elements of a reactive approach and identify safety improvements by analyzing the safety of their entire roadway network, in one of the following ways:

- One-time, network-wide safety analysis of their roadways driven by new source of funding.
- Routine safety analyses of the roadway network (Preferred Approach!)

Agencies with a proactive approach utilize both systemic and spot location improvements (as defined in section 1.5 below). Applying improvements systemically across an entire corridor or network allows an agency to proactively address locations that have not had crash concentrations in the past, but have

similar features as those currently experiencing high levels of crashes. In addition, even though a spot location improvement may be based on 'past' crashes, agencies making improvements based on countermeasures with proven crash reduction factors at their highest crash locations often have the best chance of proactively reducing future crashes.

This document encourages safety practitioners to pursue a proactive approach and routinely analyze the safety of their roadway networks to yield the best overall safety results.

1.6 Implementation Approaches

When an agency proactively identifies their safety issues throughout their roadway network, it is likely they will find high crash concentrations at intersections, roadway segments, and corridors. The safety practitioner should consider which implementation approach to utilize. Typical approaches include:

- Systemic Approach
- Spot Location Approach
- Comprehensive Approach incorporating human behavior issues

Each of these approaches has benefits and drawbacks. As Local agency practitioners identify their safety issues and analyze the data for crash patterns, they should be open to implementing a combination of these approaches, as documented in Sections 2 and 3 of this manual.

Systemic Approach

The Systemic Approach is primarily based on application of proven safety countermeasures at multiple crash locations, corridors, or geographic areas. Implementation of the Systemic Approach is generally based on 'system-wide' crash data with the estimates of the impacts being made in terms of benefits measured in traffic crash reduction and deployment cost. Identified locations experiencing high levels of crashes and locations with similar geometric features can be treated systemically with low-cost, proven safety countermeasures. *Note: The term "Systemic" used throughout in this manual is often exchanged with the term "Systematic" in many national safety documents and research studies. In general, safety practitioners will find these terms interchangeable. This manual uses "Systemic" to match the new HSM and the FHWA CMF Clearinghouse.*

Benefits of the Systemic Approach may include:

- Widespread effect. The Systemic Approach addresses safety issues at a large number of locations or on an entire local roadway network. It can also generate projects that combine HCCLs and locations with the potential for crashes and still have high Benefit to Cost (B/C) ratios. An example of this type of project could be upgrading pavement delineation and warning signs along a rural corridor: crashes may not have occurred on every curve or segment along the corridor, but all of the corridor's pavement delineation and warning signs can be upgraded at one time. For urban applications, an example could be protecting the left-turn phase of signalized intersections with

existing left-turn pockets: severe crashes may not have occurred at each of the left-turn movements, but with minor changes to the signal hardware and signing, all or many of a city's unprotected left-turn phases can be protected with one safety project.

- Crash type prevention. By focusing on a predominant crash type, an agency can address locations that have not experienced significant numbers of these types of crashes, but have similar characteristics or conditions as existing HCCLs. The resulting B/C ratios for these types of projects will be less than if only HCCLs are included; but by using low-cost countermeasures and including as many high crash locations as possible, the resulting B/C ratios should still be high enough to allow agencies to proactively address locations that have not experienced high numbers of these types of crashes. For urban areas, projects improving pedestrian crossings can be good examples of the Systemic Approach. By applying the countermeasures systemically, the agency can often justify these projects based on relatively high B/C ratios, even though some of the improvement locations have not experienced enough crashes to yield moderate-to-high B/C ratios on their own.
- Cost-effectiveness. Implementing low-cost solutions across an entire system or corridor can be a more cost-effective approach to addressing system-wide safety issues. Even though this approach does not address all (or total) safety issues for a given location, the deployment of low-cost countermeasures often result in the highest overall safety benefit for an agency with limited safety funding. An example of this would be an agency choosing to install rumble stripes along an entire corridor for equal or less money than realigning a small portion the roadway to fix a single curve.
- Reduced data needs. The Systemic Approach can be used without a detailed crash history for specific locations, thereby reducing data needs. For example, consider a long rural corridor, which includes a section that passes through an Indian Reservation: Even if there is no documented crash data for the portion of the corridor that passes through the reservation, the entire limits can be treated with the same low-cost improvements. As long as there are sufficient past crashes documented for the entire corridor, the project will still have a reasonably high B/C ratio.

Drawbacks of the Systemic Approach may include:

- Justifying improvements can be difficult. Because this approach does not always address locations with a history of crashes and active stakeholders, it can be difficult to justify the improvements. The Systemic Approach will rarely include a recommendation for a large-scale safety improvement at a single location. Since large-scale projects usually garner attention from decision makers, the media, elected officials, and the general public, safety practitioners often need to make additional efforts to explain the Systemic Approach and its benefits to those groups. Safety practitioners can utilize the high B/C ratios of these systemic projects to convey their benefits compared to high-profile, single location projects with lower B/C ratios.

Spot Location Approach

The Spot Location Approach is typically based on an analysis of crash history to identify locations that have significantly higher crashes and treat them accordingly. It is important to practitioners to

understand that for many locations, safety issues can be complicated and sometimes the most appropriate fixes are not quick, easy or cheap.

Benefits of the Spot Location Approach may include:

- Focus on demonstrated needs. The Spot Location Approach focuses directly on locations with a history of crashes and specifically addresses those crashes. Intersection improvements are some of the most common spot location projects. Intersections tend to have higher concentrations of crashes resulting from opposing traffic movements. These high crash concentrations often require stand-alone improvements to adequately resolve the safety issues.
- Justifying improvements can be easy. Because this approach addresses locations with a history of crashes, it is usually easy to justify improvements. For urban areas, reconfiguring/ reconstructing an entire intersection can be a good example of an effective Spot Location Approach. Large urban intersections can have extremely high crash concentrations, making major changes to the intersection the only way to significantly reduce future crashes. With these types of scenarios, even the highest cost countermeasures can be cost effective.
- If low-cost countermeasures are used, this approach can prove very cost effective. The Spot Location Approach does not always have to include moderate or high cost improvements. It is often appropriate for local agencies to make low-cost improvements at one location at a time. Ongoing maintenance and development projects offer great opportunities for these low-cost improvements to be constructed with no additional expense to local agencies.

Drawbacks of the Spot Location Approach may include:

- Assumption that the past equals the future. This approach assumes locations with a history of crashes will continue to experience the same number and type of crashes in the future. When agencies do not account for the random nature of roadway crashes (i.e., Regression to the Mean), moderate to high cost projects can be erroneously justified. Practitioners can mitigate this by using 5 years of crash data when analyzing their roadways. In addition, significant changes to land use or roadway characteristics in or around proposed projects can either increase or decrease the expected number of future crashes.
- Minimal overall benefit to the roadway network. Some local agencies use this approach with medium and high cost improvements at locations which do not represent their worst high crash concentration locations. The result can be projects with low B/C ratios and overall safety benefits that are not as high as if they utilized a Systemic Approach. This drawback can be minimized by safety practitioners who analyze their entire roadway network, propose spot location fixes only at their highest crash locations, and utilize lower cost countermeasures wherever appropriate.

The Spot Location Approach to traffic safety is ideally implemented along with the Systemic Approach to provide the best combination of safety treatments. For instance, the Spot Location Approach can be applied at locations where low-cost countermeasures are not expected to be effective in significantly

reducing future crashes or at those locations that have had low-cost countermeasures previously installed systemically but, after an assessment, continue to show a higher-than-average crash rate.

Comprehensive Approach

The Comprehensive Approach introduces the concept of the “5 E’s of Safety”: Education, Enforcement, Engineering, Emergency Response and Emerging Technologies. This approach recognizes that not all locations can be addressed solely by infrastructure improvements. Incorporating the “5 E’s of Safety” is often required to achieve marked improvement in roadway safety. For instance, some roadway segments will be identified for which targeted enforcement is an appropriate countermeasure. Some of the most common violations are speeding, failure-to-yield, red light running, aggressive driving, failure to wear safety belts, distracted driving, and driving while impaired. When locations are identified as having these types of violations, coordination with the appropriate law enforcement agencies is needed to deploy visible targeted enforcement to reduce the potential for future driving violations and related crashes. To improve safety, education and outreach efforts can also be used to supplement enforcement efforts. Enforcement and/or education can also be effectively utilized as short-term ways to address high crash locations, until the recommended infrastructure project can be implemented.

1.7 Our “Safety Challenge” for Local Agencies

Caltrans, FHWA and Safe Transportation Research and Education Center (SafeTREC) “challenge” local agencies to initially commit one or more days to understanding and applying the concepts and tools outlined in this manual. Experienced safety practitioners working in agencies currently using a proactive approach can quickly review the topics in the manual and consider/test some of the new tools (e.g., TIMS) identified within it. In contrast, novice safety practitioners may need several days to better understand the underlying concepts in this manual to be able to complete the basic elements of a proactive safety analysis of their roadway network. In these situations, the room for knowledge growth, internal process improvements, and expected safety benefits will be even greater, which should more than offset the additional time invested.

By utilizing this simple framework for identifying, analyzing and implementing a proactive approach for improving safety on their roadways, practitioners will have a better understanding of their agencies’ unique safety issues, the proven low-cost countermeasures that can reduce crashes, and the existing and future funding to implement the projects. This small investment of time will help local agencies achieve significant reductions in future fatalities, injuries and overall crashes. We believe these local agencies may also gain the added unexpected benefit of improved job satisfaction of those involved, as there are few more rewarding tasks than knowing that your efforts will result in future roadway users arriving safely at their destination instead of becoming statistics.

1.8 Summary of information in this Document

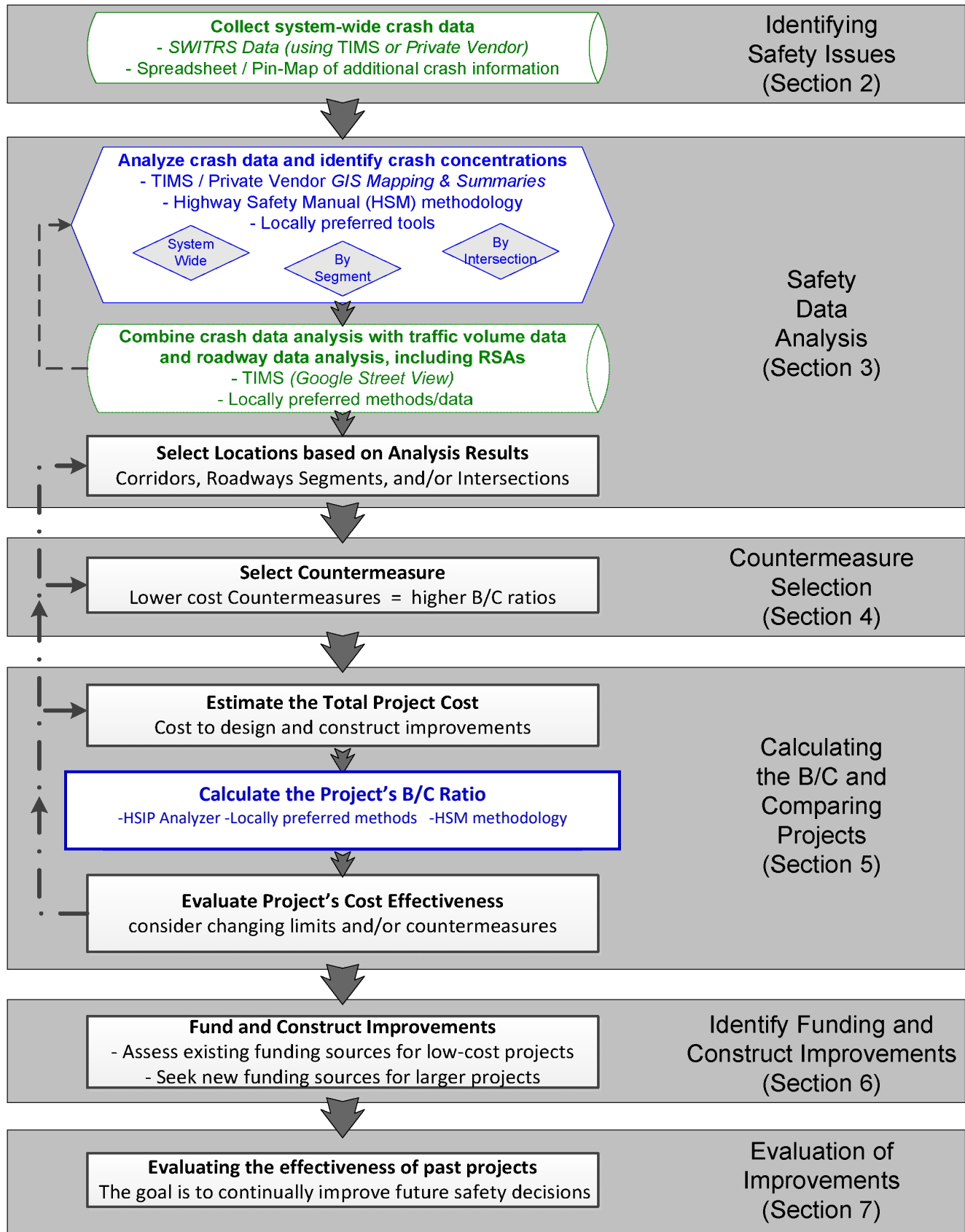
This document provides information on effectively identifying California's local roadway safety issues and the countermeasures that address them, ultimately leading to the effective implementation of safety projects that improve safety on local roadways. The document is not intended to be a comprehensive guide for roadway design and improvement or the only guide local agencies utilize for their safety analysis of their roadways.

Caltrans also expects this document will directly support its efforts in selecting local agency safety projects. The expectation is that as local agencies throughout the state utilize the proactive safety analysis approach outlined in this document, their applications for HSIP, and ATP projects will include lower cost improvements at locations with the highest safety needs. This will improve Caltrans' data-driven approach to statewide project selection of safety projects and maximize the safety benefits across California.

The proactive safety analysis framework incorporated in this document is summarized in Figure 1.

Figure 1

Local Roadway Safety: Proactive Safety Analysis Approach



The above flowchart illustrates how each of the individual sections of this document work together to make up a proactive safety analysis approach. These sections are briefly outlined below:

Section 2 of this manual provides an overview of the types of data to collect for the identification of roadway safety issues. It discusses sources of crash data and how they can be used.

Section 3 summarizes the types of analyses that can be conducted to determine what roadway countermeasures should be implemented. This section is the link between the data (Section 2) and the selection of appropriate countermeasures (Section 4). It provides definitions and examples of the qualitative and quantitative factors that should be considered when evaluating roadway safety issues.

Section 4 provides a description of selected countermeasures that have been shown to improve safety on local roads. It includes a basic set of strategies to implement at locations experiencing a history of crashes and their corresponding crash modification factors (CMF). The interrelationship between CMFs and Crash Reduction Factors (CRFs) are defined and used interchangeably throughout this document.

Section 5 defines a methodology for calculating a B/C ratio for a potential safety project. It includes sources for estimating projected costs and benefits and the specific values/formulas Caltrans uses for its statewide evaluations of HSIP projects. This section also discusses the potential value in reevaluating projects' overall cost effectiveness at this point in the safety analysis, including: refining the project's costs and/or changing the mix of countermeasures and locations.

Section 6 identifies existing and new funding opportunities for safety projects that local agencies should be considering. This section also briefly discusses some unique project development issues and strategies for safety projects as they proceed through design and construction.

Section 7 presents the process to complete an evaluation of installed treatments. After the countermeasures are installed, assessing their effectiveness will provide valuable information and can help determine which countermeasures should continue to be installed on other roadways to make them safer as well as those that should be limited or discontinued.

Appendix A presents a flowchart of the HSIP call-for-projects process. This flowchart demonstrates how this document interacts with these Caltrans calls-for-projects.

Appendix B contains Detailed Tables of countermeasures discussed in Section 4. This table includes detailed information about each countermeasure, including: where to use, why it works, general qualities (time, cost and effectiveness), crash type(s) addressed, crash reduction factor, and specific values for use in Caltrans HSIP calls-for-projects.

Appendix C includes a summary of "recommended actions" involved in a proactive safety analysis.

Appendix D contains the formulas used to calculate the B/C ratio of safety projects.

Appendix E presents TIMS tutorials that are available to assist local agencies in completing Caltrans call-for-projects application requirements and attachments. The tutorials include examples for Spot Location projects and systemic projects.

Appendix F presents a list of the abbreviations used in this document.

Appendix G presents a list of references.

2. Identifying Safety Issues

This document encourages local agency safety practitioners to proactively analyze their roadway networks with the intention of yielding the best overall safety benefits. When utilizing a proactive safety analysis approach, practitioners need to consider a wide range of data sources to get an overall picture of the safety needs.

There are a number of information sources that can be accessed to get a clearer picture of the roadway safety issues on the roadway network. These can be formal or informal sources, including:

Formal sources:

- State and local crash databases
- SafeTREC's TIMS website (or locally preferred mapping software)
- Law enforcement crash reports and citations
- Field assessments

Informal sources:

- Observational information from road maintenance crews, law enforcement, and first responders
- Citizen notification of safety concerns

Examining crash history will help practitioners identify locations with an existing roadway safety problem, and also identify locations that are susceptible to future roadway crashes. In addition to location identification, this data can provide information regarding crash causation that ultimately provides insight into identifying potentially effective countermeasures.

Emphasis on data-driven decisions is indicative of reliability and efficiency. The more reliable the data, the more likely the decisions regarding safety improvements will be effective. However, detailed, reliable crash data are not available in all areas. Under this circumstance, the practitioner should use the best available information and engineering judgment to make the best decisions. In an effort to mitigate these situations, UC Berkeley SafeTREC has developed the TIMS website, which includes GIS mapping tools to access fatal and injury crashes statewide. This site is now available to all California local agencies. See Section 2.2 for more details on TIMS.

It is generally accepted that at least 3 years, or preferably 5 years, of crash data be used for an analysis; additional years of crash data can provide better information. For low volume roadways and/or when only severe crashes are analyzed, more years of crash data may be necessary for an effective evaluation. Due to the randomness of crashes in a given year, a multi-year average of safety data will smooth outlier years of relatively high or low roadway crash rates. This concept is commonly referred to as "regression to the mean" and is critical in helping safety practitioners avoid making wrong inferences as they analyze their roadway network data. An example of this is an agency making a high-cost improvement at

a location in response to one or two tragic crashes. The Highway Safety Manual (HSM) includes more details on regression to the mean and methods to reduce the random nature of crashes.

There are some circumstances where additional years of crash data may not always be advantageous. First, it's important for practitioners to recognize that as more years of crash data are used, they need to consider changes in traffic patterns, physical infrastructure, land use, and demographics that may affect their projection of future crashes. Second, if practitioners only focus on many years of past crash data, they could miss emerging safety issues and crash trends. For these reasons, if practitioners sense one or more factors affecting crashes have changed or may be changing, they should consider looking at the crash data for the specific area on a yearly or 3-year moving average to expose any changes and crash trends that are occurring.

2.1 State and Local Crash Databases

California has a central repository for storing crash data called SWITRS, which stands for Statewide Integrated Traffic Records System. SWITRS is a comprehensive data source for doing roadway safety analysis that includes almost all public roads in the database except tribal roads which are currently not included. SWITRS information is available to California's local agencies, although many agencies have had difficulty identifying, extracting and utilizing their crash records from SWITRS. All California local agencies, especially those that currently have difficulty accessing and mapping crash data, are encouraged to utilize the SafeTREC TIMS website to access and map SWITRS data.

This document focuses on the SafeTREC TIMS website as a tool to access and map SWITRS data because TIMS is free to local agencies and the general public. At the same time, this document also acknowledges that TIMS currently does not offer some of the features currently available in some of the commercially available crash analysis software packages. For this reason, local agencies are encouraged to try TIMS, but they should not feel obligated to make a switch if they prefer using their vendor supplied crash analysis software. See section 2.2 for more details on TIMS.

Many agencies utilize one of several crash analysis software packages (e.g., Crossroads) to manage and access their crash records. Their use can be costly, but allows local road practitioners to identify locations with multiple roadway crashes, conduct an analysis that can produce predominant crash types, and identify associated roadway features that may have contributed. One drawback to agencies managing and updating their own individual databases is that the statewide database may become outdated and may not include the updated crash details like geo-coded locations. Agencies that manage and update their own individual databases are encouraged to share all updates, including any geo-coding information, with the SWITRS data managers at the California Highway Patrol. This will allow updated geo-coding and other crash features to be available on a statewide basis.

Recommended Action: Obtain at least 5 years of network-wide crash data to identify local roads that have a history of roadway crashes. This data will be used to identify predominant roadway crash locations, crash types and other common characteristics.

As practitioners gather formal and informal information relating to the safety of their roadway network, they are encouraged to develop one or more separate spreadsheets and/or pin-maps to help track and manage this data. (These spreadsheets/pin-maps should capture much of the data gathered in each of Sections 2.1 through 2.8). A spreadsheet and/or pin-map can serve as a database to help an agency identify locations and crash characteristics representing their greatest safety issues and guide them in identifying appropriate countermeasures.

The following spreadsheet is offered as an example, but each agency's spreadsheet should be reformatted to include data to meet their needs. Agencies should consider printing their spreadsheets on 'legal' or '11 x 17' paper for easy review of their data.

	General Information		Crash Information			Evaluation / Action		
Location & Date	Source/Type of information	Safety Issue/Problem	Nature of Crashes	Time of Day	Weather/Traffic Conditions	Staff Evaluation	Recommend Action	Resolution
1) Intersection "X"								
1) Feb 7, 2010	Input from law enforcement	Clearance Intervals need adjustment	V1-WB V2-SB Side-swipe	21:30	Dry, Night, Free-flowing	R. Jones 2/26/10	Increase all-red interval	Completed 2/26/10
1) Mar 9, 2010	Citizen Complaint	Ped Crossing unsafe due to RT turns	N/A	N/A	N/A	R. Jones 3/12/10	No RT on Red (Need study)	
2) Intersection "Y"								
2)								
3) Roadway Segment (PM 5.3 to PM 7.8)								
PM 6.4 to 6.8 Sep 29, 2011	Maintenance data	Extensive skid marks. Speed of Travel?	General WB: ROR	N/A	Dry Free-flowing	J. Smith 10/1/11	High Friction Overlay	Preparing HSIP App.
PM 7.1 Jan 5, 2011	Input from law enforcement	Stop Sign missing	N/A	N/A	N/A	J. Smith 1/5/11	Informed Maintenance	New sign 1/5/11

An example of a pin-map, which could be modified to capture much of the data gathered in Section 2, is shown in the following section as part of the TIMS output.

2.2 Transportation Injury Mapping System (TIMS)

The Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley, has developed a powerful website with tools for California's local agencies to gather data for their safety analyses. Their Transportation Injury Mapping System (TIMS) website provides safety practitioners with California crash data (SWITRS, i.e. Statewide Integrated Traffic Records System) and collision mapping and analysis tools. California local agencies are encouraged to utilize TIMS at: <https://tims.berkeley.edu/>

Site Features:

- Applications to query map and download geo-referenced SWITRS data.
- Summary tables based on data included in SWITRS individual crash reports. These summary tables can be generated based on specified data fields or spatial limits.
- Virtual field review by connecting the crash location to Google maps and Google Street View, allowing the examination of the existing roadway infrastructure and dimensions.
- A 'Help Tab' that provides step-by-step instructions.

Please note that SafeTREC is not able to incorporate all SWITRS crashes into TIMS due to poor crash location descriptions in the crash reports. Currently, TIMS includes the majority of California fatal and injury crashes but does not include Property Damage Only collisions.

Recommended Action: Consider augmenting your local agency's data collection approach with information available using the suite of TIMS tools. The TIMS tools (and/or purchased software applications) can help the safety practitioner complete or assist with each of the actions in Sections 2.1 through 2.8. This website includes several tutorials specifically designed to support the individual sections of this document. Local practitioners may find the TIMS output files as a great starting point to build their tracking spreadsheet discussed in the recommendation of Section 2.1.

2.3 Law Enforcement Crash Reports

Both State and local law enforcement officials can be an important source of roadway crash data. The actual law enforcement crash reports can be valuable in identifying the location and contributing circumstances to roadway crashes (e.g., did the highway hardware and features operate as intended: end treatment worked, no barrier in the passenger compartment, pavement not slippery when wet, signs visible, signal timing, etc.). The following variables can and should be extracted and compiled from the crash reports:

- Location
- Date and time
- Crash type
- Crash severity
- Weather conditions
- Lighting conditions
- Sequence of events and most harmful events
- Contributing circumstances
- Driver Variables: age of driver, DUIs, use of seat belt, etc.

Similar to the crash database, the information in the crash reports can be used to assist in the identification of potential infrastructure and non-infrastructure safety treatments and the deployment approach.

Recommended Action: Develop a working relationship with law enforcement officials responsible for enforcement and crash investigations. This could foster a partnership where sharing crash reports and safety information on problem roadway segments becomes an everyday occurrence. Practitioners with limited access to crash data are encouraged to use TIMS to assess the local crash report data.

2.4 Observational Information

Law enforcement officers, local agency maintenance crews, and Emergency Medical Services personnel can serve as valuable resources to identify problem areas. Since they travel extensively on local roads, they can continuously monitor roads for actual or potential problems (e.g., poor delineation, fixed objects near the roadway, missing signs, signs of vehicles leaving the road). Law enforcement observations of driver behavior and roadway elements can provide valuable information to the local road agency. Additionally, law enforcement officers are sometimes aware of problem areas based on citations written, even if crashes related to the violations have not yet occurred. Road maintenance crews may keep logs of their work, including sign and guardrail replacements, debris removal, and edge drop-off repairs. These logs can provide supplemental information about crashes and HCCLs that may not have been reported to law enforcement. Finally, Emergency Medical Service Crash Reports can provide an entirely different perspectives and set of observations relating to crash occurrences.

Information obtained from road maintenance crews, law enforcement officers, and Emergency Medical Services personnel can help support all three methods of implementation approaches: Spot Location treatments, systemic deployments, and the Comprehensive Approach. Often, traffic violations such as speeding and impaired driving lend themselves to education and enforcement solutions to address these behaviors and supplement the intended infrastructure countermeasures.

Recommended Action: Add information received from law enforcement, road maintenance crew, and Emergency Medical Service observations to the agency's tracking spreadsheet and/or pin-maps. Develop a system for maintenance crews to report and record observed roadway safety issues and a mechanism to address them.

2.5 Public Notifications

Occasionally, when unsafe situations are observed, local citizens may notify the local government by email, letter, telephone, or at a public meeting. Information identifying safety issues on local roads may also come from community or regional newspapers, newsletters, correspondence, and from local homeowner and neighborhood associations. These sources can serve as indicators that a safety issue may exist and may warrant further review and analysis to determine the extent of the issues. Citizen reports can be tracked along with official crash data; however, safety practitioners should not regard these reports as factual, unless proven by other methods. Local safety databases should only contain objective and verifiable data.

Recommended Action: Review and summarize information received from these sources, identifying segments or corridors with multiple notifications and record the locations, dates, and nature of the problem that are cited. Add information received from public notifications to tracking spreadsheets and/or pin-maps once confirmed.

2.6 Roadway Data and Devices

It is also valuable to obtain information about the existing roadway infrastructure. Currently, many local agencies have few of their roadway characteristics in a database. For these agencies, the establishment of a roadway database could be a long-term goal. The following roadway characteristics are often used to assist practitioners in safety analyses of roadway segments:

- Roadway surface (dirt, aggregate, asphalt, concrete)
- Roadway geometry (horizontal, vertical, flat)
- Lane information (number, width)
- Shoulder information (width, type)
- Median (type, width)
- Traffic control devices present (signs, pavement marking, signals, rumble stripes etc.)

- Roadside safety hardware (e.g., guardrail, crash cushions, drainage structures)

The TIMS site, described in Section 2.2, can provide safety practitioners with much of this roadway data virtually by using Google Maps and Google Street View. By utilizing TIMS (and/or private for-profit vendors), safety practitioners can save hours and even days of driving during the initial steps in the safety analysis of their network. Once agencies start to define individual safety projects for funding and future construction, actual field reviews are needed to ensure a complete understanding of the project location and context.

As local practitioners gather information about their existing roadway infrastructure, they need to determine whether it complies with the minimum standards for signs, breakaway supports, signals, pavement markings, protective barriers, etc. Practitioners should use the most current *California - Manual on Uniform Traffic Control Devices* (CA-MUTCD), which provides the minimum standard requirements for traffic control devices on all public streets, highways, bikeways, and private roads open to public travel.⁶ In addition to ensuring compliance with the MUTCD, geometric standards for sight distance, curve radius, and intersection skew angle and roadway standards for lane width, shoulder width, clear recovery zone, and super-elevation should also be evaluated.

Roadway information can be combined with crash data to help local practitioners identify appropriate locations and treatments to improve safety. For example, if a local rural segment is experiencing a high number of horizontal curve-related crashes, analysis of the inventory of roadway elements could reveal that the roadway does not have sufficient signage installed in advance of many of those curves to give motorists warning of the pending change in roadway geometry.

Recommended Action: Identify and track roadway characteristics for the intersections, roadway segments, and corridors, including compliance with the minimum standards. At a minimum, this should be done for locations being considered for safety improvements, but ideally agencies would establish an extensive database of roadway data to help them proactively identify high risk roadway features.

2.7 Exposure Data

The number of crashes can sometimes provide misleading information about the most appropriate locations for treatment. Introducing exposure data helps to create a more effective comparison of locations. Exposure data provides a common metric to the crash data so roadway segments and intersections can be compared more appropriately, helping local agencies prioritize their potential safety improvements.

The most common type of exposure data used on roadway segments is traffic volume. Ideally, volume would be broken down by pedestrians, bicycles, cars, motorcycles, and large trucks. A count of the number of vehicles and non-motorized users can provide information for comparison. For example, if

two roadway segments have the same number of crashes but different traffic volumes, the segment with fewer vehicles (i.e., less exposure) will have a higher crash rate, meaning that vehicles were more likely to experience a crash along that roadway segment. In situations where traffic volume is not available, segment length or population can serve as an effective exposure element for comparison.

Recommended Action: Consider the availability of exposure data and track it along with the other crash data to help prioritize potential locations for safety improvements.

2.8 Field Assessments and Road Safety Audits

Local road practitioners should always consider conducting field assessments in conjunction with their collection of crash data to help identify problem locations. An assessment can be as informal as driving, walking or virtually viewing the road network looking for evidence of roadway crashes. Ideally, informal field assessments are to be performed by multidisciplinary teams that include a traffic safety expert, law enforcement personnel, and others. The team can visit several sites and document evidence of crashes or deficiencies on the roadway or roadside, including: damaged trees or fences, skid marks, ruts on the shoulder, car parts on the shoulder, and/or pavement drop-offs. This information, along with observations of actual driver-behavior, can be used to develop recommendations for improvement.

Field reviews can also be more formalized such as in conducting a Road Safety Audit (RSA). A RSA is a formal safety performance examination of an existing or future road by an independent, multidisciplinary team. The team examines and reports on existing or potential road safety issues and identifies opportunities for safety improvements for all road users. Agencies considering RSAs for the first time are encouraged to consider requesting support from FHWA. For more information on FHWA's free RSA support, go to their website at: <http://safety.fhwa.dot.gov/rsa/>.

Informal field assessments and more formal RSAs provide an opportunity for local safety practitioners to gather and summarize all of the information sources discussed in Section 2. They can also be used to identify potential project delivery obstacles. The field assessments/RSAs should identify major environmental, right-of-way, infrastructure, and operational issues that need to be considered when applying countermeasures.

Recommended Action: Consider completing formal or informal field assessments and RSAs at certain locations to help ensure all relevant information is collected and available for the safety practitioners to complete their safety analysis and identify the most appropriate countermeasures. It's recommended that local agencies develop simple straightforward criteria on when one of these will be undertaken. The information gathered during the assessments should be added to the agency's tracking spreadsheet, as discussed in section 2.

3. Safety Data Analysis

Proactive safety analysis will assist in making informed decisions on the type, deployment levels, and locations for safety countermeasures. This builds on the previous discussions on information sources that identify safety issues. ‘Safety Data Analysis’ is one of the most critical steps in an agency’s overall proactive safety analysis approach. Ideally, agencies regularly analyze the safety data for their entire roadway networks to identify and prioritize the locations with the most severe safety issues. This step is often skipped by agencies reacting to a recent tragic crash and the corresponding public outcry, which may leave their most critical safety locations undetected.

As agencies analyze their safety data, they will need to select the implementation approach that most effectively address the safety issues identified; Systemic Approach, Spot Location Approach, Comprehensive Approach, or a combination of these approaches. For example, if a high number of crashes are occurring at a particular curve or along a short segment of roadway, a spot treatment may be appropriate. However, systemic treatment of multiple locations experiencing similar crash types may be necessary and most beneficial for reducing overall fatalities and injuries. These implementation approaches were described in Section 1.5. With all of the approaches, safety practitioners should be looking for patterns in the crash data and not just the total number of crashes. These patterns include: types of crashes, severity of crashes, mode of travel, pavement conditions, time of day, etc. Identifying and analyzing the patterns in the crash data will help ensure the most appropriate countermeasure is selected and the safety problems are effectively addressed.

3.1 Quantitative Analysis

Crash data analysis is used to determine the extent of the roadway safety issues, the priority for application of scarce resources, and the selection of appropriate countermeasures. The two main quantitative analysis methods for roadway crashes are crash frequency and crash rate.

Crash Frequency

Crash frequency is defined as the number of crashes occurring within a determined study area. A practitioner can determine crash volumes using methods discussed in Section 2, including: State crash database (SWITRS), TIMS, local agency crash databases, law enforcement crash reports, pin-maps, etc. The practitioner should analyze the data to identify locations and crash characteristics with the highest frequency. There are numerous methods to assist practitioners in this process. Each agency will have their own preferred methods for initially selecting their top priority locations. The following are a few examples of the methods used to determine Crash Frequency:

- Summarize the crashes by attributes such as type, severity and location to identify patterns in the crash data and the most significant problem locations.
 - Top 10 (or 20) lists of intersections and roadway segments. It is common to weight more severe crashes higher in this process.

- Spatially display the sites on a pin-map or a GIS software package.
 - For small or rural agencies with lower volume roadways, network-wide pin-maps may be all that is needed to identify the highest priority locations.
- Develop collision diagrams showing the direction of movement of vehicles, types of crashes, and pedestrians involved in the crashes.

As stated earlier, this manual acknowledges many local agency safety practitioners may have their preferred methods for completing these analyses. For those agencies that do not and for those willing to try something new, Caltrans recommends using the TIMS website along with the processes outlined in this document to complete these analyses.

Once the crash frequency information is collected and displayed, the practitioner can complete a methodical analysis by geographic area, route, or a cluster analysis to determine which locations have experienced a high or moderate level of crashes. The resulting crash information can be further analyzed for recurring patterns or events. As agencies consider their locations with high levels of crashes, they should understand the overall random nature of crashes and the concept of “regression to the mean”, as discussed in Section 2. Otherwise, if the natural variations in crash occurrence are not accounted for, a site might be selected for study when the number of crashes is randomly high, or overlooked when the number of crashes is randomly low.

Crash Rate

Crash rate analysis can be a useful tool to determine how a specific roadway or segment compares with similar roadway types on the network. A simple count of the number of crashes can be inadequate when comparing multiple roadways of varying lengths and/or traffic volume. Local agencies are also encouraged to compare their crashes with those occurring in similar areas around the state; doing so will help in determining just how severe the number and types of crashes are in the local area. When working with limited budgets, Crash Rates are often used to prioritize locations for safety improvements that will achieve the greatest safety benefits with limited resources. Where traffic volume data is unavailable, other information can be used to provide exposure information. One often-used factor is the length of the roadway segment on each route studied. Comparing the number of roadway crashes per mile or per intersection can help an agency identify potential opportunities to improve safety. The FHWA Roadway Departure Safety and Intersection Safety manuals include the following formulas for calculating crash rates on roadway segments and intersections:

The crash rate for crashes on a roadway is calculated as:

$$R = (C \times 100,000,000) / (V \times 365 \times N \times L)$$

Where:

R = Crash rate for the road segment expressed as crashes per 100 million vehicle-miles of travel,

C = Total number of crashes in the study period

V = Traffic volumes using Average Annual Daily Traffic (AADT) volumes

N = Number of years of data

L = Length of the roadway segment in miles

The crash rate for crashes at an intersection is calculated as:

$$R = (1,000,000 \times C) / (365 \times N \times V)$$

Where:

R = Crash rate for the intersection expressed as crashes per million entering vehicles (MEV)

C = Total number of intersection-related crashes in the study period

N = Number of years of data

V = Traffic volumes entering the intersection daily

Similar to Crash Frequency, there are numerous methods for local safety practitioners to utilize Crash Rate in their safety data analysis and each will have their own preferred methods for initially selecting their top priority locations. The following are a few examples:

- Top 10 (or 20) lists of roadway segments with the highest crashes in relationship to roadway length, traffic volumes, and/or population density.
- Top 10 (or 20) lists of intersections, sorted by crash rate.
- Top 10 (or 20) lists of the highest volume intersections, sorted by crash frequency or rate.

Even though crash frequency and crash rate are helpful for local agency safety practitioners to effectively rank their most critical locations for improvements, the lack of reliable statewide traffic volumes for all roadway types precludes Caltrans from using the crash rate methodology in their statewide project scoring and ranking processes for the HSIP (discussed in more detail in Section 5).

Recommended Action: Complete a quantitative analysis of the roadway data using both Crash Frequency and Crash Rate methodologies. Safety practitioners should look for patterns in the crash data, including: types of crashes, severity of crashes, mode of travel, pavement conditions, roadway characteristics, time of day, intersection control, etc.

3.2 Qualitative Analysis

Qualitative analysis considers the physical characteristics of the roadway network, through the examination of maps, photographs, and field assessments. Certain roadway infrastructure characteristics relate to design standard and compliance issues and should continually be identified and upgraded on a network-wide basis (e.g., signing and pavement delineation characteristics relating to CA-MUTCD compliance as discussed in more detail below). Other roadway characteristics are more important as they relate to locations with high crash frequencies and rates (e.g., well defined pedestrian

paths crossing the roadway or a high number of utility poles/fixed objects adjacent to the edge of travel way). All of these characteristics should be accounted for in an agency's proactive safety analysis.

Ensuring Compliance with CA-MUTCD and Design Standards

It is important for local agencies to continually evaluate their roadways for compliance with the minimum safety standards. The CA-MUTCD provides the minimum standard requirements for traffic control devices on all public streets, highways, bikeways, and private roads open to public travel. In addition to ensuring compliance with the CA-MUTCD, geometric standards should be evaluated as they relate to sight distance, curve radius, and intersection skew angle and roadway standards for lane width, shoulder width, clear recovery zone, and super-elevation. Many local agencies have their own specific roadway design standards, while others rely on Caltrans' Highway Design Manual⁷, FHWA's "Green Book" policy manual⁸ and PEDSAFE guide⁹, and AASHTO's Roadside Design Guide¹⁰. If the traffic control devices or roadway geometry are not in compliance, appropriate devices/countermeasures should be installed. Non-compliance is an important consideration that can affect road safety and may have liability implications for a jurisdiction. Using CA-MUTCD compliant devices results in uniformity among California roadways and serves to meet road user expectations.

Field Assessments

While the qualitative analysis of compliance issues should continually occur on a network-wide basis, a qualitative analysis should also occur for each of the locations and corridors identified as a result of a 'Quantitative Analysis'. The consideration of roadway infrastructure characteristics in conjunction with crash frequency or crash rate gives a more complete picture of overall safety and should be used in an agency's identification and prioritization process for locations needing safety improvements. The qualitative assessment of HCCLs can be completed through the examination of maps and photographs, but the importance of in-field assessments by multi-disciplinary teams should not be underestimated. In some cases, field reviews of all potential project locations may not be practical, so safety practitioners are encouraged to utilize internet-mapping tools to view maps and photographs and virtually visit these sites from their offices.

Actual field visits or RSAs can be done at the highest priority locations before or during the countermeasure selection process. In many cases, field assessments are often the only way for practitioners to identify potential countermeasure implementation and project delivery obstacles. Without in-field assessments, right-of-way, infrastructure, and operational constraints can be overlooked, including: sensitive environmental resources (widening may not be feasible next to wetlands), roadway users (rumble strips may not be feasible on roadways with high bicycle volumes and narrow shoulders), or nearby roadway stakeholders (flashing beacons may be problematic for adjacent residents.) Assessments can provide critical information for local practitioners as they prioritize their crash locations and select countermeasures with the greatest potential for cost effective deployment.

Recommended Action: Incorporate qualitative analysis elements into agency's proactive analysis approach. Consider completing field assessments and RSAs to identify locations with roadway

infrastructure characteristics that relate to both compliance issues and high crash frequencies/rates. As part of field assessments, common roadway and crash characteristics should be identified for the potential systemic deployment of countermeasures. Rather than reviewing all crash sites individually, agencies may find the use of Internet mapping tools offers significant time savings. For agencies without a preferred virtual field review method, the SafeTREC TIMS website automatically links the SWITRS crash locations to Google Maps and Google Street View.

Caltrans recommends all agencies complete both quantitative and qualitative analyses before starting their applications for HSIP program funding. The findings from these analyses should be documented in spreadsheets and/or pin-maps similar to the ones discussed in Section 2.

4. Countermeasure Selection

Once locations and crash problems are identified as illustrated in Sections 2 and 3, the safety practitioners will need to select the set of proposed safety improvements to reduce the likelihood of future crashes. Individual elements of standard safety improvements are referred to as countermeasures and most countermeasures have corresponding Crash Modification Factors (CMFs).

When applied correctly, CMFs can help agencies identify the expected safety impacts of installing various countermeasures to reduce crashes. CMFs are multiplicative factors used to estimate the expected number of crashes after implementing a given countermeasure at a specific site (the lower the CMF, the greater the expected reduction in crashes). Crash Reduction Factors (CRFs) are directly connected to the CMFs and are another indication of the effectiveness of a particular treatment, measured by the percentage of crashes the countermeasure is expected to reduce. The CRF for a countermeasure is defined mathematically as $(1 - \text{CMF})$ (the higher the CRF, the greater the expected reduction in crashes). *NOTE: Given that CRF values can be more intuitive when analyzing roadways for potential “reductions” in crashes; this document shows CRF values in the countermeasure tables. The terms CMFs and CRFs are used interchangeably throughout the text of this section and in other sections of this document.*

In an effort to stretch the limited highway safety funding, local transportation agencies are encouraged to identify and implement the optimal combination of countermeasures to achieve the greatest benefits. Combined with crash cost data and project cost information, CRFs can help safety practitioners compare the B/C ratio of multiple countermeasures and then choose the most appropriate application for their proposed safety improvement projects.

As agencies consider the overall scope/cost of their projects, they also need to consider the number of locations to which each countermeasure may be applied in order to maximize the B/C ratio and the overall effectiveness of their limited safety funding. For HCCLs with varying causes, the Spot Location Approach may be the most appropriate. In contrast, the Systemic Approach should be considered where a high proportion of similar crash types tend to occur at locations that share common geometric or operational elements. In these situations, installing the same low-cost safety countermeasure at multiple locations can increase the cost effectiveness of the safety improvement, allowing an increased number of treatments to be applied.

It is important to note that there are many safety issues and corresponding countermeasures that are more “maintenance” in nature (e.g., visibility issues relating to the need for brush clearing and roadway departure issues relating to the need to replace shoulder backing). As these issues are identified when investigating crash locations, it’s expected that the local safety practitioners would take the necessary steps to remedy the situation in the short-term. For this reason, most of the common maintenance-type safety countermeasures are not included in this document.

4.1 Selecting Countermeasures and Crash Modification Factors / Crash Reduction Factors

Selecting an appropriate countermeasure and corresponding CMF is similar to choosing the right tool for a job. In some cases, a countermeasure and CMF may not be perfect, but will still work well enough to get the job done by providing a reasonable estimation of the countermeasure's effect. In other cases, using an improper countermeasure or CMF may do more harm than good. Applying a CMF that does not fit a specific situation may give a false sense of the countermeasure's safety effectiveness and may result in an increased safety problem.

The Federal Highway Administration (FHWA) is leading a concerted effort to develop information on CMFs and makes it available to State and local agencies to assist with highway safety planning. The CMF Clearinghouse, a free online database introduced in 2009 and accessible at <http://www.cmfclearinghouse.org/>, details the varying quality and reliability of CMFs available to transportation professionals.

FHWA has identified three main considerations to assure appropriate selection of CMFs for a given countermeasure: the **availability** of relevant CMFs, the **applicability** of available CMFs, and the **quality** of applicable CMFs. The following sections detail these considerations and describe how Caltrans recommended CRF and service life values meet these criteria.

Availability: The availability of a CMF that applies to a specific situation depends on whether research has been conducted to determine the safety effects of a particular countermeasure or combination of countermeasures, and whether researchers have documented it. The CMF Clearinghouse contains more than 2,900 CMFs and receives quarterly updates to include the latest research.

At this point, Caltrans has established a small subset of 82 countermeasures and a single CRF for each of these countermeasures that must be used when submitting applications for Caltrans statewide calls-for-projects. This methodology allows for a statewide data-driven process that facilitates a fair and accurate comparison of project applications. (The reason for limiting the number of countermeasures is further explained below under “applicability”).

Applicability: In general, once a local safety practitioner determines that one or more CMFs exist for a specific countermeasure, the next step is to determine which CMF is the most applicable. Applicability depends on how closely the CMF represents the situation to which it will be applied. Safety practitioners should evaluate the potentially applicable CMFs, eliminating any that are not appropriate for the situation. Practitioners should only choose the most appropriate CMFs for their specific project based on factors including but not limited to: urban areas vs. rural areas; low vs. high traffic volumes; 2-lane vs. 6-lane roadways; individual vs. combination treatments; signalized vs. non-signalized intersections; and minor crashes vs. fatal crashes. If practitioners choose to use a CMF outside the range of applicability, the safety effect will likely be over or underestimated.

The mix of countermeasures and CRFs included in this document is intended to meet Caltrans' goal for a data-driven award process for local agencies to follow that allows for a fair and accurate comparison of project applications. Where possible and appropriate, the CRF value intended for use in statewide calls-for-projects is based on research studies that specifically established the CRF to be used for 'all' project areas, roadway types, and traffic volumes. Where not all applicability factors have already been established by prior research, Caltrans worked closely with FHWA to approximate CRFs for countermeasures often utilized by local agencies.

Quality: Often a search of the CMF Clearing House results in multiple CMFs for the same countermeasure. A practitioner needs to examine the quality of each CMF. The quality of a CMF can vary greatly depending on several factors associated with the process of developing the CMF. The primary factors that determine the quality of a CMF are the study design, sample size, standard error, potential bias, and data source. The CMF Clearinghouse provides a star rating for each based on a scale of 1 to 5, where 5 indicates the highest quality. The most reliable CMFs in the HSM are indicated with a bold font.

Wherever possible, the CRFs included in this document are based on research that has a CMF Clearinghouse star rating of 3 or more. For countermeasures that do not have corresponding research of a star rating of 3 or more but were deemed important to provide flexibility to local practitioners, Caltrans worked closely with FHWA to establish CRFs based on the best available research.

4.2 List of Countermeasures

The list of countermeasures discussed in this section is not an all-inclusive list, and only includes those available in the Caltrans' HSIP Cycle 11 Call-for-projects. Only thoroughly researched countermeasures with a readiness to be applied by local agencies on a statewide basis are utilized. In addition, the California Local HSIP program places further restrictions on the eligibility of some countermeasures to meet the most critical needs on California local roadways. Practitioners are encouraged to utilize the FHWA CMF Clearinghouse for a more comprehensive list as they establish their local agency specific set of proposed improvements and prioritize their projects.

The countermeasures listed in the following three tables have been sorted into 3 categories: Signalized Intersection, Non-Signalized Intersection, and Roadway Segment. Pedestrian and bicycle related countermeasures have been included in each of these categories, as the consideration of non-motorized travel is important for all roadway classifications and locations. The countermeasures included in these tables are also used in the HSIP Analyzer. When selecting countermeasures and CMFs to apply to their specific safety needs, local agency safety practitioners should consider the **availability, applicability, and quality** of CMFs, as discussed in section 4.1.

Only Crash Types, CRFs, Expected Lives, and HSIP Funding Eligibility of the countermeasures for use in Caltrans local HSIP program are provided in this section. Fields in the countermeasure tables are:

- **Crash Types** - “All”, “P & B” (Pedestrian and Bicycle), “Night”, “Emergency Vehicle”, or “Animal”.
- **CRF** - Crash Reduction Factor used for HSIP calls-for-projects.
- **Expected Life** - 10 years or 20 years.
- **Funding Eligibility** – the maximum HSIP reimbursement ratio for HSIP Cycle 11 Call-for-projects.
 - Eighty-one (81) countermeasures: 90%
 - One (1) countermeasure: 50% (CM No. S03: Improve signal timing, as this CM will improve the signal operation rather than merely the safety.)
- **Systemic Approach Opportunity** - Opportunity to Implement Using a Systemic Approach: “Very High”, “High”, “Medium” or “Low”.

The list of countermeasures presented in this section is intended to be a quick-reference summary. Appendix B of this manual provides more details on each of these countermeasures including Where to use, Why it works, General Qualities (Time, Cost and Effectiveness), and information from FHWA CMF Clearinghouse (Crash Types Addressed and range of Crash Reduction Factor).

Recommended Action: At this point, agencies should use all information and results obtained by completing the actions in Sections 2, 3 and 4 to select the appropriate countermeasures for their HCCLs and systemic improvements. As novice safety practitioners select countermeasures, they must realize that a reasonable level of traffic ‘engineering judgment’ is required and that this manual should not be used as a simple cheat-sheet for preparing and submitting applications for funding.

Table 2. Countermeasures for Non-Signalized Intersections

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
NS01	Lighting	Add intersection lighting (NS.I.)	Night	40%	20	90%	Medium
NS02	Control	Convert to all-way STOP control (from 2-way or Yield control)	All	50%	10	90%	High
NS03	Control	Install signals	All	30%	20	90%	Low
NS04	Control	Convert intersection to roundabout (from all way stop)	All	Varies	20	90%	Low
NS05	Control	Convert intersection to roundabout (from stop or yield control on minor road)	All	Varies	20	90%	Low
NS05mr*	Control	Convert intersection to mini-roundabout	All	30%	20	90%	Medium
NS06	Operation/ Warning	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	All	15%	10	90%	Very High
NS07	Operation/ Warning	Upgrade intersection pavement markings (NS.I.)	All	25%	10	90%	Very High
NS08	Operation/ Warning	Install Flashing Beacons at Stop-Controlled Intersections	All	15%	10	90%	High
NS09	Operation/ Warning	Install flashing beacons as advance warning (NS.I.)	All	30%	10	90%	High
NS10	Operation/ Warning	Install transverse rumble strips on approaches	All	20%	10	90%	High
NS11	Operation/ Warning	Improve sight distance to intersection (Clear Sight Triangles)	All	20%	10	90%	High
NS12	Operation/ Warning	Improve pavement friction (High Friction Surface Treatments)	All	55%	10	90%	Medium
NS13	Geometric Mod.	Install splitter-islands on the minor road approaches	All	40%	20	90%	Medium
NS14	Geometric Mod.	Install raised median on approaches (NS.I.)	All	25%	20	90%	Medium
NS15	Geometric Mod.	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)	All	50%	20	90%	Medium
NS16	Geometric Mod.	Reduced Left-Turn Conflict Intersections (NS.I.)	All	50%	20	90%	Medium
NS17	Geometric Mod.	Install right-turn lane (NS.I.)	All	20%	20	90%	Low
NS18	Geometric Mod.	Install left-turn lane (where no left-turn lane exists)	All	35%	20	90%	Low
NS19PB	Ped and Bike	Install raised medians / refuge islands (NS.I.)	P & B	45%	20	90%	Medium
NS20PB	Ped and Bike	Install pedestrian crossing at uncontrolled locations (new signs and markings only)	P & B	25%	10	90%	High
NS21PB	Ped and Bike	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	P & B	35%	20	90%	Medium
NS22PB	Ped and Bike	Install Rectangular Rapid Flashing Beacon (RRFB)	P & B	35%	20	90%	Medium
NS23PB	Ped and Bike	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	P & B	55%	20	90%	Low

*CM NS05mr is a new countermeasure added for HSIP Cycle 11 Call-for-projects.

Table 1. Countermeasures for Signalized Intersections

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
S01	Lighting	Add intersection lighting (S.I.)	Night	40%	20	90%	Medium
S02	Signal Mod.	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	All	15%	10	90%	Very High
S03	Signal Mod.	Improve signal timing (coordination, phases, red, yellow, or operation)	All	15%	10	50%	Very High
~~S04*~~	~~Signal Mod.~~	~~Provide Advanced Dilemma Zone Detection for high speed approaches~~	~~All~~	~~40%~~	~~10~~	~~90%~~	~~High~~
S05	Signal Mod.	Install emergency vehicle pre-emption systems	Emergency Vehicle	70%	10	90%	High
S06	Signal Mod.	Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)	All	55%	20	90%	Low
S07	Signal Mod.	Provide protected left turn phase (left turn lane already exists)	All	30%	20	90%	High
S08	Signal Mod.	Convert signal to mast arm (from pedestal-mounted)	All	30%	20	90%	Medium
S09	Operation/ Warning	Install raised pavement markers and striping (Through Intersection)	All	10%	10	90%	Very High
S10	Operation/ Warning	Install flashing beacons as advance warning (S.I.)	All	30%	10	90%	Medium
S11	Operation/ Warning	Improve pavement friction (High Friction Surface Treatments)	All	55%	10	90%	Medium
S12	Geometric Mod.	Install raised median on approaches (S.I.)	All	25%	20	90%	Medium
S13PB	Geometric Mod.	Install pedestrian median fencing on approaches	P & B	35%	20	90%	Low
S14	Geometric Mod.	Create directional median openings to allow (and restrict) left-turns and u-turns (S.I.)	All	50%	20	90%	Medium
S15	Geometric Mod.	Reduced Left-Turn Conflict Intersections (S.I.)	All	50%	20	90%	Medium
S16	Geometric Mod.	Convert intersection to roundabout (from signal)	All	Varies	20	90%	Low
S17PB	Ped and Bike	Install pedestrian countdown signal heads	P & B	25%	20	90%	Very High
S18PB	Ped and Bike	Install pedestrian crossing (S.I.)	P & B	25%	20	90%	High
S19PB	Ped and Bike	Pedestrian Scramble	P & B	40%	20	90%	High
S20PB	Ped and Bike	Install advance stop bar before crosswalk (Bicycle Box)	P & B	15%	10	90%	Very High
S21PB	Ped and Bike	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	P & B	60%	10	90%	Very High

*CM S04 has been deleted in HSIP Cycle 11 Call-for-projects.

Table 3. Countermeasures for Roadways

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
R01	Lighting	Add segment lighting	Night	35%	20	90%	Medium
R02	Remove/ Shield Obstacles	Remove or relocate fixed objects outside of Clear Recovery Zone	All	35%	20	90%	High
R03	Remove/ Shield Obstacles	Install Median Barrier	All	25%	20	90%	Medium
R04	Remove/ Shield Obstacles	Install Guardrail	All	25%	20	90%	High
R05	Remove/ Shield Obstacles	Install impact attenuators	All	25%	10	90%	High
R06	Remove/ Shield Obstacles	Flatten side slopes	All	30%	20	90%	Medium
R07	Remove/ Shield Obstacles	Flatten side slopes and remove guardrail	All	40%	20	90%	Medium
R08	Geometric Mod.	Install raised median	All	25%	20	90%	Medium
R09	Geometric Mod.	Install median (flush)	All	15%	20	90%	Medium
R10PB	Geometric Mod.	Install pedestrian median fencing on approaches	P & B	35%	20	90%	Low
R11	Geometric Mod.	Install acceleration/ deceleration lanes	All	25%	20	90%	Low
R12	Geometric Mod.	Widen lane (initially less than 10 ft)	All	25%	20	90%	Medium
R13	Geometric Mod.	Add two-way left-turn lane	All	30%	20	90%	Medium
R14	Geometric Mod.	Road Diet (Reduce travel lanes and add a two way left-turn and bike lanes)	All	35%	20	90%	Medium
R15	Geometric Mod.	Widen shoulder	All	30%	20	90%	Medium
R16	Geometric Mod.	Curve Shoulder widening (Outside Only)	All	45%	20	90%	Medium
R17	Geometric Mod.	Improve horizontal alignment (flatten curves)	All	50%	20	90%	Low
R18	Geometric Mod.	Flatten crest vertical curve	All	25%	20	90%	Low
R19	Geometric Mod.	Improve curve superelevation	All	45%	20	90%	Medium
R20	Geometric Mod.	Convert from two-way to one-way traffic	All	35%	20	90%	Medium
R21	Geometric Mod.	Improve pavement friction (High Friction Surface Treatments)	All	55%	10	90%	High

Table 3. Countermeasures for Roadways (Continued)

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
R22	Operation/ Warning	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	All	15%	10	90%	Very High
R23	Operation/ Warning	Install chevron signs on horizontal curves	All	40%	10	90%	Very High
R24	Operation/ Warning	Install curve advance warning signs	All	25%	10	90%	Very High
R25	Operation/ Warning	Install curve advance warning signs (flashing beacon)	All	30%	10	90%	High
R26	Operation/ Warning	Install dynamic/variable speed warning signs	All	30%	10	90%	High
R27	Operation/ Warning	Install delineators, reflectors and/or object markers	All	15%	10	90%	Very High
R28	Operation/ Warning	Install edge-lines and centerlines	All	25%	10	90%	Very High
R29	Operation/ Warning	Install no-passing line	All	45%	10	90%	Very High
R30	Operation/ Warning	Install centerline rumble strips/stripes	All	20%	10	90%	High
R31	Operation/ Warning	Install edgeline rumble strips/stripes	All	15%	10	90%	High
R32PB	Ped and Bike	Install bike lanes	P & B	35%	20	90%	High
R33PB	Ped and Bike	Install Separated Bike Lanes	P & B	45%	20	90%	High
R34PB	Ped and Bike	Install sidewalk/pathway (to avoid walking along roadway)	P & B	80%	20	90%	Medium
R35PB	Ped and Bike	Install/upgrade pedestrian crossing (with enhanced safety features)	P & B	35%	20	90%	Medium
R36PB	Ped and Bike	Install raised pedestrian crossing	P & B	35%	20	90%	Medium
R37PB	Ped and Bike	Install Rectangular Rapid Flashing Beacon (RRFB)	P & B	35%	20	90%	Medium
R38	Animal	Install animal fencing	Animal	80%	20	90%	Medium

5. Calculating the B/C Ratio and Comparing Projects

Practitioners need to consider the expected B/C ratio of their proposed projects. This is an important step in a proactive safety analysis process because it provides two key pieces of information: First, it defines the cost effectiveness of the proposed projects; and second, it gives the safety practitioner a means to help prioritize their safety projects both inside the agency's traffic safety section and against other proposed operational and maintenance projects competing for funding.

5.1 Estimate the Benefit of Implementing Proposed Improvements

Sections 2 through 4 provide the practitioner all the information needed to calculate the expected 'Benefit' of the proposed safety projects. The resulting expected benefit value is derived by applying the proposed countermeasures and corresponding CMFs to the expected crashes. It is of critical importance for the practitioner to understand that misapplication of a CMF will lead to misinformed decisions. Four main factors need to be considered when applying countermeasures and CMFs to calculate the expected benefit value: (1) how to estimate the number of expected crashes without treatment, (2) how to apply CMFs by type and severity, (3) how to apply multiple CMFs if multiple treatments are to be included in the same project, and (4) how to apply a benefit value by crash severity. The following text explains how these factors affect the expected benefit value in more detail.

Estimating expected crashes without treatment: Before applying CMFs, local safety practitioners first need to select countermeasures and CMFs. The CMF is applied to the expected safety performance (expected crashes) without any treatment in order to estimate the expected crashes with the treatment. The reduction in expected crashes multiplied by the expected costs per each crash gives the practitioner the expected benefit.

As mentioned earlier in this manual, the random nature of roadway crashes suggests that over time the number of crashes at any particular locations will change. This concept is known as "regression to the mean" and it gives rise to the concern that a site might be selected for study when the crashes are at a randomly high fluctuation, or overlooked from study when the site is at a randomly low fluctuation. The HSM presents several methods for estimating the expected safety performance of a roadway or intersection including the Empirical Bayes method, which combines observed information from the site of interest with information from similar sites to estimate the expected crashes without treatment. Another common way to minimize the impact of regression to the mean is to increase the number of years of crash data being analyzed.

For statewide calls-for-projects, Caltrans strives to ensure that all projects are fairly ranked based on a consistent statewide approach. Given this, Caltrans has avoided using methodology requiring agencies to mathematically adjust their crash data (e.g., Empirical Bayes) and instead has opted to use 5 years of "observed crashes" in estimating "expected crashes."

Applying CMFs by type and severity: Section 4.1 of this manual discusses the application of CMFs and the need for them to represent the situation to which they will be applied. It also stresses the need for

practitioners to choose the most appropriate CMFs for their specific project. In many circumstances, estimating the change in crashes by type and severity is useful; however, local safety practitioners only can use this approach when CMFs exist for the specific crash types and severities in question. If practitioners choose to use a CMF outside the range of applicability, the safety effect may be over- or underestimated. (For example: past research relating to installing a channelized left turn lane, has estimated CMFs as high as 68% for Right-Angle crashes of all severities and as low as 11% for Rear-End crashes with severities of only fatal and injury).

Applying multiple CMFs: In real-world scenarios, transportation agencies commonly install more than one countermeasure per project as part of their safety improvement program. This leads to the question, "What is the safety effect of the combined countermeasures?" The calculation methods that Transportation agencies use include: applying the CMF for the single countermeasure expected to achieve the greatest reduction, applying CMFs separately by crash type and summing them to get a project-level effect, and applying CMFs based on a review of crash patterns, etc. Regardless of the specific method employed, "engineering judgment" is required when combining multiple CMFs and it is important for local agencies to apply their method consistently throughout their analysis to ensure a fair comparison of projects.

One common practice is to assume that CMFs are multiplicative when they are applied to the same set of crash data. In other words, each successive countermeasure will achieve an additional benefit when implemented in combination with other countermeasures. The multiplicative method is a common, generally accepted method and is presented in the HSM and in the CMF Clearinghouse. This method is also used in the HSIP calls-for-projects.

To allow agencies maximum flexibility in combining countermeasures and locations into a single project while ensuring all projects can be consistently ranked on a statewide basis, Caltrans only allows up to three (3) individual countermeasures can be utilized in the B/C ratio for a project location site. The CMFs are multiplicative if there are multiple countermeasures, i.e. each successive countermeasure will achieve an additional benefit based on the remainder of the crashes after the effect of the prior countermeasures, not the original number of the crashes.

More information on these requirements and procedures are provided in the documents (Application Form Instructions, etc.) for each call-for-projects.

Applying benefit value by crash severity: The last step in estimating the overall benefit of a proposed improvement project is to multiply the expected reduction in crashes by a generally accepted value for the "cost" of crashes. In other words, the expected "benefit" value for a project is actually the expected "reduction in costs" value from reducing future crashes. There are many sources for the costs of crashes (e.g., HSM, FHWA & National Safety Council) and some of the sources vary widely depending on how they account for the economic value of a life and when the numbers were last updated.

When calculating the “benefit” to be used in calculating an improvement’s B/C ratio, it is important for the practitioner to consider whether a total benefit value for the “life” of the improvement is needed or if the benefit value should be annualized (i.e., benefit per year). Whichever method is used to calculate the overall cost of the improvements must also be used for calculating the benefit.

Caltrans has currently chosen to use published Cost-of-Crash values from the first edition of the HSM and increase the values by 4% annually. These values may be updated in the future, when updated cost-of-crash values are published by FHWA or another national source. The specific values for each of the crash severities and the formulas used to calculate the total benefit are shown in Appendix D.

Recommended Action: Prepare Total Benefit estimates for the proposed projects being evaluated in the proactive safety analysis.

5.2 Estimate the Cost of Implementing Proposed Improvements

After calculating the expected benefit of the proposed safety projects, the next step for the practitioner is to develop an estimate of the Total Project Costs. These costs need to include both the construction costs and the project development and administration costs. The most common approach to estimating construction costs is through an “Engineer’s Cost Estimate.” A Template for Detailed Engineer’s Estimate and Cost Breakdown by Countermeasures is included in the HSIP funding application website. When calculating the administration costs for a project, the complexity of the improvements must be accounted for: Low-cost countermeasures, typically used in the Systemic Approach, often have minimal environmental and right-of-way impacts and require minimal design effort. In contrast, many medium to high cost improvements tend to have greater impacts to the environment and right-of-way and require significant design efforts. It’s crucial to account for these differences to accurately determine the true B/C ratio of the projects and prioritize them correctly.

When an agency is initially evaluating several potential locations and countermeasures as part of their proactive safety analysis or in preparing for Caltrans call-for-projects, they should consider first using rough ‘ballpark’ cost estimates using previous projects that had similar scope, if possible. Ballpark cost estimates can allow the practitioner to quickly establish B/C ratios for all of their potential projects and identify the projects with high cost effectiveness and with a reasonable chance of receiving HSIP funding in a Caltrans call-for-projects.

Recommended Action: Prepare ‘Total Project Cost’ estimates for the proposed projects being evaluated in the proactive safety analysis.

5.3 Calculate the B/C Ratio

In general, the B/C ratio is calculated by taking a project’s overall benefit (as calculated in Section 5.1) and dividing it by the project’s overall cost (as calculated in Section 5.2). There are, however, several

methods and input-factors available for calculating a project's B/C ratio and practitioners may want to consider other methods as defined in the HSM.

Based on Caltrans' need for a fair, data-driven, statewide project selection process for HSIP call-for-projects, Caltrans requires the B/C ratio for all applications to be completed using the same process. Applicants must utilize the HSIP Analyzer to calculate the B/C ratio of the project. Additional details and formulas included in the calculation are included in this document as Appendix D.

Recommended Action: Calculate the B/C ratio for each of the proposed projects being evaluated in the proactive safety analysis.

5.4 Compare B/C Ratios and Consider the Need to Reevaluate Project Elements

By implementing a comprehensive proactive safety analysis approach, agencies will likely identify more potential safety projects than they can fund and deliver. It will be important for an agency to prioritize their projects internally before funding is sought. It is not uncommon for projects to have a B/C ratio as low as 0.1 or as high as 100. Once the relative cost effectiveness of an agency's potential projects has been established, the projects with low to mid-ranged B/C ratios should be reassessed. Projects with very low initial B/C ratios may be dropped while projects with low to mid ranged B/C ratios may be redefined by changing the limits of the proposed improvements to focus on higher crash locations or incorporating lower-cost countermeasures. This reiterative process is illustrated in Figure 1 in Section 1 of this document.

At the conclusion of this step, the local agency should have several potential safety projects ready to move into the project development and construction phases. Ideally, there will be a variety of low cost safety projects and potentially a few higher cost roadway reconstruction projects. How each local agency prioritizes their list of safety improvements will vary, but projects with the highest B/C ratios should generally have a high overall priority. It should be understood that available funding will play a key role in local agency prioritization (e.g., higher-cost projects may have to wait for funding to become available while low-cost improvements with lower B/C ratios can be constructed with in-house maintenance crews), but in the goal of maximizing overall safety benefits, the role of politics and public influence should be minimized.

Recommended Action: Compare, reevaluate, and prioritize the potential safety projects. Consider changing the project limits to maximize the number of fatal and injury crashes addressed within the limits. Consider lower cost countermeasures in areas where high and medium cost countermeasures resulted in low B/C ratios.

6. Identifying Funding and Construct Improvements

Funding strategies for implementing safety projects need to vary as widely as local agency's roadway types, project costs, and proposed improvements. At this point in the proactive safety analysis process, local agencies should have several potential safety projects ready to move into the project development and construction phases. There are likely a wide range of 'approaches' to fund each of these projects. This section of the document discusses some of the most common approaches.

6.1 Existing Funding for Low-cost Countermeasures

For projects utilizing low-cost countermeasures, the total project cost may be low enough that the agency can construct the project using its existing roadway funding by utilizing the ongoing activities of their roadway maintenance staff and equipment. Other low-cost projects (e.g., overlays, sealcoats, drainage, signing, and striping projects) may be more important to incorporate into larger maintenance projects. It is common for agencies to have 1-, 5-, and 10-year plans for making these standard maintenance improvements. With upfront planning and coordination between agency staff, the low-cost safety projects identified through the proactive safety analysis can be incorporated with minimal costs to an agency's maintenance program. Maximizing the cost effectiveness of the program may even allow the transportation managers to justify increasing the funding for their overall roadway maintenance program.

In addition to their maintenance program, transportation managers should also strategically seek out planned capital improvement and development projects that can incorporate low and medium cost countermeasures identified in their safety analysis. Local agencies may also find opportunities to partner with private enterprises and insurance companies to fund special safety projects that further both organizations' strategic goals.

Recommended Action: Survey planned maintenance, developer and capital projects to determine whether they overlap any of the proposed safety projects. Where projects overlap, leverage the existing funding sources to include safety countermeasures.

6.2 HSIP and Other Funding Sources

In addition to the HSIP Program, the Division of Local Assistance's web site includes several other Caltrans administered funding programs:
<https://dot.ca.gov/programs/local-assistance>

Recommended Action: Consider all potential funding opportunities to incorporate the identified safety countermeasures.

6.3 Project Development and Construction Considerations

In general, roadway safety projects don't garner the same level of attention from decision makers, media, elected officials, and the general public, that large operational and development-driven projects do. As a result, local safety practitioners and project sponsors often find their projects have difficulty in competing for the agencies' limited project delivery resources. Establishing and implementing a comprehensive safety analysis process can assist safety practitioners in delivering their safety programs in many ways, including:

- Credibility and awareness to individual projects and delivery schedules.
- Increased stakeholders tracking and delivery of a project when low-cost improvements are incorporated into ongoing maintenance and capital projects.
- An increased focus on low-cost countermeasures typically corresponds to projects with less environmental, right-of-way and other impacts; resulting in projects that have streamlined project delivery processes and short construction schedules.

Recommended Action: Safety practitioners should follow their safety projects all the way through the project delivery and construction process. In addition, they should establish a safety program delivery plan that brings awareness and support to the expedited delivery of safety projects. Where possible, safety practitioners should involve the media and even consider having their own program intended to "toot their own safety-horn."

7. Evaluation of Improvements

Evaluation of the effectiveness of roadway treatments following installation should be used to guide future decisions regarding roadway countermeasures. Field reviews should also be conducted shortly after the project is completed to insure the project is operating as intended.

A record of crash history and countermeasure installation forms the foundation for assessing how well the implemented strategies have performed. An important database to maintain is a current list of installed countermeasures with documented “when/where/why” information. Periodic assessments will provide the necessary information to make informed decisions on whether each countermeasure contributed to an increase in safety, whether the countermeasure could or should be installed at other locations, and which factors may have contributed to each countermeasure’s success.

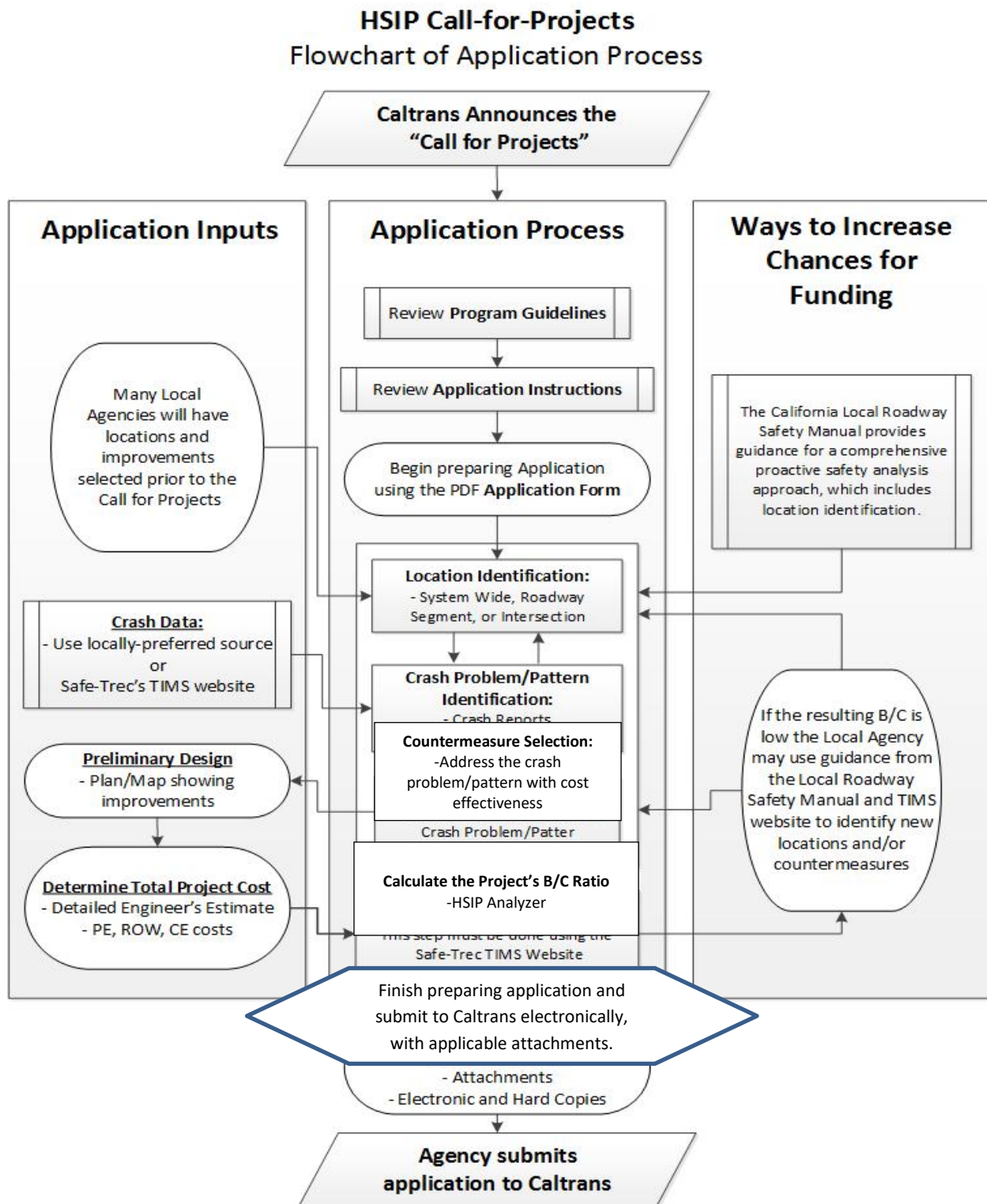
In order to perform the assessment, it is necessary to collect the required information for a certain period after strategies have been deployed at the locations. The time period varies, but whenever possible, 3 to 5 years is recommended to reduce the effects of the random nature of roadway crashes (i.e., Regression to the Mean). The information required may consist of public input and complaints, police reports, observations from maintenance crews, and local and State crash data.

It is important to keep the list of safety installations up-to-date since it will serve as a record of countermeasure deployment history (see table below for an example). By using this type of system, assessment dates can be scheduled to review the crashes and other pertinent information on segments where roadway countermeasures have been installed. Making “after” assessments will inform the practitioner on the effectiveness of past improvements and can provide data to help justify the value of continuing and expanding the local agency’s safety program in the future.

Location	Type of Countermeasure Installed	Date Installed	Crashes Before (Duration and Severity)	Crashes After (Duration and Severity)	Comments

Recommended Action: Develop a spreadsheet or database to track future safety project installations and record 3 or more years of “before” and “after” crash information at those locations. Once safety countermeasures are constructed, schedule and track assessment dates to ensure they happen.

Appendix A: HSIP Call-for-Projects Process



Appendix B: Detailed Tables of Countermeasures

The intent of the information contained in this appendix is to provide local agency safety practitioners with a list of effective countermeasures that are appropriate remedies to many common safety issues. The tables in Section 4.2 present a quick summary of the specific values that the Caltrans Division of Local Assistance uses to assess and select projects for its calls-for-projects. In addition to the same information as in Section 4.2, this appendix also includes notes for Caltrans HSIP calls-for-projects and “General information” regarding where the countermeasure should be used, why it works, the general qualities that can be used to suggest the potential complexity of installation, and information from FHWA CMF Clearinghouse on the type of crashes where the countermeasure is best used and a range of their expected overall effectiveness.

The countermeasures have been sorted into 3 categories: Signalized Intersection, Non-Signalized Intersection, and Roadway Segment. Pedestrian and bicycle related countermeasures have been included in each of these categories.

Caltrans gives careful consideration to the fair application of its calls-for-projects process. Starting in 2012, the award of safety funding has been solely based on a determined benefit-to-cost ratio for each project. The fixed set of countermeasures and CRFs included in these tables are intended to allow for all projects to be evaluated consistently and fairly throughout the project selection process. However, at this time, there are no CRFs/CMFs available for several safety improvements, such as: "dynamic/variable speed regulatory signs", "non-motorized signs and markings (regulatory and warning)", "Square-up (reduce curve radius) turn lanes" and non-infrastructure elements. These safety improvement items can be included in project applications, but they will not be included into the B/C ratio calculations, unless the safety improvements meet the intent of other separate countermeasures included in the attached lists. Caltrans is interested in adding these countermeasures (and many others) to these tables once CRFs/CMFs have been established. Caltrans will continue to periodically update this list of allowable countermeasures and CRFs as new safety research data becomes available. With this in mind, Caltrans is interested in feedback and suggestions from local agency safety practitioners on the overall countermeasure list as well as specific details of individual countermeasures, including locally developed safety effectiveness information.

Caltrans used the following references to assist its team in developing the information shown in the following tables. Safety Practitioners are encouraged to utilize these references for a more expansive list of countermeasures and CRFs / CMFs.

The Crash Modification Factors Clearinghouse

<https://www.cmfclearinghouse.org/>

NCHRP Report 500 Series: Volumes 4, 5, 6, 7, 10, 12, 13, and others

<https://www.trb.org/Main/Blurbs/152868.aspx>

Highway Safety Manual (HSM)

<http://www.highwaysafetymanual.org>

Pedestrian and Bicycle - Tools to Diagnose and Solve the Problem

https://safety.fhwa.dot.gov/ped_bike/tools_solve/

FHWA Local and Rural Road / Training, Tools, Guidance and Countermeasures for Locals

https://safety.fhwa.dot.gov/local_rural/training/

For each countermeasure (CM):

(Title) CM No., CM Name

- CM No. is
 - S01 through S21PB for Intersection Countermeasures – Signalized,
 - NS01 through NS23PB for Intersection Countermeasures – Unsignalized, or
 - R01 through R38 for Roadway Countermeasures.

For HSIP Calls-for-projects:

- **Funding Eligibility** - 90% or 50%.
- **Crash Types Addressed** - “All”, “Pedestrian and Bicycle”, “Night”, “Emergency Vehicle”, or “Animal”.
- **CRF** - Crash Reduction Factor used for HSIP calls-for-projects.
- **Expected Life** - 10 years or 20 years.
- **Notes** - Specific requirements are provided for utilizing the countermeasure on applications for Caltrans statewide calls-for-projects.
-

General Information:

- **Where to use** – Roadway segments and intersections with specific common characteristics can be addressed with similar countermeasures that are most effective.
- **Why it works** – A discussion of the benefit of a countermeasure is important to determine its appropriateness in addressing certain roadway crash types at areas with specific issues as determined by the data and roadway features.
- **General Qualities (Time, Cost and Effectiveness)** – This category is more subjective and can vary substantially. ‘Time’ refers to the approximate relative time it can take to implement the countermeasure. Costs can vary considerably due to local conditions, so ‘cost’ represents the relative cost of applying a countermeasure. A relative overall ‘effectiveness’ is also provided for some countermeasures. All of this subjective information may not be applicable to the unique circumstances for the agency and should not be utilized without verification by the safety practitioner.

- **FHWA CMF Clearinghouse**

- **Crash Types Addressed** – In order to effectively reduce the number and severity of roadway crashes, it is necessary to match countermeasures to the crash types they are intended to address. Depending on the type of problem, one or more of a range of countermeasures could be the most effective way to reduce the number and severity of future crashes.
- **Crash Reduction Factor** – The crash reduction factor (CRF) is an indication of the effectiveness of a particular treatment, measured by the percentage of crashes it is expected to reduce. Note: As mentioned earlier in this section, the effectiveness of a countermeasure can also be expressed as a Crash Modification Factor (CMF), which is defined mathematically as $1 - \text{CRF}$. However, this document uses CRFs as they can be more insightful when analyzing roadways for potential “reductions” in crashes. There is a range of CRF values that exist for each of the countermeasures (or similar countermeasures). The range of CRFs is provided to give local safety practitioners a clear understanding that they may need to go to the FHWA CMF Clearinghouse to find the most appropriate countermeasure and CRF for their specific projects and local prioritization.

B.1 Intersection Countermeasures – Signalized

S01, Add intersection lighting (Signalized Intersection => S.I.)

For HSIP Cycle 11 Call-for-projects						
Funding Eligibility		Crash Types Addressed	CRF	Expected Life		
90%		"night" crashes	40%	20 years		
Notes:	This CM only applies to "night" crashes (all types) occurring within limits of the proposed roadway lighting 'engineered' area.					
General information						
Where to use:						
Signalized intersections that have a disproportionate number of night-time crashes and do not currently provide lighting at the intersection or at its approaches. Crash data should be studied to ensure that safety at the intersection could be improved by providing lighting (this strategy would be supported by a significant number of crashes that occur at night).						
Why it works:						
Providing lighting at the intersection itself, or both at the intersection and on its approaches, improves the safety of an intersection during nighttime conditions by (1) making drivers more aware of the surroundings at an intersection, which improves drivers' perception-reaction times, (2) enhancing drivers' available sight distances, and (3) improving the visibility of non-motorists. Intersection lighting is of particular benefit to non-motorized users. Lighting not only helps them navigate the intersection, but also helps drivers see them better.						
General Qualities (Time, Cost and Effectiveness):						
A lighting project can usually be completed relatively quickly, but generally requires at least 1 year to implement because the lighting system must be designed and the provision of electrical power must be arranged. The provision of lighting involves both a fixed cost for lighting installation and an ongoing maintenance and power cost which results in a moderate to high cost. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.						
FHWA CMF Clearinghouse:		Crash Types Addressed:		Night, All	CRF:	20-74%

S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		15%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the upgraded signals. This CM does not apply to improvements like "battery backup systems", which do not provide better intersection/signal visibility or help drivers negotiate the intersection (unless applying past crashes that occurred when the signal lost power). If new signal mast arms are part of the proposed project, CM "S2" should not be used and the signal improvements would be included under CM "S7".				
General information					
Where to use:					
Signalized intersections with a high frequency of right-angle and rear-end crashes occurring because drivers are unable to see traffic signals sufficiently in advance to safely negotiate the intersection being approached. Signal intersection improvements include new LED lighting, signal back plates, retro-reflective tape outlining the back plates, or visors to increase signal visibility, larger signal heads, relocation of the signal heads, or additional signal heads.					
Why it works:					
Providing better visibility of intersection signals aids the drivers' advance perception of the upcoming intersection. Visibility and clarity of the signal should be improved without creating additional confusion for drivers.					
General Qualities (Time, Cost and Effectiveness):					
Installation costs and time should be minimal as these type strategies are classified as low cost and implementation does not typically require the approval process normally associated with more complex projects. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Rear-End, Angle	CRF: 0-46%

S03, Improve signal timing (coordination, phases, red, yellow, or operation)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
50%		All		15%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new signal timing. For projects coordination signals along a corridor, the crashes related to side-street movements should not be applied. This CM does not apply to projects that only 'study' the signal network and do not make physical timing changes, including corridor operational studies and improvements to Traffic Operation Centers (TOCs). In Caltrans calls for projects, this CM has a HSIP reimbursement ratio of 50%, considering that it will improve the signal operation rather than merely the safety.				
General information					
Where to use:					
Locations that have a crash history at multiple signalized intersections. Signalization improvements may include adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations. Understanding the corridor or roadway's crash history can provide insight into the most appropriate strategy for improving safety.					
Why it works:					
Certain timing, phasing, and control strategies can produce multiple safety benefits. Sometimes capacity improvements come along with the safety improvements and other times adverse effects on delay or capacity occur. Corridor improvements often have the highest benefit but may take longer to implement. Projects focused on capacity improvements (without a separate focus on signal timing safety needs) may not result in a reduction in future crashes.					
General Qualities (Time, Cost and Effectiveness):					
In general, these low-cost improvements to multiple signalized intersections can be implemented in a short time. Typically these low cost improvements are funded through local funding by local maintenance crews. However, some projects requiring new interconnect infrastructure can have moderate to high costs making them more appropriate to seek state or federal funding. The expected effectiveness of this CM must be assessed for each individual project.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 0 - 41%

S04, Provide Advanced Dilemma-Zone Detection for high-speed approaches

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		40%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new detection and signal timing.				
General information					
Where to use:					
More rural/remote areas that have a high frequency of right-angle and rear-end crashes. The Advanced Dilemma-Zone Detection system enhances safety at signalized intersections by modifying traffic control signal timing to reduce the number of drivers that may have difficulty deciding whether to stop or proceed during a yellow phase. This may reduce rear-end crashes associated with unsafe stopping and angle crashes due to illegally continuing into the intersection during the red phase.					
Why it works:					
Clearance times provide safe, orderly transitions in ROW assignment between conflicting streams of traffic. An Advanced Dilemma-Zone Detection system has several benefits relative to traditional multiple detector systems, which have upstream detection for vehicles in the dilemma zone but do not take the speed or size of individual vehicles into account. These benefits include: Reducing the frequency of red-light violations; Reducing the frequency of crashes associated with the traffic signal phase change (for example, rear-end and angle crashes); Reducing delay and stop frequency on the major road and a reduction in overall intersection delay.					
General Qualities (Time, Cost and Effectiveness):					
Installation costs should be low and the time to implement short. Additional modifications to the traffic signal controller may also necessary. In general, This CM can be very effective and can be considered on a systematic approach. Video detection equipment is now available for this purpose, making installation and maintenance more efficient.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 39%

S05, Install emergency vehicle pre-emption systems

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Emergency Vehicle - only	70%	10 years
Notes:	This CM only applies to "E.V." crashes occurring on the approaches / influence area of the new pre-emption system.			
General information				
Where to use:				
Corridors that have a history of crashes involving emergency response vehicles. The target of this strategy is signalized intersections where normal traffic operations impede emergency vehicles and where traffic conditions create a potential for conflicts between emergency and nonemergency vehicles. These conflicts could lead to almost any type of crash, due to the potential for erratic maneuvers of vehicles moving out of the paths of emergency vehicles				
Why it works:				
Providing emergency vehicle preemption capability at a signal or along a corridor can be a highly effective strategy in two ways; any type of crash could occur as emergency vehicles try to navigate through intersections and as other vehicles try to maneuver out of the path of the emergency vehicles. In addition, a signal preemption system can decrease emergency vehicle response times therefore decreasing the time in receiving emergency medical attention, which is critical in the outcome of any crash. When data is not available for past crashes with emergency vehicles, an agency may consider combining the E.V. pre-emption improvements into a comprehensive project that also makes significant signal hardware and/or signal timing improvements.				
General Qualities (Time, Cost and Effectiveness):				
Costs for installation of a signal preemption system will vary from medium to high, based upon the number of signalized intersections at which preemption will be installed and the number of emergency vehicles to be outfitted with the technology. The number of detectors, a requirement for new signal controllers, and the intricacy of the preemption system could increase costs. This CM is considered systemic as it is usually implemented on a corridor-basis.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Emergency Vehicle - only	CRF:	70%

S06, Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	55%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new left turn lanes. This CM does NOT apply to converting a single-left into double-left turn.			
General information				
Where to use:				
Intersections that do not currently have a left turn lane or a related left-turn phase that are experiencing a large number of crashes. Many intersection safety problems can be traced to difficulties in accommodating left-turning vehicles, in particular where there is currently no accommodation for left turning traffic. A key strategy for minimizing collisions related to left-turning vehicles (angle, rear-end, sideswipe) is to provide exclusive left-turn lanes and the appropriate signal phasing, particularly on high-volume and high-speed major-road approaches. Agencies need to document their consideration of the MUTCD, Section 4D.19 guidelines; the section on implementing protected left-turn phases.				
Why it works:				
Left-turn lanes allow separation of left-turn and through-traffic streams, thus reducing the potential for rear-end collisions. Left-turn phasing also provides a safer opportunity for drivers to make a left-turn. The combination of left-turn storage and a left turn signal has the potential to reduce many collisions between left-turning vehicles and through vehicles and/or non-motorized road users.				
General Qualities (Time, Cost and Effectiveness):				
Implementation time may vary from months to years. At some locations, left-turn lanes can be quickly installed simply by restriping the roadway. At other locations, widening of the roadway, acquisition of additional right-of-way, and extensive environmental processes may be needed. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. Installing a protected left turn lane and phase where none exists results in a high Crash Reduction Factor and is often highly effective.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	17 - 58 %

S07, Provide protected left turn phase (left turn lane already exists)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		30%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new left turn phases. This CM does NOT apply to converting a single-left into double-left turn (unless the single left is unprotected and the proposed double left will be protected).				
General information					
Where to use:					
Signalized intersections (with existing left turns pockets) that currently have a permissive left-turn or no left-turn protection that have a high frequency of angle crashes involving left turning, opposing through vehicles, and non-motorized road users. A properly timed protected left-turn phase can also help reduce rear-end and sideswipe crashes between left-turning vehicles and the through vehicles as well as vehicles behind them. Protected left-turn phases are warranted based on such factors as turning volumes, delay, visibility, opposing vehicle speed, distance to travel through the intersection, presence of non-motorized road users, and safety experience of the intersections. Agencies need to document their consideration of the MUTCD, Section 4D.19 guidelines; the section on implementing protected left-turn phases.					
Why it works:					
Left turns are widely recognized as the highest-risk movements at signalized intersections. Providing Protected left-turn phases (i.e., the provision for a specific phase for a turning movement) for signalized intersections with existing left turn pockets significantly improve the safety for left-turn maneuvers by removing the need for the drivers to navigate through gaps in oncoming/opposing through vehicles. Where left turn pockets are not protected, the pedestrian and bicyclist crossing phase often conflicts with these left turn maneuvers. Drivers focused on navigating the gaps of oncoming cars may not anticipate and/or perceive the non-motorized road users.					
General Qualities (Time, Cost and Effectiveness):					
If the existing traffic signal only requires a minor modification to allow for a protected left-turn phase, then the cost would also be low. The time to implement this countermeasure is short because there is no actual construction that has to take place. In-house signal maintainers can perform this operation once the proper signal phasing is determined so the cost is low. In addition, the countermeasure is tried and proven to be effective. Has the potential of being applied on a systemic/systematic approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Rear-End, Sideswipe, Broadside	CRF: 16 - 99%

S08, Convert signal to mast arm (from pedestal-mounted)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	30%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the converted signal heads that are relocated from median and/or outside shoulder pedestals to signal heads on master arms over the travel-lanes. Projects using CM "S7" should not also apply "S2" in the B/C calc.			
General information				
Where to use:				
Intersections currently controlled by pedestal mounted traffic signals (in medians and/or on outside shoulder) that have a high frequency of right-angle and rear-end crashes occurring because drivers are unable to see traffic signals in advance to safely negotiate the intersection. Intersections that have pedestal-mounted signals may have poor visibility and can result in vehicles not being able to stop in time for a signal change. Care should be taken to place the new signal heads (with back plates) as close to directly over the center of the travel lanes as possible.				
Why it works:				
Providing better visibility of intersection signs and signals aids the drivers' advance perception of the upcoming intersection. Visibility and clarity of the signal should be improved without creating additional confusion or distraction for drivers.				
General Qualities (Time, Cost and Effectiveness):				
Dependent on the scope of the project. Costs are generally moderate for this type of project. There is usually no right-of-way costs, minimal roadway reconstruction costs, and a shorter project development timeline. At the same time, new mast arms can be expensive. Some locations can result in high B/C ratios, but due to moderate costs, some locations may result in medium to low B/C ratios.				
FHWA CMF Clearinghouse:		Crash Types Addressed:	Rear-End, Angle	CRF: 12 - 74%

S09, Install raised pavement markers and striping (Through Intersection)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	10%	10 years
Notes:	This CM only applies to crashes occurring in the intersection and influence areas of the new pavement markers and/or markings.			
General information				
Where to use:				
Intersections where the lane designations are not clearly visible to approaching motorists and/or intersections noted as being complex and experiencing crashes that could be attributed to a driver's unsuccessful attempt to navigate the intersection. Driver confusion can exist in regard to choosing the proper turn path or where through-lanes do not line up. This is especially relevant at intersections where the overall pavement area of the intersection is large, and multiple turning lanes are involved or other unfamiliar elements are presented to the driver.				
Why it works:				
Adding clear pavement markings can guide motorists through complex intersections. When drivers approach and traverse through complex intersections, drivers may be required to perform unusual or unexpected maneuvers. Providing more effective guidance through an intersection will minimize the likelihood of a vehicle leaving its appropriate lane and encroaching upon an adjacent lane.				
General Qualities (Time, Cost and Effectiveness):				
Costs of implementing this strategy will vary based on the scope and number of applications. Applying raised pavement markers is relatively low cost but can be variable and determined largely by the material used for pavement markings (paint, thermoplastic, epoxy, RPMs etc.). When using this type delineators, an issue of concern is the cost-to-service-life of the material. (Note: When HSIP safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.) When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:		Wet, Night, All	CRF: 10 - 33%

S10, Install flashing beacons as advance warning (S.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new flashing beacons.		
General information			
Where to use:			
At signalized intersections with crashes that are a result of drivers being unaware of the intersection or are unable to see the traffic control device in time to comply.			
Why it works:			
Increased driver awareness of an approaching signalized intersection and an increase in the driver's time to react. Driver awareness of both downstream intersections and traffic control devices is critical to intersection safety. Crashes often occur when the driver is unable to perceive an intersection, signal head or the back of a stopped queue in time to react. Advance flashing beacons can be used to supplement and call driver attention to intersection control signs. Most advance warning flashing beacons can be powered by solar, thus reducing the issues relating to power source.			
General Qualities (Time, Cost and Effectiveness):			
Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). Flashing beacons can be constructed with minimal design, environmental and right-of-way issues and have relatively low costs. This combined with a relatively high CRF, can result in high B/Cs for locations with a history of crashes and lead to a high effectiveness.			
FHWA CMF Clearinghouse:	Crash Types Addressed:	Rear End, Angle	CRF: 36 - 62%

S11, Improve pavement friction (High Friction Surface Treatments)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		55%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the improved friction overlay. This CM is not intended to apply to standard chip-seal or open-graded maintenance projects for long segments of corridors or structure repaving projects intended to fix failed pavement.				
General information					
Where to use:					
Nationally, this countermeasure is referred to as "High Friction Surface Treatments" or HFST. Signalized Intersections noted as having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than needed for the actual roadway approach speeds. This treatment is intended to target locations where skidding and failure to stop is determined to be a problem in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.					
Why it works:					
Improving the skid resistance at locations with high frequencies of wet-road crashes and/or failure to stop crashes can result in reductions of 50 percent for wet-road crashes and 20 percent for total crashes. Applying HFST can double friction numbers, e.g. low 40s to high 80s. This CM represents a special focus area for both FHWA and Caltrans, which means there are extra resources available for agencies interested in more details on High Friction Surface Treatment projects.					
General Qualities (Time, Cost and Effectiveness):					
This strategy can be relatively inexpensive and implemented in a short timeframe. The installation would be done by either agency personnel or contractors and can be done by hand or machine. In general, This CM can be very effective and can be considered on a systematic approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Wet, Night, ALL	CRF: 10 - 62 %

S12, Install raised median on approaches (S.I.)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new raised median. All new raised medians funded with HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.				
General information					
Where to use:					
Intersections noted as having turning movement crashes near the intersection as a result of insufficient access control. Application of this CM should be based on current crash data and a clearly defined need to restrict or accommodate the movement.					
Why it works:					
Raised medians next to left-turn lanes at intersections offer a cost-effective means for reducing crashes and improving operations at higher volume intersections. The raised medians prohibit left turns into and out of driveways that may be located too close to the functional area of the intersection.					
General Qualities (Time, Cost and Effectiveness):					
Raised medians at intersections may be most effective in retrofit situations where high volumes of turning vehicles have degraded operations and safety, and where more extensive CMs would be too expensive because of limited right-of-way and the constraints of the built environment. The result is This CM can be very effective and can be considered on a systematic approach. Raised medians can often be installed directly over the existing pavement. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Angle	CRF: 21 -55 %

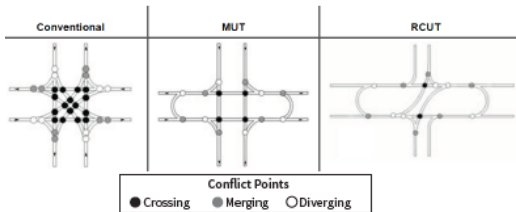
S13PB, Install pedestrian median fencing on approaches

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring on the approaches/influence area of the new pedestrian median fencing.				
General information					
Where to use:					
Signalized Intersections with high pedestrian-generators nearby (e.g. transit stops) may experience a high volumes of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the intersection and waiting to cross during the walk-phase. When this safety issue cannot be mitigated with signal timing and shoulder/sidewalk treatments, then installing a continuous pedestrian barrier in the median may be a viable solution.					
Why it works:					
Adding pedestrian median fencing has the opportunity to enhance pedestrian safety at locations noted as being problematic involving pedestrians running/darting across the roadway outside the intersection crossings. Pedestrian median fencing can significantly reduce this safety issue by creating a positive barrier, forcing pedestrians to the designated pedestrian crossing.					
General Qualities (Time, Cost and Effectiveness):					
Costs associated with this strategy will vary widely depending on the type and placement of the median fencing. Impacts to transit and other land uses may need to be considered and controversy can delay the implementation. In general, this CM can be effective as a spot-location approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 25- 40%

S14, Create directional median openings to allow (and restrict) left-turns and U-turns (S.I.)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new directional openings.				
General information					
Where to use:					
Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection.					
Why it works:					
Restricting turning movement into and out of an intersection can help reduce conflicts between through and turning traffic. The number of access points, coupled with the speed differential between vehicles traveling along the roadway, contributes to crashes. Affecting turning movements by either allowing them or restricting them, based on the application, can ensure safe movement of traffic.					
General Qualities (Time, Cost and Effectiveness):					
Turn prohibitions that are implemented by closing a median opening can be implemented quickly. The cost of this strategy will depend on the treatment. Impacts to businesses and other land uses must be considered and controversy can delay the implementation. In general, This CM can be very effective and can be considered on a systematic approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 51%

S15, Reduced Left-Turn Conflict Intersections (S.I.)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new Reduced Left-Turn Conflict.			
General information				
Where to use and Why it works:				
Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes. Two highly effective designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT).				
Restricted Crossing U-turn (RCUT):				
The RCUT intersection modifies the direct left-turn and through movements from cross-street approaches. Minor road traffic makes a right turn followed by a U-turn at a designated location (either signalized or unsignalized) to continue in the desired direction.				
The RCUT is suitable for a variety of circumstances, including along rural, high-speed, four-lane, divided highways or signalized routes. It also can be used as an alternative to signalization or constructing an interchange. RCUTs work well when consistently used along a corridor, but also can be used effectively at individual intersections.				
Median U-turn (MUT)				
The MUT intersection modifies direct left turns from the major approaches. Vehicles proceed through the main intersection, make a U-turn a short distance downstream, followed by a right turn at the main intersection. The U-turns can also be used for modifying the cross-street left turns.				
The MUT is an excellent choice for heavily traveled intersections with moderate left-turn volumes. When implemented at multiple intersections along a corridor, the efficient two-phase signal operation of the MUT can reduce delay, improve travel times, and create more crossing opportunities for pedestrians and bicyclists.				
MUT and RCUT Can Reduce Conflict Points by 50%				
				
General Qualities (Time, Cost and Effectiveness):				
Implementing this strategy may take from months to years, depending on whether additional R/W is required. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle/Left-turn/Rear-End/All	CRF:	34.8-100%

S16, Convert intersection to roundabout (from signal)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		Varies	20 years
Notes:	This CM only applies to crashes occurring in influence area of the new roundabout. This CM is not intended for mini-roundabouts. The benefit of this CM is calculated using Caltrans procedure. The CRF is dependent on the ADT, project location (Rural/Urban) and the roundabout type (1 lane or 2 lanes). The benefit comes from both the reduction in the number and the severity of the crashes.				
General information					
Where to use:					
Signalized intersections that have a significant crash problem and the only alternative is to change the nature of the intersection itself. Roundabouts can also be very effective at intersections with complex geometry and intersections with frequent left-turn movements.					
Why it works:					
The types of conflicts that occur at roundabouts are different from those occurring at conventional intersections; namely, conflicts from crossing and left-turn movements are not present in a roundabout. The geometry of a roundabout forces drivers to reduce speeds as they proceed through the intersection. This helps keep the range of vehicle speed narrow, which helps reduce the severity of crashes when they do occur. Pedestrians only have to cross one direction of traffic at a time at roundabouts, thus reducing their potential for conflicts.					
General Qualities (Time, Cost and Effectiveness):					
Provision of a roundabout requires substantial project development. The need to acquire right-of-way is likely and will vary from site to site and depends upon the geometric design. These activities may require up to 4 years or longer to implement. Costs are variable, but construction of a roundabout to replace an existing signalized intersection are relatively high. The result is this CM may have reduced relative-effectiveness compared to other CMs.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 35 - 67%

S17PB, Install pedestrian countdown signal heads

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Pedestrian and Bicycle	25%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new countdown heads.			
General information				
Where to use:				
Signals that have signalized pedestrian crossing with walk/don't walk indicators and where there have been pedestrian vs. vehicle crashes.				
Why it works:				
A pedestrian countdown signal contains a timer display and counts down the number of seconds left to finish crossing the street. Countdown signals can reassure pedestrians who are in the crosswalk when the flashing "DON'T WALK" interval appears that they still have time to finish crossing. Countdown signals begin counting down either when the "WALK" or when the flashing "DON'T WALK" interval appears and stop at the beginning of the steady "DON'T WALK" interval. These signals also have been shown to encourage more pedestrians to use the pushbutton rather than jaywalk.				
General Qualities (Time, Cost and Effectiveness):				
Costs and time of installation will vary based on the number of intersections included in this strategy and if it requires new signal controllers capable of accommodating the enhancement. When considered at a single location, these low cost improvements are usually funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	25%

S18PB, Install pedestrian crossing (S.I.)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		25%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new crossing. This CM is not intended to be used for high-cost aesthetic enhancements to intersection crosswalks (i.e. stamped concrete or stamped asphalt).				
General information					
Where to use:					
Signalized Intersections with no marked crossing and pedestrian signal heads, where pedestrians are known to be crossing intersections that involve significant turning movements. They are especially important at intersections with (1) multiphase traffic signals, such as left-turn arrows and split phases, (2) school crossings, and (3) double-right or double-left turns. At signalized intersections, pedestrian crossings are often safer when the left turns have protected phases that do not overlap the pedestrian walk phase.					
Why it works:					
Adding pedestrian crossings has the opportunity to enhance pedestrian safety at locations noted as being problematic. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. Of these, 30 percent may involve a turning vehicle. Another 22 percent of pedestrian crashes involve a pedestrian either running across the intersection or darting out in front of a vehicle whose view was blocked just prior to the impact. Finally, 16 percent of these intersection-related crashes occur because of a driver violation (e.g., failure to yield right-of-way). When agencies opt to install aesthetic enhancement to intersection crosswalks like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.					
General Qualities (Time, Cost and Effectiveness):					
Costs associated with this strategy will vary widely, depending if curb ramps and sidewalk modifications are required with the crossing. When considered at a single location, these low cost improvements may be funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate to high cost projects that are appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 25%

S19PB, Pedestrian Scramble

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Pedestrian and Bicycle	40%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection with the new pedestrian crossing.			
General information				
Where to use:				
Pedestrian Scramble is a form of pedestrian "WALK" phase at a signalized intersection in which all vehicular traffic is required to stop, allowing pedestrians/bicyclists to safely cross through the intersection in any direction, including diagonally. Pedestrian Scramble may be considered at signalized intersections with very high pedestrian/bicycle volumes, e.g. in an urban business district.				
Why it works:				
Pedestrian Scramble has been shown to reduce injury risk and increase bicycle ridership due to its perceived safety and comfort.				
General Qualities (Time, Cost and Effectiveness):				
Not involving any additional R/W, Pedestrian Scramble should not require a long development process and should be implemented reasonably soon. A systemic approach may be used in implementing this CM, resulting in cost efficiency with low to moderate cost.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	-10% to 51%

S20PB, Install advance stop bar before crosswalk (Bicycle Box)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		15%	10 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection-crossing with the new advanced stop bars.				
General information					
Where to use:					
Signalized Intersections with a marked crossing, where significant bicycle and/or pedestrians volumes are known to occur.					
Why it works:					
Adding advance stop bar before the striped crosswalk has the opportunity to enhance both pedestrian and bicycle safety. Stopping cars well before the crosswalk provides a buffer between the vehicles and the crossing pedestrians. It also allows for a dedicated space for cyclists, making them more visible to drivers (This dedicated space is often referred to as a bike-box.)					
General Qualities (Time, Cost and Effectiveness):					
Costs and time of installation will vary based on the number of intersections included in this strategy and if it requires new signal controllers capable of accommodating the enhancement. When considered at a single location, these low cost improvements are usually funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 35%

S21PB, Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		60%	10 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersections with signalized pedestrian crossing with the newly implemented Leading Pedestrian Interval (LPI).				
General information					
Where to use:					
Intersections with signalized pedestrian crossing that have high turning vehicles volumes and have had pedestrian vs. vehicle crashes.					
Why it works:					
A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter an intersection 3-7 seconds before vehicles are given a green indication. With this head start, pedestrians can better establish their presence in the crosswalk before vehicles have priority to turn left. LPIs provide (1) increased visibility of crossing pedestrians; (2) reduced conflicts between pedestrians and vehicles; (3) Increased likelihood of motorists yielding to pedestrians; and (4) enhanced safety for pedestrians who may be slower to start into the intersection.					
General Qualities (Time, Cost and Effectiveness):					
Costs for implementing LPIs are very low, since only minor signal timing alteration is required. This makes it an easy and inexpensive countermeasure that can be incorporated into pedestrian safety action plans or policies and can become routine agency practice. When considered at a single location, the LPI is usually local-funded. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 59%

B.2 Intersection Countermeasures – Non-signalized

NS01, Add intersection lighting (NS.I.)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Night	40%	20 years
Notes:	This CM only applies to "night" crashes (all types) occurring within limits of the proposed roadway lighting 'engineered' area.			
General information				
Where to use:				
Non-signalized intersections that have a disproportionate number of night-time crashes and do not currently provide lighting at the intersection or at its approaches. Crash data should be studied to ensure that safety at the intersection could be improved by providing lighting (this strategy would be supported by a significant number of crashes that occur at night).				
Why it works:				
Providing lighting at the intersection itself, or both at the intersection and on its approaches, improves the safety of an intersection during nighttime conditions by (1) making drivers more aware of the surroundings at an intersection, which improves drivers' perception-reaction times, (2) enhancing drivers' available sight distances, and (3) improving the visibility of non-motorists. Intersection lighting is of particular benefit to non-motorized users as lighting not only helps them navigate the intersection, but also helps drivers see them better.				
General Qualities (Time, Cost and Effectiveness):				
A lighting project can usually be completed relatively quickly, but generally requires at least 1 year to implement because the lighting system must be designed and the provision of electrical power must be arranged. The provision of lighting involves both a fixed cost for lighting installation and an ongoing maintenance and power cost. For rural intersections, studies have shown the installation of streetlights reduced nighttime crashes at unlit intersections and can be more effective in reducing nighttime crashes than either rumble strips or overhead flashing beacons. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.				
FHWA CMF Clearinghouse:		Crash Types Addressed:	Night, All	CRF: 25- 50%

NS02, Convert to all-way STOP control (from 2-way or Yield control)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	50%	10 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control. CA-MUTCD warrant must be met.			
General information				
Where to use:				
Unsignalized intersection locations that have a crash history and have no controls on the major roadway approaches. However, all-way stop control is suitable only at intersections with moderate and relatively balanced volume levels on the intersection approaches. Under other conditions, the use of all-way stop control may create unnecessary delays and aggressive driver behavior. MUTCD warrants should always be followed.				
Why it works:				
All-way stop control can reduce right-angle and turning collisions at unsignalized intersections by providing more orderly movement at an intersection, reducing through and turning speeds, and minimizing the safety effect of any sight distance restrictions that may be present. Advance public notification of the change is critical in assuring compliance and reducing crashes.				
General Qualities (Time, Cost and Effectiveness):				
The costs involved in converting to all-way stop control are relatively low. All-way stop control can normally be implemented at multiple intersections with just a change in signing on intersection approaches, and typically are very quick to implement. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Left-turn, Angle	CRF:	6 - 80%

NS03, Install signals

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	30%	20 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new signals. All new signals must meet MUTCD "safety" warrants: 4, 5 or 7. Given the over-arching operational changes that occur when an intersection is signalized, no other intersection CMs can be applied to the intersection crashes in conjunction with this CM.			
General information				
Where to use:				
Traffic signals can be used to prevent the most severe type crashes (right-angle, left-turn). Consideration to signalize an unsignalized intersection should only be given after (1) less restrictive forms of traffic control have been utilized as the installation of a traffic signal often leads to an increased frequency of crashes (rear-end) on major roadways and introduces congestion and (2) signal warrants have been met. Refer to the CA MUTCD, Section 4C.01, Studies and Factors for Justifying Traffic Control Signals.				
Why it works:				
Traffic signals have the potential to reduce the most severe type crashes but will likely cause an increase in rear-end collisions. A reduction in overall injury severity is likely the largest benefit of traffic signal installation.				
General Qualities (Time, Cost and Effectiveness):				
Typical traffic signal costs fall in the medium to high category and are affected by application, type of signal and right-of-away considerations. Projects of this magnitude should only be considered after alternate and lesser means of correction have been evaluated. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	0 - 74%

NS04, Convert intersection to roundabout (from all way stop)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	Varies	20 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control. The benefit of this CM is calculated using Caltrans procedure. The CRF is dependent on the ADT, project location (Rural/Urban) and the roundabout type (1 lane or 2 lanes). The benefit comes from both the reduction in the number and the severity of the crashes.			
General information				
Where to use:				
Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections. Roundabouts may not be a viable alternative in many suburban and urban settings where right-of-way is limited.				
Why it works:				
Roundabouts provide an important alternative to signalized and all-way stop-controlled intersections. Modern roundabouts differ from traditional traffic circles in that they operate in such a manner that traffic entering the roundabout must yield the right-of-way to traffic already in it. Roundabouts can serve moderate traffic volumes with less delay than all-way stop-controlled intersections and provide fewer conflict points. Crashes at roundabouts tend to be less severe because of the speed constraints and elimination of left-turn and right-angle movements.				
General Qualities (Time, Cost and Effectiveness):				
Construction of roundabouts are usually relatively costly and major projects, requiring the environmental process, right-of-way acquisition, and implementation under an agency's long-term capital improvement program. (For this reason, roundabouts may not be appropriate for California's Federal Safety Programs that have relatively short delivery requirements.) Even with roundabouts higher costs, they still can have a relatively high effectiveness.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Left-turn, Angle	CRF:	12 - 78 %

NS05, Convert intersection to roundabout (from 2-way stop or Yield control)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		Varies	20 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control. The benefit of this CM is calculated using Caltrans procedure. The CRF is dependent on the ADT, project location (Rural/Urban) and the roundabout type (1 lane or 2 lanes). The benefit comes from both the reduction in the number and the severity of the crashes.				
General information					
Where to use:					
Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections. Roundabouts may not be a viable alternative in many suburban and urban settings where right-of-way is limited.					
Why it works:					
Roundabouts provide an important alternative to signalized and all-way stop-controlled intersections. Modern roundabouts differ from traditional traffic circles in that they operate in such a manner that traffic entering the roundabout must yield the right-of-way to traffic already in it. Roundabouts can serve moderate traffic volumes with less delay than all-way stop-controlled intersections and provide fewer conflict points. Crashes at roundabouts tend to be less severe because of the speed constraints and elimination of left-turn and right-angle movements.					
General Qualities (Time, Cost and Effectiveness):					
Construction of roundabouts are usually relatively costly and major projects, requiring the environmental process, right-of-way acquisition, and implementation under an agency's long-term capital improvement program. (For this reason, roundabouts may not be appropriate for California's Federal Safety Programs that have relatively short delivery requirements.) Even with roundabouts higher costs, they still can have a relatively high effectiveness.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Left-turn, Angle	CRF: 12 - 78 %

NS05mr, Convert intersection to mini-roundabout

For HSIP Cycle 11 Call-for-projects						
Funding Eligibility		Crash Types Addressed	CRF	Expected Life		
90%		All	30%	20 years		
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control.					
General information						
Where to use:						
Mini-roundabouts are characterized by a small diameter (45-90 ft) and traversable islands (central island and splitter islands). Mini-roundabouts offer most of the benefits of regular roundabouts with the added benefit of a smaller footprint. They are best suited to environments where speeds are already low and environmental constraints would preclude the use of a larger roundabout. Mini-roundabouts are most effective in lower speed environments in which all approaching roadways have posted speed of 30 mph or less and an 85th-percentile speed of less than 35 mph near the proposed yield and/or entrance line. For any location with an 85th-percentile speed above 35 mph, the mini-roundabout can be included as part of a broader system of traffic calming measures to achieve an appropriate speed environment.						
Why it works:						
Mini-roundabouts may be an optimal solution for a safety or operational issue at an existing intersection where there is insufficient right-of-way for a standard roundabout installation. The benefits of mini-roundabouts are the Compact size, operational efficiency, traffic safety improvement and traffic Calming.						
General Qualities (Time, Cost and Effectiveness):						
Construction costs for mini-roundabouts vary widely depending upon the extent of sidewalk modifications or other geometric improvements and the types of materials used. In most cases, mini-roundabouts have been installed with little or no pavement widening and with only minor changes to curbs and sidewalks. Construction costs can be minimum for an installation consisting entirely of pavement markings and signage or moderate for mini-roundabouts that include raised islands and pedestrian improvements.						
FHWA CMF Clearinghouse:		Crash Types Addressed:		NA	CRF:	NA

NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		15%	10 years
Notes:	This CM only applies to crashes occurring in the influence area of the new signs. The influence area must be determined on a location by location basis.				
General information					
Where to use:					
The target for this strategy should be approaches to unsignalized intersections with patterns of rear-end, right-angle, or turning collisions related to lack of driver awareness of the presence of the intersection.					
Why it works:					
The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by installing larger regulatory and warning signs at or prior to intersections. A key to success in applying this strategy is to select a combination of regulatory and warning sign techniques appropriate for the conditions on a particular unsignalized intersection approach.					
General Qualities (Time, Cost and Effectiveness):					
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 11 - 55%

NS07, Upgrade intersection pavement markings (NS.I.)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new pavement markings. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing pavement markings in-kind) and must include upgraded safety features over the existing pavement markings and striping.				
General information					
Where to use:					
Unsignalized intersections that are not clearly visible to approaching motorists, particularly approaching motorists on the major road. The strategy is particularly appropriate for intersections with patterns of rear-end, right-angle, or turning crashes related to lack of driver awareness of the presence of the intersection. Also at minor road approaches where conditions allow the stop bar to be seen by an approaching driver at a significant distance from the intersection. Typical improvements include "Stop Ahead" markings and the addition of Centerlines and Stop Bars.					
Why it works:					
The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by installing appropriate pavement delineation in advance of and at intersections will provide approaching motorists with additional information at these locations. Providing visible stop bars on minor road approaches to unsignalized intersections can help direct the attention of drivers to the presence of the intersection. Drivers should be more aware that the intersection is coming up, and therefore make safer decisions as they approach the intersection.					
General Qualities (Time, Cost and Effectiveness):					
Pavement marking improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of markings. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. Note: When federal safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 13 - 60%

NS08, Install Flashing Beacons at Stop-Controlled Intersections

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	15%	10 years
Notes:	This CM only applies to crashes occurring on the stop-controlled approaches / influence area of the new beacons.			
General information				
Where to use:				
Flashing beacons can reinforce driver awareness of the Non-Signalized intersection control and can help mitigate patterns of right-angle crashes related to stop sign violations. Post-mounted advanced flashing beacons or overhead flashing beacons can be used at stop-controlled intersections to supplement and call driver attention to stop signs.				
Why it works:				
Flashing beacons provide a visible signal to the presence of an intersection and can be very effective in rural areas where there may be long stretches between intersections as well as locations where night-time visibility of intersections is an issue.				
General Qualities (Time, Cost and Effectiveness):				
Flashing beacons can be constructed with minimal design, environmental and right-of-way issues and have relatively low costs. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle, Rear-End	CRF:	5-34%

NS09, Install flashing beacons as advance warning (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new beacons placed in advance of the intersection.		
General information			
Where to use:			
Non-Signalized Intersections with patterns of crashes that could be related to lack of a driver's awareness of approaching intersection or controls at a downstream intersection.			
Why it works:			
Advance flashing beacons can be used to supplement and call driver attention to intersection control signs. Flashing beacons are intended to reinforce driver awareness of the stop or yield signs and to help mitigate patterns of crashes related to intersection regulatory sign violations. Most advance warning flashing beacons can be powered by solar, thus reducing the issues relating to power source.			
General Qualities (Time, Cost and Effectiveness):			
Use of flashing beacons requires minimal development process, allowing flashing beacons to be installed within a short time period. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.			
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle, Rear-End	CRF: 36 - 62%

NS10, Install transverse rumble strips on approaches

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	20%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new rumble strips.		
General information			
Where to use:			
Transverse rumble strips are installed in the travel lane for the purposes of providing an auditory and tactile sensation for each motorist approaching the intersection. They can be used at any stop or yield approach intersection, often in combination with advance signing to warn of the intersection ahead. Due to the noise generated by vehicles driving over the rumble strips, care must be taken to minimize disruption to nearby residences and businesses.			
Why it works:			
When motorists are traveling along the roadway, they are sometimes unaware they are approaching an intersection. This is especially true on rural roads, as there may be fewer clues indicating an intersection ahead. Transverse rumble strips warn motorists that something unexpected is ahead that they need to pay attention to.			
General Qualities (Time, Cost and Effectiveness):			
Use of transverse rumble strips requires minimal development process, allowing transverse rumble strips to be installed within a short time period. In general, This CM can be very effective and can be considered on a systematic approach, although care should be taken to not over-use this CM. Note: When federal safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.			
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF: 0 - 35%

NS11, Improve sight distance to intersection (Clear Sight Triangles)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	20%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the significantly improved new sight distance. Minor/incidental improvements to sight distance would not likely result in the CRF shown below.			
General information				
Where to use:				
Unsignalized intersections with restricted sight distance and patterns of crashes related to lack of sight distance where sight distance can be improved by clearing roadside obstructions without major reconstruction of the roadway.				
Why it works:				
Adequate sight distance for drivers at stop or yield-controlled approaches to intersections has long been recognized as among the most important factors contributing to overall safety at unsignalized intersections. By removing sight distance restrictions (e.g., vegetation, parked vehicles, signs, buildings) from the sight triangles at stop or yield-controlled intersection approaches, drivers will be able see approaching vehicles on the main line, without obstruction and therefore make better decisions about entering the intersection safely.				
General Qualities (Time, Cost and Effectiveness):				
Projects involving clearing sight obstructions on the highway right-of-way can typically be accomplished quickly, assuming the objects are readily moveable. Clearing sight obstructions on private property requires more time for discussions with the property owner. Costs will generally be low, assuming that in most cases the objects to be removed are within the right-of-way. In general, this CMs can be very effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach. Usually only high-cost removals would be good candidates for Caltrans Federal Safety Funding. Note: When federal safety funding is used to remove vegetation that has the potential to grow back, the local agency is expected to maintain the improvement for a minimum of 10 years.				
FHWA CMF Clearinghouse:	Crash Types Addressed:		All	CRF: 11 - 56%

NS12, Improve pavement friction (High Friction Surface Treatments)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		55%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the improved friction overlay. This CM is not intended to apply to standard chip-seal or open-graded maintenance projects for long segments of corridors or structure repaving projects intended to fix failed pavement.				
General information					
Where to use:					
Nationally, this countermeasure is referred to as "High Friction Surface Treatments" or HFST. Non-signalized Intersections noted as having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than needed for the actual roadway approach speeds. This treatment is intended to target locations where skidding and failure to stop is determined to be a problem in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.					
Why it works:					
Improving the skid resistance at locations with high frequencies of wet-road crashes and/or failure to stop crashes can result in reductions of 50 percent for wet-road crashes and 20 percent for total crashes. Applying HFST can double friction numbers, e.g. low 40s to high 80s. This CM represents a special focus area for both FHWA and Caltrans, which means there are extra resources available for agencies interested in more details on High Friction Surface Treatment projects.					
General Qualities (Time, Cost and Effectiveness):					
This strategy can be relatively inexpensive and implemented in a short timeframe. The installation would be done by either agency personnel or contractors and can be done by hand or machine. In general, This CM can be very effective and can be considered on a systematic approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Wet, Night, ALL	CRF: 10 - 62 %

NS13, Install splitter-islands on the minor road approaches

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		40%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of <u>the new splitter island on the minor road approaches.</u>				
General information					
Where to use:					
Minor road approaches to unsignalized intersections where the presence of the intersection or the stop sign is not readily visible to approaching motorists. The strategy is particularly appropriate for intersections where the speeds on the minor road are high. In creation of a splitter island allows for an additional stop sign to be placed in the median for the minor approach.					
Why it works:					
The installation of splitter islands allows for the addition of a stop sign in the median to make the intersection more conspicuous. Additionally, the splitter island on the minor-road provides for a positive separation between turning vehicles on the through road and vehicles stopped on the minor road approach.					
General Qualities (Time, Cost and Effectiveness):					
Splitter islands at non-signalized intersections can usually be installed with minimal roadway reconstruction and relatively quickly. In general, This CM can be very effective and can be considered on a systematic approach.					
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle, Rear-End	CRF:	35 - 100 %	

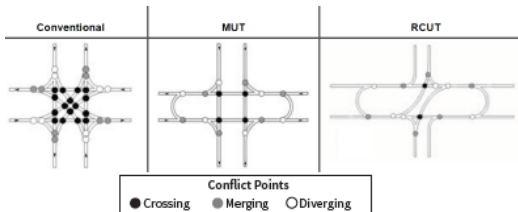
NS14, Install raised median on approaches (NS.I.)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	25%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new raised median. All new raised medians funded with federal HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.			
General information				
Where to use:				
Where related or nearby turning movements affect the safety and operation of an intersection. Effective access management is key to improving safety at, and adjacent to, intersections. The number of intersection access points coupled with the speed differential between vehicles traveling along the roadway often contributes to crashes. Any access points within 250 feet upstream and downstream of an intersection are generally undesirable.				
Why it works:				
Raised medians with left-turn lanes at intersections offer a cost-effective means for reducing crashes and improving operations at higher volume intersections. The raised medians also prohibit left turns into and out of driveways that may be located too close to the functional area of the intersection.				
General Qualities (Time, Cost and Effectiveness):				
Raised medians at intersections may be most effective in retrofit situations where high volumes of turning vehicles have degraded operations and safety, and where more extensive approaches would be too expensive because of limited right-of-way and the constraints of the built environment. Because raised medians limit property access to right turns only, the need for providing alternative access ways should be considered. In general, This CM can be very effective and can be considered on a systematic approach. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	20 - 39 %

NS15, Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new directional openings.			
General information				
Where to use:				
Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection. Because raised medians limit property access to right turns only, they should be used in conjunction with efforts to provide alternative access ways and promote driveway spacing objectives.				
Why it works:				
Agencies are increasingly using access management techniques on urban and suburban arterials to manage the number of conflicts experienced at an intersection. A key element of access management is to restrict certain movements, create directional median openings, or close median openings that are deemed too close to an intersection.				
General Qualities (Time, Cost and Effectiveness):				
Turn prohibitions that are implemented by closing a median opening can usually be implemented quickly. Costs are highly variable but in many cases could be considered low. In some cases this strategy may involve acquiring access or constructing replacement access; those actions will significantly increase the cost of the project. Impacts to businesses and other land uses must be considered and controversy can delay the implementation. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:		Crash Types Addressed:	All	CRF: 51%

NS16, Reduced Left-Turn Conflict Intersections (NS.I.)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new Reduced Left-Turn Conflict.			
General information				
Where to use and Why it works:				
Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes. Two highly effective designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT).				
Restricted Crossing U-turn (RCUT):				
The RCUT intersection modifies the direct left-turn and through movements from cross-street approaches. Minor road traffic makes a right turn followed by a U-turn at a designated location (either signalized or unsignalized) to continue in the desired direction.				
The RCUT is suitable for a variety of circumstances, including along rural, high-speed, four-lane, divided highways or signalized routes. It also can be used as an alternative to signalization or constructing an interchange. RCUTs work well when consistently used along a corridor, but also can be used effectively at individual intersections.				
Median U-turn (MUT)				
The MUT intersection modifies direct left turns from the major approaches. Vehicles proceed through the main intersection, make a U-turn a short distance downstream, followed by a right turn at the main intersection. The U-turns can also be used for modifying the cross-street left turns.				
The MUT is an excellent choice for heavily traveled intersections with moderate left-turn volumes. When implemented at multiple intersections along a corridor, the efficient two-phase signal operation of the MUT can reduce delay, improve travel times, and create more crossing opportunities for pedestrians and bicyclists.				
MUT and RCUT Can Reduce Conflict Points by 50%				
				
General Qualities (Time, Cost and Effectiveness):				
Implementing this strategy may take from months to years, depending on whether additional R/W is required. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle/Left-turn/Rear-End/All	CRF:	34.8-100%

NS17, Install right-turn lane (NS.I.)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	20%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new right-turn lanes. This CM is not eligible for use at existing all-way stop intersections.			
General information				
Where to use:				
Many collisions at unsignalized intersections are related to right-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive right-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new right-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate. When considering new right-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.				
Why it works:				
The strategy is targeted to reduce the frequency of rear-end collisions resulting from conflicts between vehicles turning right and following vehicles and vehicles turning right and through vehicles coming from the left on the cross street. Right-turn lanes also remove slow vehicles that are decelerating to turn right from the through-traffic stream, thus reducing the potential for rear-end collisions. Right-turn lanes can increase the length of the intersection crossing and create an additional potential conflict point for non-motorized users.				
General Qualities (Time, Cost and Effectiveness):				
Implementing this strategy may take from months to years. At some locations, right-turn lanes can be quickly and simply installed by restriping the roadway. At other locations, widening of the roadway, acquisition of additional right-of-way, and extensive environmental processes may be needed. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	14 - 26 %

NS18, Install left-turn lane (where no left-turn lane exists)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	35%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new left-turn lanes. This CM does NOT apply to converting a single-left into double-left turn. This CM is not eligible for use at existing all-way stop intersections.			
General information				
Where to use:				
Many collisions at unsignalized intersections are related to left-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive left-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new left-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.				
Why it works:				
Adding left-turn lanes remove vehicles waiting to turn left from the through-traffic stream, thus reducing the potential for rear-end collisions. Because they provide a sheltered location for drivers to wait for a gap in opposing traffic, left-turn lanes may encourage drivers to be more selective in choosing a gap to complete the left-turn maneuver. This strategy may reduce the potential for collisions between left-turn and opposing through vehicles.				
General Qualities (Time, Cost and Effectiveness):				
Implementing this strategy may take from months to years. At some locations, left-turn lanes can be quickly and simply installed by restriping the roadway. At other locations, widening of the roadway, acquisition of additional right-of-way, and extensive environmental processes may be needed. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	9 -55 %

NS19PB, Install raised medians (refuge islands)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		45%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the crossing with the new islands. All new raised medians funded with federal HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.				
General information					
Where to use:					
Intersections that have a long pedestrian crossing distance, a higher number of pedestrians, or a crash history. Raised medians decrease the level of exposure for pedestrians and allow pedestrians to concentrate on (or cross) only one direction of traffic at a time.					
Why it works:					
Raised pedestrian refuge islands, or medians at crossing locations along roadways, are another strategy to reduce exposure between pedestrians and motor vehicles. Refuge islands and medians that are raised (i.e., not just painted) provide pedestrians more secure places of refuge during the street crossing. They can stop partway across the street and wait for an adequate gap in traffic before completing their crossing.					
General Qualities (Time, Cost and Effectiveness):					
Median and pedestrian refuge areas are a low-cost countermeasure to implement. This cost can be applied to retrofit improvements or if it is a new construction project, implementing this countermeasure is even more cost-effective. In general, This CM can be very effective and can be considered on a systematic approach. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian and Bicycle	CRF: 30 - 56 %

NS20PB, Install pedestrian crossing at uncontrolled locations (signs and markings only)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Pedestrian and Bicycle	25%	10 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new crossing. This CM is not intended to be used for high-cost aesthetic enhancements to intersection crosswalks (i.e. stamped concrete or stamped asphalt).			
General information				
Where to use:				
Non-signalized intersections without a marked crossing, where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with right and/or left turns pockets. See Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) for additional guidance regarding when to install a marked crosswalk.				
Why it works:				
Adding pedestrian crossings has the opportunity to enhance pedestrian safety at locations noted as being problematic. Pavement markings delineate a portion of the roadway that is designated for pedestrian crossing. These markings will often be different for controlled verses uncontrolled locations. The use of "ladder", "zebra" or other enhanced markings at uncontrolled crossings can increase both pedestrian and driver awareness to the increased exposure at the crossing. Incorporating advanced "stop" or "yield" markings provides an extra safety buffer and can be effective in reducing the 'multiple-threat' danger to pedestrians. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. Of these, 30 percent may involve a turning vehicle. There are several types of pedestrian crosswalks, including: continental, ladder, zebra, and standard. When agencies opt to install aesthetic enhancement to intersection crosswalks like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.				
General Qualities (Time, Cost and Effectiveness):				
Costs associated with this strategy will vary widely, depending upon if curb ramps and sidewalk modifications are required with the crossing. When considered at a single location, these low cost improvements are usually funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian and Bicycle	CRF:	25 %

NS21PB, Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the new crossing (influence area) with enhanced safety features. This CM is not intended to be used for high-cost aesthetic enhancements to intersection crosswalks (i.e. stamped concrete or stamped asphalt).				
General information					
Where to use:					
Non-signalized intersections where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with turn pockets. Based on the Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) at many locations, a marked crosswalk alone may not be sufficient to adequately protect non-motorized users. In these cases, flashing beacons, curb extensions, advanced "stop" or "yield" markings, and other safety features should be added to complement the standard crossing elements.					
Why it works:					
Adding pedestrian crossings that include enhances safety features has the opportunity to enhance pedestrian safety at locations noted as being especially problematic. The enhanced safety elements help delineate a portion of the roadway that is designated for pedestrian crossing. Incorporating advanced "yield" markings provide an extra safety buffer and can be effective in reducing the 'multiple-threat' danger to pedestrians. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. When agencies opt to install aesthetic enhancement to intersection crosswalks like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.					
General Qualities (Time, Cost and Effectiveness):					
Costs associated with this strategy will vary widely, depending upon the types of enhanced features that will be combined with the standard crossing improvements. The need for new curb ramps and sidewalk modifications will also be a factor. This CM may be effectively and efficiently implemented using a systematic approach with more than one location and can have relatively high B/C ratios based on past non-motorized crash history.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian and Bicycle	CRF: 37%

NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the influence area (expected to be a maximum of within 250') of the crossing which includes the RRFB.			
General information				
Where to use:				
Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings.				
Why it works:				
RRFBs can enhance safety by increasing driver awareness of potential pedestrian conflicts and reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings. The addition of RRFB may also increase the safety effectiveness of other treatments, such as crossing warning signs and markings.				
General Qualities (Time, Cost and Effectiveness):				
RRFBs are a lower cost alternative to traffic signals and hybrid signals. This CM can often be effectively and efficiently implemented using a systematic approach with numerous locations.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	7 – 47.4%

NS23PB, Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		55%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new signal. For HAWK or other pedestrian signals, the justification may be Warrant 4, 5 and/or 7, or passing the test in Figure 4F-1/4F-2 in Chapter 4F of CA MUTCD. Please refer to Chapter 4F of CA MUTCD for more details				
General information					
Where to use:					
Intersections noted as having a history of pedestrian vs. vehicle crashes and in areas where the likelihood of the pedestrian presence is high. Corridors should also be assessed to determine if there are adequate safe opportunities for non-motorists to cross and if a pedestrian signal, or a Pedestrian Hybrid Beacon (PHB) (also called High-Intensity Activated crossWalk beacon (HAWK)) are needed to provide an active warning to motorists when a pedestrian is in the crosswalk.					
Why it works:					
Adding a pedestrian signal has the opportunity to greatly enhance pedestrian safety at locations noted as being problematic. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.					
General Qualities (Time, Cost and Effectiveness):					
The cost of improvements are generally high, but can vary dependent on the type of signal and overall scope of the project. In most cases the project duration can be short. The expected effectiveness of this CM must be assessed for each individual location.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian and Bicycle	CRF: 15 - 69%

B.3 Roadway Countermeasures

R01, Add Segment Lighting

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Night		35%	20 years
Notes:	This CM only applies to "night" crashes (all types) occurring within limits of the proposed roadway lighting 'engineered' area.				
General information					
Where to use:					
Where to use: Noted substantial patterns of nighttime crashes. In particular, patterns of rear-end, right-angle, turning or roadway departure collisions on the roadways may indicate that night-time drivers can be unaware of the roadway characteristics.					
Why it works:					
Providing roadway lighting improves the safety during nighttime conditions by (1) making drivers more aware of the surroundings, which improves drivers' perception-reaction times, (2) enhancing drivers' available sight distances to perceive roadway characteristic in advance of the change, and (3) improving non-motorist's visibility and navigation.					
General Qualities (Time, Cost and Effectiveness):					
It expected that projects of this type may be constructed in a year or two and are relatively costly. There are several types of costs associated with providing lighting, including the cost of providing a permanent source of power to the location, the cost for the luminaire supports (i.e., poles), and the cost for routinely replacing the bulbs and maintenance of the luminaire supports. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Night, All	CRF: 18 - 69 %

R02, Remove or relocate fixed objects outside of Clear Recovery Zone

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		35%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new clear recovery zone (per Caltrans' HDM).				
General information					
Where to use:					
Known locations or roadway segments prone to collisions with fixed objects such as utility poles, drainage structures, trees, and other fixed objects, such as the outside of a curve, end of lane drops, and in traffic islands. A clear recovery zone should be developed on every roadway, as space is available. In situations where public right-of-way is limited, steps should be taken to request assistance from property owners, as appropriate.					
Why it works:					
While this strategy does not prevent the vehicle leaving the roadway, it does provide a mechanism to reduce the severity of a resulting crash. A clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway. Removing or moving fixed objects, flattening slopes, or providing recovery areas reduces the likelihood of a crash.					
General Qualities (Time, Cost and Effectiveness):					
Projects involving removing fixed objects from highway right-of-way can typically be accomplished quickly, assuming the objects are readily moveable. Clearing objects on private property requires more time for discussions with the property owner. Costs will generally be low, assuming that in most cases the objects to be removed are within the right-of-way. This CMs can be very effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach. High-cost removals or removals implemented using a systematic approach would be good candidates for Caltrans Federal Safety Funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Fixed Object	CRF: 17 - 100 %

R03, Install Median Barrier

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	25%	20 years
Notes:	Note: For Caltrans' statewide Calls-for-Projects, this CM only applies to crashes occurring within the limits of the new barrier.			
General information				
Where to use:				
Areas where crash history indicates drivers are unintentionally crossing the median and the cross-overs are resulting in high severity crashes. The installation of median barriers can increase the number of PDO and non-severe injuries. The net result in safety from this countermeasure is connected more to reducing the severity of crashes not the number of crashes. It is recommended to review the warrants as outlined in Chapter 7 of the Caltrans Traffic Manual when considering whether to install median barriers.				
Why it works:				
This strategy is designed to prevent head-on collisions by providing a barrier between opposing lanes of traffic. The variety of median barriers available makes it easier to choose a site-specific solution. The main advantage is the reduction of the severity of the crashes. The key to success would be in selecting an appropriate barrier based on the site, previous crash history, maintenance needs, and median width.				
General Qualities (Time, Cost and Effectiveness):				
This strategy would in many cases be possible to implement within a short period after site selection. Costs will vary depending on the type of median barrier selected and whether the strategy is implemented as a stand-alone project or incorporated as part of a reconstruction or resurfacing effort. Maintenance costs and worker exposure will also vary depending on the type of barrier selected. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Head-on	CRF:	0 - 94 %

R04, Install Guardrail

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new guardrail. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing damaged rail). For projects proposing to upgrade existing guardrail to current standards, this CM and corresponding CRF should only be applied to locations where past crash data or engineering judgment applied to the existing rail conditions suggests the upgraded guardrail may result in fewer or less severe crashes (justifying the use of the 25% CRF for this CM).		
General information			
Where to use:			
Guardrail is installed to reduce the severity of lane departure crashes. However, guardrail can reduce crash severity only for those conditions where striking the guardrail is less severe than going down an embankment or striking a fixed object. Guardrail should only be installed where it is clear that crash severity will be reduced, or there is a history of run-off-the-road crashes at a given location that have resulted in severe crashes. New and upgraded guardrail and end-treatments must meet current safety standards; see Method for Assessing Safety Hardware (MASH) for more information. Caltrans (or other national accepted guidance) slope/height criteria need to be considered and documented.			
Why it works:			
Guardrail redirects a vehicle away from embankment slopes or fixed objects and dissipates the energy of an errant vehicle.			
General Qualities (Time, Cost and Effectiveness):			
Strategies range from relatively inexpensive too costly. Costly projects may include those that upgrade existing guardrail applications to more semi-rigid and rigid barrier systems over extended distances. In general, this CMs can be effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach.			
FHWA CMF Clearinghouse:	Crash Types Addressed:	Fixed Object, Run-off Road	CRF: 11 - 78 %

R05, Install impact attenuators

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new attenuators. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing damaged attenuators). For projects proposing to upgrade existing attenuators to current standards, this CM and corresponding CRF should only be applied to locations where past crash data or engineering judgment applied to the existing attenuator conditions suggests the upgraded attenuators may result in fewer or less severe crashes (justifying the use of the 25% CRF for this CM).				
General information					
Where to use:					
Impact attenuators are typically used to shield rigid roadside objects such as concrete barrier ends, steel guardrail ends and bridge pillars from oncoming automobiles. Attenuators should only be installed where it is impractical for the objects to be removed. New and upgraded barrier end-treatments must meet current safety standards; see MASH for more information.					
Why it works:					
Attenuators bring an errant vehicle to a more-controlled stop or redirect the vehicle away from a rigid object. Attenuators are effective at absorbing impact energy and increasing occupant safety. They also tend to draw attention to the fixed object, which helps drivers steer clear of the fixed objects.					
General Qualities (Time, Cost and Effectiveness):					
Costs depending on the scope of the project, type(s) used, and associated ongoing maintenance costs. Time to install is fairly quick once site is identified.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Fixed Object, Run-off Road	CRF: 5 - 50 %

R06, Flatten side slopes

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		30%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new side slopes. Minor/incidental flattening of side slopes would not likely result in the CRF shown below and may not be appropriate for use in Caltrans B/C calculations.				
General information					
Where to use:					
Roadways experiencing frequent lane departure crashes that result in roll-over type crashes as a result of the roadway slope being so severe as to not accommodate a reasonable degree of driver correction. When there is a need to reduce the severity of lane departure crashes without installing a barrier system that could result in increased numbers of crashes.					
Why it works:					
Flattened slopes provide a greater area for a driver to regain control of a vehicle. Steep slopes, ditches or unprotected hazardous drops-offs adjacent to a travel lane offer little opportunities to correct an inappropriate action by a driver and can result in sever crashes.					
General Qualities (Time, Cost and Effectiveness):					
Roadside modifications range from relatively inexpensive to very costly. Strategies that include creating safer side slopes where none exists can be moderately expensive based on the scope of the project and the associated clearing, grading, etc. The potential for high environmental and right-of-way impacts is high which can take several years to clear. In other cases This CM can be effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Fixed Object, Run-off Road	CRF: 5 - 62 %

R07, Flatten side slopes and remove guardrail

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		40%	20 years
Notes:	This CM only applies to crashes occurring within the limits of both the removed guardrail and the new side slopes.				
General information					
Where to use:					
Locations where high number of crashes originate as a lane departure and result in collision with guardrail or a fixed object located on the side slope shielded by guardrail. The guardrail may or may not meet current standards. Even though guardrails are generally installed to reduce the severity of departure crashes, they still can result in severe crashes in some locations.					
Why it works:					
Flattened side slopes and an unobstructed clear zone provide a greater area for a driver to regain control of a vehicle. The existing guardrail may help protect the steep slopes, fixed objects, or unprotected hazardous drops-offs adjacent to a travel lane, but removing all of these obstacles generally improves safety.					
General Qualities (Time, Cost and Effectiveness):					
Roadside modifications range from relatively inexpensive to very costly. Strategies that include creating safer side slopes where none exists can be moderately expensive based on the scope of the project and the associated clearing, grading, etc. The potential for high environmental and right-of-way impacts is high which can take several years to clear.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Roll Over, Fixed Object	CRF: 42%

R08, Install raised median

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new raised median. All new raised medians funded with federal HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.				
General information					
Where to use:					
Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Installing a raised median is a more restrictive approach in that it represents a more rigid barrier between opposing traffic. Application of raised medians on roadways with higher speeds is not advised - instead a median barrier should be considered. Including landscaping in new raised medians can be counterproductive to the HSIP safety goals and should only be done in ways that do not increase drivers' exposure to fixed objects and that will maintain driver's sight distance needs throughout the life of the proposed landscaping. <u>Agencies need to consider and document impacts of additional turning movements at nearby intersections.</u>					
Why it works:					
Adding raised medians is a particularly effective strategy as it adds to or reallocates the existing cross section to incorporate a buffer between the opposing travel lanes and reinforces the limits of the travel lane. Raised median may also be used to limit unsafe turning movements along a roadway.					
General Qualities (Time, Cost and Effectiveness):					
In some cases this strategy may be a retrofit into the existing roadway by utilizing a portion of the existing paved shoulder. These raised medians can be installed directly over the existing pavement. Cost and time to implement could significantly increase if the paved area is not sufficient to include a median. The surface treatment of the raised median also significantly affects their cost-effectiveness: standard concrete or other hardscape surfaces are usually more cost effective than landscaped medians. When agencies opt to install landscaping in conjunction with new raised medians, the project design and construction costs can significantly increase due to excavation, backfill/top-soil, water-connection, irrigation, planting, maintenance needed for the landscaping. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Head-on	CRF: 20 - 75 %

R09, Install median (flush)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	15%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new flush median. The new median must be a minimum of 4 feet wide (or "wider" if a narrow median exists before the proposed project).			
General information				
Where to use:				
Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Roadways with oversized lanes offer an opportunity to restripe the roadway to reduce the lanes to standard widths and use the extra width for the median.				
Why it works:				
Adding medians is a particularly effective strategy as it adds to or reallocates the existing cross section to incorporate a narrow buffer median between opposing flows, thereby providing a greater opportunity to correct an errant maneuver and further reinforce the limits of the travel lane. Application widths can vary based on the available cross section and intended application. Additional safety can be provided by combining this CM with rumble strips.				
General Qualities (Time, Cost and Effectiveness):				
In some cases this strategy may be retrofitted into the existing roadway by utilizing a portion of the existing paved shoulder and can ultimately be as simple as restriping the roadway. Costs and time to implement could significantly increase if the paved area is not sufficient to include a median.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	15 - 78 %

R10PB, Install pedestrian median fencing

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring on the approaches/influence area of the new pedestrian median fencing.				
General information					
Where to use:					
Roadway segments with high pedestrian-generators and pedestrian-destinations nearby (e.g. transit stops) may experience a high volume of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the nearest intersection or designated mid-block crossing. When this safety issue cannot be mitigated with shoulder, sidewalk and/or crossing treatments, then installing a continuous pedestrian barrier in the median may be a viable solution.					
Why it works:					
Adding pedestrian median fencing has the opportunity to enhance pedestrian safety at locations noted as being problematic involving pedestrians running/darting across the roadway outside designated pedestrian crossings. Pedestrian median fencing can significantly reduce this safety issue by creating a positive barrier, forcing pedestrians to the designated pedestrian crossing.					
General Qualities (Time, Cost and Effectiveness):					
Costs associated with this strategy will vary widely depending on the type and placement of the median fencing. Impacts to transit and other land uses may need to be considered and controversy can delay the implementation. In general, this CM can be effective as a spot-location approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 25 - 40%

R11, Install acceleration/ deceleration lanes

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new accel/decel lanes on high speed roadways. Significant improvements to the merge length for lane-drop locations is also an acceptable use of this CM.				
General information					
Where to use:					
Areas proven to have crashes that are the result of drivers not being able to turn onto a high speed roadway to accelerate until the desired roadway speed is reached and areas that do not provide the opportunity to safely decelerate to negotiate a turning movement. This CM can also be used to improve the safety of merging vehicles at a lane-drop location.					
Why it works:					
A lane that does not provide enough deceleration length and storage space for turning traffic may cause the turn queue to back up into the adjacent through lane. This can contribute to rear-end and sideswipe crashes. An acceleration lane is an auxiliary or speed-change lane that allows vehicles to accelerate to highway speeds (high speed roadways) before entering the through-traffic lanes of a highway. Additionally, if acceleration by entering traffic takes place directly on the traveled way, it may disrupt the flow of through-traffic and cause rear-end and sideswipe collisions.					
General Qualities (Time, Cost and Effectiveness):					
Costs are highly variable. Where sufficient median or shoulder space exists it may be possible to provide acceleration/deceleration lanes at a moderate cost. Where the roadway must be widened and additional right-of-way must be acquired, higher costs and a lengthy time-to-construct are likely. The expected effectiveness of this CM must be assessed for each individual location.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Sideswipe, Rear-End	CRF: 10 - 75 %

R12, Widen lane (initially less than 10 ft)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	20 years
Notes:	Note: For Caltrans' statewide Calls-for-Projects, this CM only applies to crashes occurring within the limits of the widened lanes. Widening must a minimum of 1 foot.				
General information					
Where to use:					
Horizontal curves or tangents and low speed or high speed roadways identified as having lane departure crashes, sideswipe or head-on crashes that can be attributed to an existing pavement width less than 10 feet.					
Why it works:					
Increasing pavement width can affect almost all crash types. A common practice is to widen the traveled way on horizontal curves to make operating conditions on curves comparable to those on tangents. Speed is a primary consideration when evaluating potential adverse impacts of lane width on safety. On high-speed, rural two-lane highways, an increased risk of cross-centerline head-on or cross-centerline sideswipe crashes is a concern because drivers may have more difficulty staying within the travel lane.					
General Qualities (Time, Cost and Effectiveness):					
Costs will depend on the amount of reconstruction necessary and on whether additional right-of-way is required. In general, this is one of the higher-cost strategies recommended, but it can also be very beneficial. Since this is a relatively expensive treatment, one of the keys to creating a cost effective project with at least a medium B/C ratio is targeting higher-hazard roadways.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 5 - 70 %

R13, Add two-way left-turn lane

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	30%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new lane, where an existing median did not already exist.			
General information				
Where to use:				
Roadways having a high frequency of drivers being rear-ended while attempting to make a left turn across oncoming traffic. Also can be effective for drivers crossing the centerline of an undivided multilane roadway inadvertently.				
Why it works:				
Two-way left-turn lanes provide a buffer between opposing directions of travel and separate left turning traffic from through traffic. They can also help to allow vehicles to begin to accelerate before entering the through-traffic lanes. They reduce the disruption of flow of through-traffic and reducing rear-end and sideswipe collisions. For some roadways the option of converting a four-lane undivided arterials to two-vehicle-lane roadways with a center left-turn lane and bike lanes should be considered (see "Road Diet" CM.)				
General Qualities (Time, Cost and Effectiveness):				
In some cases this strategy may be retrofitted into the existing roadway by utilizing a portion of the existing paved shoulder and can ultimately be as simple as restriping the roadway. Costs and time to implement could significantly increase if the paved area is not sufficient to include a median, requiring new right-of-way, and having significant environmental impacts. The expected effectiveness of this CM must be assessed for each individual location as the B/C ratios will vary from low to high.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	8 - 50 %

R14, Road Diet (Reduce travel lanes and add a two way left-turn and bike lanes)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	35%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new lane striping. "Intersection" crashes can only be applied when they resulted from turning movements that had no designated turn lanes/phases in the existing condition and the Road Diet will provide turn lanes/phases for these movements. This CM does not apply to roadway sections that already included left turn lanes or two way left turn lanes before the lane reductions. New bike lanes are also expected to be part of these projects. if any pavement is planned to be removed for the purpose of adding landscaping, planter-boxes, or other non-roadway user features, the cost should be non-participating.			
General information				
Where to use:				
Areas noted as having a higher frequency of head-on, left-turn, and rear-end crashes with traffic volumes that can be handled by only 2 free flowing lanes. Using this strategy in locations with traffic volumes that are too high could result in diversion of traffic to routes less safe than the original four-lane design. It may also result in congestion levels that contribute to other crashes.				
Why it works:				
The application of this strategy usually reduces the roadway segment speeds and serious head-on crashes. In many cases the extra pavement width can be used for the installation of bike lanes. In addition to increasing bicycle safety, these bike lanes can improve the safety of on-street parking.				
General Qualities (Time, Cost and Effectiveness):				
Implementation would require more time than in other low-cost treatments to complete environmental analyses, traffic studies and public input. Projects that only require new lane markings and minor signalization modifications will have relatively low cost and can be very effective and can be considered on a systematic approach. These striping and signal modification costs should be considered part of this CM and not an additional CM. (If additional signal hardware improvements are being made, over what is needed for the road diet, then the Improve Signal Hardware CM may also be used.) Often road diet projects need a seal-coat placed on the roadway to fully remove the old striping. These seal coats are considered part of the proper installation of this CM. In contrast, structural-overlays should not be considered part of this CM and are not considered eligible for funding in the California Local HSIP.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	26 - 43 %

R15, Widen shoulder

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		30%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new paved shoulder. A minimum of 2 feet width must be added and the new/resulting shoulders must be a minimum of 4 feet wide. This CM is not eligible unless it is done as the last step of an "incremental approach", for which the agency documents that: 1) they have already pursued and installed lower cost and lower impact CMs (i.e. signing/stripping upgrades to MUTCD standards/recommendations, rumble strips, etc.), 2) they have already monitored the crash occurrences after these improvements were installed, and 3) the 'after' crash rate is still unacceptably high. This 'incremental approach' (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application and a summary of the 'before' and 'after' crash analysis must be attached to the application.				
General information					
Where to use:					
Roadways that have a frequent incidence of vehicles leaving the travel lane resulting in an unsuccessful attempt to reenter the roadway. The probability of a safe recovery is increased if an errant vehicle is provided with an increased paved area in which to initiate such a recovery.					
Why it works:					
Based on the best available research, adding shoulder or widening an existing shoulder provides a greater area to regain control of a vehicle, as well as lateral clearance to roadside objects such as guardrail, signs and poles. They may also provide space for disabled vehicles to stop or drive slowly, provide increased sight distance for through vehicles and for vehicles entering the roadway, and in some cases reduce passing conflicts between motor vehicles and bicyclists and pedestrians. The likely safety benefits for adding or widening an existing shoulder generally increase as the widening width increases - practitioners should refer to NCHRP Report 500 Series, the CMF Clearinghouse or other references for more details.					
General Qualities (Time, Cost and Effectiveness):					
Shoulder widening costs would depend on whether new right-of-way is required and whether extensive roadside modification is needed. Since shoulder widening can be a relatively expensive treatment, one of the keys to creating a cost effective project with at least a medium B/C ratio is targeting higher-hazard roadways.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Fixed Object, Run-off Road, Sideswipe	CRF: 15 - 75 %

R16, Curve Shoulder widening (Outside Only)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	45%	20 years
Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the new shoulder widening at curves. A minimum of 2-4 feet width must be added to the outside of horizontal curves and the new traversable shoulder must be a minimum of 4 feet wide.			
General information				
Where to use:				
Roadway curves noted as having frequent lane departure crashes due to inadequate or no shoulders, resulting in an unsuccessful attempt to reenter the roadway.				
Why it works:				
Adding shoulders (outside only) creates a recovery area in which a driver can regain control of a vehicle, as well as lateral clearance to roadside objects.				
General Qualities (Time, Cost and Effectiveness):				
To minimize the R/W needs and the cost, only outside shoulder at curves is to be widened. This CM can be implemented in a relatively short timeframe.				
FHWA CMF Clearinghouse:	NA			

R17, Improve horizontal alignment (flatten curves)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		50%	20 years
Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the improved alignment. This CM is not eligible unless it is done as the last step of an "incremental approach", including: the agency documents that: 1) they have already pursued and installed lower cost and lower impact CMs (i.e. signing/stripping upgrades to MUTCD standards/recommendations, rumble strips, etc.), 2) they have already monitored the crash occurrences after these improvements were installed, and 3) the 'after' crash rate is still unacceptably high. This 'incremental approach' (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application and a summary of the agency's 'before' and 'after' crash analysis must be attached to the application.				
General information					
Where to use:					
Roadways with horizontal curves that have experienced lane departure crashes as a result of a roadway segment having compound curves or a severe radius. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.					
Why it works:					
Increasing the radius of a horizontal curve can be very effective in improving the safety performance of the curve. Curve modification reduces the likelihood of a vehicle leaving its lane, crossing the roadway centerline, or leaving the roadway at a horizontal curve; and minimizes the adverse consequences of leaving the roadway. Horizontal alignment improvement projects are expected to include standard/improved superelevation elements, which should be considered part of this CM and not an additional CM.					
General Qualities (Time, Cost and Effectiveness):					
This strategy is a long-term, higher-cost alternative for improving the safety of a horizontal curve because it usually involves total reconstruction of the roadway. It may also require acquisition of additional right-of-way and an environmental review. This strategy, albeit costly, has shown that increasing the radius of curvature can significantly reduce total curve-related crashes by up to 80 percent. The expected effectiveness of this CM must be assessed for each individual location.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 24 - 90%

R18, Flatten crest vertical curve

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	25%	20 years
Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the improved alignment. This CM is not eligible unless it is done as the last step of an "incremental approach", including: the agency documents that: 1) they have already pursued and installed lower cost and lower impact CMs (i.e. signing/stripping upgrades to MUTCD standards/recommendations, rumble strips, etc.), 2) they have already monitored the crash occurrences after these improvements were installed, and 3) the 'after' crash rate is still unacceptably high. This 'incremental approach' (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application and a summary of the agency's 'before' and 'after' crash analysis must be attached to the application.			
General information				
Where to use:				
The target for this strategy is usually unsignalized intersections with restricted sight distance due to vertical geometry and with patterns of crashes related to that lack of sight distance that cannot be ameliorated by less expensive methods. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.				
Why it works:				
Adequate sight distance for drivers at stopped approaches to intersections has long been recognized as among the most important factors contributing to overall intersection safety. Vertical alignment improvement projects are expected to include standard/improved superelevation elements, which should be considered part of this CM and not an additional CM.				
General Qualities (Time, Cost and Effectiveness):				
Projects involving changing the horizontal and/or vertical alignment to provide more sight distance are quite extensive and usually take several years to accomplish. If additional right-of-way is required or environmental impacts are expected, these projects will require a substantial period of time. Since this is usually an expensive treatment, one of the keys to creating a cost effective project with at least a medium B/C ratio is targeting higher-hazard locations.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	20 - 51 %

R19, Improve curve superelevation

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		45%	20 years
Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the improved superelevation. This CM does not apply to sections of roadways where the horizontal or vertical alignments are changing via another CM.				
General information					
Where to use:					
Roadways noted as having frequent lane departure crashes and inadequate or no superelevation. Safety can be enhanced when the superelevation is improved or restored along curves where the actual superelevation is less than the optimal.					
Why it works:					
Superelevation works with friction between the tires and pavement to counteract the forces on the vehicle associated with cornering. Many curves may have inadequate superelevation because of vehicles traveling at higher speeds than were originally designed for, because of loss of effective superelevation after resurfacing, or because of changes in design policy after the curve was originally constructed.					
General Qualities (Time, Cost and Effectiveness):					
This strategy can be a higher-cost alternative for improving the safety of a curve because it involves reconstruction to some degree. Other projects may be able to be constructed by simple overlays and minimal reconstruction of roadway features. When simple overlay fixes are pursued, a systematic installation approach may be appropriate. The expected effectiveness of this CM must be assessed for each individual location.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Run-off Road, All	CRF: 40 - 50 %

R20, Convert from two-way to one-way traffic

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	35%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new one-way sections.			
General information				
Where to use:				
One-way streets can offer improved signal timing and accommodate odd-spaced signals. One-way streets can simplify crossings for pedestrians, who must look for traffic in only one direction. While studies have shown that conversion of two-way streets to one-way generally reduces pedestrian crashes and the number of conflict points, one-way streets tend to have higher speeds which creates new problems. Care must be taken not to create conditions that cause driver confusion and erratic maneuvers.				
Why it works:				
Studies have shown a 10 to 50-percent reduction in total crashes after conversion of a two-way street to one-way operation. While studies have shown that con-version of two-way streets to one-way generally reduces pedestrian crashes, one-way streets tend to have higher speeds which creates new problems. At the same time, this strategy (1) increases capacity significantly and (2) can have safety-related drawbacks including pedestrian confusion and minor sideswipe crashes.				
General Qualities (Time, Cost and Effectiveness):				
The costs will vary depending on length of treatment and if the conversion requires modification to signals. Conversion costs can be high to build "crossovers" where the one-way streets convert back to two-way streets and to rebuild traffic signals. It's also likely that these types of modifications will require public involvement and could significantly add to the time it takes to complete the project. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	26 - 43 %

R21, Improve pavement friction (High Friction Surface Treatments)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	55%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the improved friction overlay. This CM is not intended to apply to standard chip-seal or open-graded maintenance projects for long segments of corridors or structure repaving projects intended to fix failed pavement.			
General information				
Where to use:				
Nationally, this countermeasure is referred to as "High Friction Surface Treatments" or HFST. Areas as noted having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than actual roadway speeds; including but not limited to curves, loop ramps, intersections, and areas with short stopping or weaving distances. This treatment is intended to target locations where skidding is determined to be a problem, in wet or dry conditions and the target vehicle is one that runs (skids) off the road or is unable to stop due to insufficient skid resistance.				
Why it works:				
Improving the skid resistance at locations with high frequencies of wet-road crashes and/or failure to stop crashes can result in a reduction of 50 percent for wet-road crashes and 20 percent for total crashes. Applying HFST can double friction numbers, e.g. low 40s to high 80s. This CM represents a special focus area for both FHWA and Caltrans, which means there are extra resources available for agencies interested in more details on High Friction Surface Treatment projects.				
General Qualities (Time, Cost and Effectiveness):				
This strategy can be relatively inexpensive and implemented in a short timeframe. The installation would be done by either agency personnel or contractors and can be done by hand or machine. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Wet, Rear-End, All	CRF:	17 - 68 %

R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		15%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new/upgraded signs. This CM is not intended for maintenance upgrades of street-name, parking, guide, or any other signs without a primary focus on roadway safety. <u>This CM is not eligible unless</u> it is done as part of a larger sign audit project, including the study of: 1) the existing signs' locations, sizes and information per MUTCD standards, 2) missing signs per MUTCD standards, and 3) sign retroreflectivity. The overall sign audit scope (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application. Based on the scope of the project/audit, it may be appropriate to combine other CMs in the B/C calculation.				
General information					
Where to use:					
The target for this strategy should be on roadway segments with patterns of head on, nighttime, non-intersection, run-off road, and sideswipe crashes related to lack of driver awareness of the presence of a specific roadway feature or regulatory requirement. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install chevrons, warning signs, delineators, markers, beacons, and relocation of existing signs per MUTCD standards.)					
Why it works:					
This strategy primarily addresses crashes caused by lack of driver awareness (or compliance) roadway signing. It is intended to get the drivers attention and give them a visual warning by using fluorescent yellow sheeting (or other retroreflective material).					
General Qualities (Time, Cost and Effectiveness):					
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Head on, Run-off road, Sideswipe, Night	CRF: 18 - 35%

R23, Install chevron signs on horizontal curves

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		40%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. only through the curve).				
General information					
Where to use:					
Roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install warning signs, delineators, markers, beacons, and relocation of existing signs per MUTCD standards.)					
Why it works:					
Post-mounted chevrons are intended to warn drivers of an approaching curve and provide tracking information and guidance to the drivers. While they are intended to act as a warning, it should also be remembered that the posts, placed along the roadside, represent a possible object with which an errant vehicle can crash into. Design of posts to minimize damage and injury is an important part of the considerations to be made when selecting these treatments.					
General Qualities (Time, Cost and Effectiveness):					
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Run-off Road, All	CRF: 6 - 64 %

R24, Install curve advance warning signs

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. only through the curve)				
General information					
Where to use:					
Roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness. This countermeasure may also include horizontal alignment and/or advisory speed warning signs. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install warning signs, chevrons, delineators, markers, beacons, and relocation of existing signs per MUTCD standards.)					
Why it works:					
This strategy primarily addresses problem curves, and serves as an advance warning of an unexpected or sharp curve. It provides advance information and gives drivers a visual warning that their added attention is needed.					
General Qualities (Time, Cost and Effectiveness):					
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Run-off Road, All	CRF: 20 - 30 %

R25, Install curve advance warning signs (flashing beacon)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		30%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. only through the curve)				
General information					
Where to use:					
Roadways that have an unacceptable level of crashes on relatively sharp curves. Flashing beacons in conjunction with warning signs should only be used on horizontal curves that have an established severe crash history to help maintain their effectiveness.					
Why it works:					
This strategy primarily addresses problem curves, and serves as an enhanced advance warning of an unexpected or sharp curve. It provides advance information and gives drivers a visual warning that their added attention is needed. Flashing beacons are an added indication that a curve may be particularly challenging.					
General Qualities (Time, Cost and Effectiveness):					
Use of flashing beacons requires minimal development process, allowing flashing beacons to be installed within a short time period. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 30 %

R26, Install dynamic/variable speed warning signs

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		All	30%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. through the curve) {This CM does not apply to dynamic regulatory speed warning signs. There are currently no nationally accepted CRFs for dynamic regulatory signs (also known as Radar Speed Feedback Signs). CRFs are being developed and Caltrans hopes to include these CMs and CRFs in future calls for projects.}			
General information				
Where to use:				
Curvilinear roadways that have an unacceptable level of crashes due to excessive speeds on relatively sharp curves.				
Why it works:				
This strategy primarily addresses crashes caused by motorists traveling too fast around sharp curves. It is intended to get the drivers attention and give them a visual warning that they may be traveling over the recommended speed for the approaching curve. Care should be taken to limit the placement of these signs to help maintain their effectiveness.				
General Qualities (Time, Cost and Effectiveness):				
Use of dynamic speed warning signs requires minimal development process, allowing them to be installed within a short time period. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	0 - 41 %

R27, Install delineators, reflectors and/or object markers

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		15%	10 years
Notes:	This CM only applies to crashes occurring within the limits / influence area of the new features. {This is not a striping-related CM}				
General information					
Where to use:					
Roadways that have an unacceptable level of crashes on curves (relatively flat to sharp) during periods of light and darkness. Any road with a history of fixed object crashes is a candidate for this treatment, as are roadways with similar fixed objects along the roadside that have yet to experience crashes. If a fixed object cannot be relocated or made break-away, placing an object marker can provide additional information to motorists. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install warning signs, chevrons, beacons, and relocation of existing signs per MUTCD standards.)					
Why it works:					
Delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed. They are intended to provide tracking information and guidance to the drivers. They are generally less costly than Chevron Signs as they don't require posts to place along the roadside, avoiding an additional object with which an errant vehicle can crash into.					
General Qualities (Time, Cost and Effectiveness):					
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of locations. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		All	CRF: 0 - 30 %

R28, Install edge-lines and centerlines

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		25%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new centerlines and/or edge-lines. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing striping and RPMs in-kind) and must include upgraded safety features over the existing striping. For two lane roadways allowing passing, a striping audit must be done to ensure the passing limits meeting the MUTCD standards. Both the centerline and edge-lines are expected to be upgraded, unless prior approval is granted by Caltrans staff in writing and attached to application.				
General information					
Where to use:					
Any road with a history of run-off-road right, head-on, opposite-direction-sideswipe, or run-off-road-left crashes is a candidate for this treatment - install where the existing lane delineation is not sufficient to assist the motorist in understanding the existing limits of the roadway. Depending on the width of the roadway, various combinations of edge line and/or center line pavement markings may be the most appropriate. Incorporating raised/reflective pavement markers (RPMs) into centerlines (and edge-lines) should be considered as it has been shown to improve safety.					
Why it works:					
Installing edge-lines and centerlines where none exists or making significant upgrades to existing lines (paint to thermoplastic, adding audible disks/bumps in the thermoplastic stripes, or adding RPMs) are intended/designed to help drivers who might leave the roadway because of their inability to see the edge of the roadway along the horizontal edge of the pavement or cross-over the centerline of the roadway into oncoming traffic. New pavement marking products tend to be more durable, are all-weather, more visible, and have a higher retroreflectivity than traditional pavement markings.					
General Qualities (Time, Cost and Effectiveness):					
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded striping upgrade project, California local agencies are encouraged to consider "Roadway Safety Striping Audit and Upgrade Projects". Including wide-scale striping audits in the development phase of striping projects are expected to identify non-standard (per MUTCD) striping/markings features, no-passing zone limits needing adjustment, and missing striping/markings that may otherwise go unnoticed. More information on this concepts is available on the Local Assistance HSIP webpage under an RSSA example document. Note: When federal safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Head-on, Run-off Road, All	CRF: 0 - 44 %

R29, Install no-passing line

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		45%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new or extended no-passing zones.				
General information					
Where to use:					
Roadways that have a high percentage of head-on crashes suggesting that many head-on crashes may relate to failed passing maneuvers. No-passing lines should be installed where drivers "passing sight distance" is not available due to horizontal or vertical obstructions. General restriping projects can be good opportunities to reevaluate and incorporate new no-passing zones limits. The incorporation 'No Passing Zone' pennants should also be considered when reevaluating the limits of no-passing zones. Installing no-passing limits in areas that are not warranted may reduce the overall safety of the corridor as drivers may become frustrated and attempt passing maneuvers at other locations without the necessary sight distance.					
Why it works:					
When the centerline markings do not differentiate between passing and no-passing areas, drivers may have difficulty determining where passing maneuvers can be completed safely. Providing clear and engineered passing and no-passing areas can encourage drivers to wait patiently for safe passing areas and avoid aggressively looking for passing opportunities.					
General Qualities (Time, Cost and Effectiveness):					
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Head-on, Side-swipe	CRF: 40 - 53%

R30, Install centerline rumble strips/stripes

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	20%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new rumble strips/stripes.		
General information			
Where to use:			
Center Line rumble strips/stripes can be used on virtually any roadway – especially those with a history of head-on crashes. It is recommended that rumble strips/stripes be applied systematically along an entire route instead of only at spot locations. For all rumble strips/stripes, pavement condition should be sufficient to accept milled rumble strips. Care should be taken when considering installing rumble strips in locations with residential land uses or in areas with high bicycle volumes.			
Why it works:			
Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line. Additionally, rumble stripes (pavement marking in the rumble itself) provide an enhanced marking, especially in wet dark conditions.			
General Qualities (Time, Cost and Effectiveness):			
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.			
FHWA CMF Clearinghouse:	Crash Types Addressed:	Head-on, Side-swipe, All	CRF: 15 - 68%

R31, Install edgeline rumble strips/strips

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		All		15%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new rumble strips/stripes.				
General information					
Where to use:					
Shoulder and edge line milled rumble strips/stripes should be used on roads with a history of roadway departure crashes. It is recommended that rumble strips/stripes be applied systematically along an entire route instead of only at spot locations. For all rumble strips/stripes, pavement condition should be sufficient to accept milled rumble strips. Special requirements may apply and care should be taken when considering installing rumble strips in locations with residential land uses or in areas with high bicycle volumes.					
Why it works:					
Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line. Additionally, rumble stripes (pavement marking in the rumble itself) provide an enhanced marking, especially in wet dark conditions.					
General Qualities (Time, Cost and Effectiveness):					
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Run-off Road	CRF: 10 - 41%

R32PB, Install bike lanes

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring within the limits of the Class II (not Class III) bike lanes. When an off-street bike-path is proposed that is not adjacent to the roadway, the applicant must document the engineering judgment used to determine which "Ped & Bike" crashes to apply.			
General information				
Where to use:				
Roadway segments noted as having crashes between bicycles and vehicles or crashes that may be preventable with a buffer/shoulder. Most studies suggest that bicycle lanes may provide protection against bicycle/motor vehicle collisions. Striped bike lanes can be incorporated into a roadway when is desirable to delineate which available road space is for exclusive or preferential use by bicyclists.				
Why it works:				
Most studies present evidence that bicycle lanes provide protection against bicycle/motor vehicle collisions. Bicycle lanes provide marked areas for bicyclist to travel along the roadway and provide for more predictable movements for both bicyclist and motorist. Evidence also shows that riding with the flow of vehicular traffic reduces bicyclists’ chances of collision with a motor vehicle. Locations with bicycle lanes have lower rates of wrong-way riding. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.				
General Qualities (Time, Cost and Effectiveness):				
Adding striped bicycle lanes can range from the simply restriping the roadway and minor signing to projects that require roadway widening, right-of-way, and environmental impacts. It is most cost efficient to create bike lanes during street reconstruction, street resurfacing, or at the time of original construction. The expected effectiveness of this CM must be assessed for each individual location. For simple installation scenarios, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	0 - 53 %

R33PB, Install Separated Bike Lanes

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		45%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring within the limits of the separated bike lanes. When an off-street bike-path is proposed that is not adjacent to the roadway, the applicant must document the engineering judgment used to determine which "Ped & Bike" crashes to apply.				
General information					
Where to use:					
Separated bikeways are most appropriate on streets with high volumes of bike traffic and/or high bike-vehicle collisions, presumably in an urban or suburban area. Separation types range from simple, painted buffers and flexible delineators, to more substantial separation measures including raised curbs, grade separation, bollards, planters, and parking lanes. These options range in feasibility due to roadway characteristics, available space, and cost. In some cases, it may be possible to provide additional space in areas where pedestrian and bicyclists may interact, such as the parking buffer, or loading zones, or extra bike lane width for cyclists to pass one another.					
Why it works:					
Separated bike lanes provide increased safety and comfort for bicyclists beyond conventional bicycle lanes. By separating bicyclists from motor traffic, “protected” or physically separated bike lanes can offer a higher level of comfort and are attractive to a wider spectrum of the public. Intersections and approaches must be carefully designed to promote safety and facilitate left-turns for bicyclists from the primary corridor to cross street. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.					
General Qualities (Time, Cost and Effectiveness):					
The cost of Installing separated bike lanes can be low to medium or high, depending on whether roadway widening, right-of-way and environmental impacts are involved. It is most cost efficient to create bike lanes during street reconstruction, street resurfacing, or at the time of original construction. The expected effectiveness of this CM must be assessed for each individual location.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 3.7 - 100 %

R34PB, Install sidewalk/pathway (to avoid walking along roadway)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Pedestrian and Bicycle	80%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring within the limits of the new walkway. This CM is not intended to be used where an existing sidewalk is being replaced with a wider one, unless prior Caltrans approval is included in the application. When an off-street multi-use path is proposed that is not adjacent to the roadway, the applicant must document the engineering judgment used to determine which "Ped & Bike" crashes to apply.			
General information				
Where to use:				
Areas noted as not having adequate or no sidewalks and a history of walking along roadway pedestrian crashes. In rural areas asphalt curbs and/or separated walkways may be appropriate.				
Why it works:				
Sidewalks and walkways provide people with space to travel within the public right-of-way that is separated from roadway vehicles. The presence of sidewalks on both sides of the street has been found to be related to significant reductions in the “walking along roadway” pedestrian crash risk compared to locations where no sidewalks or walkways exist. Reductions of 50 to 90 percent of these types of pedestrian crashes. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.				
General Qualities (Time, Cost and Effectiveness):				

Costs for sidewalks will vary, depending upon factors such as width, materials, and existing of curb, gutter and drainage. Asphalt curbs and walkways are less expensive, but require more maintenance. The expected effectiveness of this CM must be assessed for each individual location. These projects can be very effective in areas of high-pedestrian volumes with a past history of crashes involving pedestrians.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	65 - 89 %
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R35PB, Install/upgrade pedestrian crossing (with enhanced safety features)

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the influence area (expected to be a maximum of within 250') of the new crossing which includes new enhanced safety features. Note: This CM is not intended to be combined with the "Install raised pedestrian crossing" when calculating the improvement's B/C ratio. This CM is not intended to be used for high-cost aesthetic enhancements (i.e. stamped concrete or stamped asphalt).				
General information					
Where to use:					
Roadway segments with no controlled crossing for a significant distance in high-use midblock crossing areas and/or multilane roads locations. Based on the Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) at many locations, a marked crosswalk alone may not be sufficient to adequately protect non-motorized users. In these cases, flashing beacons, curb extensions, medians and pedestrian crossing islands and/or other safety features should be added to complement the standard crossing elements. For multi-lane roadways, advance "yield" markings can be effective in reducing the 'multiple-threat' danger to pedestrians.					
Why it works:					
Adding pedestrian crossings has the opportunity to greatly enhance pedestrian safety at locations noted as being problematic. The enhanced safety elements, which may include curb extensions, medians and pedestrian crossing islands, beacons, and lighting, combined with pavement markings delineating a portion of the roadway that is designated for pedestrian crossing. Care must be taken to warn drivers of the potential for pedestrians crossing the roadway and enhanced improvements added to the crossing increase the likelihood of pedestrians crossing in a safe manner. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths and signs. When agencies opt to install aesthetic enhancement to crossing like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.					
General Qualities (Time, Cost and Effectiveness):					
Costs associated with this strategy will vary widely, depending on the extent of the curb extensions, raised medians, flashing beacons, and other pedestrian safety elements that are needed with the crossing. When considered at a single location, these improvements can sometimes be low cost and funded through local funding by local crews. This CM can often be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate to high cost projects that are appropriate to seek state or federal funding.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 8 - 56%

R36PB, Install raised pedestrian crossing

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Pedestrian and Bicycle		35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the area with the new raised crossing. Note: This CM is not intended to be combined with the "Install pedestrian crossing (with enhanced safety features)" when calculating the improvement's B/C ratio.				
General information					
Where to use:					
On lower-speed roadways, where pedestrians are known to be crossing roadways that involve significant vehicular traffic. Based on the Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) at many locations, a marked crosswalk alone, may not be sufficient to adequately protect non-motorized users. In these cases, raised crossings can be added to complement the standard crossing elements. Special requirements may apply and extra care should be taken when considering installing raised crossings to ensure unintended safety issues are not created, such as: emergency vehicle access or truck route issues.					
Why it works:					
Adding a raised pedestrian crossing has the opportunity to enhance pedestrian safety at locations noted as being especially problematic. The raised crossing encourages motorists to reduce their speed and provides improved delineation for the portion of the roadway that is designated for pedestrian crossing. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths.					
General Qualities (Time, Cost and Effectiveness):					
Costs associated with this strategy will vary widely, depending upon the elements of the raised crossing and the need for new curb ramps and sidewalk modifications. This CM may be effectively and efficiently implemented using a systematic approach with more than one location and can have medium to high B/C ratios based on past non-motorized crash history.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Pedestrian, Bicycle	CRF: 30 - 46%

R37PB, Install Rectangular Rapid Flashing Beacon (RRFB)

For HSIP Cycle 11 Call-for-projects				
Funding Eligibility		Crash Types Addressed	CRF	Expected Life
90%		Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the influence area (expected to be a maximum of within 250') of the crossing which includes the RRFB.			
General information				
Where to use:				
Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings.				
Why it works:				
RRFBs can enhance safety by increasing driver awareness of potential pedestrian conflicts and reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings. The addition of RRFB may also increase the safety effectiveness of other treatments, such as crossing warning signs and markings.				
General Qualities (Time, Cost and Effectiveness):				
RRFBs are a lower cost alternative to traffic signals and hybrid signals. This CM can often be effectively and efficiently implemented using a systematic approach with numerous locations.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	7 – 47.4%

R38, Install Animal Fencing

For HSIP Cycle 11 Call-for-projects					
Funding Eligibility		Crash Types Addressed		CRF	Expected Life
90%		Animal		80%	20 years
Notes:	This CM only applies to "animal" crashes occurring within the limits of the new fencing.				
General information					
Where to use:					
At locations with high percent of vehicular/animal crashes (reactive) or where there is a known high percent of animals crossing due to migratory patterns (proactive).					
Why it works:					
Animal fencing helps to channelize the identified animals to a natural or man-made crossing, eliminating the conflict between vehicles and animals on the same place. Animal fencing is typically installed at a bridge location with its "run of need" dependent on the surrounding terrain.					
General Qualities (Time, Cost and Effectiveness):					
Time to install fencing can be moderate to lengthy depending on the environmental commitments and agreed upon solution to mitigating project impacts. Costs will be fairly low and depend on the "run of need" length. There will be minimal reoccurring maintenance costs on keeping the fence intact. The expected effectiveness of this CM must be assessed for each individual location.					
FHWA CMF Clearinghouse:		Crash Types Addressed:		Animal	CRF: 70 - 90 %

Appendix C: Summary of “Recommended Actions”

The information contained here represent a brief summary of each section of this manual as well as the Summary of “Recommended Actions” from Sections 2 through 7. This is intended to be a quick-reference for local agency practitioners working on a “proactive safety analysis” of their roadway network.

Introduction and Purpose

As safety practitioners consider implementing a ‘proactive safety analysis approach’ they should consider the overall context of the safety issues facing California local agencies and Caltrans primary goals for preparing this Safety manual for California’s local roadway owners. Figure 1 provides a flowchart of the process and Appendices E and F provide examples and lessons learned from recent statewide calls-for-projects.

Identifying Safety Issues

This section provides an overview of the types of data to collect for the identification of roadway safety issues. It discusses sources of crash data and how they can be used. As practitioners gather information they are encouraged to develop one or more separate spreadsheets and/or pin-maps to help track and manage this data. The following spreadsheet is offered as an example, but each agency’s spreadsheet should include data and be formatted as necessary to meet their needs.

Location & Date	General Information		Crash Information			Evaluation / Action		
	Source/Type of information	Safety Issue/Problem	Nature of Crashes	Time of Day	Weather/Traffic Conditions	Staff Evaluation	Recommend Action	Resolution
1) Intersection “X”								
2) Roadway Segment (PM 5.3 to PM 7.8)								

State and Local Crash Databases

Recommended Action: Obtain at least 3 years of network-wide crash data to identify local roads that have a history of roadway crashes. This will be used to identify predominant roadway crash locations, crash types and other common characteristics.

Transportation Injury Mapping System (TIMS)

Recommended Action: Consider augmenting your local agency’s data collection approach with information available using the suite of TIMS tools. The TIMS tools (and/or tools from private for-profit vendors) can help the safety practitioner access and manage their crash data.

Law Enforcement Crash Reports

Recommended Action: Develop a working relationship with law enforcement officials responsible for enforcement and crash investigations. This could foster a partnership where sharing crash reports and

safety information on problem roadway segments becomes an everyday occurrence. Practitioners with limited access to crash data are encouraged to use TIMS to assess the local crash report data.

Observational Information

Recommended Action: Gather information received from law enforcement and road maintenance crew observations. Develop a system for maintenance crews to report and record observed roadway safety issues and a mechanism to address them.

Public Notifications

Recommended Action: Review and summarize information received from these sources, identifying segments or corridors with multiple notifications and record the locations, dates, and nature of the problem that are cited.

Roadway Data and Devices

Recommended Action: Identify and track roadway characteristics for the intersections, roadway segments, and corridors, including compliance with the minimum standards. At a minimum, this should be done for locations being considered for safety improvements, but ideally agencies would establish an extensive database of roadway data to help them proactively identify high risk roadway features.

Exposure Data

Recommended Action: Consider the availability of exposure data and track it along with the other crash data to help prioritize potential locations for safety improvements.

Field Assessments and Road Safety Audits

Recommended Action: Consider completing formal or informal field assessments and RSAs at certain locations to help ensure all relevant information is collected and available for the safety practitioners to complete their safety analysis and identification of the most appropriate countermeasures. Develop simple straightforward criteria on when one of these will be undertaken.

Safety Data Analysis

This section summarizes the types of analyses that can be conducted to determine what roadway countermeasures should be implemented. This section is the link between the data (Section 2) and the selection of appropriate countermeasures (Section 4). It provides definitions and examples of the qualitative and quantitative factors that should be considered when evaluating roadway safety issues.

Quantitative Analysis

Recommended Action: Complete a quantitative analysis of their roadway data using both Crash Frequency and Crash Rate methodologies, including:

Crash Frequency

Top 10 (or 20) lists of intersections and roadway segments.

For lower volume roadways, network wide pin-maps may be more effective.

Develop collision diagrams showing the direction of movement of vehicles and pedestrians.

Crash Rate

Top 10 (or 20) lists of roadway segments in relationship to length, volumes, and/or density.

Top 10 (or 20) lists of intersections, sorted by crash rate.

Top 10 (or 20) lists of the highest volume intersections, sorted by crash frequency or rate.

Qualitative Analysis

Recommended Action: Consider completing field assessments and RSAs to identify roadway infrastructure characteristics relating to both locations with compliance issues and locations with high crash frequencies/rates. As part the field assessments, common roadway and crash characteristics should be identified for the potential systemic deployment of countermeasures.

Caltrans recommends all agencies complete both quantitative and qualitative analyses before starting their applications for HSIP program funding. The findings from these analyses should be documented in spreadsheets and/or pin-maps similar to the ones discussed in Section 2.

Countermeasures

This Section provides a description of selected countermeasures that have been shown in this manual. It includes a basic set of strategies to implement at locations experiencing a history of crashes and their corresponding crash modification factors (CMF). NOTE: Crash Reduction Factors (CRFs) are directly connected to the CMFs and are another indication of the effectiveness of a particular treatment. The CRF for a countermeasure is defined mathematically as $1 - \text{CMF}$. The terms CMFs and CRFs are used interchangeably throughout this document.

Selecting Countermeasures and Crash Modification Factors / Crash Reduction Factors

Countermeasure Details and Characteristics

Recommended Action: Agencies should use all information and results obtained through completing the actions in Sections 2, 3 and 4 to select the appropriate countermeasures for their HCCLs and systemic improvements. As novice safety practitioners select countermeasures, they must realize that a reasonable level of traffic ‘engineering judgment’ is required and that this manual and should not be used as a simple cheat-sheet for preparing and submitting applications for funding.

Calculating the B/C ratio and Comparing Projects

This section defines a methodology for calculating a benefit to cost (B/C) ratio for a potential safety project. It includes sources for estimating projected costs and benefits and the specific values/formulas Caltrans uses for its statewide evaluations of HSIP projects. This section also discusses the potential value in reevaluating projects’ overall cost effectiveness.

Estimating the Benefit of Implementing Proposed Improvements

Recommended Action: Prepare ‘Total Benefit’ estimates for the proposed projects being evaluated in the proactive safety analysis.

Estimating the Cost of Implementing Proposed Improvements

Recommended Action: Prepare ‘Total Project Cost’ estimates for the proposed projects being evaluated in the proactive safety analysis.

Calculating the B/C Ratio

Recommended Action: Calculate the B/C ratio for each of the proposed projects being evaluated in the proactive safety analysis.

Compare B/C Ratios and Consider the Need to Reevaluate Project Elements

Recommended Action: Compare, reevaluate, and prioritize the potential safety projects. Consider changing the project limits or utilizing lower cost countermeasures for projects with low initial B/C ratios.

Identifying Funding and Construct Improvements

This section identifies existing and new funding opportunities for safety projects that local agencies should be considering. This section also briefly discusses some unique project development issues and strategies for safety projects as they proceed through design and construction.

Existing Funding for Low-cost Countermeasures

Recommended Action: Survey planned maintenance, developer and capital projects to determine whether they overlap any of the proposed safety projects. Where projects overlap, leverage the existing funding sources to include safety countermeasures.

Other Funding Sources

Recommended Action: Consider all potential funding opportunities to incorporate the identified safety countermeasures including the HSIP and ATP Programs.

Project Development and Construction Considerations

Recommended Action: Safety practitioners should follow their safety projects all the way through the project delivery and construction process. In addition, they should establish a safety program delivery plan that brings awareness and support to the expedited delivery of safety projects. Where possible, safety practitioners should involve the media and even consider having their own program intended to “toot their own safety-horn.”

Evaluation Improvements

This section presents the process to complete an evaluation of installed treatments. After the countermeasures are installed, assessing their effectiveness will provide valuable information and can help determine which countermeasures should continue to be installed on other roadways to make them safer as well.

Recommended Action: Develop a spreadsheet to track future safety project installations and record 3+ years of “before” and “after” crash information at those locations. Once safety countermeasures are constructed, schedule and track assessment dates to ensure they happen.

Appendix D: Benefit Cost Ratio (BCR) Calculations

This appendix includes the Benefit Cost methodology used in the Caltrans calls-for-projects in the HSIP programs. The HSM, Part B - Chapter 7, includes more details on conducting Economic Appraisal for roadway safety projects. Local agencies will be required to utilize the HSIP Analyzer to calculate the Benefit Cost Ratio (BCR) as part of their application for HSIP funding. Starting in Cycle 7 call for projects, the fatality and severe injury costs have been combined for calculating the benefit. Because fatality figures are small and are a matter of randomness, this change is being made to reduce the possibility of selecting an improvement project on the basis of randomness.

$$1) \text{ Benefit (Annual)} = \sum_{s=0}^3 \frac{CRF \times N \times CC_{ave}}{Y}$$

- CRF : Crash reduction factor in each countermeasure.
- S : Severity (0: PDO, 1: Minor Injury, 2: Injury, 3: Severe Injury/Fatal). See the below table.
- N : Number of Crashes, in severity levels, related to selected countermeasure.
- Y : Crash data time period (Year).
- CC_{ave} : Crash costs in severity levels.

Severity (S)	Crash Severity *	Location Type	Crash Cost ***
3	**Fatality and Severe Injury Combined (KA)	Signalized Intersection	\$1,787,000
3		Non Signalized Intersection	\$2,843,000
3		Roadway	\$2,461,000
2	Evident Injury – Other Visible (B)		\$159,900
1	Possible Injury–Complaint of Pain (C)		\$90,900
0	Property Damage Only (O)		\$14,900

* The letters in parenthesis (K, A, B, C and O) refer to the KABCO scale; it is commonly used by law enforcement agencies in their crash reporting efforts and is further documented in the HSM.

** Figures were calculated based on an average Fatality (K) / Severe Injury (A) ratio for each area type, a crash cost for a Fatality (K) of \$8,112,200, and a crash cost of a Severe/Disabling Injury (A) of \$437,100. These costs are used in the HSIP Analyzer.

*** Based on Table 7-1, Highway Safety Manual (HSM), First Edition, 2010. Adjusted to 2022 Dollars.

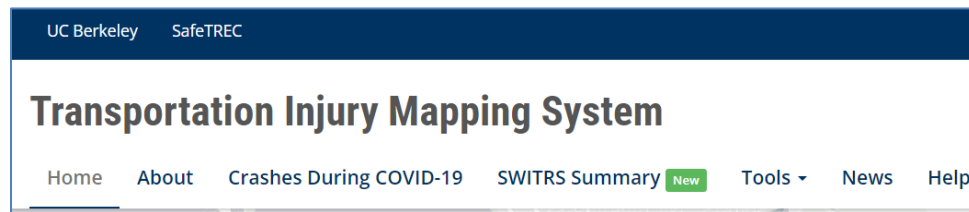
$$2) \text{ Benefit (Life)} = \text{Benefit (annual)} \times \text{Years of service life}$$

$$3) \text{ BCR (each countermeasure): } \text{Benefit Cost Ratio}_{(CM)} = \frac{\text{Benefit (Life)}_{(CM)}}{\text{Total Project Cost}_{(CM)}}$$

$$4) \text{ BCR (project): } \text{BCR (Project)} = \frac{\sum_{CM=1}^n \text{Benefit (Life)}_{(CM)}}{\text{Total Project Cost}}$$

Appendix E: Examples of Crash Data Collection and Analysis Techniques using TIMS

As demonstrated throughout the manual, SafeTREC's TIMS website <http://tims.berkeley.edu/> can be used to assist local agencies in completing a proactive safety analysis of their roadway network. *(Note: This manual focuses on TIMS as a tool to access and map SWITRS data because TIMS is free to local agencies and the general public. Local agencies are encouraged to try TIMS, but they should not feel obligated to make a switch if they prefer using their vendor-supplied crash analysis software to complete their data collection and analysis process).*



SWITRS Query & Map:

The SWITRS Query & Map application is a tool for accessing and mapping fatal and injury collision data from the California Statewide Integrated Traffic Records System (SWITRS).

SWITRS GIS Map:

The SWITRS GIS Map offers an interactive map-centric approach to viewing and querying SWITRS collision data, with the capability of multiple tasks including Rank by Intersection, Collision Diagram, etc.

Collision Diagram Tool:

The Collision Diagram tool allows users to generate an interactive collision diagram. The Collision Diagram is accessible through SWITRS GIS Map after a set of collisions is selected.

ATP Maps & Summary Data:

The ATP Maps & Summary Data tool utilizes interactive collision maps to find pedestrian and bicycle collisions hot spot and generate data summaries within specified project and/or community limits. Though it is designed to support the California Active Transportation Program (ATP), this tool may be useful in developing an HSIP project targeting pedestrian and bicycle safety issues.

Appendix F: List of Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ATP	Active Transportation Program
B/C; BCR	Benefit Cost Ratio
Caltrans	California Department of Transportation (Division of Local Assistance)
CA-MUTCD	California - Manual on Uniform Traffic Control Devices
CM	Countermeasure
CMF	Crash Modification Factor
CRF	Crash Reduction Factor
“5 E’s of Safety”	Education, Enforcement, Engineering, Emergency Response and Emerging Technologies
EMS	Emergency Medical Services
FHWA	Federal Highway Administration
HCCL	High Crash Concentration Location
HR3	High Risk Rural Roads Program
HSIP	Highway Safety Improvement Program
HSM	Highway Safety Manual
RSA	Roadway Safety Audit
SafeTREC	Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley
SHSP	Strategic Highway Safety Plan
SWITRS	Statewide Integrated Traffic Records System
TIMS	Transportation Injury Mapping System (a product of SafeTREC)

Appendix G: References

1. FHWA, Office of Safety website: Local and Rural Road Safety Program
 - https://safety.fhwa.dot.gov/local_rural/
2. Highway Safety Manual (HSM). Product of the American Association of State Highway and Transportation Officials.
 - <http://www.highwaysafetymanual.org/Pages/default.aspx>
3. National Highway Traffic Safety Administration (NHTSA): National Center for Statistics and Analysis (NCSA) Motor Vehicle Traffic Crash Data Resource
 - <https://crashstats.nhtsa.dot.gov/>
4. California - Manual on Uniform Traffic Control Devices (CA-MUTCD)
 - <https://dot.ca.gov/programs/safety-programs/camutcd>
5. Caltrans' website on the Highway Design Manual
 - <https://dot.ca.gov/programs/design/manual-highway-design-manual-hdm>
6. FHWA, Research and Development website for Bikesafe and Pedsafe
 - https://safety.fhwa.dot.gov/ped_bike/tools_solve/
7. AASHTO - A Policy on Geometric Design of Highways and Streets ("Green Book")

AASHTO - the Roadside Design Guide
 - <https://store.transportation.org/>
8. FHWA – Public Roads Magazine:
 - <https://highways.dot.gov/public-roads/home>

APPENDIX F. COUNTERMEASURE TOOLBOX



Table 1. Countermeasures for Intersections

ID	Intersection	Control	Consolidated CMs (HSIP-Eligible - Refer to LRSM* 2020)						Additional CM (non-HSIP)**	Emphasis Area 1 - Intersection Safety			Emphasis Area -2 - Reduce Nighttime Collisions			Emphasis Area -3 - Reduce Unsafe Speed Collisions			Emphasis Area -4 - Reduce Broadside Collisions			Emphasis Area -5 - Reduce Automobile Right of Way Collisions			Emphasis Area - 6 - Reduce Pedestrian Collisions			Additional CM's	Total Injury Collisions	KSI	Broadside	Pedestrian Collisions	Unsafe Speed	DUI Collisions
			CM1	CM2	CM3	CM4	CM5	Other		CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3							
I-1	Appian Way and Fitzgerald Dr	Signalized	S02	S03	S20PB				Red light camera, High visibility crosswalk, median pedestrian refuge island, directional curb ramps, reduce corner curb radius	S02	S03	S09	S01	S02	S10	S03	S04	S11	S02	S03	S09	S02	S03	S09	S18PB	S21PB		S20PB	7	1	2	1	2	0
I-2	San Pablo Ave and Tennent Ave	Signalized	S03	S20PB					High visibility crosswalk, directional curb ramps, ADA curb ramps, consider removing slip lane, yield limit lines at approach to slip lane, Educational program (DUI)	S02	S03	S09	S01	S02	S10	S03	S04	S11	S02	S03	S09	S02	S03	S09	S18PB	S21PB		S20PB	4	1	1	1	0	1
I-3	Appian Way and Canyon Dr and Tara Hills	Signalized	S02	S03	S12	S20PB			high visibility crosswalk	S02	S03	S09	S01	S02	S10	S03	S04	S11	S02	S03	S09	S02	S03	S09	S18PB	S21PB		S20PB	4	1	0	1	2	0
I-5	Pinole Valley Road/ Tennent Ave/Ellerhorst St	Signalized	S02	S03	S12	S16			Stipe high visibility crosswalk, install yield limit lines at slip lane, upgrade curb ramps to ADA curb ramps, install bulb outs at Ellerhorst St and Pinole Valley Rd near Elementary school, Conduct Traffic Study to remove parking lane on Ellerhorst	S02	S03	S09	S01	S02	S10	S03	S04	S11	S02	S03	S09	S02	S03	S09	S18PB	S21PB			3	1	1	0	0	1
I-6	Walter Ave and San Pablo Ave	Two Way Stop C	NS01	NS06	NS22PB	NS21PB	NS15		Mark crosswalks across Walter Ave (ladder style or high vis), upgrade curb ramps to be ADA compliant, stripe centerline on Walter Ave	NS06	NS07	NS11	NS01	NS06	NS07	NS07	NS10	NS12	NS06	NS07	NS08	NS06	NS07	NS08	NS21PB	NS22PB	NS23PB		1	1	0	0	1	0
I-7	Fitzgerald Dr and Best Buy Parking Lot	Signalized	S01	S09	S20PB				Upgrade crosswalk to high visibly crosswalk, Add handrail on the southwest corner	S02	S03	S09	S01	S02	S10	S03	S04	S11	S02	S03	S09	S02	S03	S09	S18PB	S21PB			2	0	0	1	0	0
I-8	San Pablo Ave and Del Monte	Signalized		S09					Install reflectors, object marker of raised median	S02	S03	S09	S01	S02	S10	S03	S04	S11	S02	S03	S09	S02	S03	S09	S18PB	S21PB			2	0	1	0	1	0

Recommended HSIP Countermeasures (Refer to LRSM for more details about each countermeasure)

Code	Countermeasure Name
HSIP/Non-HSIP Code	
S01	Add intersection lighting
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number
S03	Improve signal timing (coordination, phases, red, yellow, or operation)
S05	Install emergency vehicle pre-emption systems
S06	Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)
S07	Provide protected left turn phase (left turn lane already exists)
S08	Convert signal to mast arm (from pedestal-mounted)
S09	Install raised pavement markers and striping (Through Intersection)
S10	Install flashing beacons as advance warning (S.I.)
S11	Improve pavement friction (High Friction Surface Treatments)
S12	Install raised median on approaches (S.I.)
S13PB	Install pedestrian median fencing on approaches
S14	Create directional median openings to allow (and restrict) left-turns and U-turns (S.I.)
S15	Reduced Left-Turn Conflict Intersections (S.I.)
S16	Convert intersection to roundabout (from signal)
S17PB	Install pedestrian countdown signal heads
S18PB	Install pedestrian crossing (S.I.)
S19PB	Pedestrian Scramble
S20PB	Install advance stop bar before crosswalk (Bicycle Box)
S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

Code	Countermeasure Name
NS01	Add intersection lighting (NS.I.)
NS02	Convert to all-way STOP control (from 2-way or Yield control)
NS03	Install Signals
NS04	Convert intersection to roundabout (from all way stop)
NS05	Convert intersection to roundabout (from 2-way stop or Yield control)
NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatorysigns
NS07	Upgrade intersection pavement markings (NS.I.)
NS08	Install Flashing Beacons at Stop-Controlled Intersections
NS09	Install flashing beacons as advance warning (NS.I.)
NS10	Install transverse rumble strips on approaches
NS11	Improve sight distance to intersection (Clear Sight Triangles)
NS12	Improve pavement friction (High Friction Surface Treatments)
NS13	Install splitter-islands on the minor road approaches
NS14	Install raised median on approaches (NS.I.)
NS15	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)
NS16	Reduced Left-Turn Conflict Intersections (NS.I.)
NS17	Install right-turn lane (NS.I.)
NS18	Install left-turn lane (where no left-turn lane exists)
NS19PB	Install raised medians (refuge islands)
NS20PB	Install pedestrian crossing at uncontrolled locations (signs and markings only)
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)
NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)
NS23PB	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))



Table 2. Countermeasures for Roadway Segments

ID	Roadway Segment	Consolidated CMs (HSIP-Eligible - Refer to LRSM* 2020)						Additional CM (non-HSIP)**	Emphasis Area 1 - Intersection Safety			Emphasis Area -2 - Reduce Nighttime Collisions			Emphasis Area -3 - Reduce Unsafe Speed Collisions			Emphasis Area -4 - Reduce Broadside Collisions			Emphasis Area -5 - Reduce Automobile Right of Way Collisions			Emphasis Area - 6 - Reduce Pedestrian Collisions			Total Injury Collisions	F+SI Collisions	Broadside Collisons	Pedestrian Collisions	Unsafe Speed	DUI Collisions
		CM1	CM2	CM3	CM4	CM5	CM6		CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3						
A	Pinole Valley Rd: San Pablo Ave to Collins Ave	R22	R27	R26	R01	R30	R37PB	NH1				R01	R22	R27	R22	R26	R27	R21	R22	R30	R22	R24	R27	R35PB	R36PB	R37PB	10	3	3	1	4	1
B	San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd	R28	R27	R22	R14			Consider installing traffic calming measures, Restrip and Repave, NH1				R01	R22	R27	R14	R28	R21	R21	R22	R30	R22	R27		R35PB	R36PB	R37PB	7	1	0	0	2	3
C	San Pablo Ave: Golden Gate Park to Del Monte D	R22	R27	R21	R31			Pavement markers can be added at the nose of the medians, NH1				R01	R22	R27	R22	R31	R27	R21	R22	R30	R22	R27		R35PB	R36PB	R37PB	3	1	2	0	1	0
D	Tara Hills: Kilkenny Way to Appian Way	R14	R28	R27	R22			Restriping and repave, Traffic calming, NH1, Restrict parking near Gas Station				R01	R22	R27	R14	R28	R21	R21	R22	R28	R22	R27		R35PB	R36PB	R37PB	2	1	0	1	2	0
E	Walter Ave: North Terminus to San Pablo Ave	R01	R22	R27	R28	R30						R01	R22	R27	R22	R30	R27	R21	R22	R28	R22	R27		R35PB	R36PB	R37PB	1	1	0	0	1	0
F	Fitzgerald Dr: Jovita Ln to Appian Way	R35PB	R14	R26	R22	R27		Additional traffic calming measures, Pedestrian Safety (Bulb-outs), NH1				R01	R22	R27	R26	R30	R28	R21	R22	R28	R22	R27	R23	R35PB	R36PB	R37PB	7	0	0	2	0	0
G	Appian Way: San Pablo Ave to Michael Dr	R22	R27	R26	R21			Bike Lane				R01	R22	R27	R26	R21	R27	R21	R22	R30	R22	R27	R23	R35PB	R36PB	R37PB	6	0	1	0	4	0
H	Tennent Ave: San Pablo Ave to Pinole Valley Rd	R22	R30	R28	R27	R37PB		Improve Pavement Condition, Add bulb out at Plum St/Pear St				R01	R22	R27	R22	R30	R27	R21	R22	R30	R22	R27	R28	R35PB	R36PB	R37PB	1	0	1	0	0	0

**Non-HSIP Eligible CMs	Code
Speed Feedback Signs	NH1

Recommended HSIP Countermeasures (Refer to LRSM for more details about each countermeasure)

Code	Countermeasure Name
R01	Add Segment Lighting
R02	Remove or relocate fixed objects outside of Clear Recovery Zone
R03	Install Median Barrier
R04	Install Guardrail
R05	Install impact attenuators
R06	Flatten side slopes
R07	Flatten side slopes and remove guardrail
R08	Install raised median
R09	Install median (flush)
R10PB	Install pedestrian median fencing
R11	Install acceleration/ deceleration lanes
R12	Widen lane (initially less than 10 ft)
R13	Add two-way left-turn lane (without reducing travel lanes)
R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)
R15	Widen shoulder
R16	Curve Shoulder widening (Outside Only)
R17	Improve horizontal alignment (flatten curves)
R18	Flatten crest vertical curve
R19	Improve curve superelevation
R20	Convert from two-way to one-way traffic
R21	Improve pavement friction (High Friction Surface Treatments)
R22	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
R23	Install chevron signs on horizontal curves
R24	Install curve advance warning signs
R25	Install curve advance warning signs (flashing beacon)
R26	Install dynamic/variable speed warning signs
R27	Install delineators, reflectors and/or object markers
R28	Install edge-lines and centerlines
R29	Install no-passing line
R30	Install centerline rumble strips/stripes
R31	Install edgeline rumble strips/stripes
R32PB	Install bike lanes
R33PB	Install Separated Bike Lanes
R34PB	Install sidewalk/pathway (to avoid walking along roadway)
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)
R36PB	Install raised pedestrian crossing
R37PB	Install Rectangular Rapid Flashing Beacon (RRFB)
R38	Install Animal Fencing



Signalized Intersection						
Sr. No.	Code	Countermeasure Name	CM Description	CRF	Federal Funding	Systemic Approach Opportunity
HSIP/Non-HSIP Code						
1	S01	Add intersection lighting	Provision of lighting at intersection.	40%	90%	Medium
2	S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	Includes New LED lighting, signal back plates, retro-reflective tape outlining the back plates, or visors to increase signal visibility, larger signal heads, relocation of the signal heads, or additional signal heads.	15%	90%	Very High
3	S03	Improve signal timing (coordination, phases, red, yellow, or operation)	Includes adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations.	15%	50%	Very High
4	S05	Install emergency vehicle pre-emption systems	Corridors that have a history of crashes involving emergency response vehicles. The target of this strategy is signalized intersections where normal traffic operations impede emergency vehicles and where traffic conditions create a potential for conflicts between emergency and nonemergency vehicles. These conflicts could lead to almost any type of crash, due to the potential for erratic maneuvers of vehicles moving out of the paths of emergency vehicles	70%	90%	High
5	S06	Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)	Intersections that do not currently have a left turn lane or a related left-turn phase that are experiencing a large number of crashes. Many intersection safety problems can be traced to difficulties in accommodating left-turning vehicles, in particular where there is currently no accommodation for left turning traffic. A key strategy for minimizing collisions related to left-turning vehicles (angle, rear-end, sideswipe) is to provide exclusive left-turn lanes and the appropriate signal phasing, particularly on high-volume and high-speed major-road approaches.	55%	90%	Low
6	S07	Provide protected left turn phase (left turn lane already exists)	Left turns are widely recognized as the highest-risk movements at signalized intersections. Providing Protected left-turn phases for signalized intersections with existing left turn pockets significantly improve the safety for left-turn maneuvers by removing the need for the drivers to navigate through gaps in oncoming/opposing through vehicles	30%	90%	High
7	S08	Convert signal to mast arm (from pedestal-mounted)	Providing better visibility of intersection signs and signals aids the drivers’ advance perception of the upcoming intersection. Visibility and clarity of the signal should be improved without creating additional confusion or distraction for drivers.	30%	90%	Medium
8	S09	Install raised pavement markers and striping (Through Intersection)	Adding clear pavement markings can guide motorists through complex intersections. When drivers approach and traverse through complex intersections, drivers may be required to perform unusual or unexpected maneuvers	10%	90%	Very High
9	S10	Install flashing beacons as advance warning (S.I.)	Increased driver awareness of an approaching signalized intersection and an increase in the driver's time to react.	30%	90%	Medium
10	S11	Improve pavement friction (High Friction Surface Treatments)	Improving the skid resistance at locations with high frequencies of wet road crashes and/or failure to stop crashes	55%	90%	Medium
11	S12	Install raised median on approaches (S.I.)	Raised medians next to left turn lanes at intersections offer a cost effective means for reducing crashes and improving operations at higher volume intersections	25%	90%	Medium
12	S13PB	Install pedestrian median fencing on approaches	Signalized Intersections with high pedestrian-generators nearby (e.g. transit stops) may experience a high volumes of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the intersection and waiting to cross during the walk-phase.	30%	90%	Low
13	S14	Create directional median openings to allow (and restrict) left-turns and U-turns (S.I.)	Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection	50%	90%	Medium
14	S15	Reduced Left-Turn Conflict Intersections (S.I.)	Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes. Two highly effective designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT).	50%	90%	Medium

15	S16	Convert intersection to roundabout (from signal)	Signalized intersections that have a significant crash problem and the only alternative is to change the nature of the intersection itself. Roundabouts can also be very effective at intersections with complex geometry and intersections with frequent left-turn movements.	Varies	90%	Low
16	S17PB	Install pedestrian countdown signal heads	Signals that have signalized pedestrian crossing with walk/don't walk indicators and where there have been pedestrian vs. vehicle crashes.	25%	90%	Very High
17	S18PB	Install pedestrian crossing (S.I.)	Signalized Intersections with no marked crossing and pedestrian signal heads, where pedestrians are known to be crossing intersections that involve significant turning movements. They are especially important at intersections with (1) multiphase traffic signals, such as left-turn arrows and split phases, (2) school crossings, and (3) double-right or double-left turns. At signalized intersections, pedestrian crossings are often safer when the left turns have protected phases that do not overlap the pedestrian walk phase.	25%	90%	High
18	S19PB	Pedestrian Scramble	Pedestrian Scramble is a form of pedestrian "WALK" phase at a signalized intersection in which all vehicular traffic is required to stop, allowing pedestrians/bicyclists to safely cross through the intersection in any direction, including diagonally. Pedestrian Scramble may be considered at signalized intersections with very high pedestrian/bicycle volumes, e.g. in an urban business district.	40%	90%	High
19	S20PB	Install advance stop bar before crosswalk (Bicycle Box)	Signalized Intersections with a marked crossing, where significant bicycle and/or pedestrians volumes are known to occur.	15%	90%	Very High
20	S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Addition of LPI gives pedestrians the opportunity to enter an intersection 3-7 seconds before vehicles are given a green indication; only minor signal timing alteration is required.	60%	90%	Very High

Unsignalized Intersection						
Sr. No.	Code	Countermeasure Name	CM Description	CRF	Federal Funding	Systemic Approach Opportunity
1	NS01	Add intersection lighting (NS.I.)	Provision of lighting at intersection.	40%	90%	Medium
2	NS02	Convert to all-way STOP control (from 2-way or Yield control)	Unsignalized intersection locations that have a crash history and have no controls on the major roadway approaches. However, all-way stop control is suitable only at intersections with moderate,and relatively balanced volume levels on the intersection approaches. Under other conditions, the use of all-way stop control may create unnecessary delays and aggressive driver behavior.	50%	90%	High
3	NS03	Install Signals	Installation of traffic signals	25%	90%	Low
4	NS04	Convert intersection to roundabout (from all way stop)	Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections.	Varies	90%	Low
5	NS05	Convert intersection to roundabout (from 2-way stop or Yield control)	Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections.	Varies	90%	Low
6	S05mr	Convert intersection to mini-roundabout	Mini-roundabouts are characterized by a small diameter (45-90 ft) and traversable islands (central island and splitter islands).	30%	90%	Medium
7	NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatory	Additional regulatory and warning signs at or prior to intersections will help enhance the ability of approaching drivers to percieve them	15%	90%	Very High
8	NS07	Upgrade intersection pavement markings (NS.I.)	Typical improvements include "Stop Ahead" markings and the addition of centerlines and stop bars	25%	90%	Very High
9	NS08	Install Flashing Beacons at Stop-Controlled Intersections	Flashing beacons can reinforce driver awareness of the Non-Signalized intersection control and can help mitigate patterns of right-angle crashes related to stop sign violations. Post-mounted advanced flashing beacons or overhead flashing beacons can be used at stop-controlled intersections to supplement and call driver attention to stop signs.	15%	90%	High
10	NS09	Install flashing beacons as advance warning (NS.I.)	Installation of advance flashing beacoms to call drivers attention to intersection control signs	30%	90%	High
11	NS10	Install transverse rumble strips on approaches	Transverse rumble strips are installed in the travel lane for the purposes of providing an auditory and tactile sensation for each motorist approaching the intersection.	20%	90%	High

12	NS11	Improve sight distance to intersection (Clear Sight Triangles)	Unsignalized intersections with restricted sight distance and patterns of crashes related to lack of sight distance where sight distance can be improved by clearing roadside obstructions without major reconstruction of the roadway.	20%	90%	High
13	NS12	Improve pavement friction (High Friction Surface Treatments)	Non-signalized Intersections noted as having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than needed for the actual roadway approach speeds. This treatment is intended to target locations where skidding and failure to stop is determined to be a problem in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.	55%	90%	Medium
14	NS13	Install splitter-islands on the minor road approaches	The installation of a splitter island allows for the addition of a stop sign in the median to make the intersection more conspicuous.	40%	90%	Medium
15	NS14	Install raised median on approaches (NS.I.)	Effective access management is key to improving safety at, and adjacent to, intersections. The number of intersection access points coupled with the speed differential between vehicles traveling along the roadway often contributes to crashes. Any access points within 250 feet upstream and downstream of an intersection are generally undesirable.	25%	90%	Medium
16	NS15	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)	Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection.	50%	90%	Medium
17	NS16	Reduced Left-Turn Conflict Intersections (NS.I.)	Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes.	50%	90%	Medium
18	NS17	Install right-turn lane (NS.I.)	Many collisions at unsignalized intersections are related to right-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive right-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new right-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.	20%	90%	Low
19	NS18	Install left-turn lane (where no left-turn lane exists)	Many collisions at unsignalized intersections are related to left-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive left-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new left-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.	35%	90%	Low
20	NS19PB	Install raised medians (refuge islands)	Intersections that have a long pedestrian crossing distance, a higher number of pedestrians, or a crash history. Raised medians decrease the level of exposure for pedestrians and allow pedestrians to concentrate on (or cross) only one direction of traffic at a time.	45%	90%	Medium
21	NS20PB	Install pedestrian crossing at uncontrolled locations (signs and markings only)	Non-signalized intersections without a marked crossing, where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with right and/or left turns pockets. See Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) for additional guidance regarding when to install a marked crosswalk.	25%	90%	High
22	NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Non-signalized intersections where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with turn pockets.flashing beacons, curb extensions, advanced "stop" or "yield" markings, and other safety features should be added to complement the standard crossing elements.	35%	90%	Medium
23	NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings.	35%	90%	Medium
24	NS23PB	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	Intersections noted as having a history of pedestrian vs. vehicle crashes and in areas where the likelihood of the pedestrian presence is high. Corridors should also be assessed to determine if there are adequate safe opportunities for non-motorists to cross and if a pedestrian signal, or a Pedestrian Hybrid Beacon (PHB) (also called High-Intensity Activated crossWaK beacon (HAWK)) are needed to provide an active warning to motorists when a pedestrian is in the crosswalk.	55%	90%	Low

Sr. No.	Code	Countermeasure Name	CM Description	CRF	Federal Funding	Systemic Approach Opportunity
1	R01	Add Segment Lighting	Provision of lighting along roadways.	35%	100%	Medium
2	R02	Remove or relocate fixed objects outside of Clear Recovery Zone	Known locations or roadway segments prone to collisions with fixed objects such as utility poles, drainage structures, trees, and other fixed objects, such as the outside of a curve, end of lane drops, and in traffic islands. A clear recovery zone should be developed on every roadway, as space is available. In situations where public right-of-way is limited, steps should be taken to request assistance from property owners, as appropriate.	35%	90%	High
3	R03	Install Median Barrier	Areas where crash history indicates drivers are unintentionally crossing the median and the cross-overs are resulting in high severity crashes. The installation of median barriers can increase the number of PDO and non-severe injuries. The net result in safety from this countermeasure is connected more to reducing the severity of crashes not the number of crashes.	25%	100%	Medium
4	R04	Install Guardrail	Guardrail is installed to reduce the severity of lane departure crashes. However, guardrail can reduce crash severity only for those conditions where striking the guardrail is less severe than going down an embankment or striking a fixed object. Guardrail should only be installed where it is clear that crash severity will be reduced, or there is a history of run-off-the-road crashes at a given location that have resulted in severe crashes.	25%	100%	High
5	R05	Install impact attenuators	Impact attenuators are typically used to shield rigid roadside objects such as concrete barrier ends, steel guardrail ends and bridge pillars from oncoming automobiles. Attenuators should only be installed where it is impractical for the objects to be removed.	25%	100%	High
6	R06	Flatten side slopes	Roadways experiencing frequent lane departure crashes that result in roll-over type crashes as a result of the roadway slope being so severe as to not accommodate a reasonable degree of driver correction. When there is a need to reduce the severity of lane departure crashes without installing a barrier system that could result in increased numbers of crashes.	30%	100%	Medium
7	R07	Flatten side slopes and remove guardrail	Locations where high number of crashes originate as a lane departure and result in collision with guardrail or a fixed object located on the side slope shielded by guardrail. The guardrail may or may not meet current standards. Even though guardrails are generally installed to reduce the severity of departure crashes, they still can result in severe crashes in some locations.	40%	90%	Medium
8	R08	Install raised median	Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Installing a raised median is a more restrictive approach in that it represents a more rigid barrier between opposing traffic.	25%	90%	Medium
9	R09	Install median (flush)	Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Roadways with oversized lanes offer an opportunity to restripe the roadway to reduce the lanes to standard widths and use the extra width for the median.	15%	90%	Medium
10	R10PB	Install pedestrian median fencing	Roadway segments with high pedestrian-generators and pedestrian-destinations nearby (e.g. transit stops) may experience a high volume of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the nearest intersection or designated mid-block crossing. When this safety issue cannot be mitigated with shoulder, sidewalk and/or crossing treatments, then installing a continuous pedestrian barrier in the median may be a viable solution.	35%	90%	Low
11	R11	Install acceleration/ deceleration lanes	Areas proven to have crashes that are the result of drivers not being able to turn onto a high speed roadway to accelerate until the desired roadway speed is reached and areas that do not provide the opportunity to safety decelerate to negotiate a turning movement.	25%	90%	Low
12	R12	Widen lane (initially less than 10 ft)	Horizontal curves or tangents and low speed or high speed roadways identified as having lane departure crashes, sideswipe or head-on crashes that can be attributed to an existing pavement width less than 10 feet.	25%	90%	Medium
13	R13	Add two-way left-turn lane (without reducing travel lanes)	Roadways having a high frequency of drivers being rear-ended while attempting to make a left turn across oncoming traffic. Also can be effective for drivers crossing the centerline of an undivided multilane roadway inadvertently.	30%	90%	Medium

14	R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)	Areas noted as having a higher frequency of head-on, left-turn, and rear-end crashes with traffic volumes that can be handled by only 2 free flowing lanes. Using this strategy in locations with traffic volumes that are too high could result in diversion of traffic to routes less safe than the original four-lane design.	30%	90%	Medium
15	R15	Widen shoulder	Roadways that have a frequent incidence of vehicles leaving the travel lane resulting in an unsuccessful attempt to reenter the roadway. The probability of a safe recovery is increased if an errant vehicle is provided with an increased paved area in which to initiate such a recovery.	30%	90%	Medium
16	R16	Curve Shoulder widening (Outside Only)	Roadway curves noted as having frequent lane departure crashes due to inadequate or no shoulders, resulting in an unsuccessful attempt to reenter the roadway.	45%	90%	Medium
17	R17	Improve horizontal alignment (flatten curves)	Roadways with horizontal curves that have experienced lane departure crashes as a result of a roadway segment having compound curves or a severe radius. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.	50%	90%	Low
18	R18	Flatten crest vertical curve	The target for this strategy is usually unsignalized intersections with restricted sight distance due to vertical geometry and with patterns of crashes related to that lack of sight distance that cannot be ameliorated by less expensive methods. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.	25%	90%	Low
19	R19	Improve curve superelevation	Roadways noted as having frequent lane departure crashes and inadequate or no superelevation. Safety can be enhanced when the superelevation is improved or restored along curves where the actual superelevation is less than the optimal.	45%	90%	Medium
20	R20	Convert from two-way to one-way traffic	One-way streets can offer improved signal timing and accommodate odd-spaced signals. One-way streets can simplify crossings for pedestrians, who must look for traffic in only one direction. While studies have shown that conversion of two-way streets to one-way generally reduces pedestrian crashes and the number of conflict points, one-way streets tend to have higher speeds which creates new problems.	35%	90%	Medium
21	R21	Improve pavement friction (High Friction Surface Treatments)	Improving the skid resistance at locations with high frequencies of wet road crashes and/or failure to stop crashes	55%	100%	High
22	R22	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	Additional or new signage can address crashes caused by lack of driver awareness or complaine of roadway signing.	15%	100%	Very High
23	R23	Install chevron signs on horizontal curves	Roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness.			
24	R24	Install curve advance warning signs	Addition of advance curve warning signs; may also include horizontal alignment and/or advisory speed warning signs	25%	100%	Very High
25	R25	Install curve advance warning signs (flashing beacon)	Roadways that have an unacceptable level of crashes on relatively sharp curves. Flashing beacons in conjunction with warning signs should only be used on horizontal curves that have an established severe crash history to help maintain their effectiveness.			
26	R26	Install dynamic/variable speed warning signs	Includes the addition of dynamic speed warning signs (also known as Radar Speed Feedback Signs)	30%	100%	High
27	R27	Install delineators, reflectors and/or object markers	Installation of delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed.	15%	100%	Very High
28	R28	Install edge-lines and centerlines	Any road with a history of run-off-road right, head-on, opposite-direction-sideswipe, or run-off-road-left crashes is a candidate for this treatment -install where the existing lane delineation is not sufficient to assist the motorist in understanding the existing limits of the roadway. Depending on the width of the roadway, various combinations of edge line and/or center line pavement markings may be the most appropriate.	25%	100%	Very High
29	R29	Install no-passing line	Roadways that have a high percentage of head-on crashes suggesting that many head-on crashes may relate to failed passing maneuvers. No-passing lines should be installed where drivers "passing sight distance" is not available due to horizontal or vertical obstructions.	45%	100%	Very High
30	R30	Install centerline rumble strips/stripes	Center Line rumble strips/stripes can be used on virtually any roadway – especially those with a history of head-on crashes.	20%	100%	High
31	R31	Install edgeline rumble strips/stripes	Shoulder and edge line milled rumble strips/stripes should be used on roads with a history of roadway departure crashes.	15%	100%	High

32	R32PB	Install bike lanes	Roadway segments noted as having crashes between bicycles and vehicles or crashes that may be preventable with a buffer/shoulder.	35%	90%	High
33	R33PB	Install Separated Bike Lanes	Separated bikeways are most appropriate on streets with high volumes of bike traffic and/or high bike-vehicle collisions, presumably in an urban or suburban area. Separation types range from simple, painted buffers and flexible delineators, to more substantial separation measures including raised curbs, grade separation, bollards, planters, and parking lanes.	45%	90%	High
34	R34PB	Install sidewalk/pathway (to avoid walking along roadway)	Areas noted as not having adequate or no sidewalks and a history of walking along roadway pedestrian crashes. In rural areas asphalt curbs and/or separated walkways may be appropriate.	80%	90%	Medium
35	R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)	Roadway segments with no controlled crossing for a significant distance in high-use midblock crossing areas and/or multilane roads locations. flashing beacons, curb extensions, medians and pedestrian crossing islands and/or other safety features should be added to complement the standard crossing elements.	35%	90%	Medium
36	R36PB	Install raised pedestrian crossing	On lower-speed roadways, where pedestrians are known to be crossing roadways that involve significant vehicular traffic.	35%	90%	Medium
37	R37PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings	35%	100%	Medium
38	R38	Install Animal Fencing	At locations with high percent of vehicular/animal crashes (reactive) or where there is a known high percent of animals crossing due to migratory patterns (proactive).	80%	90%	Medium

	Strategy	Performance Measure	Organizations to be involved
Education	Conduct public information and education campaign for intersection safety laws, unsafe speeds, distracted driving, and driving under the influence.	Number of education campaigns	City/ School District/ Police Department
	Conduct pedestrian safety campaigns and outreach to raise their awareness of pedestrian safety needs through media outlets and social media.	Number of education campaigns	City/ School District/ Police Department
	Conduct bicycle safety campaigns and outreach to raise their awareness of bicycle safety needs through media outlets and social media.	Number of education campaigns	City/ School District/ Police Department
Enforcement	Targeted enforcement at high-risk locations.	Number of tickets issued.	Police Department
	Increase the number of personnel who have completed Advanced Roadside impaired Driving Enforcement (ARIDE) training	Number of personnel who have completed Advanced Roadside impaired Driving Enforcement (ARIDE) training	Police Department
EMS	Improve resource deployment for emergency responses at collision sites.	EMS vehicle response time.	City/ Health Department

APPENDIX G. B/C RATIO CALCULATION



Cost, Benefit and B/C Ratio Calculation Table																	
		Crash Costs				CM Annual Benefit			CM Life Benefit			Benefit		Total Benefit			
FID	Location	Other Visible Injury	Compliant of Pain	PDO	Crash Costs	Total Crash Cost	CM1_Benefit (Annual)	CM2_Benefit (Annual)	CM3_Benefit (Annual)	CM1_Benefit (Life)	CM2_Benefit (Life)	CM3_Benefit (Life)	Benefit per Location (Life)	Total_Benefit (Life)			
Project 1: Safety at Signalized Intersections																	
I-1	Applian Way and Fitzgerald Dr	\$ -	\$ 272,700.00	\$ -	\$ 2,059,700.00	\$ 8,969,300.00	\$ 61,791.00	\$ 61,791.00	\$ -	\$ 617,910.00	\$ 617,910.00	\$ -	\$ 1,235,820.00	\$ 4,962,120.00	Combined Benefit	\$ 4,962,120.00	
I-2	San Pablo Ave and Tennent Ave	\$ 159,900	\$ 90,900.00	\$ -	\$ 2,037,800.00		\$ -	\$ 61,134.00	\$ -	\$ -	\$ 611,340.00	\$ -	\$ -		\$ 611,340.00	Combined Cost	\$ 183,792
I-3	Applian Way and Canyon Dr and Tara Hills	\$ -	\$ 272,700.00	\$ -	\$ 2,059,700.00		\$ 61,791.00	\$ 61,791.00	\$ -	\$ 617,910.00	\$ 617,910.00	\$ -	\$ -		\$ 1,235,820.00	B/C	\$ 27.00
I-5	Pinole Valley Road/ Tennent Ave/Ellerhorst St	\$ -	\$ 181,800.00	\$ -	\$ 1,968,800.00		\$ 59,064.00	\$ 59,064.00	\$ -	\$ 590,640.00	\$ 590,640.00	\$ -	\$ -		\$ 1,181,280.00		
I-7	Fitzgerald Dr and Best Buy Parking Lot	\$ 159,900	\$ -	\$ -	\$ 159,900.00		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -		
2*	San Pablo Ave and Pinole Valley Rd	\$ -	\$ 181,800.00	\$ -	\$ 181,800.00		\$ -	\$ 5,454.00	\$ -	\$ -	\$ 54,540.00	\$ -	\$ -		\$ 54,540.00		
5*	San Pablo Ave and Pinon Ave/Appian Way	\$ 319,800	\$ 90,900.00	\$ -	\$ 410,700.00		\$ -	\$ 12,321.00	\$ 24,642.00	\$ -	\$ 123,210.00	\$ 492,840.00	\$ -		\$ 616,050.00		
7*	Pinole Valley Rd and Estates Ave	\$ -	\$ 90,900.00	\$ -	\$ 90,900.00		\$ -	\$ 2,727.00	\$ -	\$ -	\$ 27,270.00	\$ -	\$ -		\$ 27,270.00		
Project 2: Pedestrian Safety at Signalized Intersections																	
I-1	Applian Way and Fitzgerald Dr	\$ -	\$ 272,700.00	\$ -	\$ 2,059,700.00	\$ 8,558,600.00	\$ 61,791.00	\$ -	\$ -	\$ 617,910.00	\$ -	\$ -	\$ 617,910.00	\$ 6,273,760.00	Combined Benefit	\$ 6,273,760.00	
I-2	San Pablo Ave and Tennent Ave	\$ 159,900	\$ 90,900.00	\$ -	\$ 2,037,800.00		\$ 61,134.00	\$ -	\$ -	\$ 611,340.00	\$ -	\$ -	\$ 611,340.00		Combined Cost	\$ 514,548	
I-3	Applian Way and Canyon Dr and Tara Hills	\$ -	\$ 272,700.00	\$ -	\$ 2,059,700.00		\$ 61,791.00	\$ 102,985.00	\$ -	\$ 617,910.00	\$ 2,059,700.00	\$ -	\$ -		\$ 2,677,610.00	B/C	\$ 12.19
I-5	Pinole Valley Road/ Tennent Ave/Ellerhorst St	\$ -	\$ 181,800.00	\$ -	\$ 1,968,800.00		\$ -	\$ 98,440.00	\$ -	\$ -	\$ 1,968,800.00	\$ -	\$ -		\$ 1,968,800.00		
I-7	Fitzgerald Dr and Best Buy Parking Lot	\$ 159,900	\$ -	\$ -	\$ 159,900.00		\$ 4,797.00	\$ -	\$ 3,198.00	\$ 47,970.00	\$ -	\$ 31,980.00	\$ 79,950.00				
2*	San Pablo Ave and Pinole Valley Rd	\$ -	\$ 181,800.00	\$ -	\$ 181,800.00		\$ 5,454.00	\$ 9,090.00	\$ 3,636.00	\$ 54,540.00	\$ 181,800.00	\$ 36,360.00	\$ 272,700.00				
7*	Pinole Valley Rd and Estates Ave	\$ -	\$ 90,900.00	\$ -	\$ 90,900.00		\$ 2,727.00	\$ -	\$ -	\$ 27,270.00	\$ -	\$ -	\$ 45,450.00				
Project 3: Safety at Unsignalized Intersections																	
I-6	Walter Ave and San Pablo Ave	\$ -	\$ -	\$ -	\$ 2,843,000.00	\$ 3,115,700.00	\$ 227,440.00	\$ 85,290.00	\$ 199,010.00	\$ 4,548,800.00	\$ 852,900.00	\$ 3,980,200.00	\$ 9,381,900.00	\$ 9,590,970.00	Combined Benefit	\$ 9,590,970.00	
1*	Pinole Valley Rd and Simas Ave	\$ -	\$ 90,900.00	\$ -	\$ 90,900.00		\$ -	\$ 2,727.00	\$ 6,363.00	\$ -	\$ 27,270.00	\$ 127,260.00	\$ 154,530.00		Combined Cost	\$ 879,830	
3*	Pinole Valley Rd and Wright Ave	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		B/C	\$ 10.90	
4*	Pinole Valley Rd and Rafaela St	\$ -	\$ 181,800.00	\$ -	\$ 181,800.00		\$ -	\$ 5,454.00	\$ -	\$ -	\$ 54,540.00	\$ -	\$ -		\$ 54,540.00		
6*	Wright Ave and Carol St	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -				
8*	Pinole Valley Rd and Savage Ave	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -				
9*	Simas Ave and Moraga Dr	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -				
Project 4: Citywide Signal Upgrade																	
1	Citywide Signalized Intersections	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	Combined Benefit	\$ -	
		\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		Combined Cost	\$ -	
		\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		B/C	#DIV/0!	
Project 5: Citywide Street light Inventory																	
1	Citywide	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	Combined Benefit	\$ -	
		\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		Combined Cost	\$ -	
		\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		B/C	#DIV/0!	
Project 6: Safety on Roadway Segments - Lighting and Vi																	
A	Pinole Valley Rd: San Pablo Ave to Collins Ave	\$ 319,800	\$ 363,600.00	\$ -	\$ 8,066,400.00	\$ 20,527,900.00	\$ 241,992.00	\$ 241,992.00	\$ 564,648.00	\$ 2,419,920.00	\$ 2,419,920.00	\$ 11,292,960.00	\$ 16,132,800.00	\$ 27,055,100.00	Combined Benefit	\$ 27,055,100.00	
B	San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd	\$ 479,700	\$ 363,600.00	\$ -	\$ 3,304,300.00		\$ 99,129.00	\$ 99,129.00	\$ -	\$ 991,290.00	\$ 991,290.00	\$ -	\$ -		\$ 1,982,580.00	Combined Cost	\$ 1,469,474
C	San Pablo Ave: Golden Gate Park to Del Monte Dr	\$ -	\$ 181,800.00	\$ -	\$ 2,642,800.00		\$ 79,284.00	\$ 79,284.00	\$ -	\$ 792,840.00	\$ 792,840.00	\$ -	\$ -		\$ 1,585,680.00	B/C	\$ 18.41
D	Tara Hills: Kilkenny Way to Applian Way	\$ -	\$ 90,900.00	\$ -	\$ 2,551,900.00		\$ 76,557.00	\$ 76,557.00	\$ -	\$ 765,570.00	\$ 765,570.00	\$ -	\$ -		\$ 1,531,140.00		
E	Walter Ave: North Terminus to San Pablo Ave	\$ -	\$ -	\$ -	\$ 2,461,000.00		\$ 73,830.00	\$ 73,830.00	\$ 172,270.00	\$ 738,300.00	\$ 738,300.00	\$ 3,445,400.00	\$ -		\$ 4,922,000.00		
F	Fitzgerald Dr: Jovita Ln to Applian Way	\$ 319,800	\$ 454,500.00	\$ -	\$ 774,300.00		\$ 23,229.00	\$ 23,229.00	\$ -	\$ 232,290.00	\$ 232,290.00	\$ -	\$ -		\$ 464,580.00		
G	Applian Way: San Pablo Ave to Michael Dr	\$ -	\$ 636,300.00	\$ -	\$ 636,300.00		\$ 19,089.00	\$ 19,089.00	\$ -	\$ 190,890.00	\$ 190,890.00	\$ -	\$ -		\$ 381,780.00		
H	Tennent Ave: San Pablo Ave to Pinole Valley Rd	\$ -	\$ 90,900.00	\$ -	\$ 90,900.00		\$ 2,727.00	\$ 2,727.00	\$ -	\$ 27,270.00	\$ 27,270.00	\$ -	\$ -		\$ 54,540.00		
Project 7: Safety on Roadway Segments - Centerline/Edg																	
A	Pinole Valley Rd: San Pablo Ave to Collins Ave	\$ 319,800	\$ 363,600.00	\$ -	\$ 8,066,400.00	\$ 19,117,300.00	\$ 322,656.00	\$ -	\$ 564,648.00	\$ 3,226,560.00	\$ -	\$ 11,292,960.00	\$ 14,519,520.00	\$ 21,192,990.00	Combined Benefit	\$ 21,192,990.00	
B	San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd	\$ 479,700	\$ 363,600.00	\$ -	\$ 3,304,300.00		\$ -	\$ 165,215.00	\$ -	\$ -	\$ 1,652,150.00	\$ -	\$ -		\$ 1,652,150.00	Combined Cost	\$ 914,375
C	San Pablo Ave: Golden Gate Park to Del Monte Dr	\$ -	\$ 181,800.00	\$ -	\$ 2,642,800.00		\$ -	\$ 132,140.00	\$ -	\$ -	\$ 1,321,400.00	\$ -	\$ -		\$ 1,321,400.00	B/C	\$ 23.18
D	Tara Hills: Kilkenny Way to Applian Way	\$ -	\$ 90,900.00	\$ -	\$ 2,551,900.00		\$ -	\$ 127,595.00	\$ -	\$ -	\$ 1,275,950.00	\$ -	\$ -		\$ 1,275,950.00		
E	Walter Ave: North Terminus to San Pablo Ave	\$ -	\$ -	\$ -	\$ 2,461,000.00		\$ 98,440.00	\$ 123,050.00	\$ -	\$ 984,400.00	\$ 1,230,500.00	\$ -	\$ -		\$ 2,214,900.00		
H	Tennent Ave: San Pablo Ave to Pinole Valley Rd	\$ -	\$ 90,900.00	\$ -	\$ 90,900.00		\$ 3,636.00	\$ 4,545.00	\$ 6,363.00	\$ 36,360.00	\$ 45,450.00	\$ 127,260.00	\$ 209,070.00				
Project 8: Safety on Roadway Segments - Unsafe Speed a																	
A	Pinole Valley Rd: San Pablo Ave to Collins Ave	\$ 319,800	\$ 363,600.00	\$ -	\$ 8,066,400.00		\$ 15,333,200.00	\$ -	\$ 483,984.00	\$ -	\$ -	\$ 4,839,840.00	\$ -		\$ 4,839,840.00	\$ 16,052,920.00	Combined Benefit
B	San Pablo Ave: Oak Ridge Rd to Pinole Valley Rd	\$ 479,700	\$ 363,600.00	\$ -	\$ 3,304,300.00	\$ 231,301.00		\$ -	\$ -	\$ 4,626,020.00	\$ -	\$ -	\$ 4,626,020.00	Combined Cost	\$ 1,483,510		
D	Tara Hills: Kilkenny Way to Applian Way	\$ -	\$ 90,900.00	\$ -	\$ 2,551,900.00	\$ 178,633.00		\$ -	\$ -	\$ 3,572,660.00	\$ -	\$ -	\$ 3,572,660.00	B/C	\$ 10.82		
F	Fitzgerald Dr: Jovita Ln to Applian Way	\$ 319,800	\$ 454,500.00	\$ -	\$ 774,300.00	\$ 54,201.00		\$ 46,458.00	\$ 54,201.00	\$ 1,084,020.00	\$ 464,580.00	\$ 1,084,020.00	\$ 2,632,620.00				
G	Applian Way: San Pablo Ave to Michael Dr	\$ -	\$ 636,300.00	\$ -	\$ 636,300.00	\$ -		\$ 38,178.00	\$ -	\$ -	\$ 381,780.00	\$ -	\$ -	\$ 381,780.00			
Project 9: Citywide Sign Inventory																	
1	Citywide Roadways	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	Combined Benefit	\$ -	
		\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		Combined Cost	\$ -	
		\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		B/C	#DIV/0!	
HSIP App: Safety on Roadway Segments - Pedestrian Set																	
H	Tennent Ave and Plum St	\$ -	\$ -	\$ -	\$ -	\$ 223,200.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	Combined Benefit	\$ -	
H	Tennent Ave and Pear St	\$ 142,300	\$ 80,900.00	\$ -	\$ 223,200.00		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		Combined Cost	\$ 248,300	
		\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		B/C	0.00	