CITY OF CUPERTINO

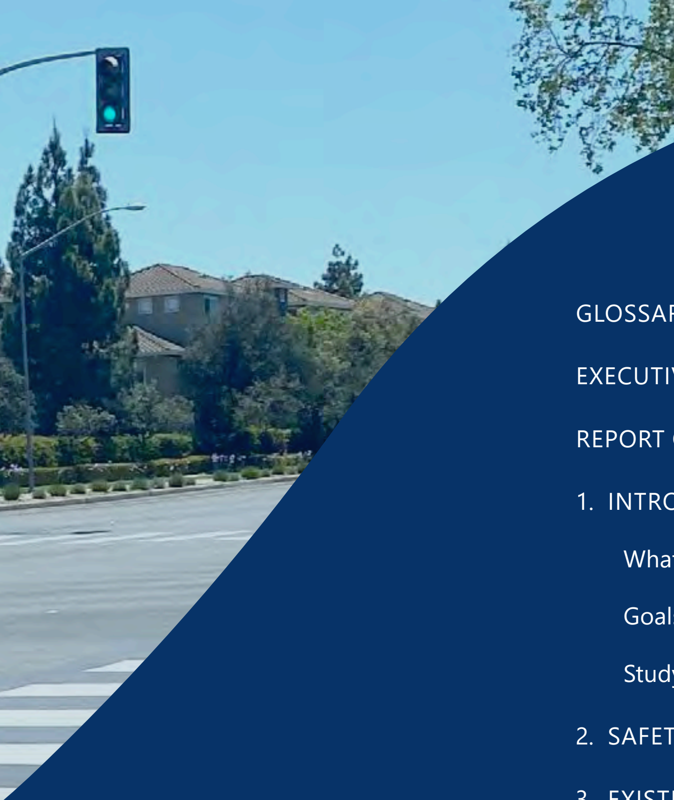
LOCAL ROADWAY SAFETY PLAN

JANUARY 2023

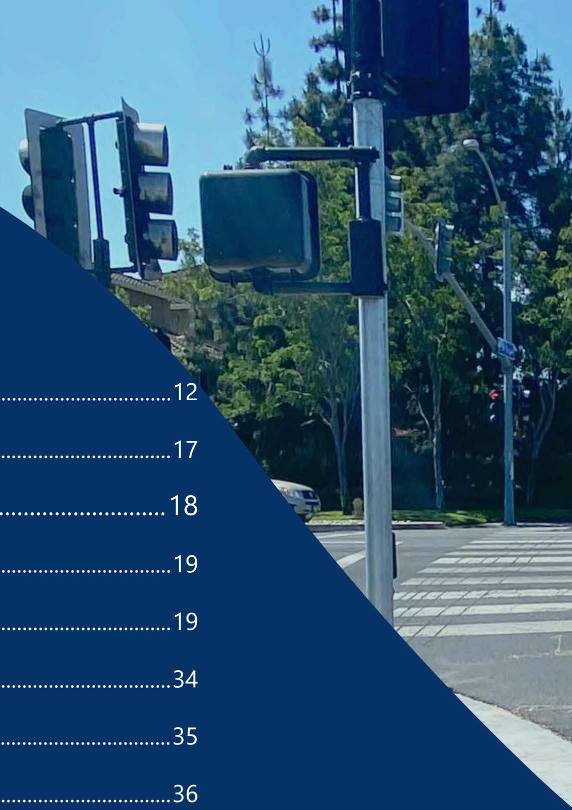
FINAL REPORT

CUPERTINO


Homestead Rd.
CUPERTINO



CONTENTS



LIST OF FIGURES

LIST OF TABLES

APPENDICES

GLOSSARY

4E – The 4E of traffic safety: education, enforcement, engineering, emergency medical services.

ACS – American Community Survey.

ADT – Average Daily Traffic.

ATP – Active Transportation Plan.

B/C Ratio – Benefit-Cost Ratio. It summarizes overall value for money of a project.

BTP – Bicycle Transportation Plan.

CRF – Crash Reduction Factor. It is the percentage crash reduction that might be expected after implementing a given countermeasure at a specific site.

Collision Rate – It is the number of crashes that occur at a given location during a specified time period (usually three to five years) divided by a measure of exposure for the same period.

Collision Severity – Defined as seriousness of collision, which include fatal (F), severe injury (SI), other visible injury and complaint of pain (Other), and property damage only (PDO).

EMS – Emergency Medical Services.

FHWA – Federal Highway Administration.

HSIP – Highway Safety Improvement Program.

LRSM – Local Roadway Safety Manual.

MITP – Metropolitan Transportation Improvement Program.

OTS – California Office of Traffic Safety.

RSTP – Federal Regional Surface Transportation Program.

Primary Violation Factor – Defined as factors that are strong in contribution to the collision.

SB1 – Sustainable Community Grants

SACOG – Sacramento Area Council of Governments.

SR2S –Safe Routes to School.

STIP – State Transportation Improvement Program.

SWITRS – Statewide Integrated Traffic Records System. It is a database that contains all collisions reported to California Highway Patrol from local and governmental agencies.

TIMS – Transportation Injury Mapping System. It is a platform to access California's crash data.

This page is intentionally left blank.

EXECUTIVE SUMMARY

The City of Cupertino's Local Road Safety Plan (LRSP) is a comprehensive plan that creates a framework to systematically identify and analyze traffic safety related issues and recommend projects and countermeasures. It aims to reduce fatal and severe injury (F+SI) collisions through a prioritized list of improvements that can enhance safety on local roadways.

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. It is also a living document, one that is routinely reviewed and updated by City staff and their safety partners to reflect evolving collision trends and community needs and priorities. With the LRSP as a guide, the City will be able to readily apply for grant funds, such as the federal Highway Safety Improvement Program (HSIP) or One Bay Area Grant (OBAG). This document summarizes an analysis of collisions that occurred in Cupertino, identifies high-injury locations, and recommends countermeasures at each of these high-risk locations.

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 Cupertino
- 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 Cupertino

PROCESS

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

COLLISION DATA

Collision data was obtained for a five-year period from 2015 to 2019 from the Santa Clara County's Crossroads Software's Traffic Collision Database, 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 the Santa Clara County's Crossroads Software's Traffic Collision Database.

COLLISION TREND

Key findings on patterns and trends:

- A total of 2,140 collisions occurred between 2015 and 2019.
- Three collisions resulted in fatality, 46 collisions resulted in severe injuries, 203 resulted in a visible injury, 362 resulted in a complaint of pain injury, and 1,526 resulted in PDO collisions.
- The year 2015 had highest number of collisions with 133 collisions, and 2018 had the lowest number of collisions with 109 collisions.
- The highest number of injury collisions occurred within 250 feet of an intersection (80%).
- Rear-end and broadside collisions, each accounted for 26% of total injury collisions. 29% of broadside collisions resulted into F+SI collisions.
- Unsafe speed accounted for 28% of all injury collisions, followed by automobile right-of-way violation (20%) and improper turning (16%).
- Most of the F+SI collisions occurred between 4:00 p.m. and 6:00 p.m., followed by between 6:30 p.m. and 7:30 p.m., 7:30 a.m. and 10:00 a.m.
- 53% of injury collisions were motor vehicle involved with other motor vehicles followed by motor vehicle involved with a cyclist (24%), motor vehicle involved with a pedestrian (12%), and fixed objects (7%).
- There were a total of 219 bicycle and pedestrian injury collisions during the study period, of which 147 were bicycle and 72 pedestrian collisions. The total number of pedestrian and cyclist collisions has remained relatively steady over the five-year period.

HIGH RISK LOCATIONS

The collision rate analysis was performed on all City streets. The corridors were ranked to show the top 11 high-collision roadway segments and top 10 high-collision intersections.

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

- There were a total of 390 injury collisions that occurred on the roadway segments
- 38 collisions led to F+SI collisions
- The Stevens Creek Boulevard between Janice Avenue and Judy Avenue had the highest number of F+SI collisions with 11, followed by De Anza Boulevard between Pacifica Drive and Homestead Road with eight F+SI collisions

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

- There were a total of 147 injury collisions that occurred at the intersection
- 24 collisions led to F+SI
- The intersection of De Anza Boulevard and Homestead Road had the highest number of injury collisions overall (41)

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 Cupertino. The nine emphasis area identified for the City of Cupertino are:

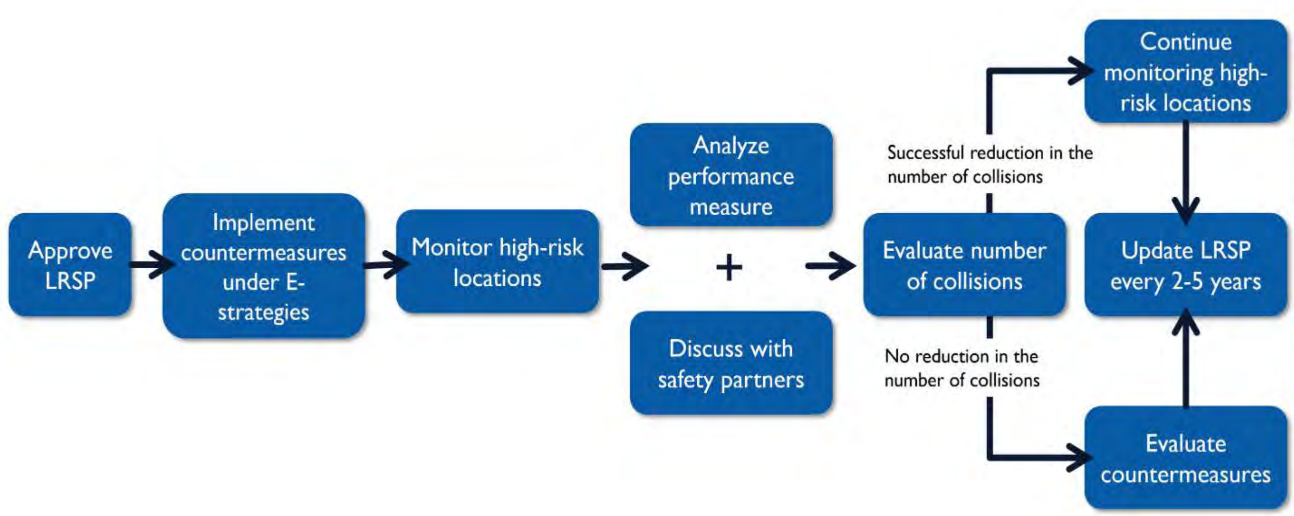
- Improve Intersection Safety (Collisions within 250 feet of an intersection)
- Reduce Unsafe Speed
- Reduce Automobile Right-of-Way Violations
- Improve Pedestrian and Bicyclist Safety
- Reduce Nighttime Collisions
- Reduce Rear End Collisions
- Reduce Broadside Collisions
- Reduce Improper Driving Collisions
- Reduce Collisions near Schools

VIABLE SAFETY PROJECTS

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

- Project 1: Safety at Signalized Intersections - Unsafe Speed and Rear End
- Project 2: Safety at Signalized Intersections - Improper Turning, Auto Right-of-Way Violations, and Broadside
- Project 3: Safety at Signalized Intersections - Pedestrian and Bicyclist Safety
- Project 4: Safety on Roadway Segments - Unsafe Speed Violations and Rear End
- Project 5: Safety on Roadway Segments - Improve Pedestrian and Bicyclist Safety
- Project 6: Safety on Roadway Segments - Reduce Nighttime Collisions

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 Cupertino 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 Cupertino, this included the City Department Staff from Public Works and Planning, City's Public Outreach Representatives, Santa Clara County Sheriff's Department, Santa Clara County Fire Department, Cupertino Union School District, Fremont Union High School District, Walk Bike Cupertino, and Cupertino Bicycle Pedestrian Commission. 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 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 nine 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

This page is intentionally left blank.

1 INTRODUCTION

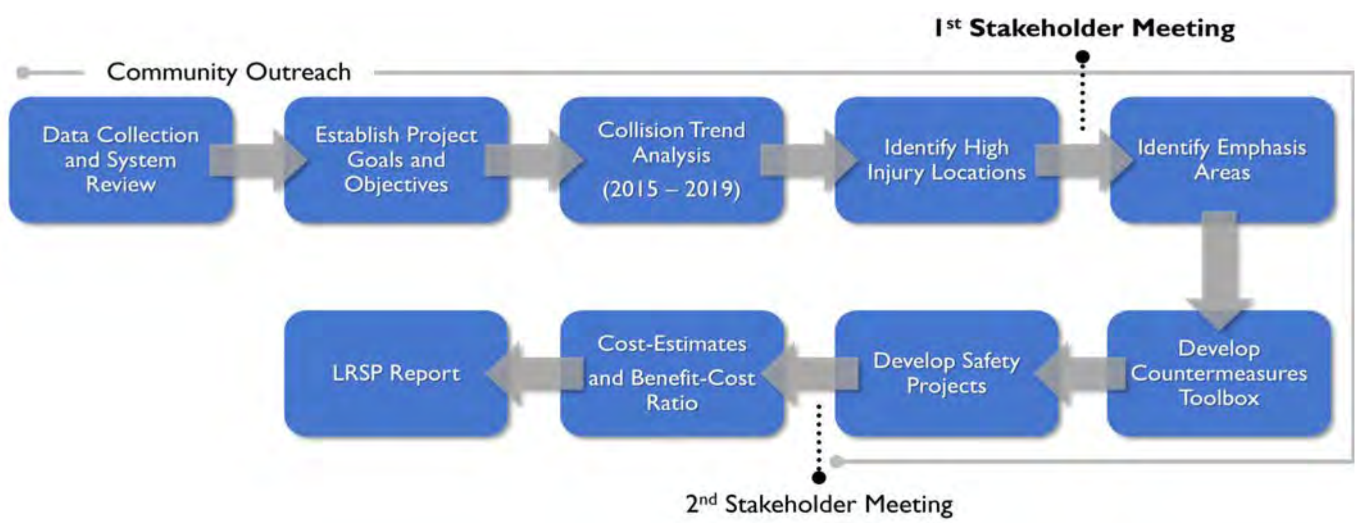
WHAT IS AN LRSP?

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. The LRSP creates a framework to systematically identify and analyze traffic safety-related issues, and 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 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 Cupertino 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 Cupertino 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/privately 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 CUPERTINO

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 Cupertino.*

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

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

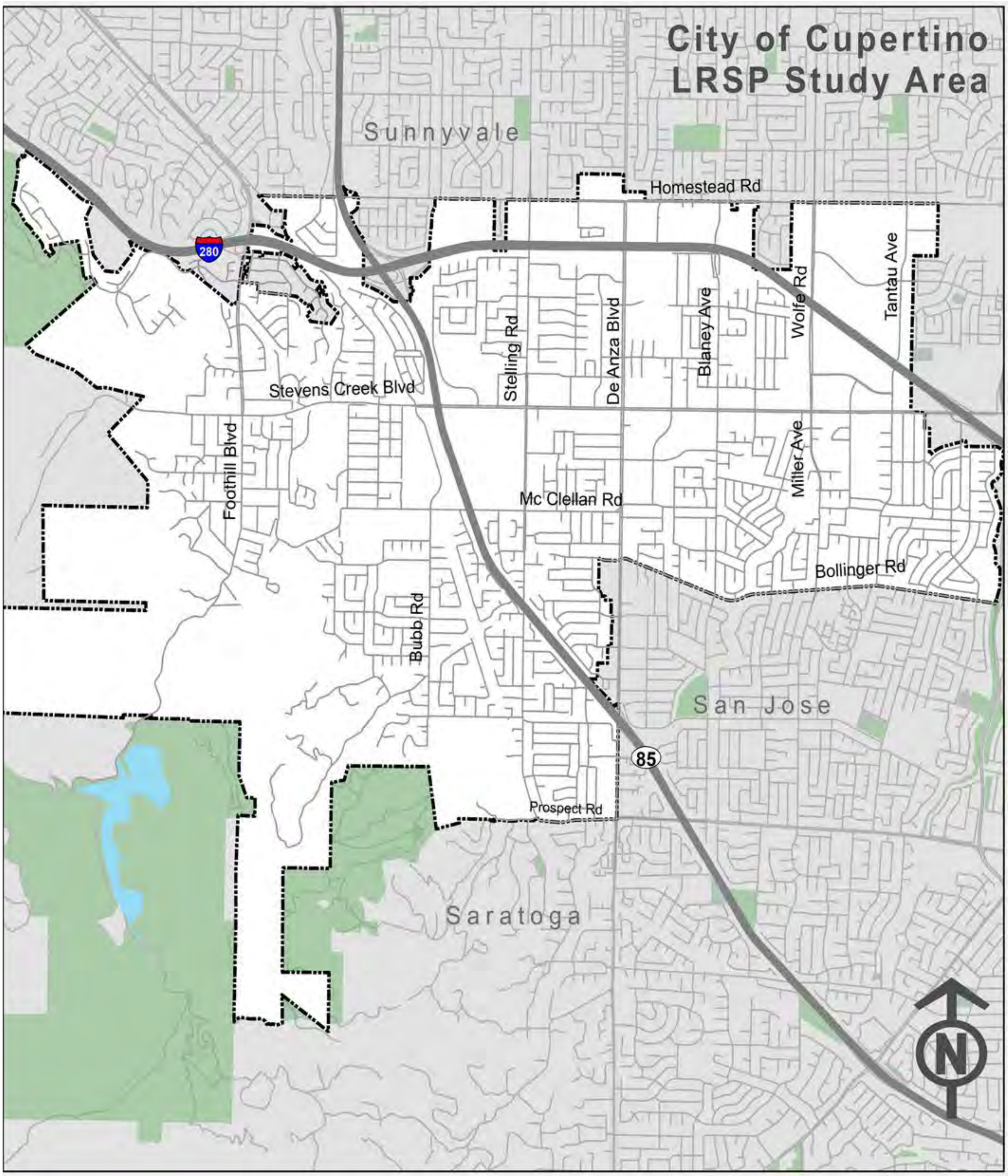
Objective 2: *Provide a forum for residents to lodge complaints about traffic safety, as well as for City officials to respond to such complaints.*

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

STUDY AREA

The City of Cupertino, located in Santa Clara County, California, covers a total area of 11.3 square miles and is located in the South Bay just west of San Jose. The City's estimated population is 60,381 (US Census 2020). Interstate (I)-280 and State Route (SR) 85 are main thoroughfares that connect the City with nearby cities. The nearest cities include San Jose and Santa Clara to the east, Saratoga to the south, and Sunnyvale and Los Altos to the north. 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) 2019 from the U.S. Census, 79.1% of Cupertino commuters get to work by driving alone, higher than both the Santa Clara County and State rate of driving commuters. The second most common method of commuting to work is carpool at 7.9%. The different modes of transportation used by Cupertino residents to commute to work are shown in **Table 1** below.

Table 1. Cupertino Commute to Work Census Data

Commute to Work	Cupertino	Santa Clara County	California
Drive Alone	79.1%	74.7%	73.7%
Carpool	7.9%	10.6%	10.1%
Public Transportation	3.5%	4.4%	5.1%
Walked	2.2%	2.1%	2.6%
Bicycle	0.7%	1.8%	1.0%
Work from Home	5.3%	5.0%	5.9%
Other	1.3%	1.3%	1.6%

2. SAFETY PARTNERS AND PUBLIC OUTREACH

This page is intentionally left blank.

2 SAFETY PARTNERS AND PUBLIC OUTREACH

Safety partners are vital to the development and implementation of an LRSP. For the City of Cupertino, these include City Department Staff from Public Works and Planning, City's Public Outreach Representatives, Santa Clara County Sheriff's Department, Santa Clara County Fire Department, Cupertino Union School District, Fremont Union High School District, Walk Bike Cupertino, and Cupertino Bicycle Pedestrian Commission. These stakeholders attended two virtual stakeholder meetings, which were held on February 03, 2022, and July 06, 2022, to review project goals and findings, and to solicit feedback from the group.

Figure 2. Zoom Meeting from Stakeholder Meeting #1

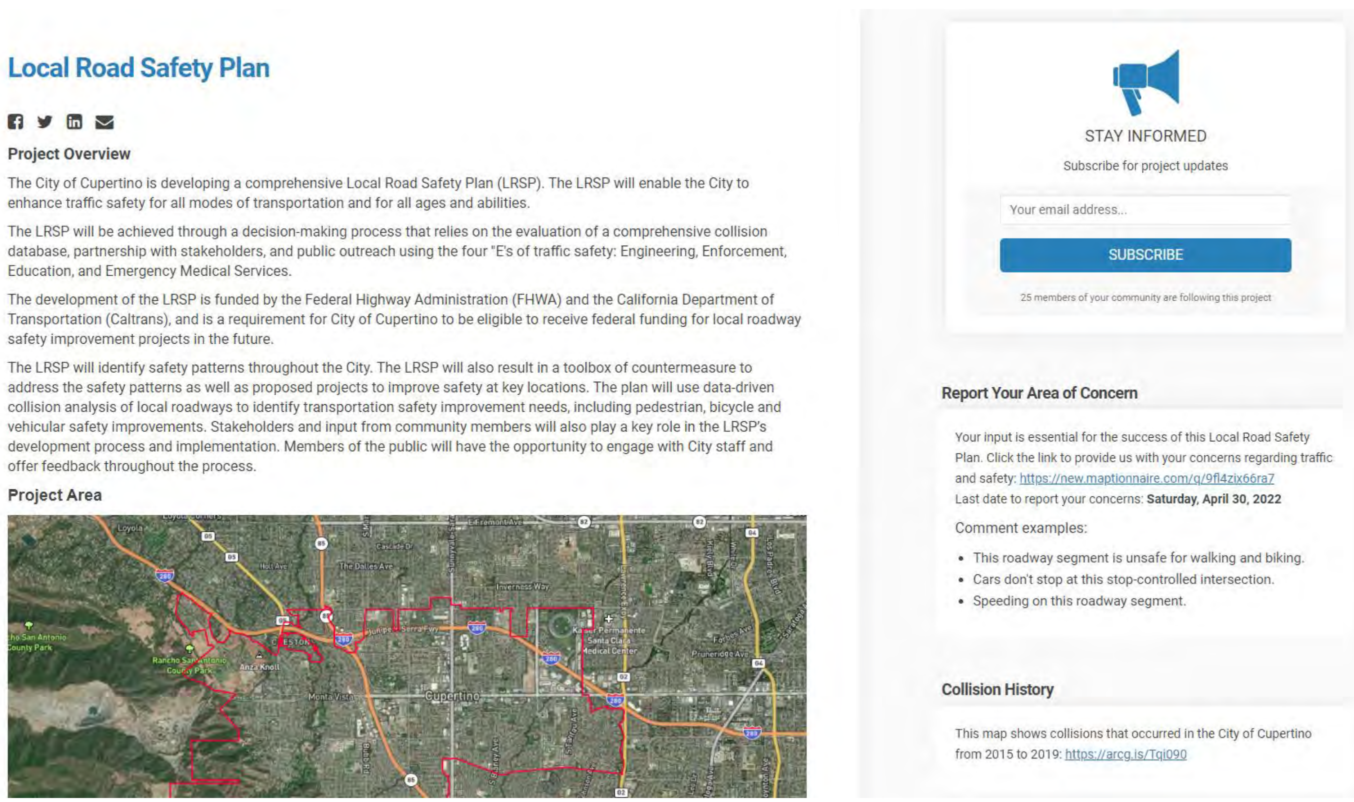
This stakeholder outreach was supplemented by two community workshops, held on March 30, 2022 and July 11, 2022. The first community workshop was attended by 18 residents and introduced the project to the community, as well as collected feedback on traffic safety concerns. The second community workshop was attended by 11 participants and focused on the recommendations from the plan, and solicited feedback on the plan's findings.

The outreach also included a project website with an interactive map tool platform that was posted to the City's Engage Cupertino website. The interactive map was used to solicit input from Cupertino residents and stakeholders outside the confines of traditional meetings.

Community Information and Perceptions

Community members and stakeholders shared their observations and concerns regarding locations and situations where collisions are occurring but are not necessarily being reported. They shared their knowledge and experiences of locations where "near-miss" collisions were occurring. They also indicated those locations that did not "feel safe" and that despite a lack of documented crash data, a heightened risk of collisions could occur. In other words, there was a risk of a collision but that risk had yet to materialize as an actual event. This is more than a general fear of a collision occurring, but an intuitive and rational sense that a particular location was not safe.

Figure 3. Cupertino LRSP Project Website



In total, 387 comments were received through the project website for Cupertino. The most comments were received about Stevens Creek Boulevard and McClellan Road, and the most common concerns were pedestrian safety and bicycle safety. The results of the interactive map are shown below in **Figure 4**, and summarized in **Figure 5**. In **Figure 4**, each dot and line represents a comment provided by a community member. Comments received from the community are attached in **Appendix A.**

Figure 4. Interactive Map Comment Responses

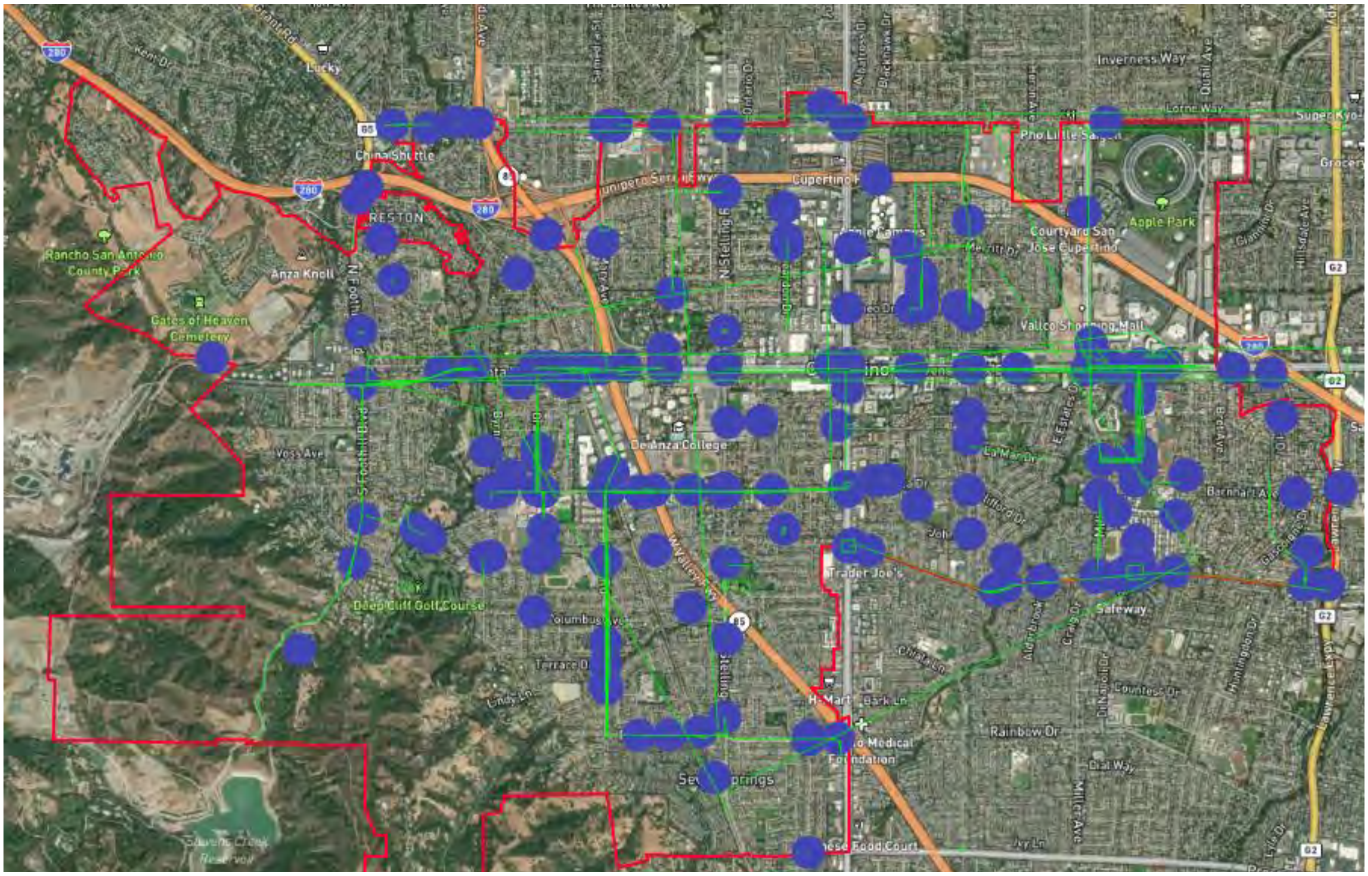
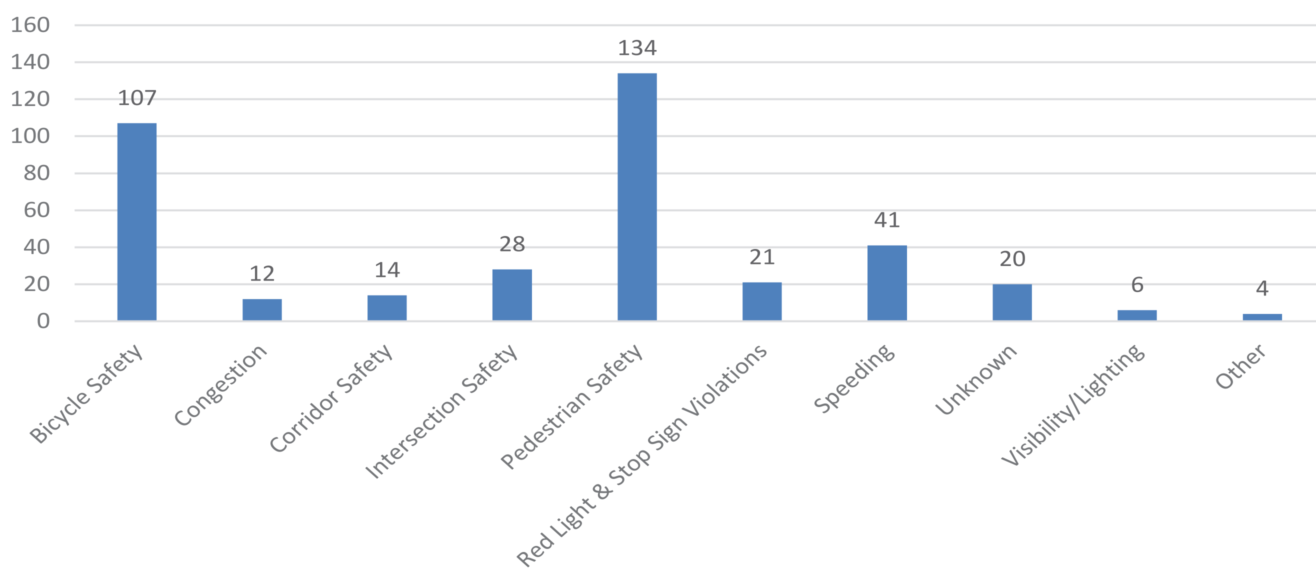


Figure 5. Public Comments on Traffic Safety



3. EXISTING PLANNING EFFORTS

This page is intentionally left blank.

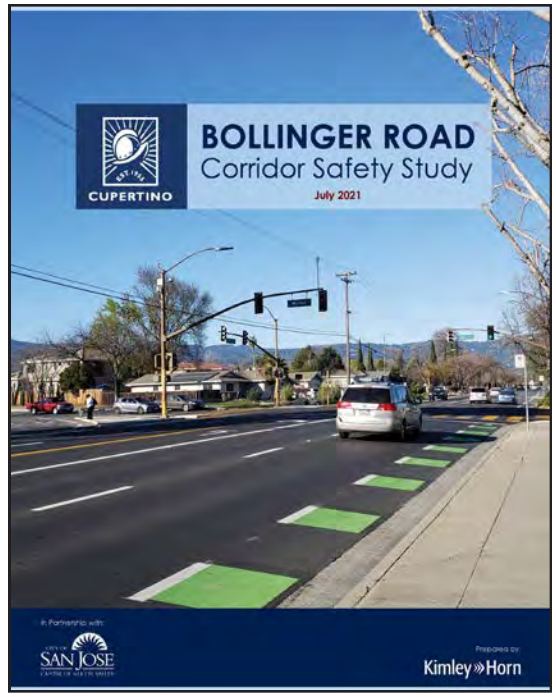
3 EXISTING PLANNING EFFORTS

This chapter summarizes the planning documents, projects underway, and studies reviewed for the City of Cupertino LRSP. The purpose of this section is to ensure the LRSP vision, goals, and 4 E's strategies (Education, Enforcement, Engineering, and EMS) are aligned with prior planning efforts, planned transportation projects, and non-infrastructure programs for the City. The documents reviewed are listed below:

- City of Cupertino Bollinger Road Corridor Safety Study (2021)
- City of Cupertino Transportation Study Guidelines (2021)
- City of Cupertino Neighborhood Traffic Calming Program (2020)
- City of Cupertino 2020 Parks and Recreation System Master Plan (2020)
- City of Cupertino Capital Improvement Program FY 2023
- City of Cupertino Pedestrian Transportation Plan (2018)
- City of Cupertino 2016 Bicycle Transportation Plan (2016)
- City of Cupertino General Plan 2040 Chapter 5: Mobility Element (2015)
- VTP2040 The Long-Range Transportation Plan for Santa Clara County
- Cupertino Safe Routes to School Program
- City of Cupertino School Walk Audit Report (2016/17)

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**.

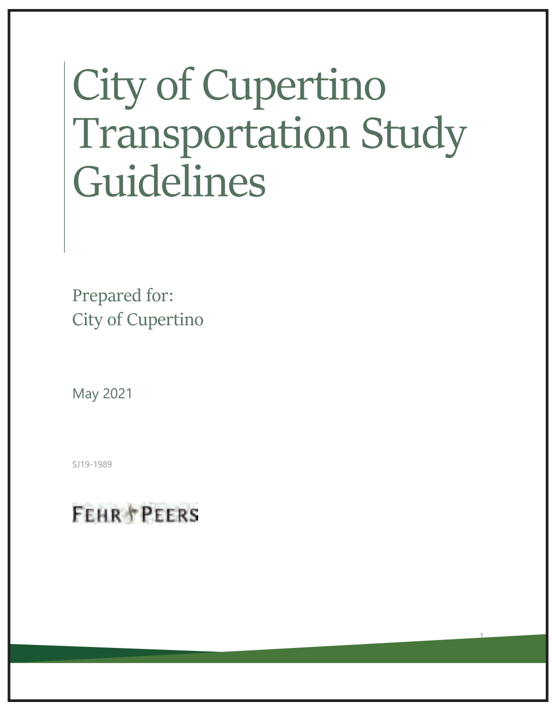
CITY OF CUPERTINO BOLLINGER ROAD CORRIDOR SAFETY STUDY (2021)



Bollinger Road is a two-mile long east-west major collector street that connects Lawrence Expressway and De Anza Boulevard, two major north-south arterials. The road lies along the border of Cupertino and San Jose, with Cupertino to the north and San Jose to the south. The road traverses through a residential neighborhood, which is home to four nearby elementary schools, Hyde Middle School, and Cupertino High School.

The City of Cupertino commissioned the Bollinger Road Corridor Safety Study ("Study") to identify improvements to create a safer and more accessible corridor for pedestrians, bicyclists, transit riders, and motorists. As part of the Study, an analysis of existing conditions and a summary of past collisions along the corridor was conducted. This was followed by an online public survey that gathered public input on location-specific improvement needs along the corridor. The feedback from the community was evaluated and used to create two conceptual corridor alternatives. These proposed alternatives were then presented to the community in a neighborhood meeting. Feedback was collected during the meeting as well as through a summarized online survey. The efforts performed for the study are summarized in this report.

CITY OF CUPERTINO TRANSPORTATION STUDY GUIDELINES (2021)



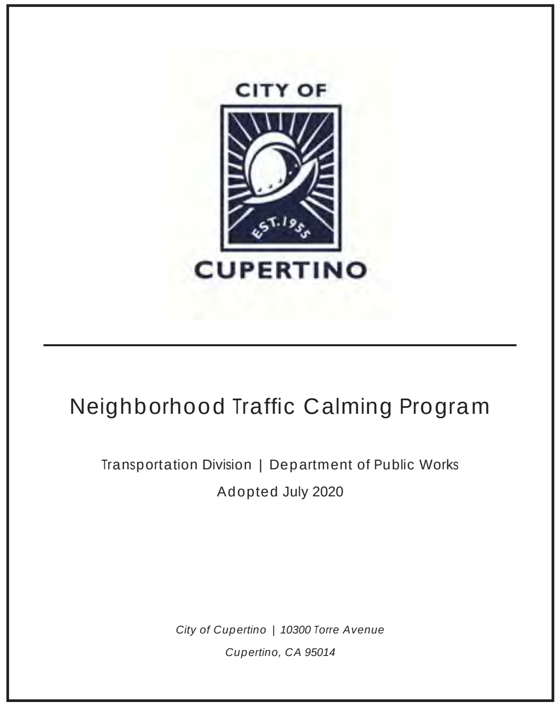
The Transportation Study Guidelines provide a clear and consistent technical approach for evaluating the transportation effects (adverse or beneficial) of projects on the City's transportation system and services. A transportation study provides essential information for decision-makers and the public when evaluating individual development projects, small- and large-scale area plans, and transportation infrastructure projects.

The Mobility Element of the Cupertino General Plan seeks to "implement strategies that make alternative modes of transportation attractive choices, help reduce the strain on the automobile network, and improve health and quality of life for Cupertino residents and businesses." The Transportation Study Guidelines support this goal by evaluating new projects against the policies of the General Plan and other relevant documents. In addition, these Guidelines fulfill Goal M-7 of the Cupertino General Plan, which requires that the City "review and update Transportation Impact Analysis (TIA) policies and guidelines that allow for adequate consideration for all modes of transportation including automobiles, walking, bicycles, and transit."

CITY OF CUPERTINO NEIGHBORHOOD TRAFFIC CALMING PROGRAM (2020)

Due to rising public interest and concerns about speeding and cut-through traffic in Cupertino's residential neighborhoods, the City of Cupertino Transportation Division has developed a Neighborhood Traffic Calming Program.

The Neighborhood Traffic Calming Program aims to establish a consistent set of guidelines to provide residents and property owners with a means to obtain relief from traffic-related concerns, namely speeding vehicles and cut-through traffic on their residential street. This is accomplished through a multi-step process involving an initial petition, a traffic survey, neighborhood meetings, a postcard survey, and the possible installation of traffic calming measures.


CITY OF

CUPERTINO

Neighborhood Traffic Calming Program

Transportation Division | Department of Public Works

Adopted July 2020

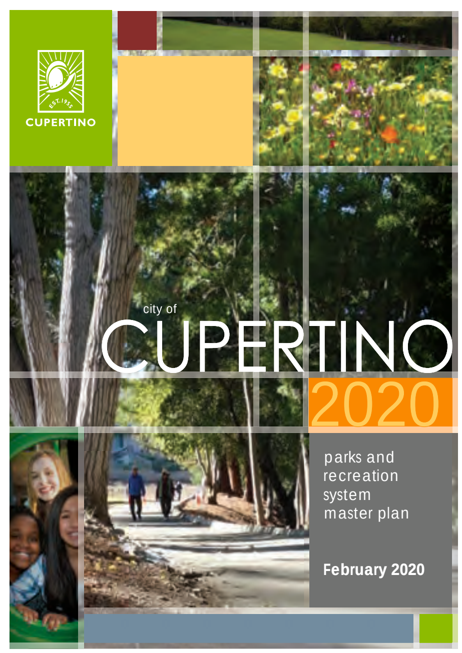
City of Cupertino | 10300 Torre Avenue

Cupertino, CA 95014

CITY OF CUPERTINO 2020 PARKS AND RECREATION SYSTEM MASTER PLAN (2020)

The Parks and Recreation System Master Plan (Master Plan) integrates the City's long-term vision and aspirations into a cohesive strategy to guide the future development, renovation, management, and programming of city parks and recreation facilities. The Master Plan will provide direction for the City and Parks and Recreation Department as it improves and enhances parks and recreation through the year 2040.

The community identified 12 primary themes to address through new policies and projects. These include improving park and facility access and trail connectivity, as well as integrating nature, the arts, and extraordinary play opportunities. Residents want a greater variety of recreation options, plus welcoming customer-friendly parks, and services that reflect the community's diverse culture and unique characteristics. Empowering youth and teens, supporting social gatherings, and collaborating with partners and stakeholders round out the priorities noted through community feedback. From this community input, the Master Plan's vision, mission, and goals were defined to guide the City in enhancing recreation opportunities for all Cupertino residents.

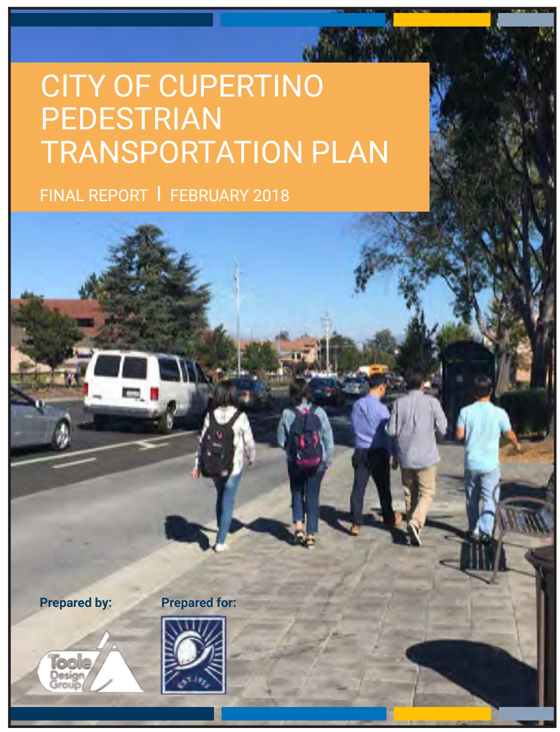


CITY OF CUPERTINO CAPITAL IMPROVEMENT PROGRAM FY 2023

This document guides the City in the funding and scheduling of infrastructure improvement projects for fiscal year 2022/23 and provides insights into project and funding needs over the next five years. Community-Driven Master Plans and Asset Management Plans continue to guide how we build our city's infrastructure. With the completion of the Storm Drain Master Plan and the Citywide Building Condition Assessment in FY 2018/19 combined with the recently completed plans (Bicycle Transportation Plan, ADA Transition Plan, Pedestrian Master Plan, School Walk Audit, the Santa Clara County Expressway Plan, the Stevens Creek Corridor Park Master Plan and Restoration Plan, the McClellan Ranch Preserve Master Plan, and the Regnart Road Slope Stability Study), we now have a more complete picture of our infrastructure maintenance needs. Many of our current and new projects are identified as priorities in these adopted master plans.

CITY OF CUPERTINO PEDESTRIAN TRANSPORTATION PLAN (2018)

The City of Cupertino is undertaking a number of ambitious initiatives to improve pedestrian and bicycling conditions throughout the city. This Pedestrian Transportation Plan is the blueprint for Cupertino to achieve its vision of an inviting, safe, and connected pedestrian network that enhances the quality of life for all community members and visitors. The purpose of this Pedestrian Transportation Plan is to establish a guiding framework for the development and maintenance of pedestrian facilities throughout Cupertino and recommend policies, programs, and messaging to support and promote walking.

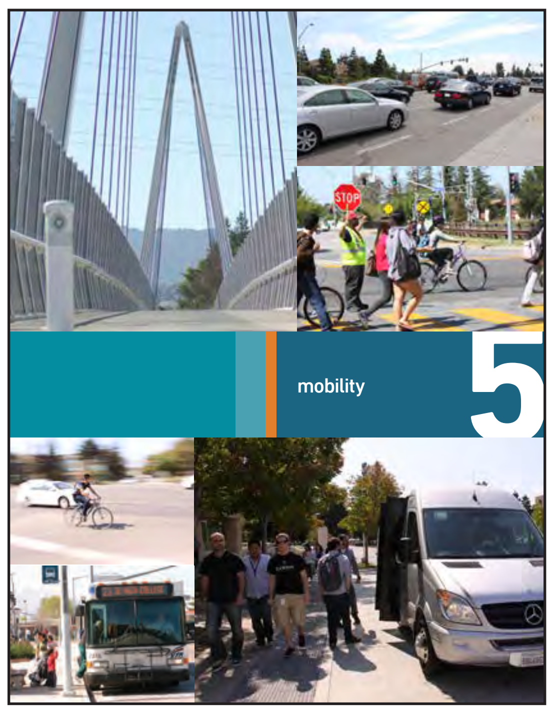


The Pedestrian Transportation Plan builds upon the City's comprehensive strategies to create a connected, multimodal transportation network, and enhance quality of life throughout Cupertino. For example, the Cupertino Bicycle Transportation Plan (adopted 2016) envisions a citywide multimodal bicycle network, and this document complements the proposed bicycle network to create comprehensive active transportation options of safe routes for pedestrians and bicyclists.

CITY OF CUPERTINO 2016 BICYCLE TRANSPORTATION PLAN (2016)

Riding a bicycle is a great way to stay fit, reduce air pollution, and traffic congestion. The City of Cupertino, through implementation of projects recommended in the Cupertino Bicycle Transportation Plan, is working toward establishing a comprehensive network of bicycle facilities throughout the City to encourage cycling by providing safe and convenient routes for doing so. The Plan is a long-range planning document designed to encourage bicycling as a safe, practical, and healthy alternative to the motor vehicle. It addresses present and future needs of the bicycling community, lays the groundwork for grant funding eligibility for bicycle projects, and is in close alignment with the goals set by the Cupertino Bicycle Pedestrian Commission to significantly increase the attractiveness and safety of bicycling throughout the City, with a particular focus on safe connectivity to schools.

CITY OF CUPERTINO GENERAL PLAN 2040 CHAPTER 5: MOBILITY ELEMENT (2015)

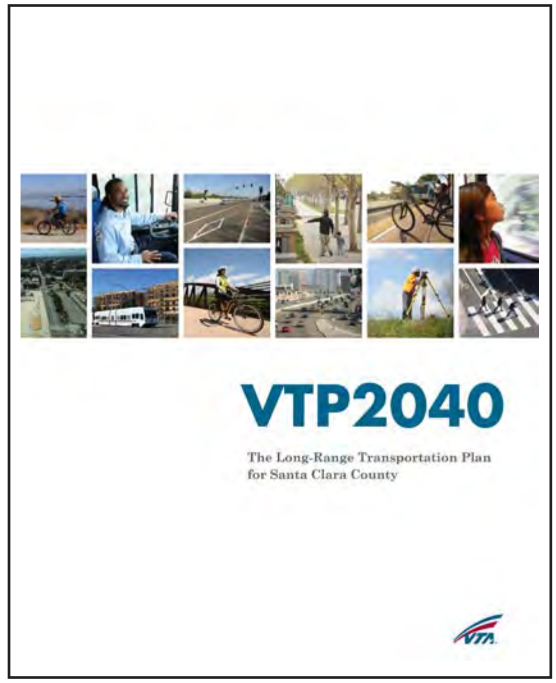


Cupertino's transportation system is multi-faceted. It integrates walkways, sidewalks, bicycle routes, bus transit facilities, local streets, major roadways, and freeways into a single, integrated system that supports the city's high quality of life. At the local level, this includes facilities that connect neighborhoods with pedestrian, bicycle, and automobile routes. Longer distance connections include links to major boulevards, expressways, commuter rail, and the regional freeway system.

This Element includes goals, policies and strategies that the City will use in making decisions regarding transportation network improvements needed to accommodate Cupertino's anticipated growth. The purpose of this Element is to implement strategies that make alternative modes of transportation attractive choices. This will help reduce strain on the automobile network and improve health and quality of life for Cupertino residents and businesses.

VTP2040: THE LONG-RANGE TRANSPORTATION PLAN FOR SANTA CLARA COUNTY

The Valley Transportation Plan 2040 (VTP 2040) provides a long-range vision for the transportation system in Santa Clara County. VTP 2040 identifies programs, projects, and policies that Santa Clara Valley Transportation Authority's (VTA) Board of Directors is going to pursue over the lifetime of the plan. It connects projects and programs with anticipated funds and provides a framework for the development and maintenance of the transportation over the next 25 years. It considers all travel modes and addresses the links between transportation, land use, air quality, energy use, and community livability.



VTA, as the Congestion Management Agency for Santa Clara County, is responsible for preparing and updating the VTP on a four-year cycle coinciding with the update of the Bay Area's Regional Transportation Plan. The 2040 update to the Regional Transportation Plan, called the Plan Bay Area, produced by the Metropolitan Transportation Commission (MTC), guides transportation funding and helps to inform planning throughout the nine-county Bay Area through the year 2040.

CUPERTINO SAFE ROUTES TO SCHOOL PROGRAM

Cupertino Safe Routes to School (SRTS) is a partnership between local schools, school districts, parent organizations, community groups, and the Santa Clara County Sheriff's Office in the mission of creating a safer environment for students and families in Cupertino to travel to and from school safely, and reducing single occupancy vehicle travel to and from school in order to reduce carbon emission. In pursuit of these goals, the City is actively working toward expanding beyond the traditional infrastructure and enforcement approach to traffic safety, by incorporating education, encouragement, engagement, evaluation, and equity into the program. This unique approach has led to the creation of an effective and powerful Cupertino SRTS program.

CITY OF CUPERTINO SCHOOL WALK AUDIT REPORT (2016/17)

In 2016/17, Cupertino SRTS worked with each public school in Cupertino to develop a list of infrastructure improvements that would make walking and biking safer, and the student drop-off and pick-up operations smoother. This effort, which focused on the public roadway network within a few blocks of the schools, culminated in 14 Walk Audit Reports, one specific for each public school in the City. In 2019/20, Cupertino SRTS worked with each school to update the reports, which together contribute towards the SRTS program goals of enhancing safety, reducing congestion and encouraging active transportation to and from Cupertino's public schools.

This page is intentionally left blank.

4. COLLISION DATA AND ANALYSIS

This page is intentionally left blank.

4 COLLISION DATA AND ANALYSIS

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

1. Data Collection
2. Collision Data Analysis Results
3. High Injury Network
4. Summary

The LRSP focuses on systemically identifying and analyzing traffic safety issues and recommends appropriate safety improvements. The chapter starts with a comprehensive analysis of collisions of all severity types in the City of Cupertino and compares this with F+SI collisions. Factors such as collision severity, type of collision, primary collision factor, lighting, weather, and time of day were analyzed. Following this, a more detailed analysis was conducted for F+SI collisions that have occurred on the City's roadways, including analyzing collision factors together (such as comparing collision type with violation category). **Figure 6** illustrates all collisions (including PDO collisions) that have occurred in the City of Cupertino from January 1, 2015 to December 31, 2019. **Figure 7** illustrates a heat map depicting collision counts on Cupertino roadways.

Figure 6. Collisions on City of Cupertino Roadways (2015-2019)

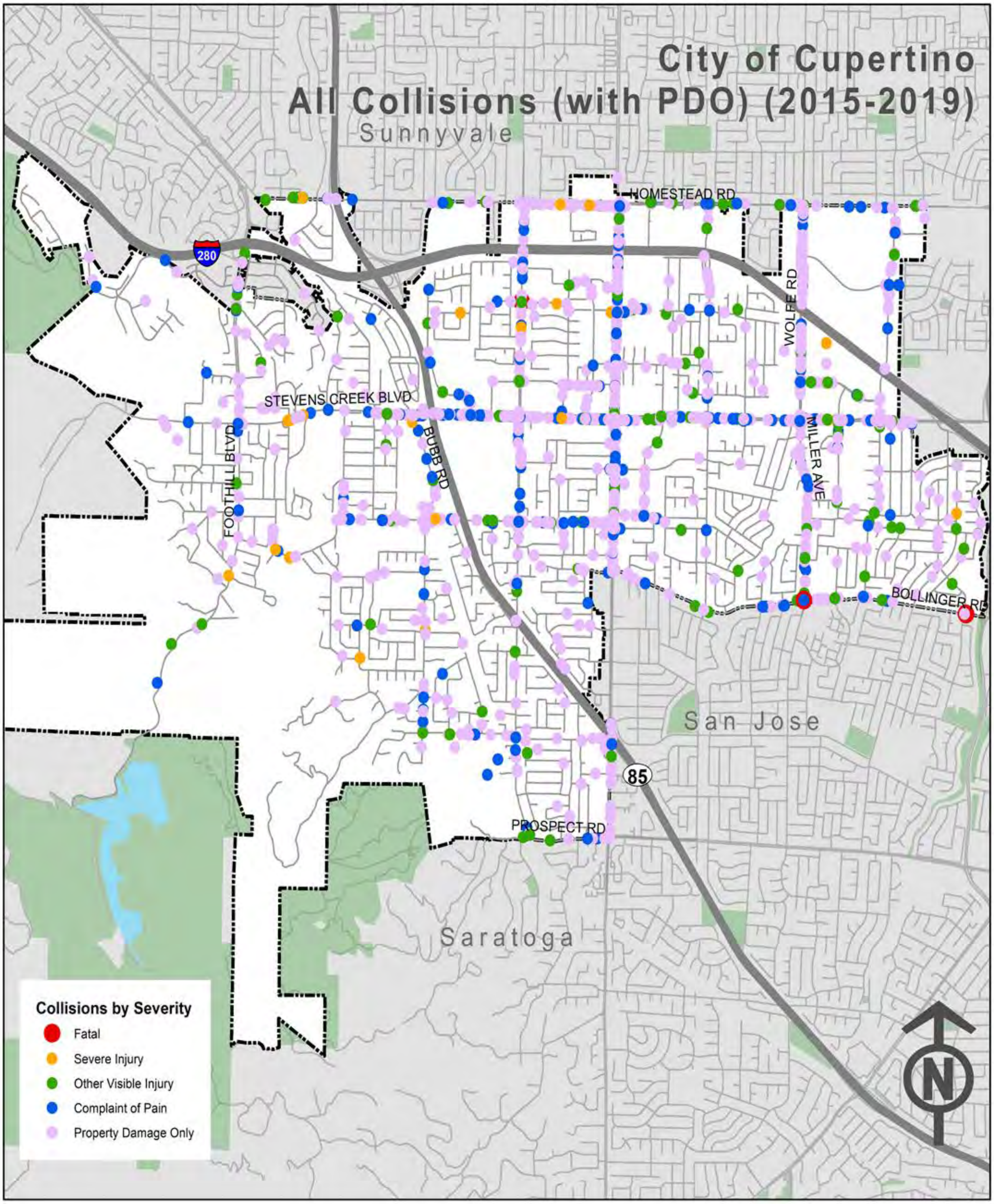
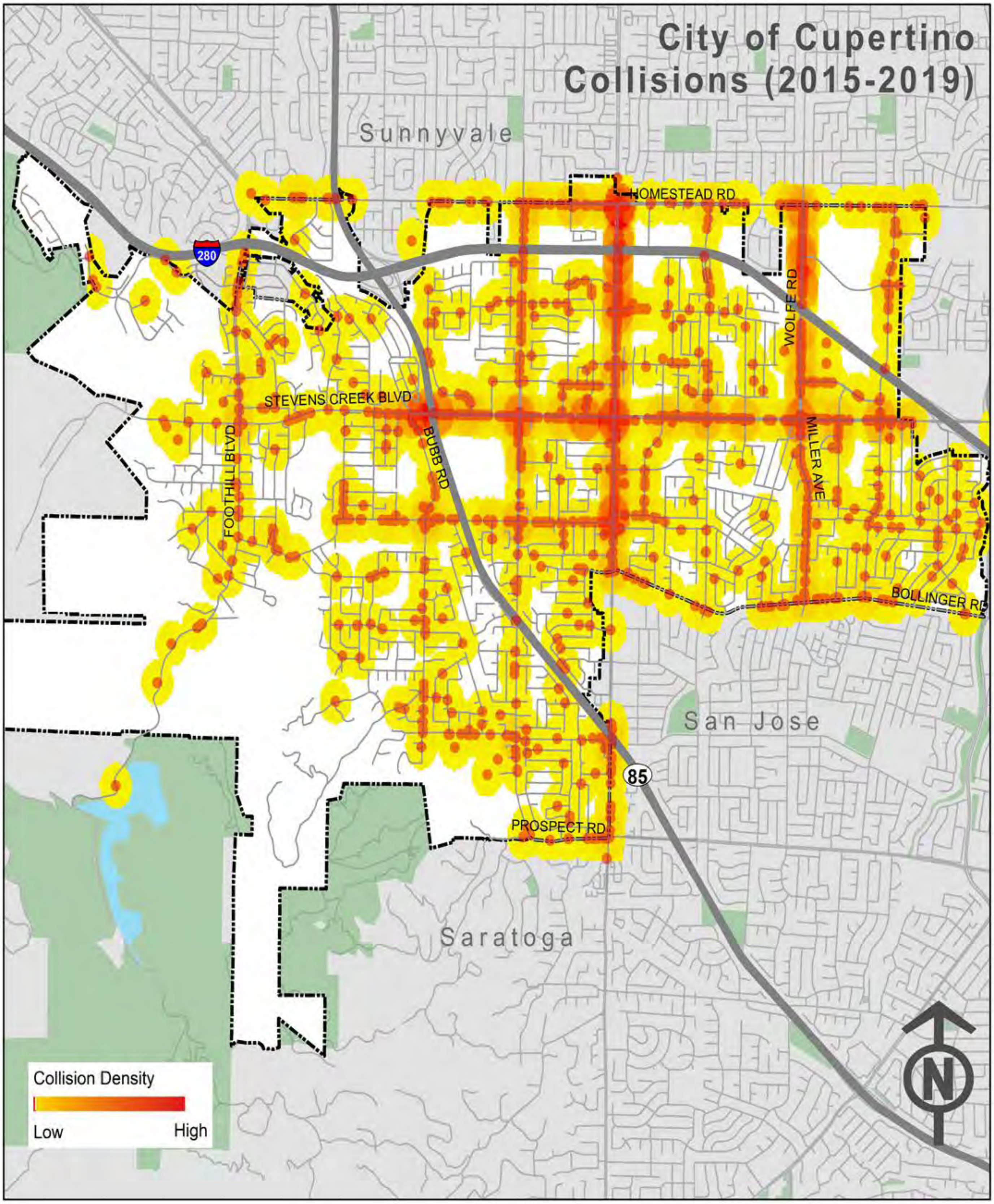


Figure 7. Heat Map of Collisions (COUNT) on City of Cupertino Roadways (2015-2019)



DATA COLLECTION

COLLISION DATA

Collecting and analyzing collision data is helpful to understand different factors that might be influencing collision patterns in a given area. For the purpose of this analysis, five years of collision data was retrieved from Santa Clara County's Crossroads Software's Traffic Collision Database from 2015 to 2019. Additional data was sourced from the SafeTREC TIMS in order to assess hourly collision data trends. The collision data was analyzed and plotted in ArcMap to identify high collision intersections and roadways segments.

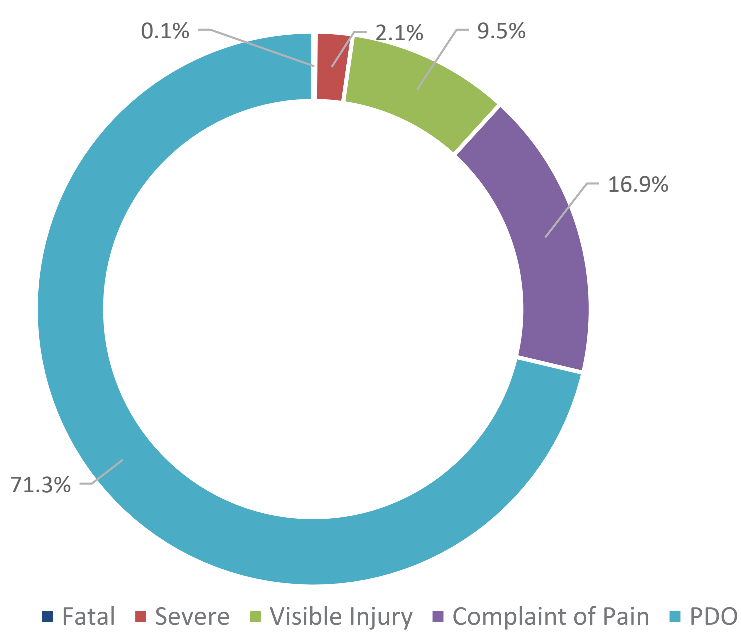
GIS SHAPEFILES

GIS shapefiles of the city's boundary and roadway centerlines were collected from the City of Cupertino's open data portal. Additional shapefiles of parks and open space, water bodies, and surrounding city boundaries were collected from Santa Clara County's open data portal.

COLLISION DATA ANALYSIS RESULTS[1]

Between 2015 and 2019, the city reported a total of 2,140 collisions. Out of these 2,140 collisions, 1,526 (71.3%) resulted in PDO collisions, 362 (16.9%) resulted in a complaint of pain injury, and 203 (9.5%) resulted in a visible injury. In addition, 46 collisions (2.1%) resulted in a serious injury and three collisions (0.1%) resulted in a fatality. **Figure 8** depicts the severity classification of all collisions.

Figure 8. All Collisions by Severity in Cupertino (including PDO)



1 Percentages may not total 100 due to rounding.

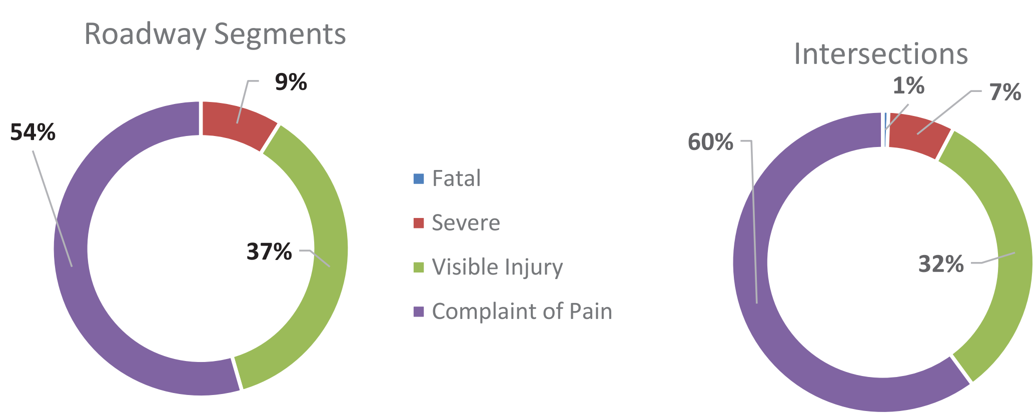
The preliminary analysis below includes a comparative evaluation between injury collisions (fatal, severe injury, visible injury, and complaint of pain collisions) and F+SI collisions, while omitting PDO collisions. The evaluation is focused on various factors including (but not limited to): primary collision factor, collision type, facility type (roadway or intersection), motor vehicle involved with weather, lighting, and time of day. The next section includes a comprehensive analysis for F+SI collisions only. The LRSP process focuses on the locations of these collisions to proactively identify and counter the respective safety issues.

Injury collision data was separated by facility type, identifying collisions occurring at intersections versus on roadway segments. For the purposes of the analysis, a collision was said to have taken place at an intersection if it occurred within 250 feet of the intersection in accordance with Caltrans HSIP guidance. The reported injury collisions are categorized by facility type and collision severity in **Table 2**. Fatal, severe injury, visible injury, and complaint of pain collisions by roadway segments and intersections are displayed in **Figure 9**. About 9% collisions on roadway segments led to severe injury, 37% led to visible injury, and 54% led to complaint of pain. At intersections, about 1% led to fatality, 7% led to severe injury, 32% led to visible injury, and 60% led to complaint of pain.

Table 2. Injury Collisions by Severity and Facility Type in Cupertino

Collision Severity	Roadway Segment	Intersection	Total	Percent
Fatal	0	3	3	0.5%
Severe	11	35	46	7.5%
Visible Injury	45	158	203	33%
Complaint of Pain	67	295	362	59%
Total	**123**	**491**	**614**	

Figure 9. Injury Collisions by Severity on Roadway Segments and Intersections



PRELIMINARY ANALYSIS[1]

YEAR TREND – INJURY COLLISIONS

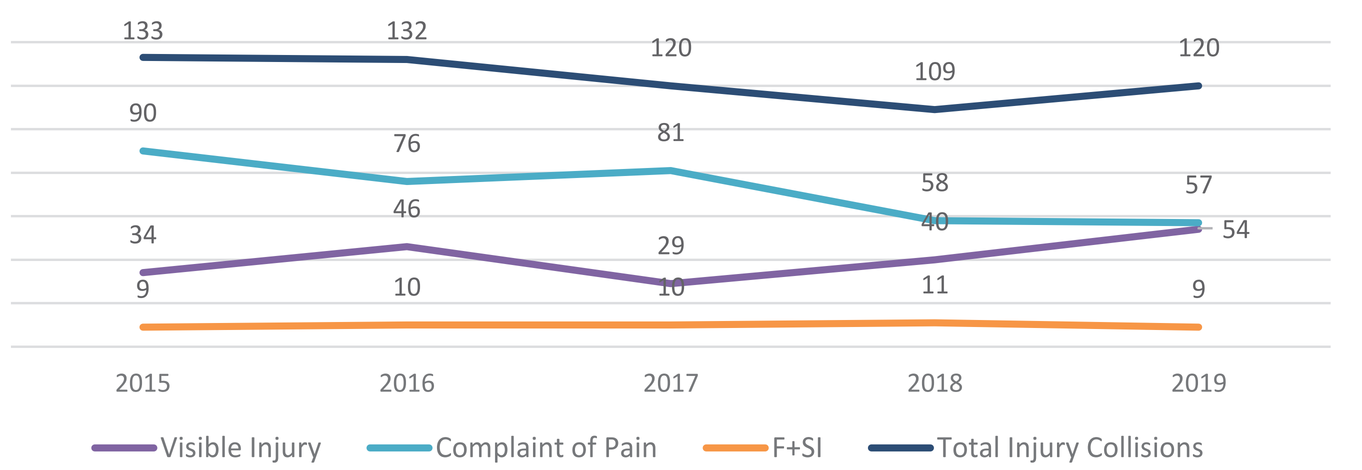
The total number of injury collisions decreased from 2015 to 2018, then increased back to 2017 levels in 2019. The highest number of injury collisions (133 collisions) were recorded in 2015, and the lowest number of injury collisions (109) were recorded in 2018.

A total of 49 F+SI collisions occurred in the City during the study period. They were observed to be the lowest in 2015 and 2019 (nine collisions each), and highest in 2018 (11 collisions). Overall, the number of F+SI collisions remained relatively stable throughout the study period. **Table 3** and **Figure 10** illustrates the five-year injury collision trend for all injury collisions, F+SI collisions, visible injury collisions, and collisions resulting in complaints of pain by drivers, passengers, or other parties involved in the collision.

Table 3. Five-Year Injury Collision Trend

Collision Severity	2015	2016	2017	2018	2019
F+SI	9	10	10	11	9
Visible Injury	34	46	29	40	54
Complaint of Pain	90	76	81	58	57
Total	**133**	**132**	**120**	**109**	**120**

Figure 10. Five-Year Injury Collision Trend Chart



1 Other/Not Stated categories, unless otherwise noted, refer to instances where the category was not coded into the police report, and/or where the category was small and had few collisions associated with it. These categories were aggregated together in such instances

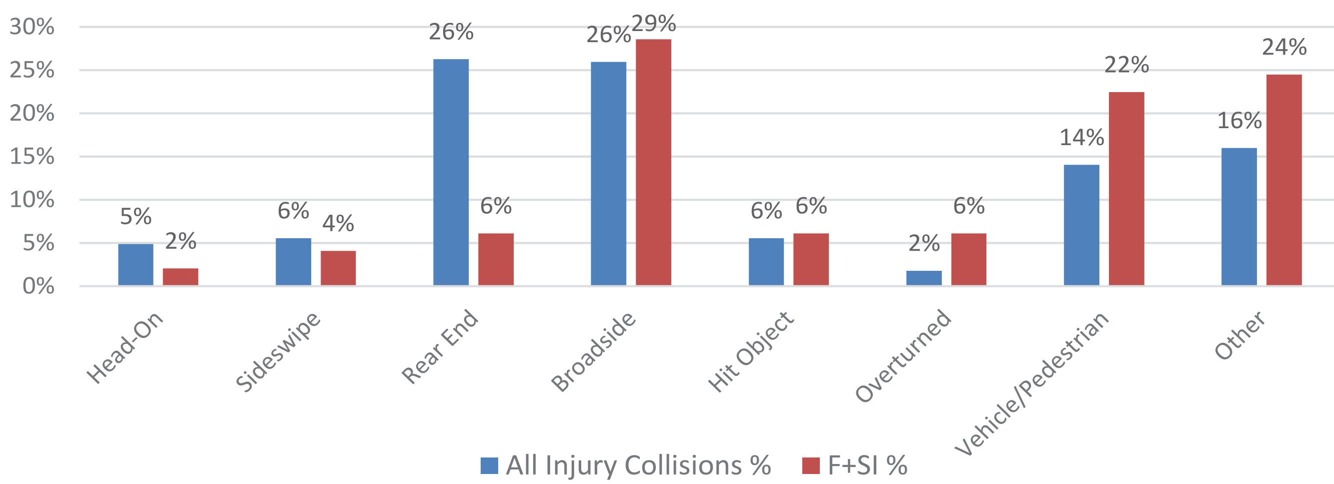
INTERSECTION VS. ROADWAY COLLISIONS

An analysis of injury collisions allocated by facility reveals that 20% (123 collisions) occurred on roadway segments whereas 80% (491 collisions) occurred within 250 feet of an intersection. When only F+SI collisions are considered, 22% (11 collisions) occurred on roadway segments, while 78% (38 collisions) occurred near intersections.

COLLISION TYPE

The most commonly occurring collision types among all injury collisions were rear-end collisions (26%), broadside collisions (26%), and "other" collisions (16%), where a specific collision type was not coded in the police report. When only F+SI collisions are considered, the most commonly occurring collision types were broadside (29%), and vehicle/pedestrian collisions (22%). **Figure 11** illustrates the collision type for all injury collisions and F+SI collisions.

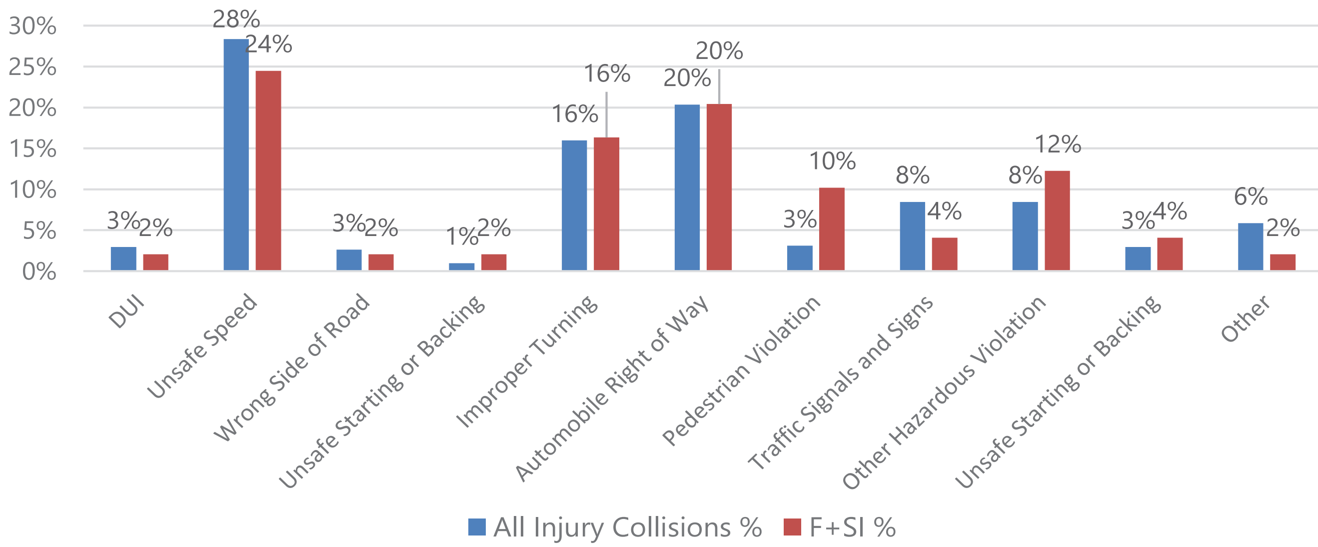
Figure 11. Collision Type: All Injury Collisions vs. F+SI Collisions



PRIMARY COLLISION FACTOR

The most common primary collision factor for injury collisions was unsafe speed (28%), followed by automobile right of way (20%), and improper turning (16%). The most common primary collision factor for F+SI collisions was also unsafe speed (24%), followed by automobile right of way (20%), and improper turning (16%). **Figure 12** illustrates the primary collision factor for all injury collisions and F+SI collisions.

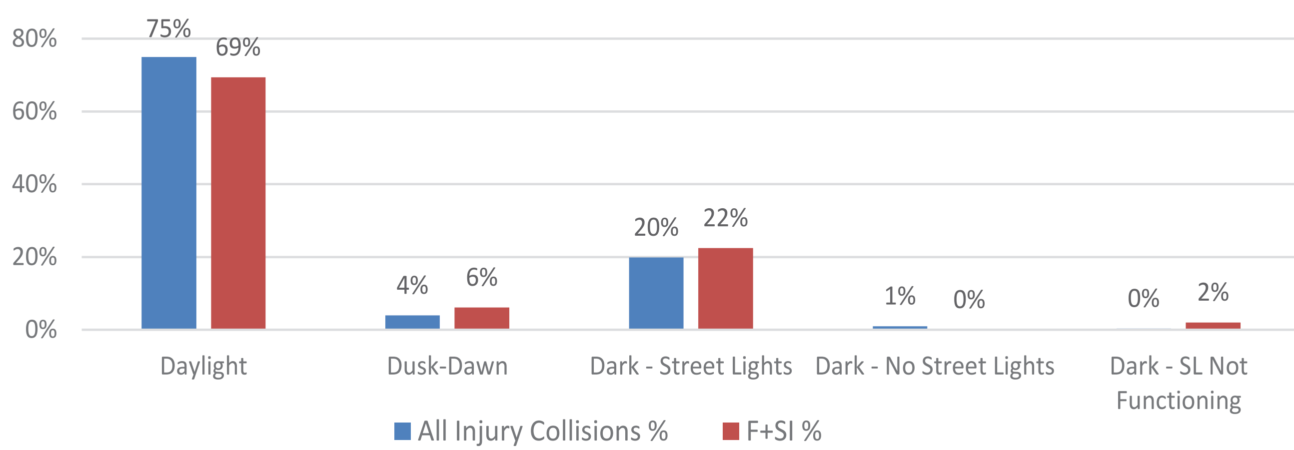
Figure 12. Primary Collision Factor: All Injury Collisions vs. F+SI Collisions



LIGHTING

Of all injury collisions, 75% occurred in daylight and 20% occurred in the dark on streets with street lights. Similar trends were observed for F+SI collisions, where 69% of collisions occurred in daylight and 22% occurred in the dark on streets with street lights. **Figure 13** illustrates the lighting condition for all injury collisions and F+SI collisions.

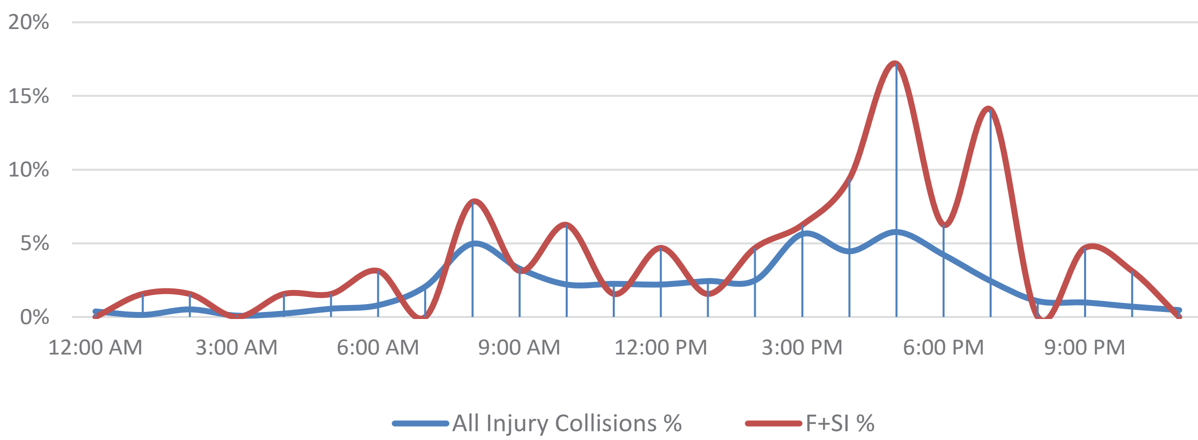
Figure 13. Lighting Conditions: All Injury Collisions vs. F+SI Collisions



TIME OF THE DAY

Of all injury collisions, the highest number of collisions occurred at around 3:00 p.m. (6%) and 5:00 p.m. (6%), and the lowest number of collisions occurred between 11:00 p.m. and 4:00 a.m. For F+SI collisions, the highest number of collisions occurred at around 5:00 p.m. (17%). The lowest number of F+SI collisions occurred between 11:00 p.m. and 12:00 a.m. **Figure 14** illustrates the percentage of collisions occurring during the day for all injury collisions as well as F+SI collisions.

Figure 14. Time of the Day: All Injury Collisions vs. F+SI Collisions

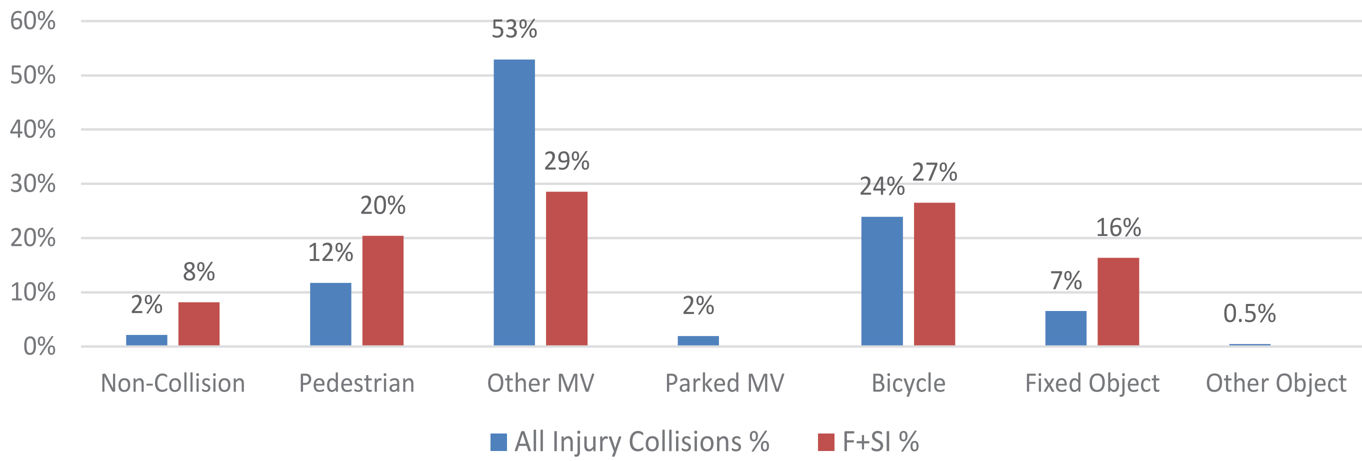


DATA SOURCE: Data for collision times was sourced from the SafeTREC Transportation Injury Mapping System (TIMS) in lieu of City-collected crash data due to the method of time recording; TIMS crash time data was recorded using military time format, which allows for 24-hour crash time analysis.

MOTOR VEHICLE INVOLVED WITH

53% of injury collisions were motor vehicle involved with other motor vehicles. Other prominent categories among all injury collisions include motor vehicle involved with a cyclist (24%), motor vehicle involved with a pedestrian (12%), and fixed objects (7%). Similar trends were observed for F+SI collisions. About 29% of the collisions occurred where motor vehicles were involved with other motor vehicles, 27% of the collisions involved a cyclist, 20% involved a pedestrian, and 16% involved a fixed object. **Figure 15** illustrates the percentage for all injury collisions as well as F+SI collisions.

Figure 15. Motor Vehicle Involved With: All Injury Collisions vs. F+SI Collisions



PEDESTRIAN AND BICYCLE INJURY COLLISIONS

Pedestrian and bicycle collision data is of particular importance to the assessment of active transportation safety. Examining which collision types and violations lead to pedestrian and cyclist injury collisions highlights causal variables specific to these categories and supports countermeasure development. **Figure 16** below shows the bicycle and pedestrian injury collision counts by year throughout the study period. The total number of pedestrian and cyclist collisions has remained relatively steady over the five-year period. There were a total of 219 bicycle and pedestrian injury collisions during the study period, of which 147 were bicycle and 72 pedestrian collisions. **Figure 17** illustrates pedestrian collisions and **Figure 18** illustrates bicycle collisions on City of Cupertino roadways.

Figure 16. Bicycle and Pedestrian Injury Collision Counts by Year

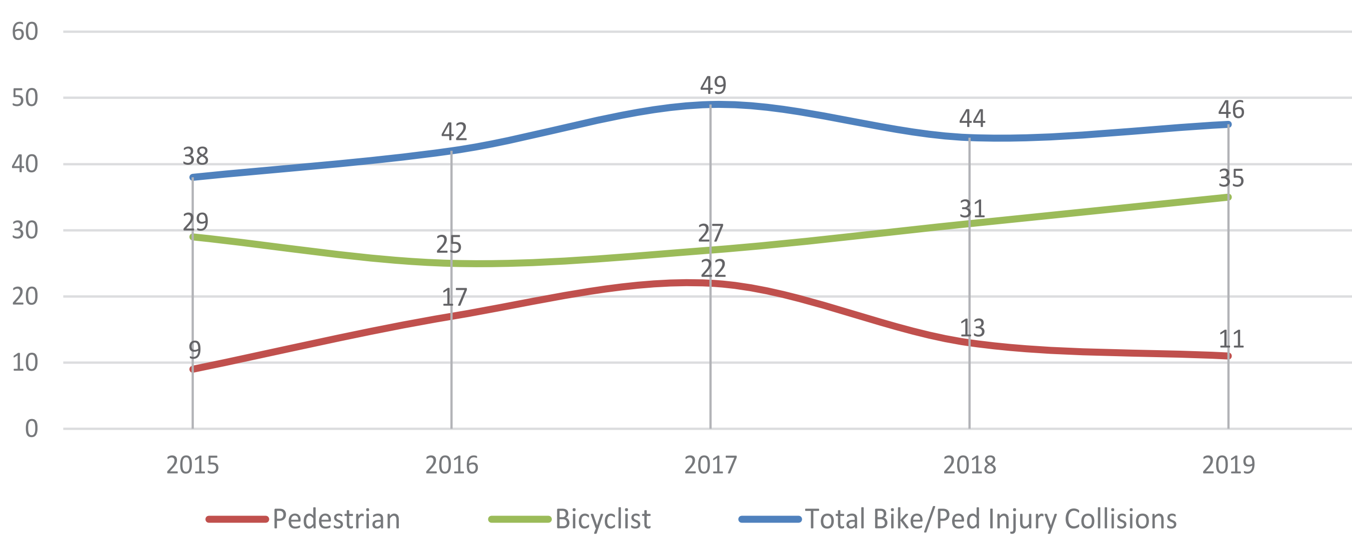


Figure 17. Pedestrian Collisions on City of Cupertino Roadways

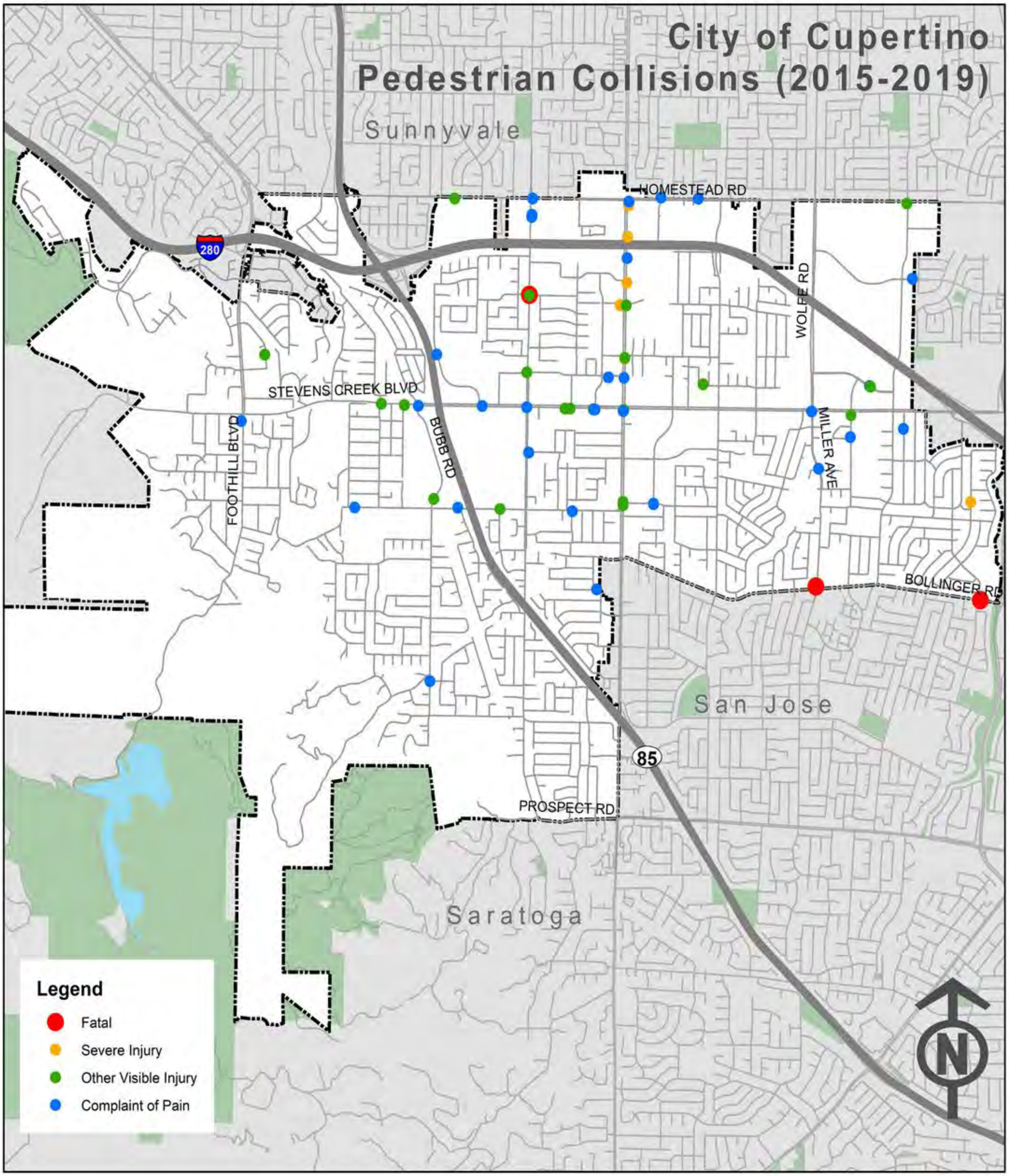


Figure 18. Bicycle Collisions on City of Cupertino Roadways

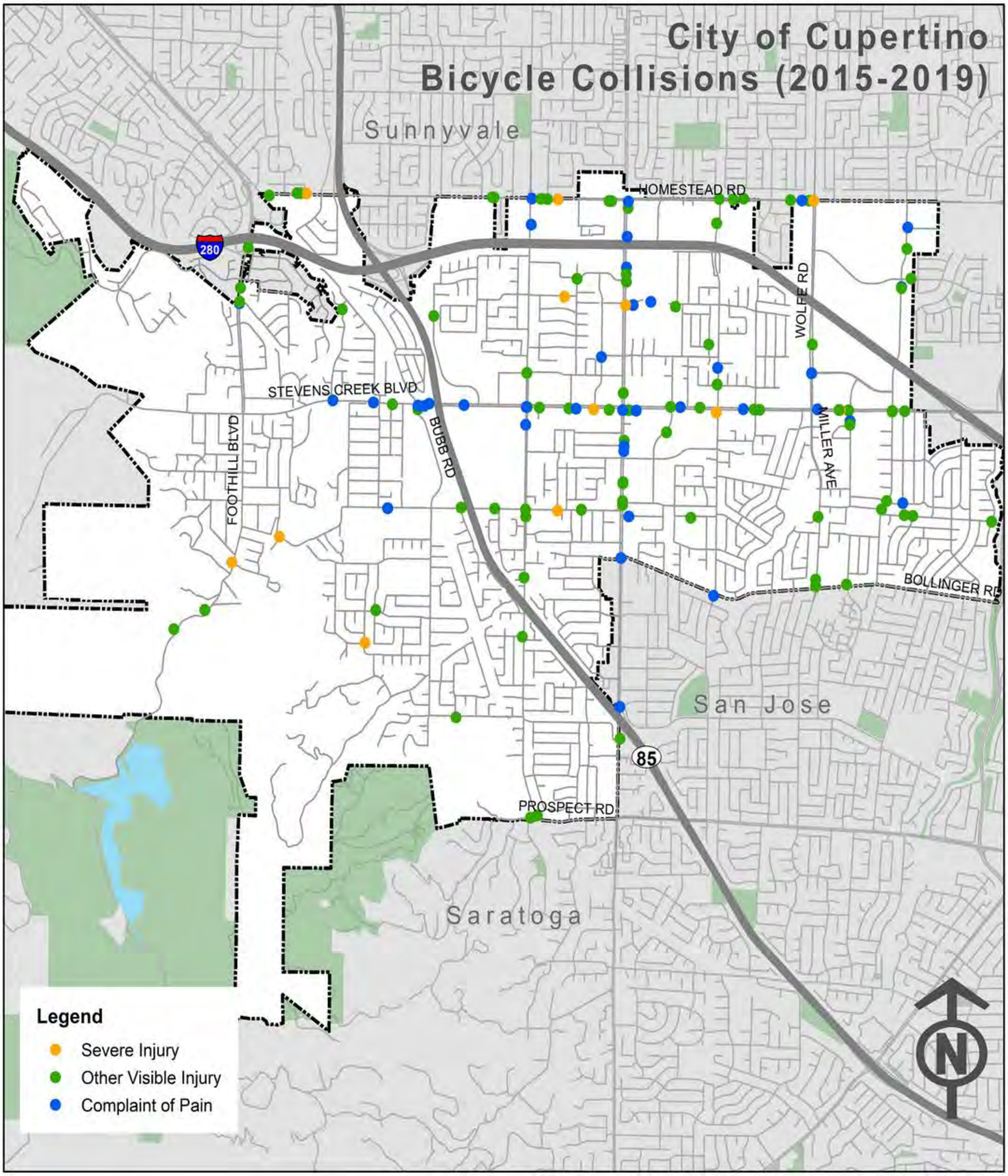


FIgure 19 and **Figure 20** identify the most common violations associated with pedestrian and bicyclist injury collisions. Improper turning and automobile right of way are the top violation types for bicycle collisions, while "other hazardous violations" and pedestrian violations are the primary causes of pedestrian injury collisions. When considering pedestrian and cyclist collision data, we observe that the same trends hold true; improper turning and automobile right-of-way are the common violations.

Figure 19a. Primary Violations (by Percentage) Contributing to Bicycle Injury Collisions Combined

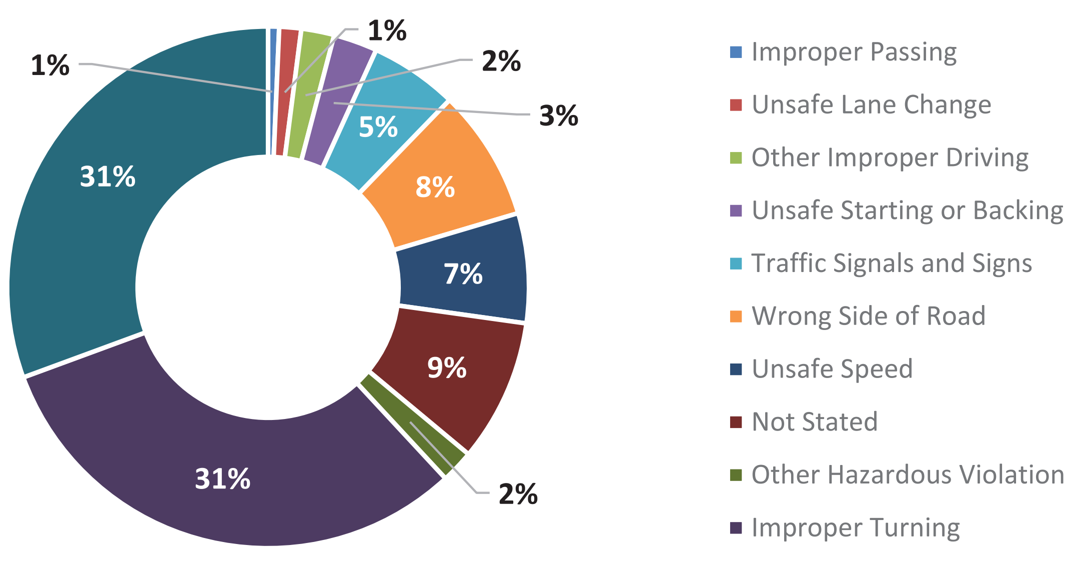


Figure 19b. Primary Violations (by Percentage) Contributing to Pedestrian Injury Collisions Combined

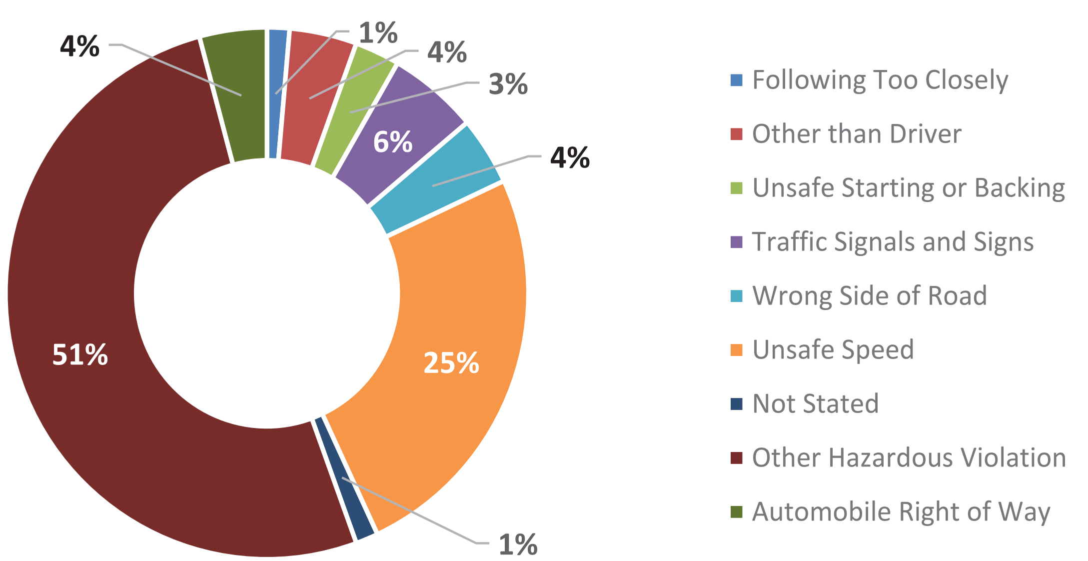
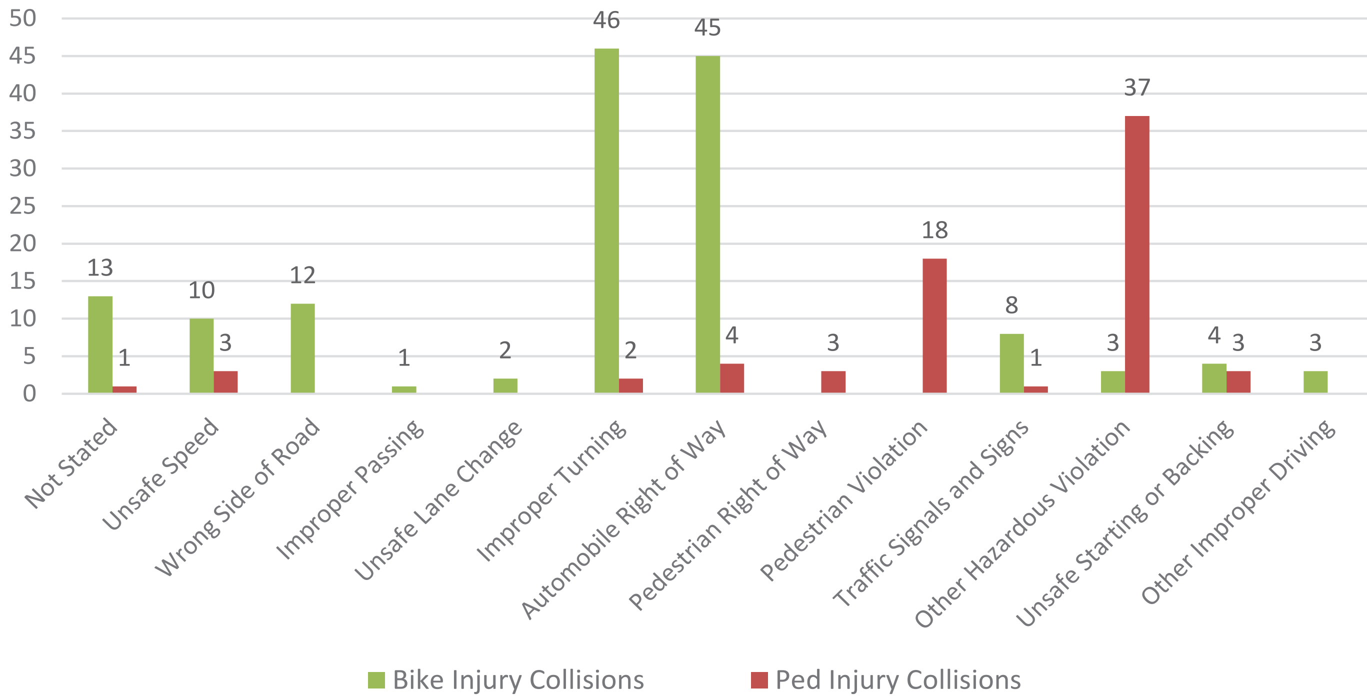


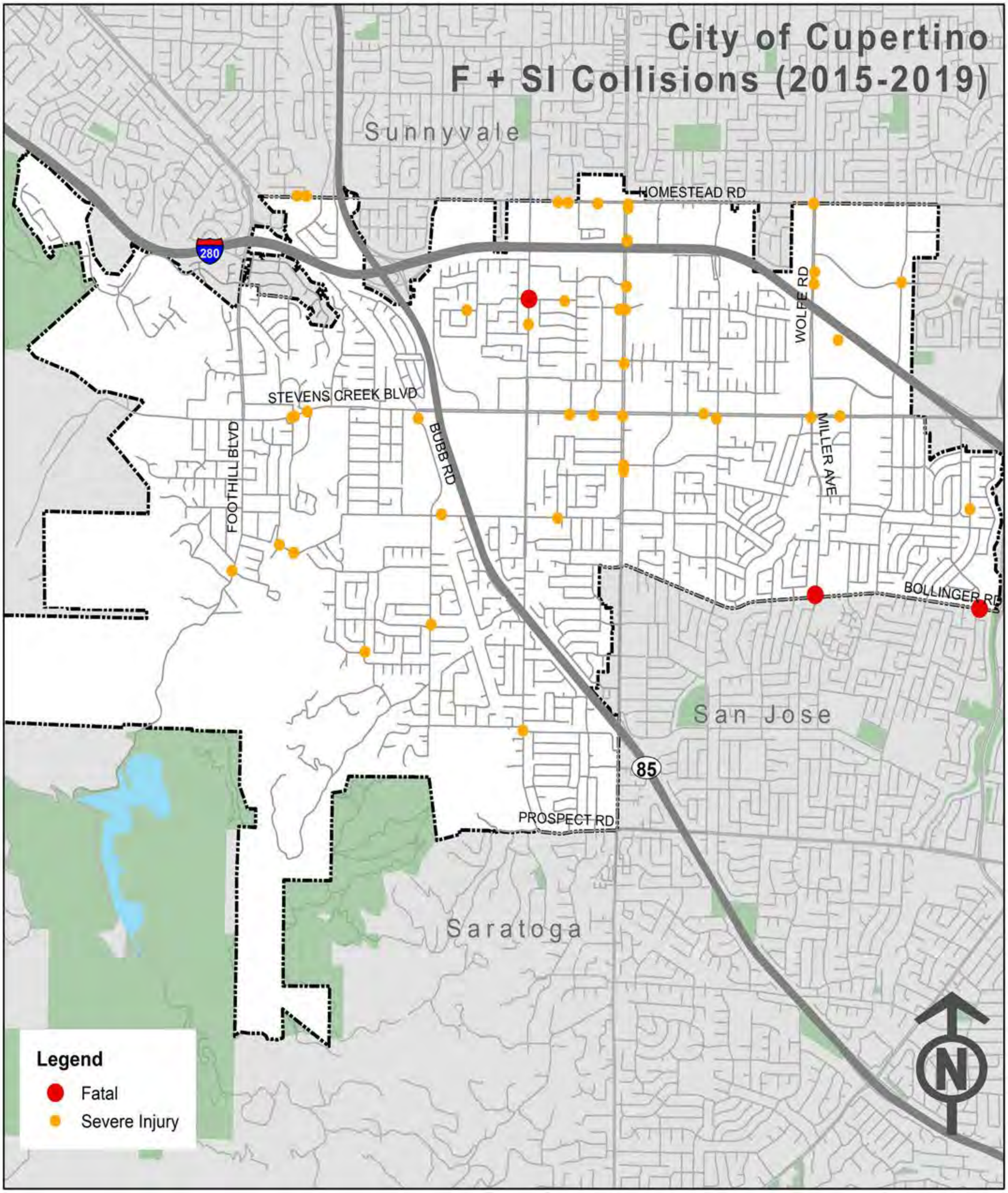
Figure 20. Primary Violations (by Count) Contributing to Pedestrian and Bicycle Injury Collisions



FATAL AND SEVERE INJURY COLLISIONS BY FACILITY TYPE

This section describes a detailed collision analysis performed for F+SI collisions on roadway segments and at intersections in the City of Cupertino. There were a total of 49 collisions in the City that resulted in a fatality or severe injury, out of which 11 collisions (22%) occurred along roadway segments, and 38 (78%) occurred at or near intersections. **Figure 21** illustrates F+SI collisions in the City of Cupertino.

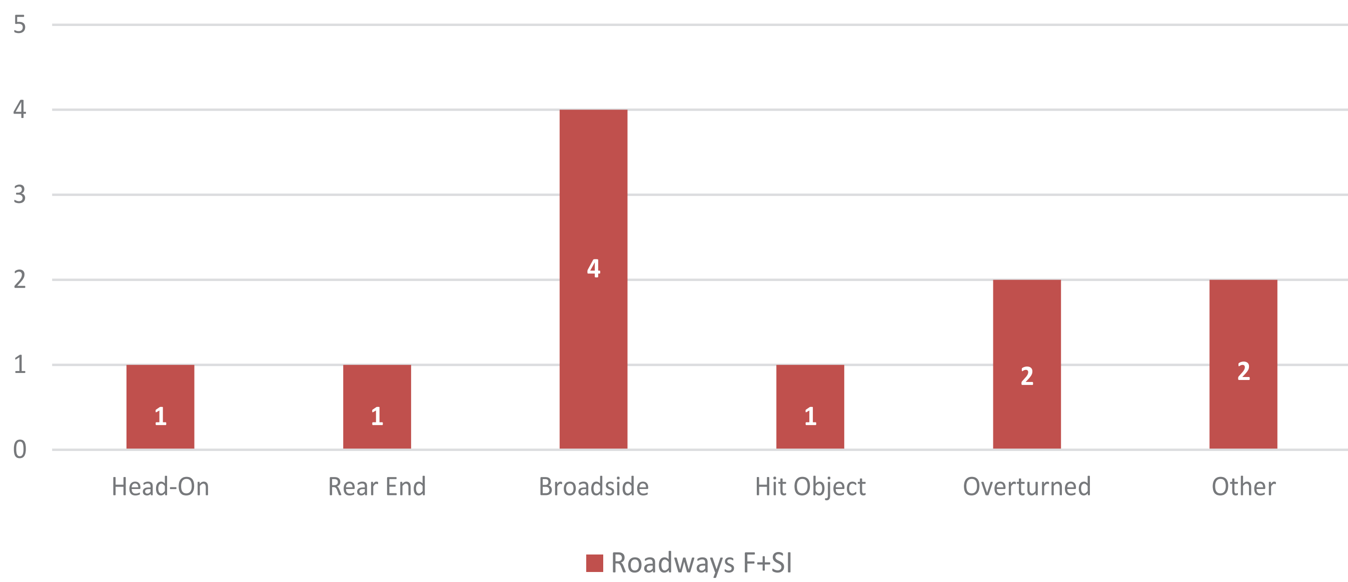
Figure 21. F+SI Collisions in the City of Cupertino



ROADWAY SEGMENT F+SI COLLISION ANALYSIS

Out of the total 49 F+SI collisions in the City of Cupertino between 2015 and 2019, 11 collisions occurred on roadway segments (collisions occurring more than 250 feet from an intersection). For F+SI collisions on roadway segments, the most common collision type was broadside, followed by overturned collisions. **Figure 22** illustrates F+SI collision totals on roadway segments by collision type.

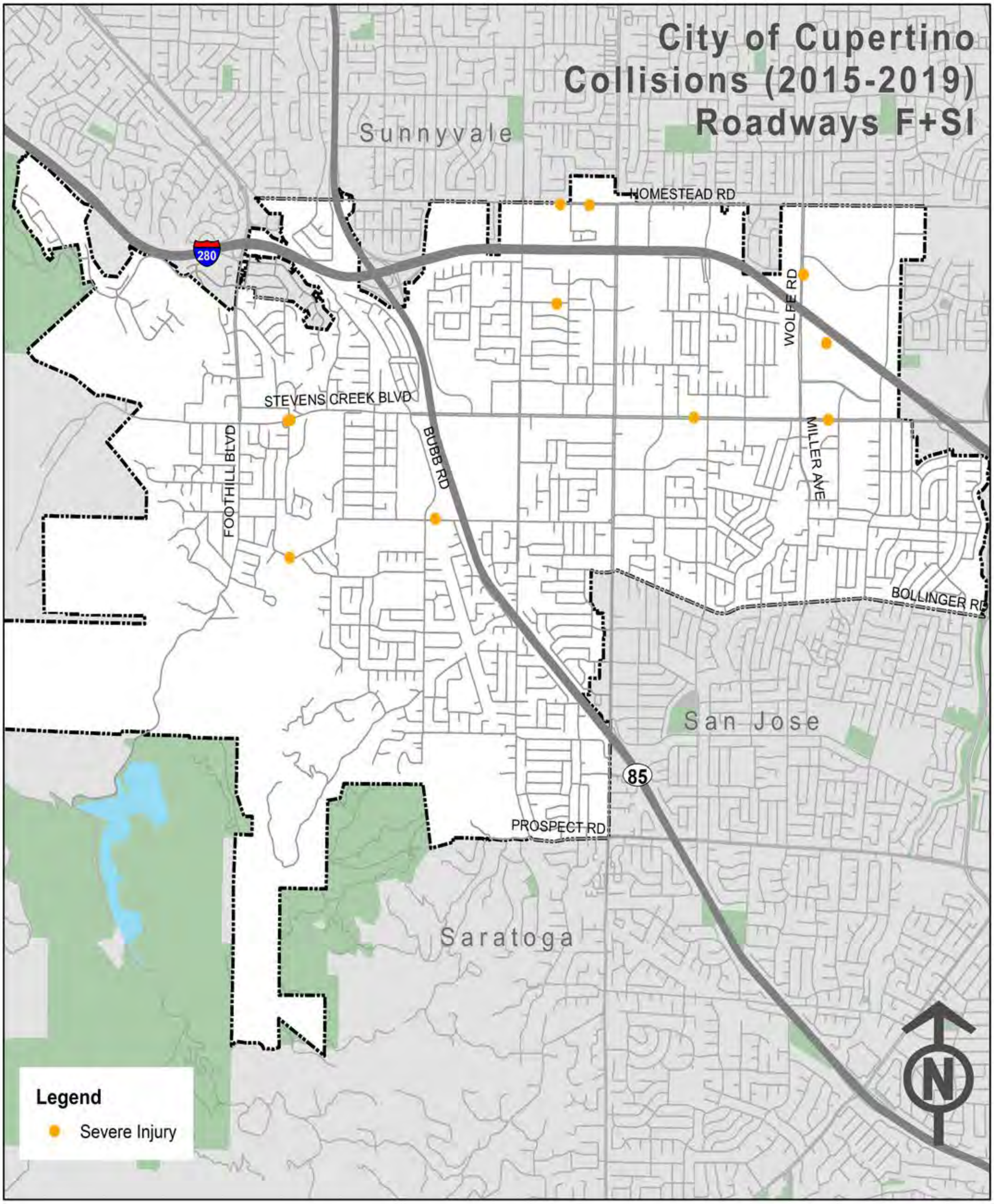
Figure 22. Roadway Segment F+SI Collision Counts by Collision Type



ROADWAY SEGMENT F+SI COLLISION: COLLISION TYPE AND SEVERITY

All 11 F+SI collisions on roadway segments resulted in severe injuries; no fatalities were reported outside of intersection areas during the study period. **Figure 23** below illustrates the F+SI collisions that have occurred on roadway segments.

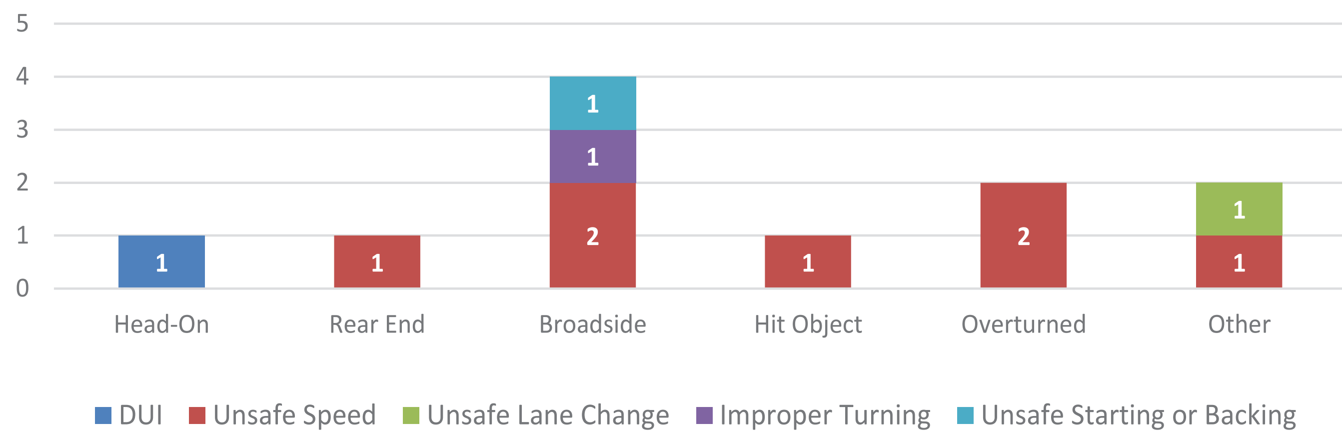
Figure 23. F+SI Collisions on City of Cupertino Roadways (2015-2019)



ROADWAY SEGMENT F+SI COLLISIONS: COLLISION TYPE AND VIOLATION FACTOR

Of the 11 F+SI collisions on roadway segments, seven resulted due to unsafe speed. DUI, unsafe lane change, improper turning, and unsafe starting or backing caused one F+SI collision each. The two most common collision type/violation factor combinations were broadside collisions caused by unsafe speed, and overturned collisions caused by unsafe speed. **Figure 24** illustrates F+SI collisions on roadway segments by collision type and violation factor.

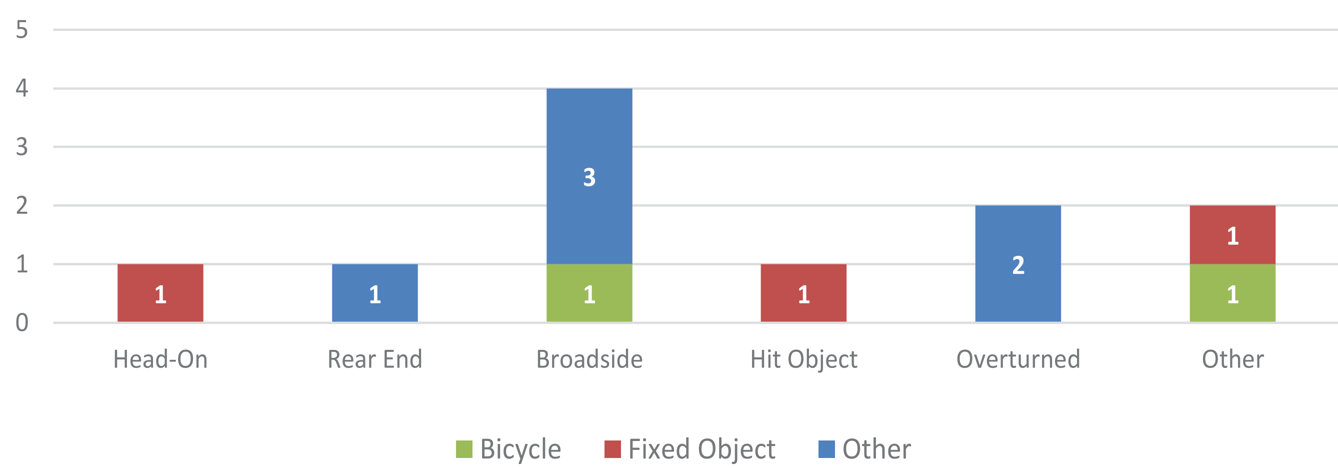
Figure 24. Roadway Segment F+SI Collisions: Collision Type and Violation Factor



ROADWAY SEGMENT F+SI COLLISIONS: COLLISION TYPE AND MOTOR VEHICLE INVOLVED WITH

Bicycles were involved in two of 11 F+SI collisions occurring on roadway segments. Three of 11 F+SI collisions involved a fixed object (such as a tree or telephone pole). **Figure 25** illustrates collision type by mode for all F+SI collisions that have occurred along roadway segments during the study period.

Figure 25. Roadway Segment F+SI Collisions: Collision Type and Mode



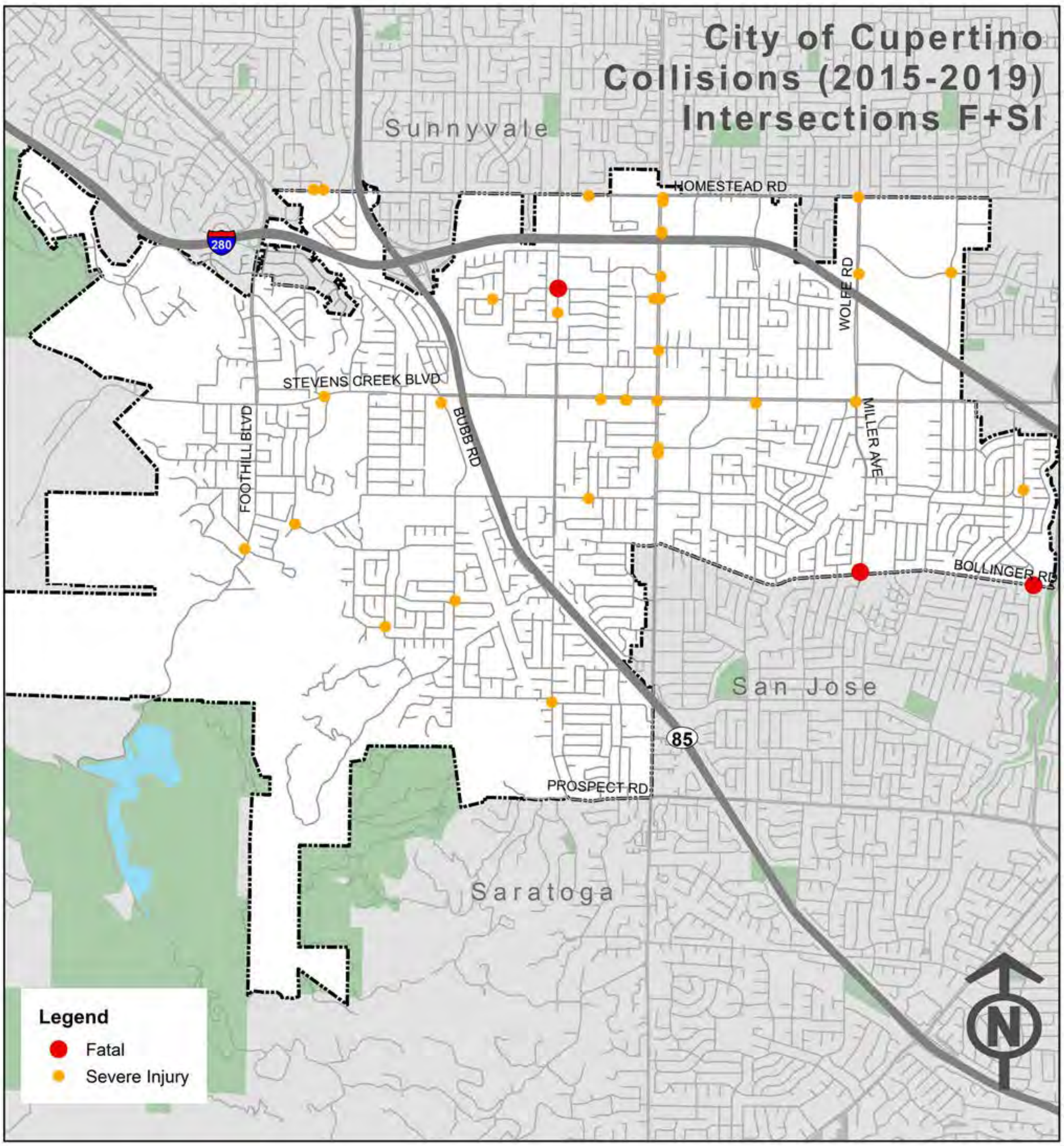
ROADWAY SEGMENT F+SI COLLISIONS: COLLISION TYPE AND LIGHTING CONDITION

All F+SI collisions on roadway segments occurred during daylight (natural light conditions).

INTERSECTION F+SI COLLISION ANALYSIS

Of the 49 F+SI collisions in the City of Cupertino occurring between 2015 and 2019, 38 occurred at or near intersections (within 250 feet from the center of an intersection). **Figure 26** illustrates all F+SI collisions that have occurred at intersections in the City during the study period.

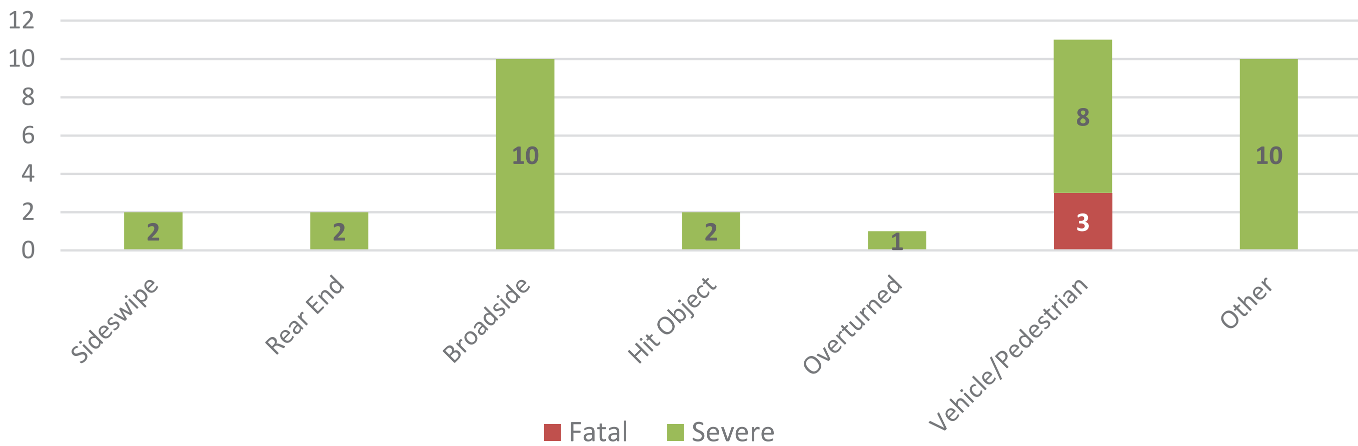
Figure 26. F+SI Collisions at City of Cupertino's Intersections



INTERSECTION F+SI COLLISIONS: COLLISION TYPE AND SEVERITY

Examining which collision types led to F+SI collisions at intersections can help to identify the appropriate countermeasures. Of the 38 F+SI collisions at intersections, sideswipe, rear-end, broadside, hit object, overturned, vehicle/pedestrian, and other accounted for 35 severe injuries, while vehicle/pedestrian collisions accounted for all three fatal collisions, as shown in **Figure 27**.

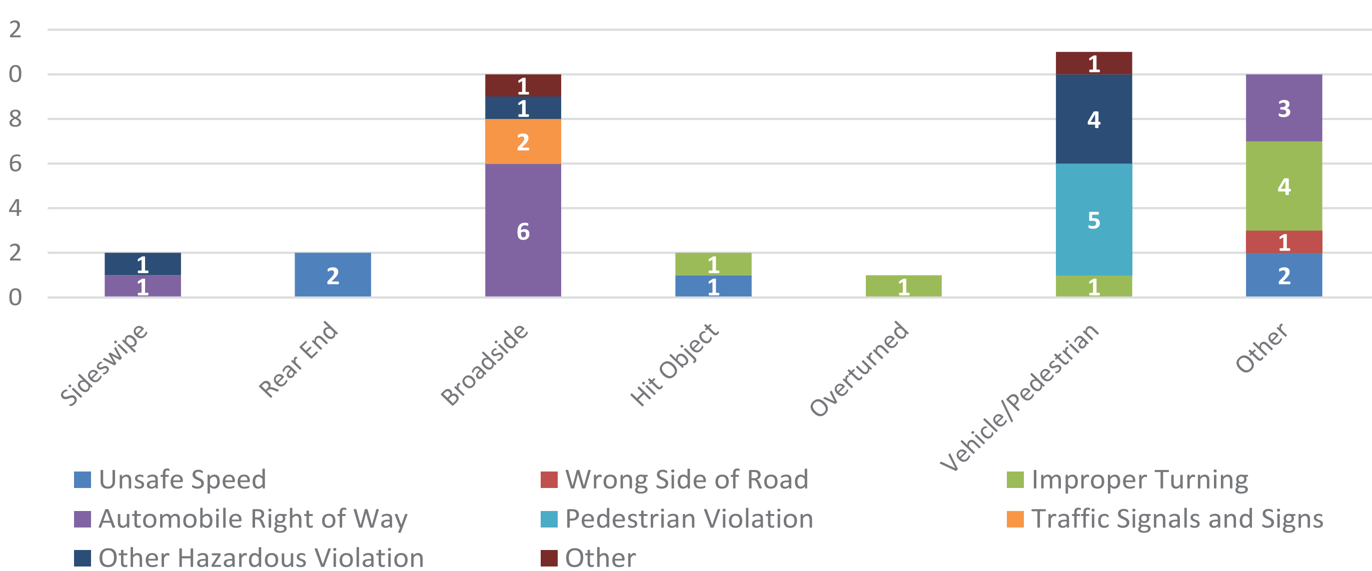
Figure 27. Intersection F+SI Collisions: Collision Type and Severity



INTERSECTION F+SI COLLISIONS: COLLISION TYPE AND VIOLATION FACTOR

Of the 38 F+SI collisions at intersections, vehicle/pedestrian collisions were the most prevalent. These collisions were most commonly associated with pedestrian violations (five) and other hazardous violations (four) out of the 11 total vehicle/pedestrian F+SI collisions. Broadside collisions (10) were the second most common F+SI type to occur within 250 feet of an intersection; six of the 10 broadside collisions were caused by automobile right-of-way violations. **Figure 28** illustrates F+SI collisions at intersections by collision type and violation factor.

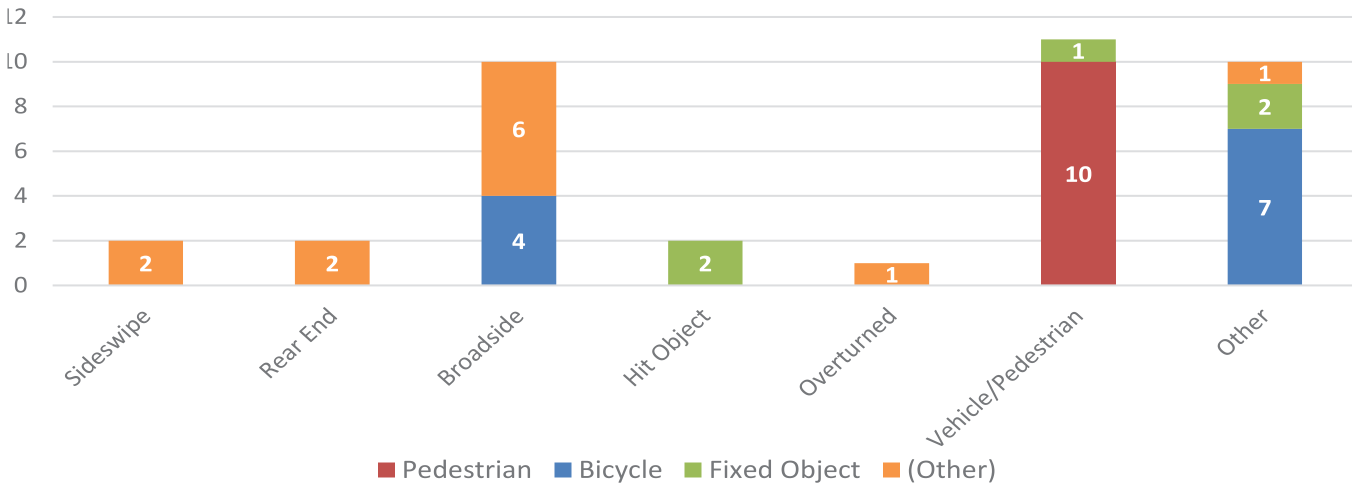
Figure 28. Intersection F+SI Collisions: Collision Type and Violation Factor



INTERSECTION F+SI COLLISIONS: COLLISION TYPE AND MODE

Of the 38 F+SI collisions recorded at intersections, 11 involved bicyclists, and 10 involved pedestrians. A fixed object (such as a tree or telephone pole) was involved in five of 38 F+SI collisions at intersections. **Figure 29** illustrates F+SI collisions at intersections by collision type and mode.

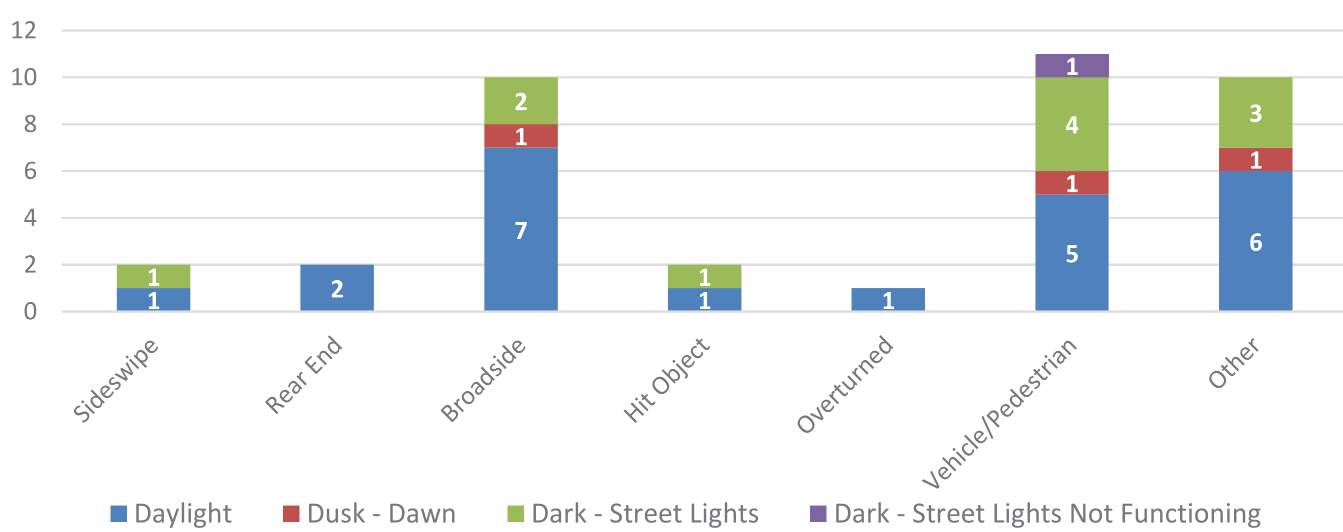
Figure 29. Intersection F+SI Collisions: Collision Type and Mode



INTERSECTION F+SI COLLISIONS: COLLISION TYPE AND LIGHTING CONDITION

Of the 38 F+SI collisions recorded at intersections, 23 occurred during the day (natural light conditions) and the rest occurred during low-light or dark conditions. Vehicle/pedestrian collisions show a greater share of collisions occurring in both daylight and nighttime conditions. **Figure 30** illustrates F+SI collisions at intersections by collision type and lighting condition.

Figure 30. Intersection F+SI Collisions: Collision Type and Lighting Condition



PROMINENT COLLISION TRENDS

The collision analysis above was used to identify key trends among collisions in Cupertino. These collision trends will help to inform the emphasis areas selected for the LRSP, which represent the most critical traffic safety issues in Cupertino. It is important to identify these top collision trends because the emphasis areas will not only be based on these trends, each emphasis area will be accompanied by 4 E's strategies. The 4 E's strategies are intended to help address each of the top collision trends holistically through educational programs, enforcement tactics, engineering countermeasures, and emergency response strategies. The top collision trends (and subsequently the High Collision Network locations), will be better addressed through the 4 E's strategies than through engineering solutions alone. Eight factors emerged as a result of this analysis:

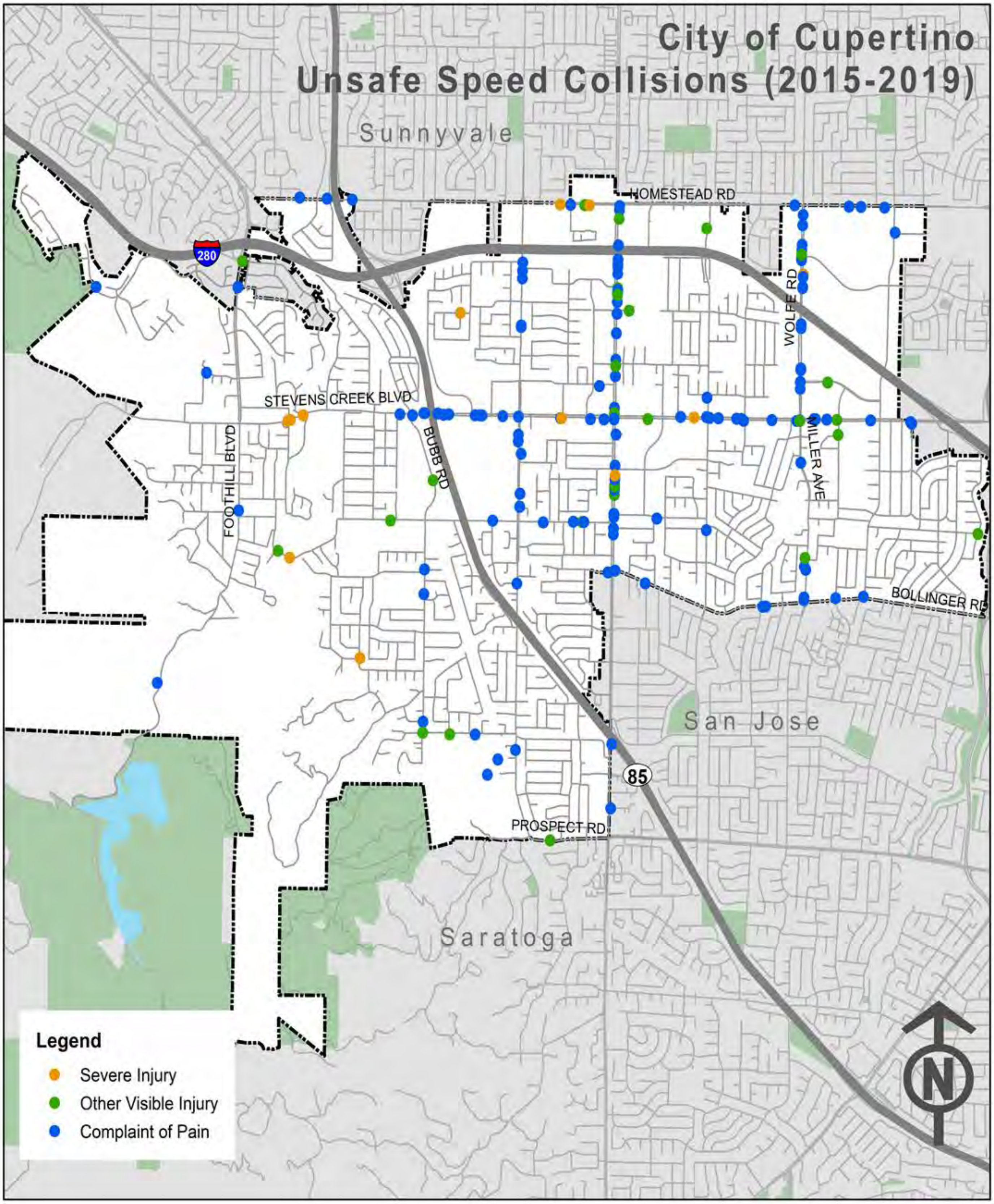
- **Unsafe speed** violations leading to injury collisions (particularly F+SI collisions)
- **Automobile right-of-way** violations leading to injury collisions (particularly F+SI collisions)
- Collisions caused by **improper turning** violations leading to injury collisions (particularly F+SI collisions)
- **Broadside** collisions leading to injury collisions (particularly F+SI collisions)
- **Rear-end** collisions leading to injury collisions
- **Vehicle/pedestrian** collisions leading to a high number of fatality and/or severe injury
- **Vehicle/bicycle** collisions leading to a high number of severe injury
- **Nighttime** collisions resulting in a high number of fatality and/or severe injury

Each of the factors listed above are mapped and summarized in the following pages.

UNSAFE SPEED VIOLATIONS

Among all injury collisions, 28% occurred as a result of unsafe speed. Speeding also caused 24% of F+SI collisions. Higher levels of unsafe speed violations resulting in injury collisions occurred on De Anza Boulevard, Homestead Road, McClellan Road, Stelling Road, Wolfe Road, and Stevens Creek Boulevard. About 79% of injury collisions caused by unsafe speed violations were rear-end collisions. **Figure 31** shows the distribution of unsafe speed-related injury collisions in Cupertino.

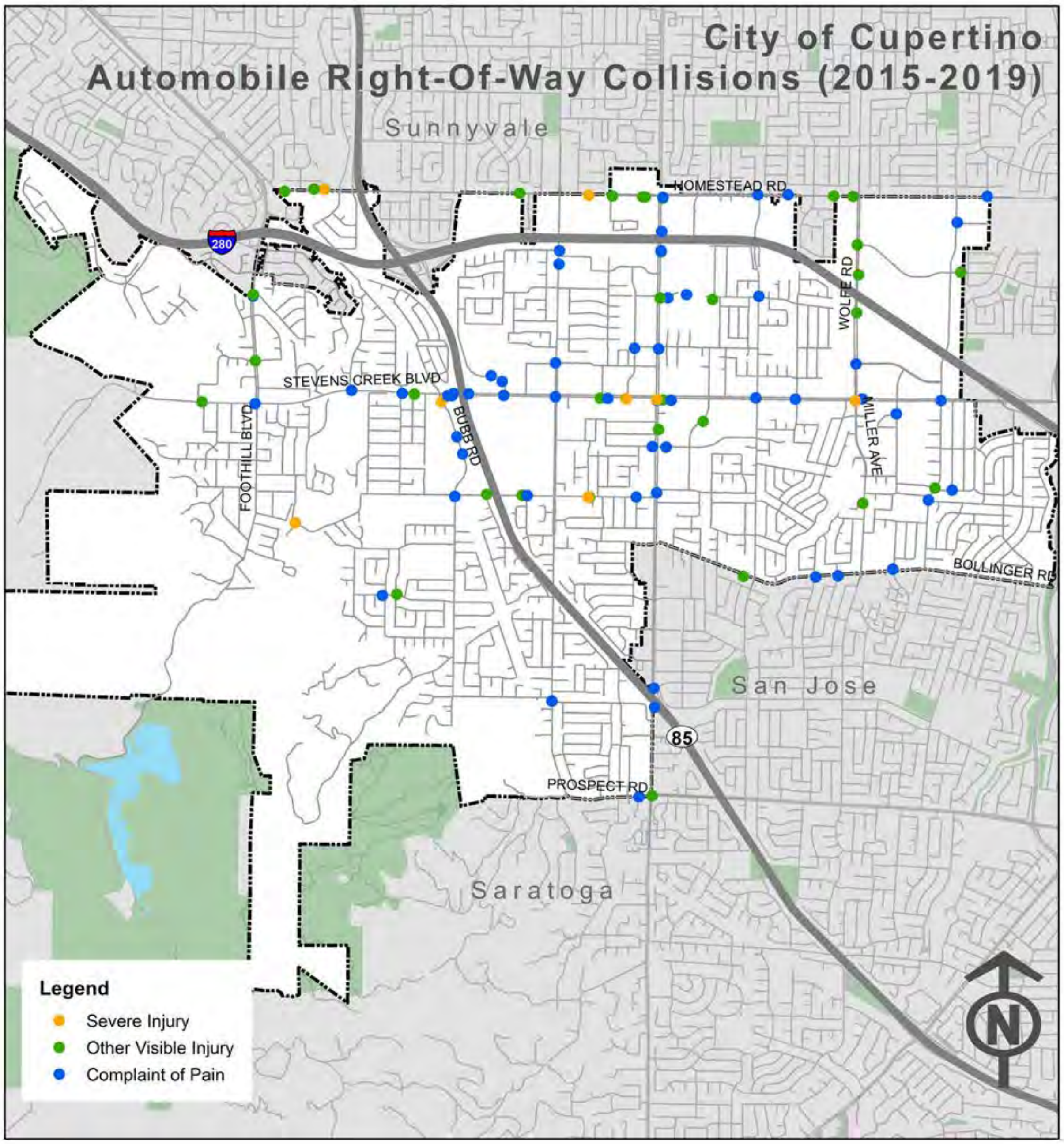
Figure 31. Unsafe Speed Injury Collisions by Severity



AUTOMOBILE RIGHT-OF-WAY VIOLATIONS

Automobile right-of-way violations were the second most common violation among all injury collisions (20%) and F+SI collisions (20%). Automobile right-of-way violations occur when the party at fault violates the right-of-way of another approaching vehicle (eg. turning in front of another vehicle at an intersection). Approximately 55% of automobile right-of-way violations leading to injury collisions resulted in broadside collisions. Higher numbers of automobile right-of-way violations were observed on Stevens Creek Boulevard, De Anza Boulevard, McClellan Road, Homestead Road, and Stelling Road compared to other Cupertino roads. **Figure 32** shows the distribution of automobile right-of-way violation-related injury collisions in Cupertino.

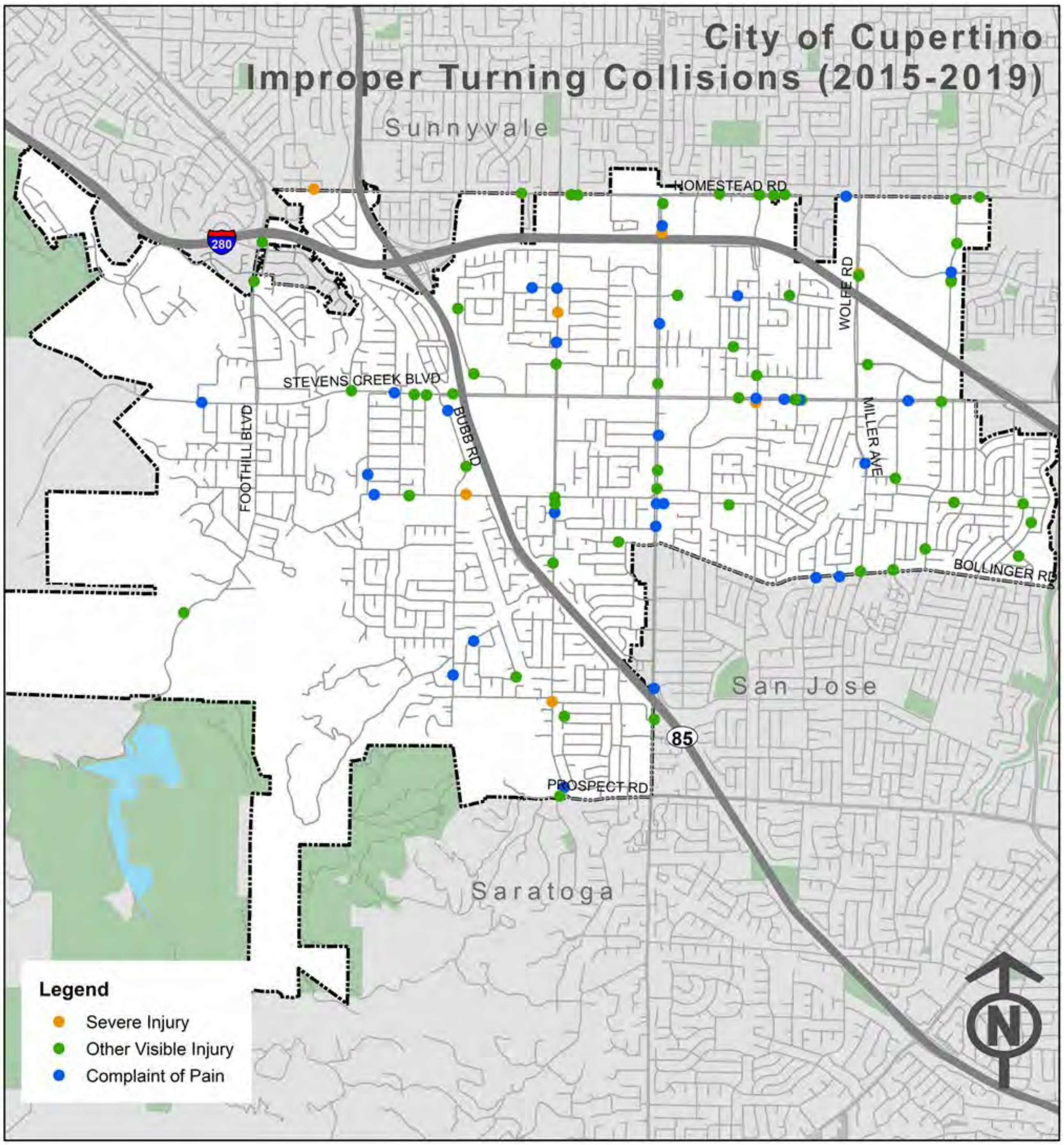
Figure 32. Automobile Right-of-Way Violation-Related Injury Collisions



IMPROPER TURNING VIOLATIONS

Improper turning violations caused 16% of all injury collisions, and 16% of F+SI collisions during the study period. The majority of injury collisions resulting from improper turning violations were hit object collisions (18%), broadside collisions (17%), and vehicle/pedestrian collisions (10%). **Figure 33** maps injury collisions resulting from improper turning violations.

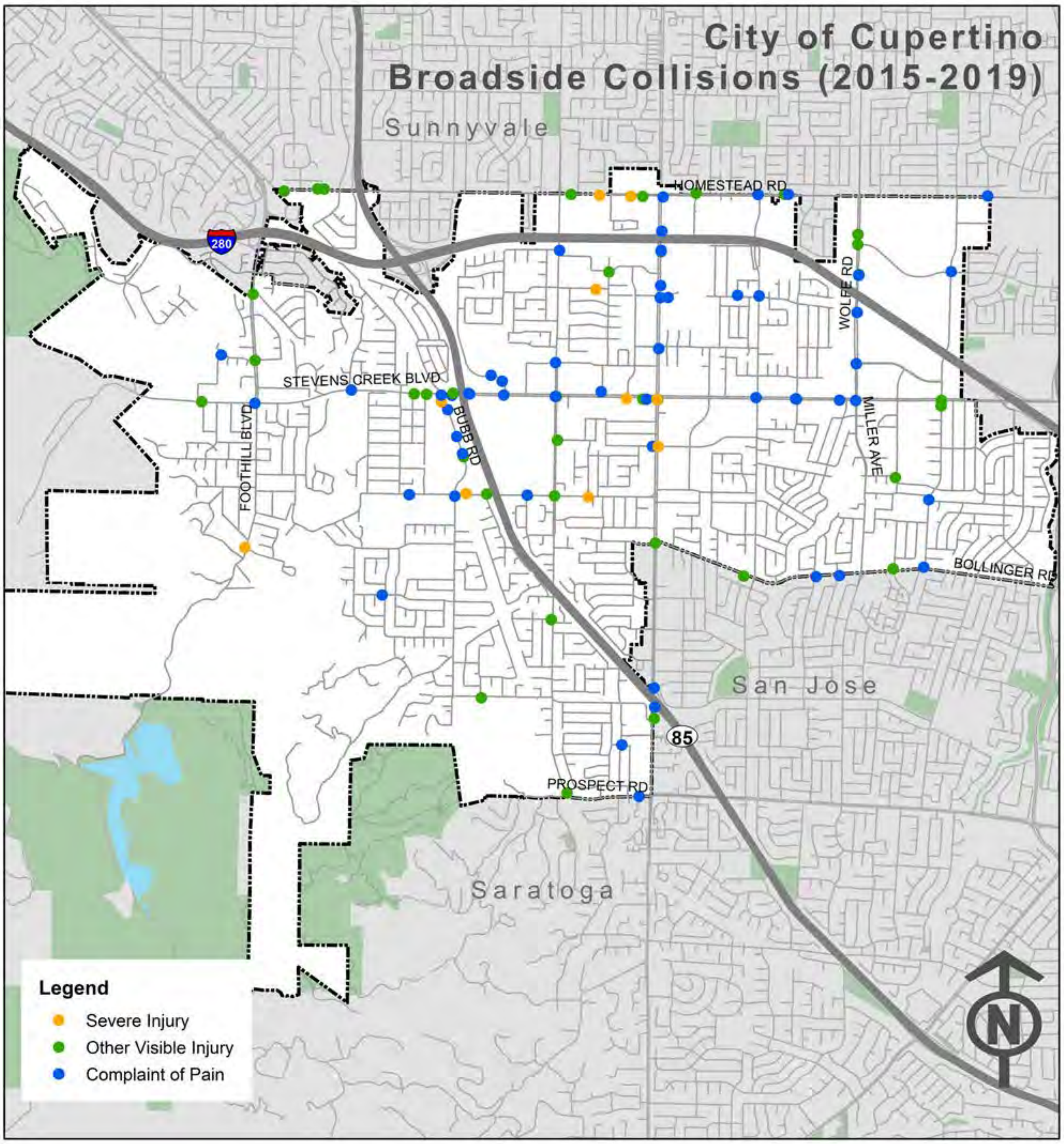
Figure 33. Improper Turning-Related Injury Collisions



BROADSIDE COLLISIONS

Broadside collisions were the second most prominent collision type among all injury collisions (26%), but account for the largest number of F+SI collisions (29%). They most commonly occur at intersections where there are increased vehicle conflict points. Higher numbers of broadside collisions occurred on De Anza Boulevard, Homestead Road, and Stevens Creek Boulevard. **Figure 34** shows the distribution of broadside injury collisions in Cupertino.

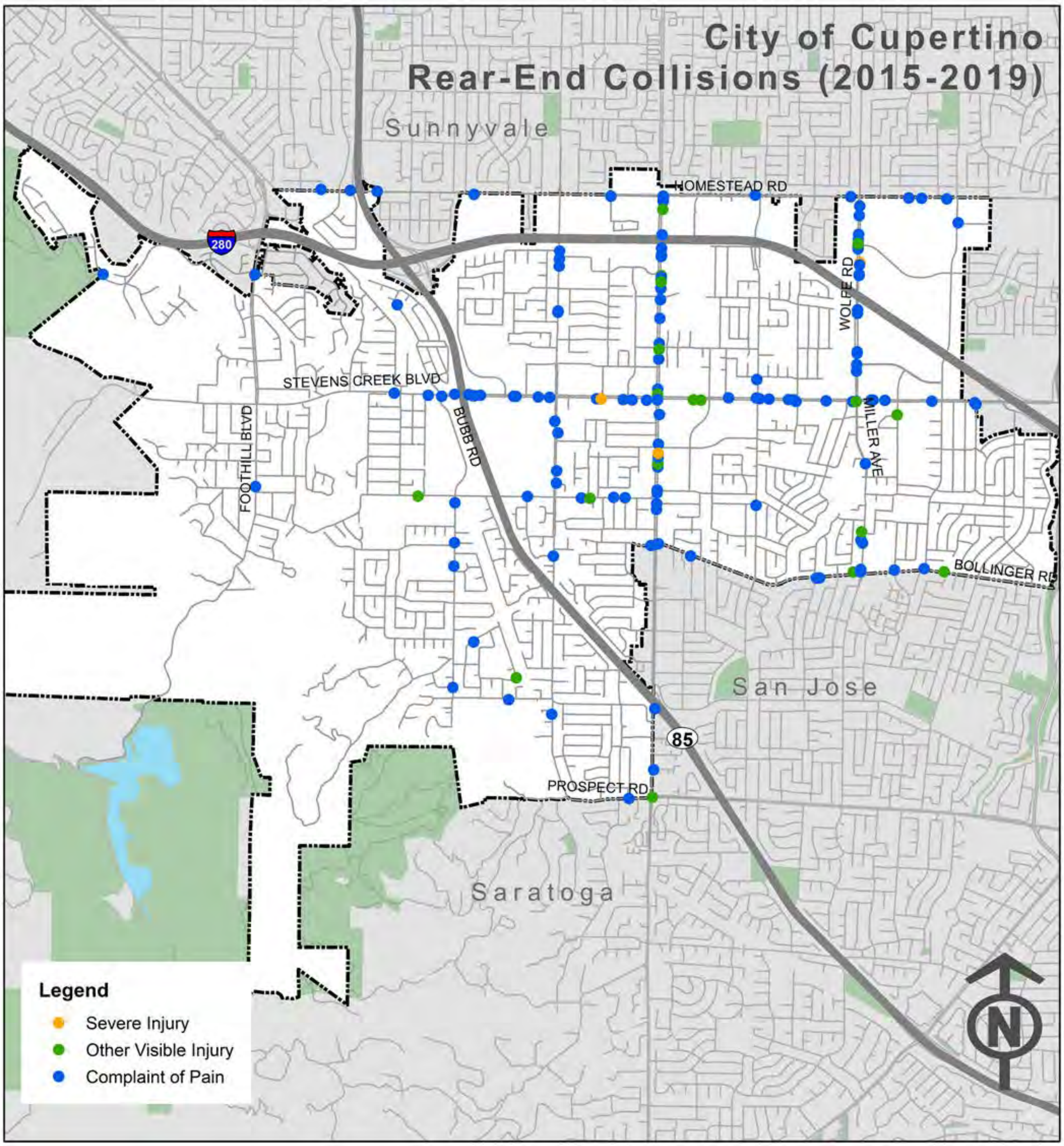
Figure 34. Broadside Injury Collisions



REAR-END COLLISIONS

Rear-end collisions comprise 26% of all injury collisions in Cupertino, with the majority caused by unsafe speed violations. The high numbers of both unsafe speed violations and rear-end collisions indicate a need for traffic slowing measures on certain roadways. **Figure 35** maps rear-end injury collisions in Cupertino.

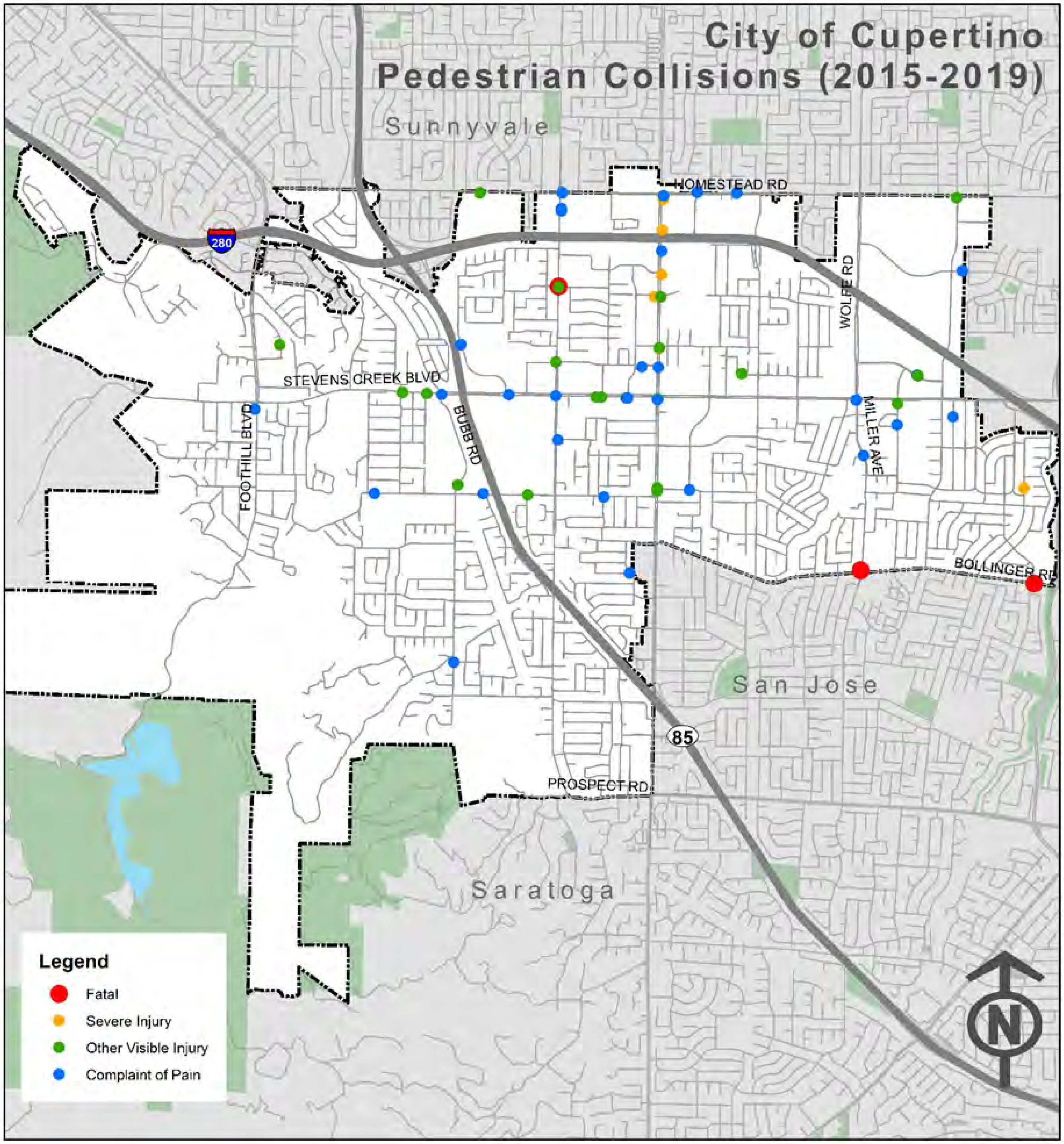
Figure 35. Rear-End Injury Collisions



VEHICLE/PEDESTRIAN COLLISIONS

All of the three fatal collisions that occurred in Cupertino during the five-year study period involved pedestrians. Pedestrian collisions account for 12% of all injury collisions, and 20% of F+SI collisions. **Figure 36** maps pedestrian injury collisions; higher concentrations of F+SI pedestrian collisions occurred on De Anza Boulevard.

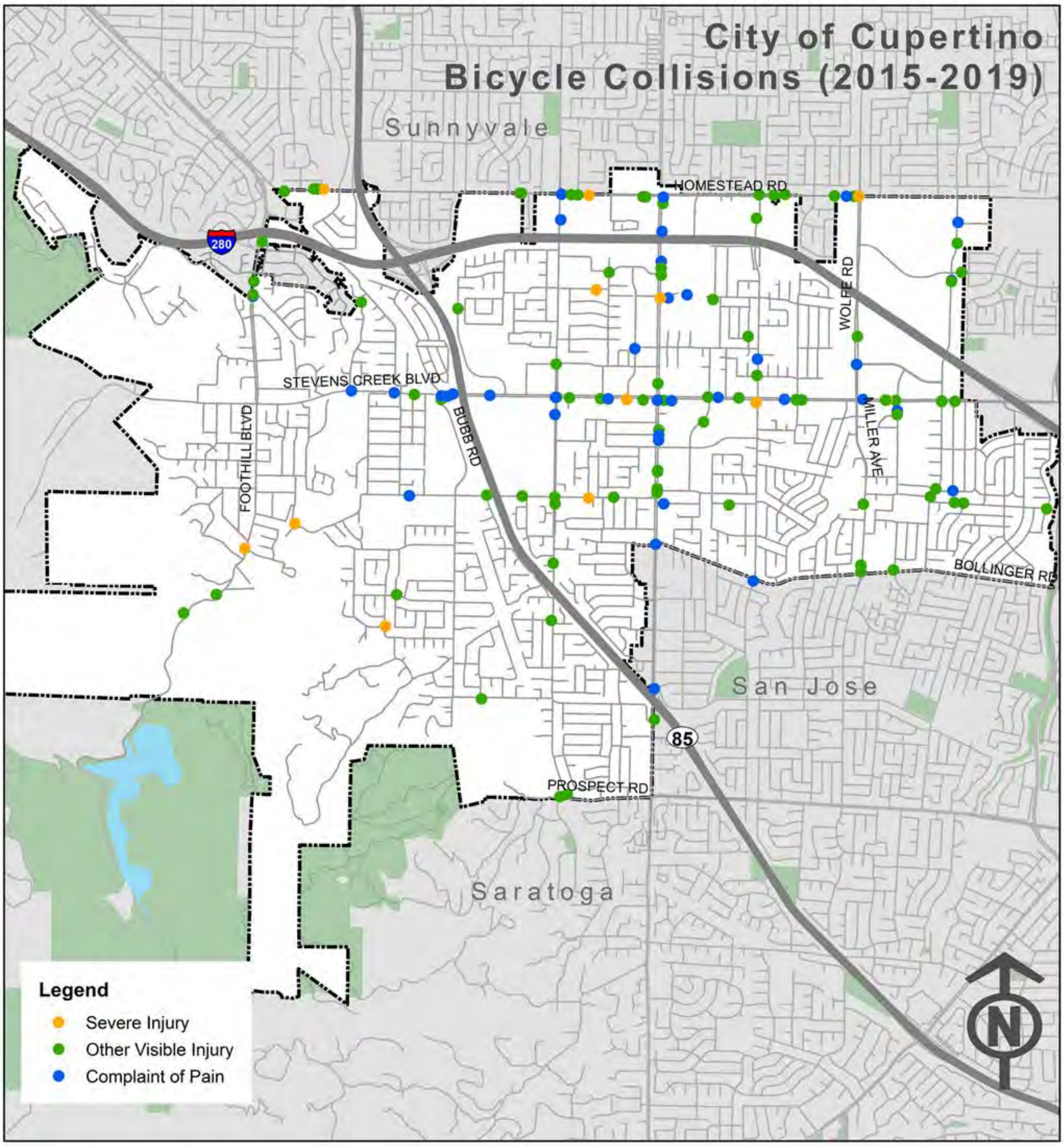
Figure 36. Pedestrian Injury Collisions



VEHICLE/BICYCLE COLLISIONS

Cyclists were involved in 24% of all injury collisions, and 27% of F+SI collisions. Automobile right of way violations caused 31% of bicycle injury collisions and 38% of bicycle F+SI collisions. In addition, improper turning violations caused 31% of bicycle injury collisions and 15% of bicycle F+SI collisions. Bicycle collisions in Cupertino are concentrated along De Anza Boulevard and Stevens Creek Boulevard. **Figure 37** maps bicycle injury collisions.

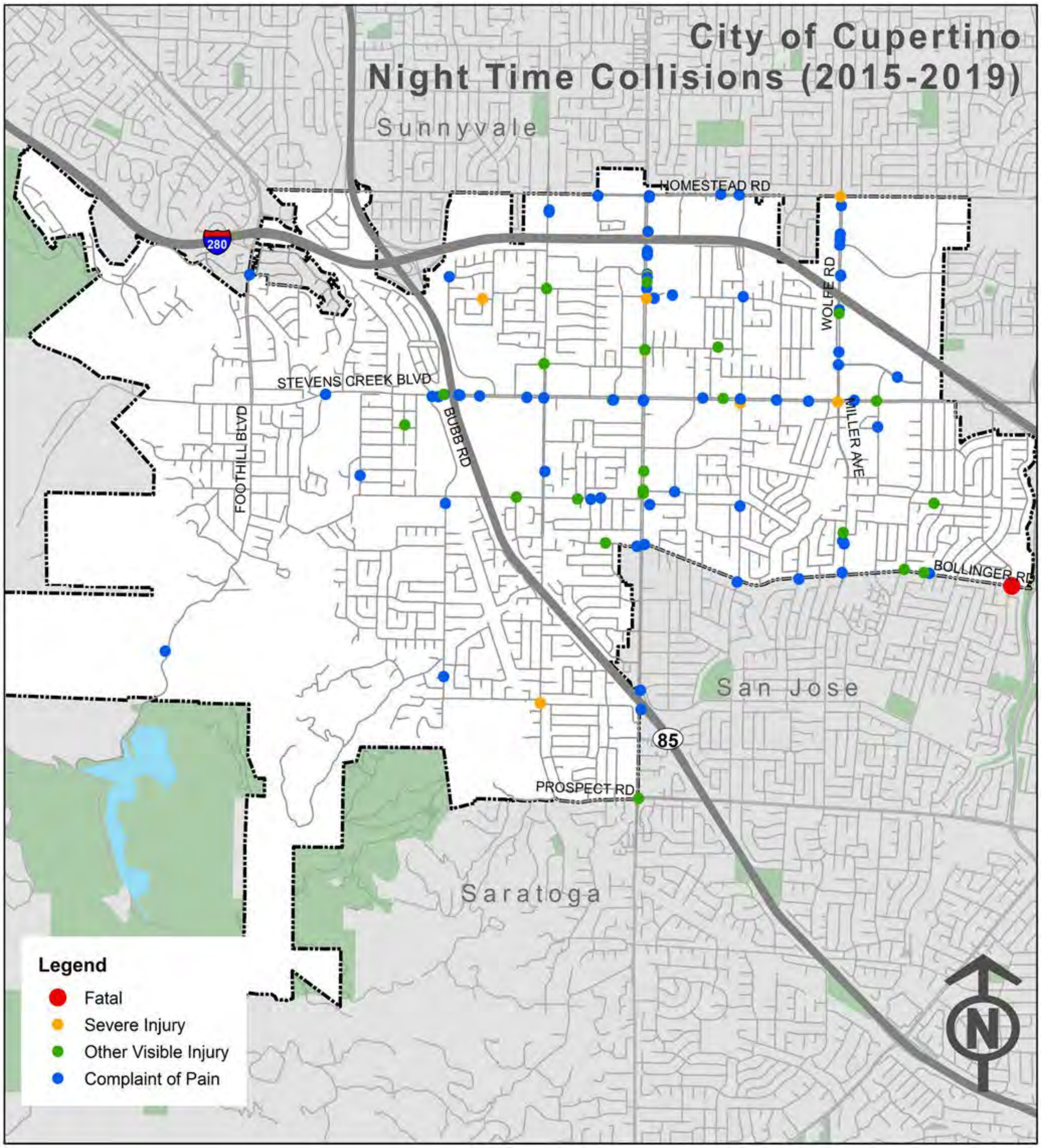
Figure 37. Bicycle Injury Collisions by Severity (No PDO)



NIGHTTIME COLLISIONS

For F+SI collisions, 31% occurred during nighttime or dawn/dusk conditions, compared to just 25% of injury collisions. Street corridors with higher concentrations of collisions occurring under non-daylight conditions include De Anza Boulevard, Stevens Creek Boulevard, and Wolfe Road, indicating lighting as a potential countermeasure at these locations. **Figure 38** shows the distribution of nighttime injury collisions in Cupertino.

Figure 38. Nighttime Injury Collisions



IDENTIFICATION OF HIGH COLLISION NETWORK

EQUIVALENT PROPERTY DAMAGE ONLY (EPDO) SCORE

The EPDO method was used to identify the high severity collision network. The EPDO method accounts for both the severity and frequency of collisions by converting each collision to an equivalent number of 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 10 application. The weights used in the analysis are shown below in **Table 4**.

Table 4. EPDO Score used in HSIP Cycle 10

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

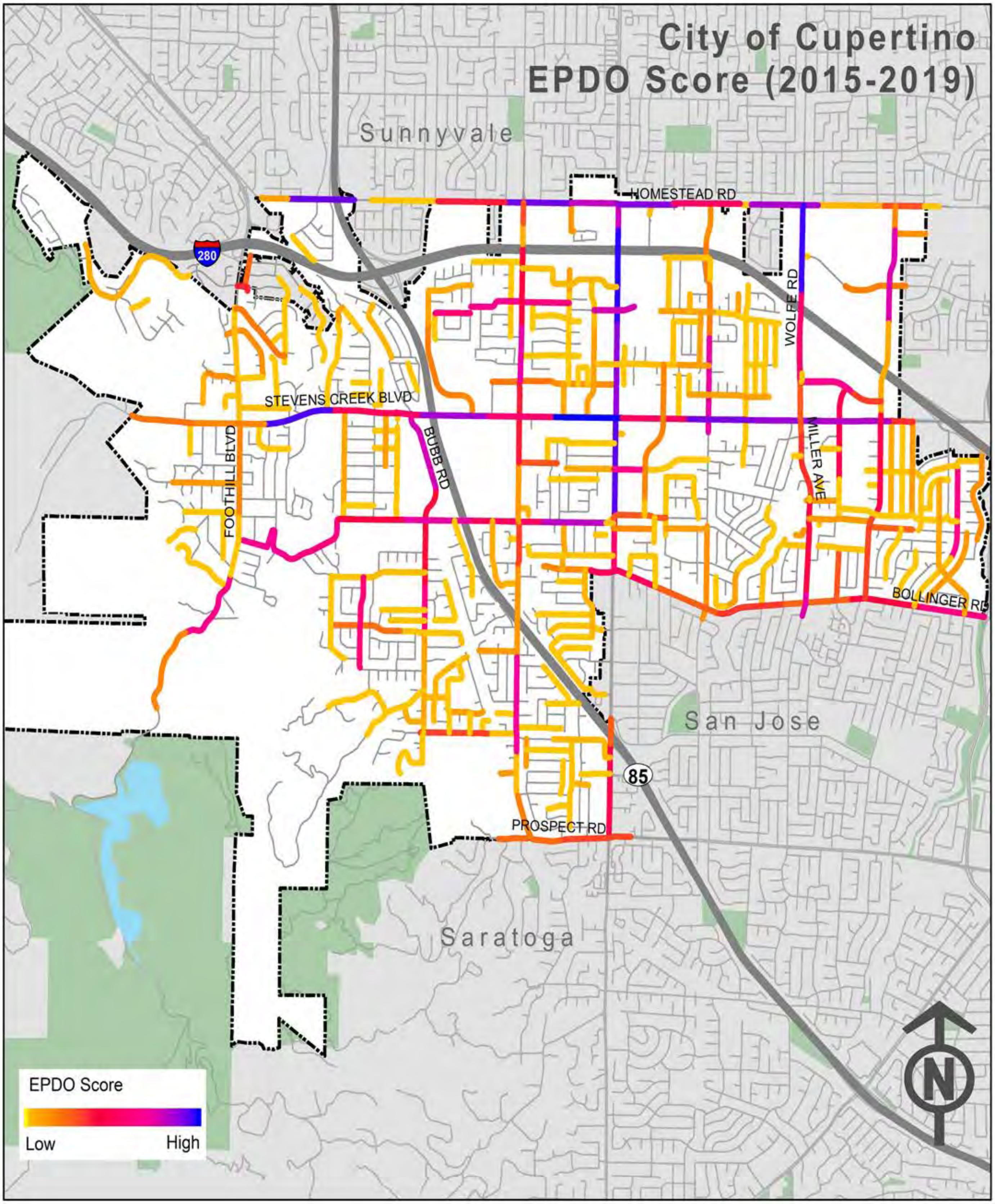
**This is the score used in HSIP Cycle 10 for collisions on roadways segments, to simplify the analysis this study uses the same score for all F+SI collisions regardless of location*

EPDO is used because it provides a methodology for the project team to understand the locations in Cupertino that are experiencing the most severe crashes. Because of the high score given to F+SI crashes, locations that have these types of crashes are more likely to receive a higher EPDO score than other locations that may have more collisions, but fewer F+SI collisions. Locations that have the highest EPDO scores are selected for inclusion in the High Collision Network**.** Identified intersections are scored based on collisions occurring at or within 250 feet of the intersection, while roadway segment locations are identified based on collisions that occur along the segment, except directly at an intersection (zero feet from intersection per Crossroads data). Identifying the locations with the most severe crashes allows the team to focus recommended solutions and countermeasures at these locations.

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 Cupertino were geolocated onto Cupertino's road network. For the purposes of this analysis (and future analyses), PDO collisions were included. GIS is then used to calculate the EPDO score for each roadway segment and intersection citywide, which is then ranked according to its score.

Figure 39 shows the location and geographic concentration of collisions by their EPDO score.

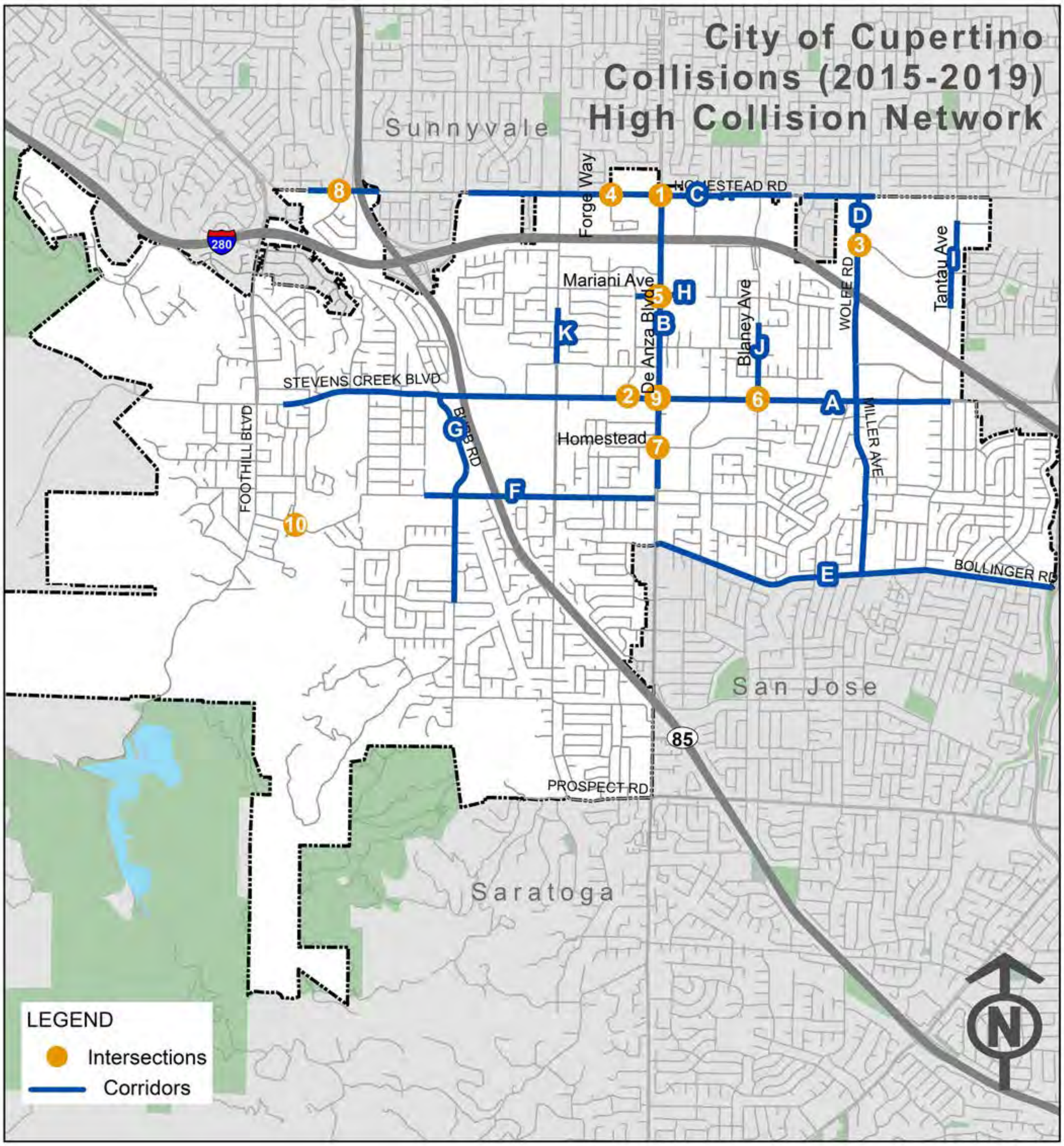
Figure 39. Equivalent Property Damage Only (EPDO) Score



HIGH COLLISION NETWORK

Following the detailed collision analysis in **Section 4**, the next step in the LRSP analysis identifies high-risk roadway segments and intersections. Intersections and segments were selected using the weighted score methodology from the EPDO analysis. **Figure 40** shows the top 11 high-collision roadway segments, and top 10 high-collision intersections in Cupertino.

Figure 40. High Collision Network



CORRIDOR RANKINGS

Eleven corridors were identified as high collision corridors. There were a total of 390 injury collisions, 38 F+SI collisions, and 987 PDO collisions on these corridors, which represents 64% of all injury collisions, 78% of all F+SI collisions, and 65% of all PDO collisions citywide. The Stevens Creek Boulevard corridor had the highest number of F+SI collisions with 11.

Table 5 lists the collision rate of the top 11 identified high-collision corridors along with the number of total injury collisions, F+SI collisions, PDO collision, total (injury+PDO) nighttime, total (injury+PDO) pedestrian, total (injury+PDO) bicycle collisions, length of the corridors, and EPDO score.

Table 5. High Collision Corridors

ID	Corridor	Collisions						Length (miles)	EPDO Score
		Total Injury	F+SI	PDO	Total Nighttime	Total Pedestrian	Total Bicycle		
A	Stevens Creek Blvd: Janice Ave to Judy Ave	147	11	323	81	17	45	3.4	3,139
B	De Anza Blvd: Pacifica Dr to Homestead Rd	87	8	187	72	11	18	1.5	2,096
C*	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	45	7	188	32	6	22	2.8	1,666
D	Wolfe Rd/Miller Ave: Homestead Rd to Bollinger Rd	36	2	150	39	0	3	1.9	729
E*	Bollinger Rd: Lawrence Expy to De Anza Blvd	27	2	42	19	2	3	1.5	562
F	McClellan Rd: Imperial Ave to De Anza Blvd	17	2	40	9	2	6	1.2	490
G	Bubb Rd: Stevens Creek Blvd to Columbus Ave	13	2	20	4	1	3	1.1	436
H	Mariani Ave: Bandley Dr to Infinite Loop	5	1	10	2	1	3	0.3	209
I	Tantau Ave: Forge Dr to Pruneridge Ave	5	1	9	0	0	4	0.3	208
J	Blaney Ave: Pear Tree Ln to Stevens Creek Blvd	4	1	9	1	0	4	0.3	192
K	N Stelling Rd: Alves Dr to Greenleaf Dr	4	1	9	1	0	1	0.3	192

**Corridors are shared with other jurisdictions (Homestead Road is shared with the City of Sunnyvale and Bollinger Road is shared with the City of San Jose).*

INTERSECTION RANKINGS

There were 10 intersections identified as high collision intersections. There were a total of 147 injury collisions, 24 F+SI collisions and 354 PDO collisions that occurred at these intersections, which represents 24% of all injury collisions, 49% of all F+SI collisions, and 23% of all PDO collisions citywide. The intersection of De Anza Boulevard and Homestead Road had the highest number of injury collisions overall (41).

Table 6 lists the collision rate of the top 10 identified high-risk intersections along with the number of total injury collisions, F+SI collisions, PDO collision, total (injury+PDO) nighttime, total (injury+PDO) pedestrian, total (injury+PDO) bicycle collisions, and EPDO score.

Table 6. High Collision Intersections

ID	Intersection	Collisions						EPDO Score
		Total Injury	F+SI	PDO	Total Nighttime	Total Pedestrian	Total Bicycle	
1	De Anza Blvd and Homestead Rd	41	4	86	35	7	9	1,028
2	Bandley Dr and Stevens Creek Blvd	18	4	31	8	7	2	800
3	Prunridge Ave and Wolfe Rd	20	2	78	20	0	0	546
4	Franco Ct/Forge Wy and Homestead Rd	6	3	22	6	0	1	545
5	De Anza Blvd and Mariani Ave	15	2	37	11	2	5	465
6	Blaney Ave and Stevens Creek Blvd	9	2	23	7	0	4	400
7	S De Anza Blvd and Rodrigues Ave	8	2	17	8	0	0	388
8	Barranca Dr and Homestead Rd	6	2	4	1	1	5	373
9	De Anza Blvd and Stevens Creek Blvd	20	1	54	14	2	8	373
10	McClellan Rd and Clubhouse Ln	4	2	2	2	0	2	349

SUMMARY

Between 2015 and 2019, a total of 2,140 collisions occurred within the City of Cupertino, of which 1,526 resulted in PDO collisions, 362 resulted in a complaint of pain injury, 203 resulted in a visible injury, 46 resulted in a serious injury, and three resulted in a fatality. Of the total 614 injury collisions (fatal, severe injury, visible injury, and complaint of pain), 123 occurred on roadway segments whereas 491 occurred within 250 feet of an intersection.

Among all injury collisions, the most prominent collision types were rear-end and broadside collisions, while unsafe speed, automobile right-of-way, and improper turning were the most common violation types. EPDO methodology was used to understand the locations in Cupertino that are experiencing the most severe crashes. A total of 11 corridors and 10 intersections contributed to a high collision network. The corridor with the highest EPDO score was Stevens Creek Boulevard from Janice Avenue to Judy Avenue, while the intersection with the highest EPDO score was the crossing of De Anza Boulevard and Homestead Road.

The next steps in the LRSP will be to identify emphasis areas based on the collision analysis. The most prominent collision types, violations, and human behaviors will be selected for inclusion as an emphasis area, as these represent the most prominent traffic safety issues in Cupertino. Each emphasis area will be accompanied with strategies corresponding to the 4 E's of safety to comprehensively help make the City of Cupertino safer for all modes of transportation.

This page is intentionally left blank.

5. EMPHASIS AREAS

This page is intentionally left blank.

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 the City of Cupertino. Emphasis areas help in identifying appropriate safety strategies and countermeasures with the greatest potential to reduce collisions occurring at these 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 nine emphasis areas identified for the City of Cupertino. These emphasis areas were derived from the consolidated high injury collision database (**Appendix C**) where top injury factors were identified by combining the data manually. Along with findings from the data analysis, stakeholder input was also considered while identifying emphasis areas specific to the City of Cupertino.

The identified emphasis areas are as follows:

- Improve Intersection Safety (Collisions within 250 feet of an intersection)
- Reduce Unsafe Speed
- Reduce Automobile Right-of-Way Violations
- Improve Pedestrian and Bicyclist Safety
- Reduce Nighttime Collisions
- Reduce Rear End Collisions
- Reduce Broadside Collisions
- Reduce Improper Driving Collisions
- Reduce Collisions near Schools

THE 4 E'S OF TRAFFIC SAFETY

The LRSP utilizes a comprehensive approach to safety incorporating the “4 E’s of traffic safety”: **E**ngineering, **E**nforcement, **E**ducation, and **E**MS. This approach recognizes that not all locations can be addressed solely by infrastructure improvements. Incorporating the 4 E’s of traffic safety is often required to ensure successful implementation of significant safety improvements and reduce the severity and frequency of collisions throughout a jurisdiction.

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 be used to supplement enforcement and improve the efficiency of each strategy. Education can also be employed in the short-term to address high crash locations until the recommended infrastructure project can be implemented. Similarly, EMS entails strategies around supporting organizations that provide rapid response and care when responding to collisions causing injury, by stabilizing victims and transporting them to medical facilities.

EXISTING TRAFFIC SAFETY EFFORTS IN THE CITY OF CUPERTINO

The City of Cupertino and partner agencies have already planned and implemented safety strategies corresponding to the 4 E’s of traffic safety. The strategies detailed in this section can supplement these existing programs and concentrate them on high injury collision locations and crash types. These initiatives are summarized in **Table 7**.

Table 7. Existing Efforts Summary

Document/Program	Description	E's Addressed
Santa Clara County Sheriff's Department and Fire Department	Santa Clara County Sheriff's Department and Fire Department provide traffic enforcement and emergency response to collisions occurring in the unincorporated areas, as well as within the City of Cupertino limits.	Enforcement, EMS
City of Cupertino Traffic Calming Program (2020)	The Neighborhood Traffic Calming Program aims to establish a consistent set of guidelines to provide residents and property owners with a means to obtain relief from traffic-related concerns, namely speeding vehicles and cut-through traffic on their residential street. This is accomplished through a multi-step process involving an initial petition, a traffic survey, neighborhood meetings, a postcard survey, and the possible installation of traffic calming measures.	Engineering, Education
Cupertino Safe Routes to School Program	SRTS is a citywide program encouraging students to walk and bike to school and to enhance safety for students walking and biking to school. Looking at student and parent barriers to walking and biking, environmental/ infrastructure issues that make walking and biking easy or difficult, education, and supports and incentives to encourage walking, the program strives to increase the number of students that walk and bike to school.	Education
SRTS School Walk Audit Project	In 2016/17, Cupertino SRTS worked with each public school in Cupertino to develop a list of infrastructure improvements that would make walking and biking safer, and drop-off and pick-up smoother.	Engineering, Education
Capital Improvement Program FY 2023	The City's Capital Improvement Program lists proposed improvements including signal modifications, additional Class I and Class IV bike lanes and signage.	Engineering

FACTORS CONSIDERED IN THE DETERMINATION OF EMPHASIS AREAS

This section presents collision data analysis of collision type, collision factors, facility type, and roadway geometries, analyzed for the various emphasis areas. Emphasis areas were determined by identifying factors that led to the highest number of injury collisions (fatal, severe injury, visible injury, and complaint of pain) with a specific emphasis on F+SI injury collisions. The City of Cupertino data indicates a total of 2,140 collisions between 2015 and 2019, of which 1,526 resulted in PDO collisions, 362 resulted in a complaint of pain injury, 203 resulted in a visible injury, and 49 resulted in a F+SI. Following that, a high collision network was identified that included top 11 high-collision roadway segments and top 10 high-collision intersections. This high collision network experienced 439 injury collisions, including 42 F+SI collisions, and 1,052 PDO collisions, for a total of 1,491 collisions. The data presented below in each emphasis area is based on the fatal, severe injury, visible injury, complaint of pain, and PDO collisions on the high collision network.

Each emphasis area is accompanied by comprehensive programs, policies and countermeasures to reduce collisions on the 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.

Engineering 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.

EMPHASIS AREA 1 – INTERSECTIONS

There were a total of 147 injury collisions (including 24 F+SI collisions) and 354 PDO collisions that occurred at the 10 high-risk intersections in the City of Cupertino. The following collision data is based on only intersection collisions that occurred in the high collision network in the City of Cupertino. **Table 8** describes recommended programs and countermeasures to comprehensively address intersection safety.

11%

Involved pedestrians and bicyclists

32%

Unsafe speed collisions

22%

Occurred at night

Table 8. Emphasis Area 1 Strategies

Objective: To reduce the number of fatal and severe injury collisions at intersections.					
	Strategies	**Performance Measure**	**Agencies/ Organizations**	**Monitoring and Evaluation**	**Funding Sources**
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/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
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.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
Engineering	• S01, Install 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) • 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) • S16/NS04/NS05, Convert intersection to roundabout • S19PB, Pedestrian Scramble • S20PB, Install advance stop bar before crosswalk (Bicycle Box) • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS14, Install raised median on approaches • R01, Add Segment Lighting • R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) • R27, Install delineators, reflectors and/or object markers • Curb extension	Number of intersections improved	City	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	• S05, Install emergency vehicle pre-emption systems • Maintenance and upgradation of existing preemptive system	EMS vehicle response timew	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 2 – UNSAFE SPEED

Of the 1,491 collisions in the high collision network, 368 were caused by unsafe speeding. The following collision analysis is based on unsafe speed collisions in the high collision network in the City of Cupertino. **Table 9** describes recommended programs and countermeasures to comprehensively reduce unsafe speed collisions.

40%
Involved pedestrians and bicyclists

18%
Involved fixed objects

60%
Nighttime collisions

Table 9. Emphasis Area 2 Strategies

Objective: To reduce the number of collisions caused due to unsafe speeding.					
	Strategies	**Performance Measure**	**Agencies/ Organizations**	**Monitoring and Evaluation**	**Funding Sources**
Education	• Conduct public education and outreach activities that elevate the awareness of the dangers of speeding. • Public service announcements regarding increased and strict traffic law enforcement.	Number of public outreach events and public service announcements	City/ School District/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
Enforcement	Increase enforcement, penalties and prosecution for traffic law violations.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
Engineering	• S03, Improve signal timing (coordination, phases, red, yellow, or operation) • S04, Provide Advanced Dilemma-Zone Detection for high speed approaches • S11/NS12, Improve pavement friction (High Friction Surface Treatments) • S12, Install raised median on approaches (S.I.) • S16, Convert intersection to roundabout • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings (NS.I.) • NS11, Improve sight distance to intersection (Clear Sight Triangles) • R14, Road Diet • R25, Install curve advance warning signs (flashing beacon) • R26, Install dynamic/variable speed warning signs • R27, Install delineators, reflectors and/or object markers • Decrease width of travel lanes	Number of locations improved	City	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	• S05, Install emergency vehicle pre-emption systems • Maintenance and upgradation of existing preemptive system	EMS vehicle response time	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 3 – AUTOMOBILE RIGHT-OF-WAY VIOLATIONS

Of the total 1,491 collisions in the high collision network of the City of Cupertino, 323 resulted due to automobile right-of-way violations. The following collision analysis is based on automobile right-of-way violations-related collisions in the high collision network in the City of Cupertino. **Table 10** describes recommended programs and countermeasures to comprehensively reduce automobile right-of-way violations.

14%	58%	30%
Involved pedestrians	**Broadside collisions**	**Nighttime collisions**

Table 10. Emphasis Area 3 Strategies

Objective: To reduce the number of collisions caused due to automobile right-of-way violations.					
	Strategies	**Performance Measure**	**Agencies/ Organizations**	**Monitoring and Evaluation**	**Funding Sources**
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/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
Enforcement	• Increase enforcement, penalties and prosecution for traffic law violations. • Targeted enforcement at locations with most automobile right-of-way violations, and implement strict penalties for such violations.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
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	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	• S05, Install emergency vehicle pre-emption systems • Maintenance and upgradation of existing preemptive system	EMS vehicle response time	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 4 – PEDESTRIAN AND BICYCLIST COLLISIONS

Of the 1,491 collisions in the City of Cupertino's high collision network, 147 collisions involved a pedestrian or a bicyclist. The following collision data is based on pedestrian and bicyclist collisions in the high collision network in the City of Cupertino. **Table 11** describes recommended programs and countermeasures to comprehensively improve pedestrian and bicyclist safety.

33%	32%	21%
Automobile right-of-way violations	**Nighttime collisions**	**Broadside collisions**

Table 11. Emphasis Area 4 Strategies

Objective: To improve environment for pedestrians and bicyclists.					
	Strategies	**Performance Measure**	**Agencies/ Organizations**	**Monitoring and Evaluation**	**Funding Sources**
Education	• Pedestrian safety campaigns and outreach to raise awareness of pedestrian safety needs through media outlets and public events. • Post signage along roadways in areas of anticipated or known high pedestrian activity advising motorists of zero tolerance motor vehicle law enforcement. • Provide public outreach to advise of City efforts toward zero-tolerance motor vehicle law enforcement in high pedestrian activity. • Public education and outreach to raise awareness of bicyclist safety needs and helmets.	Number of outreach events for pedestrian and bicyclist safety campaigns	City/ School District/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
Enforcement	Targeted and zero-tolerance enforcement of motor vehicle speed limit violations, signal/right-of-way violations, pedestrian violations, aggressive driving, distracted driving, and DUI in areas with known or anticipated high pedestrian and bicyclist activity.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
Engineering	• 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) • NS07, Upgrade intersection pavement markings (NS.I.) • NS19PB, Install raised medians (refuge islands) • NS20PB, Install pedestrian crossing at uncontrolled locations (signs and markings only) • NS21PB/R35PB, Install/upgrade pedestrian crossing (with enhanced safety features) • 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 Beacons (RRFB) • High-visibility ladder crosswalks • Mid-block curb extension • Pedestrian crossing flags • Yield sign for pedestrian crossing at crosswalk • Highlighted crossing for bicyclist • Curb extensions at wide approaches	Number of locations improved	City	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	Improve resource deployment for emergency responses at collision sites.	EMS vehicle response time	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 5 – NIGHTTIME COLLISIONS

Out of the total 1,491 collisions on the high collision network in the City of Cupertino, 222 occurred at night (no natural lighting condition). The following collision analysis is based on nighttime collisions on the high collision network in the City of Cupertino. **Table 12** describes recommended programs and countermeasures to comprehensively reduce nighttime collisions.

17%

Involved bicyclists and pedestrians

28%

Rear-end collisions

32%

While making turns

Table 12. Emphasis Area 5 Strategies

Objective: To reduce the number of fatal and severe injury collisions occurring at night (no natural light).					
	Strategies	Performance Measure	Agencies/ Organizations	Monitoring and Evaluation	Funding Sources
Education	Develop awareness program to inform residents of high-risk collision locations, the most common violations and collision types occurring at night.	Number of education campaigns	City/ School District/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
Enforcement	Increase patrolling during nighttime.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
Engineering	• S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number • S09, Install raised pavement markers and striping (Through Intersection) • S10, Install flashing beacons as advance warning (S.I.) • NS01, Intersection Lighting • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings (NS.I.) • R01, Add segment lighting • R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) • R27, Install delineators, reflectors and/or object markers • R37PB/NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB) • Reflective paint on roadside objects, guard walls and poles	Number of locations improved to mitigate night-time collisions	City	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	Improve resource of deployment at night for emergency responses to collision sites.	EMS vehicle response time at night	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 6 – REAR-END COLLISIONS

The City of Cupertino experienced a total 1,491 reported collisions on the high collision network, of which 388 were rear-end collisions. The following collision analysis is based on rear-end collisions on the high collision network in the City of Cupertino. **Table 13** describes recommended programs and countermeasures to comprehensively reduce rear-end collisions.

77%

Unsafe speed collisions

18%

Nighttime collisions

Table 13. Emphasis Area 6 Strategies

Objective: To reduce the number of rear-end collisions.					
	Strategies	Performance Measure	Agencies/ Organizations	Monitoring and Evaluation	Funding Sources
Education	Conduct public education and outreach activities that elevate the awareness of the dangers of rear-end collisions.	Number of public outreach events	City/ School District/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
Enforcement	Increase penalties for repeat offenders.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department)	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
Engineering	• S02, Improve signal hardware: lenses, back-plates with retro-reflective borders, mounting, size, and number • S03, Improve signal timing (coordination, phases, red, yellow, or operation) • S09, Install raised pavement markers and striping (Through Intersection) • S11, Improve pavement friction (High Friction Surface Treatments) • S12, Install raised median on approaches (S.I.) • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings (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) • R05, Install impact attenuators • R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) • R27, Install delineators, reflectors and/or object markers • Add paved shoulders • Simplify turn configurations	Number of locations improved	City	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	• S05, Install emergency vehicle pre-emption systems • Maintenance and upgradation of existing preemptive system	EMS vehicle response time	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 7 – BROADSIDE COLLISIONS

The City of Cupertino had a total of 1,491 collisions reported on the high collision network, with 397 resulting in broadside collisions. The following collision analysis is based on broadside collisions on the high collision network in the City of Cupertino. **Table 14** describes recommended programs and countermeasures to comprehensively reduce broadside collisions.

89%

Involved another motor vehicle

17%

Nighttime collisions

43%

Automobile right-of-way violations

Table 14. Emphasis Area 7 Strategies

Objective: To reduce the number of broadside collisions.					
	Strategies	Performance Measure	Agencies/ Organizations	Monitoring and Evaluation	Funding Sources
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/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
Enforcement	Targeted enforcement at locations with most red light running and stop sign violations, and implement strict penalties for such violations.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
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	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	• S05, Install emergency vehicle pre-emption systems • Maintenance and upgradation of existing preemptive system	EMS vehicle response time	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 8 – IMPROPER DRIVING

Of the 1,491 total collisions in the high collision network, 328 collisions were caused by improper driving actions (improper passing, improper turning, and wrong side of road). The following collision analysis is based on improper driving actions on the high collision network in the City of Cupertino. **Table 15** describes recommended programs and countermeasures to comprehensively reduce improper driving.

21%

Involved fixed objects and parked motor vehicles

33%

Nighttime collisions

13%

Broadside collisions

Table 15. Emphasis Area 8 Strategies

	Objective: To reduce the number of collisions caused due to improper driving.				
	Strategies	**Performance Measure**	**Agencies/ Organizations**	**Monitoring and Evaluation**	**Funding Sources**
Education	• Conduct public education and outreach activities that elevate the awareness of the dangers of improper driving. • Public service announcements regarding increased and strict traffic law enforcement.	Number of public outreach events and public service announcements	City/ School District/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS
Enforcement	Increase enforcement, penalties and prosecution for traffic law violations.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
Engineering	• S09, Install raised pavement markers and striping (Through Intersection) • S11, Improve pavement friction (High Friction Surface Treatments) • S12, Install raised median on approaches (S.I.) • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings (NS.I.) • NS10, Install transverse rumble strips on approaches • NS12, Improve pavement friction (High Friction Surface Treatments) • R03, Install Median Barrier • R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) • R27, Install delineators, reflectors and/or object markers • R30, Install centerline rumble strips/stripes • R31, Install edgeline rumble strips/stripes	Number of locations improved	City	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	Improve resource deployment for emergency responses at collision sites.	EMS vehicle response time	City/ Fire Department	EMS response time compared to the previous year	OTS

EMPHASIS AREA 9 – REDUCE COLLISIONS NEAR SCHOOLS

Cupertino residents, stakeholders, and city officials have all agreed that safety around schools is of paramount importance, with a particular emphasis on reducing collisions near schools. The programs and countermeasures recommended to comprehensively reduce collisions near schools are outlined in **Table 16**.

Table 16. Emphasis Area 9 Strategies

Objective: To reduce the number of collisions within 0.25 miles of school properties.						
Strategies		**Performance Measure**	**Agencies/ Organizations**	**Monitoring and Evaluation**	**Funding Sources**
Education	Continue to support SRTS program and educate school-goers about safe walking practices and activities on road safety.	Number of schools participating	City/ School District/ Sheriff's Department	Online or print survey of public response	ATP BTP OTS SRTS
Enforcement	Targeted enforcement at intersections and roadway segments around schools during pickup and drop-off hours.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance	Sheriff's Department	Number of intersection collisions related to traffic law, violations, compared to the previous year	ATP OTS
Engineering	• S09, Install raised pavement markers and striping (Through Intersection) • S12, Install raised median on approaches (S.I.) • S21PB, Modify signal phasing to implement a Leading Pedestrian Interval (LPI) • NS08, Install Flashing Beacons at Stop-Controlled Intersections • NS21PB, Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features) • NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB) • 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) • R35PB, Install/upgrade pedestrian crossing (with enhanced safety features) • R37PB, Install Rectangular Rapid Flashing Beacon (RRFB)	Number of locations improved	City	Number of intersection crashes related to traffic movement compared to the previous year	HSIP ATP BTP SB1 RSTP MTIP STIP
EMS	Improve resource deployment for emergency responses at collision sites within 0.25 miles of schools.	EMS vehicle response time	City/ Fire Department	EMS response time compared to the previous year	OTS

This page is intentionally left blank.

6. COUNTERMEASURE SELECTION

This page is intentionally left blank.

6 COUNTERMEASURE SELECTION

IDENTIFICATION OF COUNTERMEASURES

Upon the identification of high-risk locations and Emphasis Areas, the next step is to identify appropriate safety countermeasures. The Caltrans LRSM provides 82 countermeasures, of which 21 are eligible in the current HSIP call for signalized intersections, 23 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 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, Google Maps Street View software, and in-person site visits. 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 nine identified Emphasis Areas. The table was refined by selecting up to seven 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 off of 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 HSIP applications already submitted or 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. The countermeasure toolbox in **Appendix C** details the 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 City's Capital Improvement Program.

Table 17 provides a description of each countermeasure 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 D**.

Table 17. Countermeasures Selected for the City of Cupertino

Code	Countermeasure Name	Countermeasure Description	CRF	Federal Funding	Systemic Approach Opportunity
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
S04	Provide Advanced Dilemma Zone Detection for high speed approaches	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.	40%	100%	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
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
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
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
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

Code	Countermeasure Name	Countermeasure Description	CRF	Federal Funding	Systemic Approach Opportunity
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
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
S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Addition of LPI gives pedestrians the opportunity to enter an intersection three-seven seconds before vehicles are given a green indication; only minor signal timing alteration is required.	60%	90%	Very High
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 perceive them.	15%	90%	Very High
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
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
NS09	Install flashing beacons as advance warning (NS.I.)	Installation of advance flashing beacons to call drivers attention to intersection control signs.	30%	90%	Low
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
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

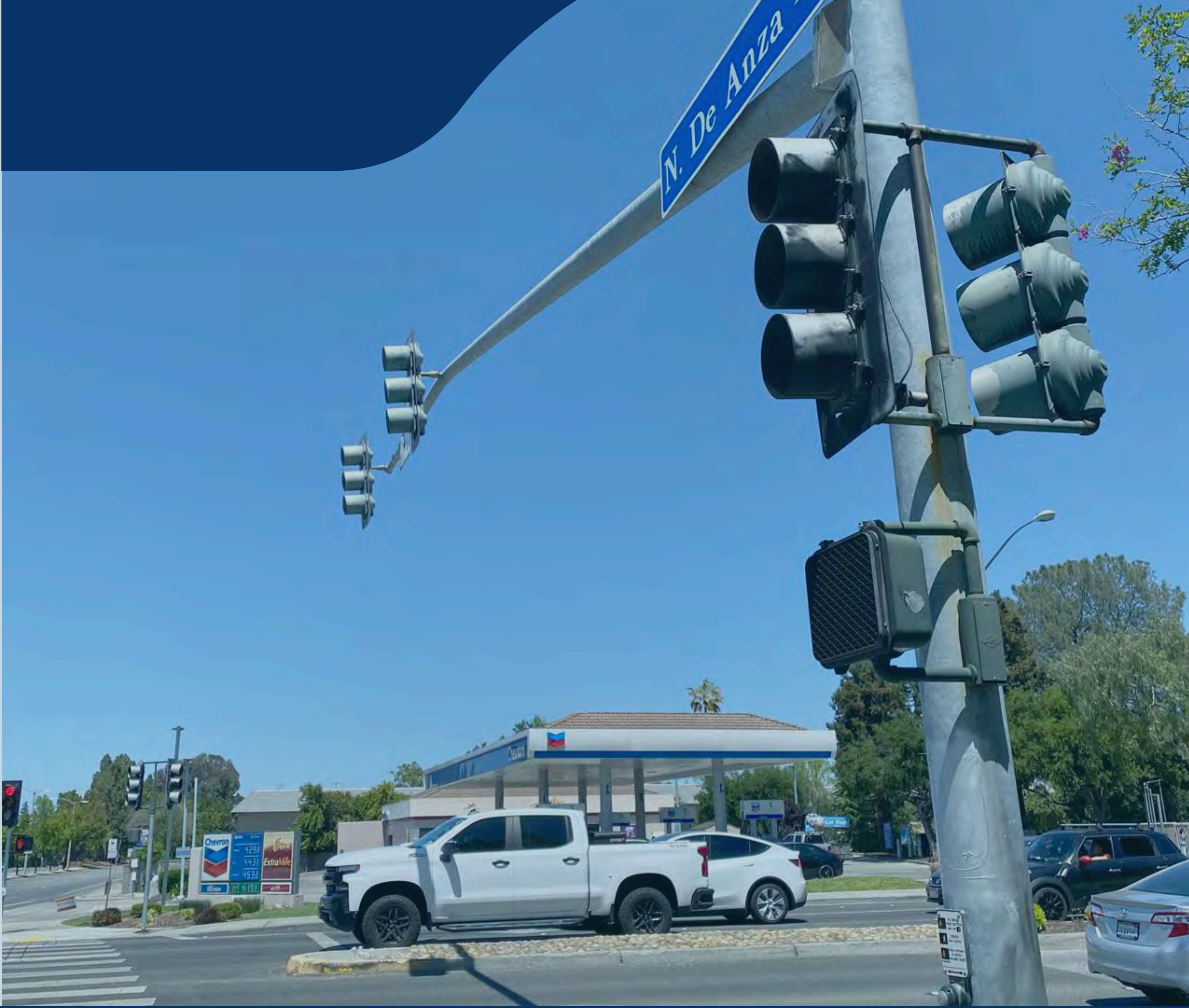
Code	Countermeasure Name	Countermeasure Description	CRF	Federal Funding	Systemic Approach Opportunity
NS12	Improve pavement friction (High Friction Surface Treatments)	Non-signalized Intersections noted as having crashes on wet pavements or under dry conditions when the pavement friction available is 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
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
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
R01	Add segment lighting	Adds the provision of lighting along segments where none exists or is inadequate to address nighttime collisions.	35%	90%	Medium
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
R10PB	Install pedestrian median fencing	Adds fencing along a median on a roadway segment to prevent pedestrians from jay-walking outside of a marked crosswalk.	35%	90%	Low
R14	Road Diet (Reduce travel lanes from four to three and add a two-way left turn lane and bike lanes)	Reduces the number of travel lanes and allows for the installation of bike lanes to help increase bicycle safety and reduce vehicle speeds.	35%	90%	Medium

Code	Countermeasure Name	Countermeasure Description	CRF	Federal Funding	Systemic Approach Opportunity
R21	Improve pavement friction (High Friction Surface Treatment)	Roadway segments 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%	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	Provides a visual feedback of a motorist's speed.	30%	90%	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 fixed object that cannot easily be removed.	15%	90%	Very High
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%	90%	High
R33PB	Install separated bike lanes	Installs a bike lane with a vertical separation from adjacent travel lanes to increase comfort and safety of bicyclists.	45%	90%	Medium
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)	RRFB should be installed in the median rather than the far-side of the roadway if there is a pedestrian refuge or other type of median. Use in combination with a crosswalk, wheelchair ramps, advance yield or stop pavement markings and signs may be used to supplement RRFBs.	35%	90%	Medium

** Code: S - Signalized intersection improvements*

NS - Non-signalized intersection improvements

R - Roadway segment improvements



7. VIABLE SAFETY PROJECTS

This page is intentionally left blank.

7 VIABLE SAFETY PROJECTS

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

Specific countermeasures and improvements were selected from the 2020 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 six 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. 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 Cupertino.

Table 18 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 (2020).

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

Typically, the next step in the process will be to prepare grant ready materials for HSIP applications. It should be noted that while the LRSP projects were based on high-injury locations, HSIP applications can be expanded to include many locations across the City. Based off this list of Safety Projects and countermeasures, three HSIP applications, for Safety Projects 1, 5, and 6, were submitted for HSIP Cycle 11 review. Note that 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 Cupertino, with a preliminary cost estimate for each location and the resulting B/C 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. 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. Please note, the BCR ratios below and in Attachment E may not match exactly based off those projects submitted for HSIP Cycle 11 review.

Table 18. List of Viable Safety Projects

Location	CM1	CM2	CM3	Cost per Location	Total Cost	B/C Ratio
Project 1: Safety at Signalized Intersections - Unsafe Speed and Rear End						
De Anza Blvd and Homestead Rd	S02			$465,523	$2,077,306	21.40
Bandley Dr and Stevens Creek Blvd	S02	S09		$27,318		
Pruneridge Ave and Wolfe Rd	S02		S11	$258,550		
Franco Ct/Forge Wy and Homestead Rd	S02	S09	S11	$140,875		
De Anza Blvd and Mariani Ave	S02			$26,245		
Blaney Ave and Stevens Creek Blvd	S02	S09	S11	$286,665		
S De Anza Blvd and Rodrigues Ave	S02	S09	S11	$238,018		
Barranca Dr and Homestead Rd	S02		S11	$142,129		
De Anza Blvd and Stevens Creek Blvd	S02		S11	$465,479		
Calle De Barcelona and Miller Ave	S02	S09		$26,506		

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

S09 – Install raised pavement markers (through intersection)

S11 – Improve pavement friction (High Friction Surface Treatment)

Location	CM1	CM2	CM3	Cost per Location	Total Cost	B/C Ratio
Project 2: Safety at Signalized Intersections - Improper Turning, Auto ROW Violations, and Broadside						
De Anza Blvd and Homestead Rd	S03			$9,425	$783,725	38.24
Bandley Dr and Stevens Creek Blvd	S03	S08		$197,200		
Prunridge Ave and Wolfe Rd	S03			$9,425		
De Anza Blvd and Mariani Ave	S03	S08		$242,150		
Barranca Dr and Homestead Rd	S03			$9,425		
De Anza Blvd and Stevens Creek Blvd	S03			$9,425		
Calle De Barcelona and Miller Ave			S07	$7,250		
De Anza Blvd and Rodrigues		S08		$116,725		
Blaney Ave and Stevens Creek Rd		S08		$182,700		

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

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

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

Project 3: Safety at Signalized Intersections - Pedestrian and Bicyclist Safety						
De Anza Blvd and Homestead Rd	S20PB	S21PB		$114,985	$1,076,277	61.16
Bandley Dr and Stevens Creek Blvd	S20PB	S21PB		$118,117		
Prunridge Ave and Wolfe Rd		S21PB		$7,250		
Franco Ct/Forge Wy and Homestead Rd	S20PB	S21PB		$108,460		
De Anza Blvd and Mariani Ave	S20PB			$129,195		
Blaney Ave and Stevens Creek Blvd	S20PB			$170,433		
Barranca Dr and Homestead Rd	S20PB	S21PB		$8,131		
De Anza Blvd and Stevens Creek Blvd	S20PB	S21PB		$275,384		
Calle De Barcelona and Miller Ave	S20PB	S21PB		$64,322		

S20PB – Install advance stop bar (Bicycle box)

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

Location	CM1	CM2	CM3	Cost per Location	Total Cost	B/C Ratio
Project 4: Safety on Roadway Segments - Improve Pedestrian and Bicyclist Safety						
Stevens Creek Blvd: Janice Ave to Judy Ave	R22	R27		$127,999	$621,617	102.13
De Anza Blvd: Pacifica Dr to Homestead Rd	R22	R27		$40,528		
Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R22	R27		$96,860		
Wolfe Rd/Miller Ave: Homestead Rd to SCB	R22	R27		$49,191		
Bollinger Rd: Lawrence Expy to De Anza Blvd	R22	R27		$64,598		
McClellan Rd: Imperial Ave to De Anza Blvd	R22	R27		$80,910		
Bubb Rd: Stevens Creek Blvd to Columbus Ave	R22	R27		$43,500		
Mariani Ave: Bandley Dr to Infinite Loop	R22	R27		$7,359		
Tantau Ave: Forge Dr to Pruneridge Ave	R22	R27		$15,660		
Blaney Ave: Homestead to Stevens Creek Blvd	R22	R27		$32,589		
N Stelling Rd: Alves Dr to Greenleaf Dr	R22	R27		$22,838		
Rainbow Dr: Bubb Rd to Stelling Rd		R27		$6,090		
Rainbow Dr: De Anza to Stelling Rd		R27		$1,305		
McCellan Rd: Byrne Ave to Stevens Canyon Rd		R27		$7,830		
Miller Ave: Bollinger Rd to Stevens Creek Blvd		R27		$6,960		
Calvert Dr: Stevens Creek Blvd to Tilson Ave		R27		$2,610		
Finch Ave: Stevens Creek Blvd to Tilson Ave		R27		$3,480		
Stelling Rd: Rainbow Dr to Prospect Rd		R27		$4,350		
Prospect Rd: Stelling Rd to De Anza Blvd		R27		$5,220		
Valley Green Dr: Stelling Rd to Beardon Dr		R27		$1,740		

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

R27 - Install delineators, reflectors and/or object markers

Location	CM1	CM2	CM3	Cost per Location	Total Cost	B/C Ratio
Project 5: Safety on Roadway Segments - Unsafe Speed Violations and Rear End						
Stevens Creek Blvd: Janice Ave to Judy Ave	R21	R26		$748,345	$4,134,835	235.06
De Anza Blvd: Pacifica Dr to Homestead Rd	R21			$546,505		
Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R21			$322,915		
Wolfe Rd/Miller Ave: Homestead Rd to Bollinger Rd	R21			$396,720		
Bollinger Rd: Lawrence Expy to De Anza Blvd	R21	R26		$796,993		
McClellan Rd: Imperial Ave to Stelling Rd	R21	R26		$258,267		
Bubb Rd: Stevens Creek Blvd to Columbus Ave		R26		$41,615		
Mariani Ave: Bandley Dr to Infinite Loop	R21			$304,210		
Tantau Ave: Forge Dr to Pruneridge Ave	R21	R26		$448,768		
Blaney Ave: Homestead to Stevens Creek Blvd		R26		$41,615		
Rainbow Dr: Bubb Rd to Stelling Rd		R26		$20,808		
Rainbow Dr: De Anza Blvd to Stelling Rd		R26		$20,808		
McCellan Rd: Byrne Ave to Stevens Canyon Rd		R26		$41,615		
Miller Ave: Bollinger Rd to Stevens Creek Blvd		R26		$41,615		
Stelling Rd: McClellan Rd to Prospect Rd		R26		$41,615		
Valley Green Dr between Stelling Rd and Beardon Dr		R26		$20,808		
Calvert Dr between Stevens Creek Blvd to Tilson Ave		R26		$20,808		
Mary Ave between Parkwood Dr to Meteor Dr		R26		$20,808		

R21 - Improve pavement friction (High Friction Surface Treatment)
R26 – Install dynamic/variable speed warning signs

Location	CM1	CM2	CM3	Cost per Location	Total Cost	B/C Ratio
6: Safety on Roadway Segments - Improve Pedestrian and Bicyclist Safety						
Stevens Creek Blvd: Janice Ave to Judy Ave	R33PB	R35PB		$306,240	$4,622,174	24.18
De Anza Blvd: Pacifica Dr to Homestead Rd	R33PB	R35PB		$633,940		
Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R33PB	R35PB		$559,694		
Wolfe Rd/Miller Ave: Homestead Rd to SCB		R35PB		$58,754		
Bollinger Rd: Lawrence Expy to De Anza Blvd	R33PB	R35PB		$604,636		
McClellan Rd: Imperial Ave to De Anza Blvd		R35PB		$101,500		
Bubb Rd: Stevens Creek Blvd to Columbus Ave		R35PB		$287,680		
Blaney Ave: Homestead to Stevens Creek Blvd		R35PB		$174,377		
N Stelling Rd: Alves Dr to Greenleaf Dr	R33PB	R35PB		$127,600		
Rainbow Dr: Bubb Rd to Stelling Rd		R35PB	R37PB	$268,598		
Rainbow Dr: De Anza Blvd to Stelling Rd		R35PB	R37PB	$226,635		
McCellan Rd: Byrne Ave to Stevens Canyon Rd		R35PB	R37PB	$201,550		
Miller Ave: Bollinger Rd to Stevens Creek Blvd		R35PB		$64,815		
Finch Ave: Stevens Creek Blvd to Tilson Ave		R35PB	R37PB	$294,205		
Stelling Rd: Rainbow Dr to Prospect Rd		R35PB		$72,500		
Prospect Rd: Stelling Rd to De Anza Blvd		R35PB	R37PB	$403,622		
Valley Green Dr: Stelling Rd to Beardon Dr		R35PB	R37PB	$235,828		

WR33PB – Install separated bike lanes

R35PB – Install/upgrade pedestrian crossing (with enhanced safety features)

R37PB – Install Rectangular Rapid Flashing Beacon (RRFB)

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

This page is intentionally left blank.

8. IMPLEMENTATION AND EVALUATION

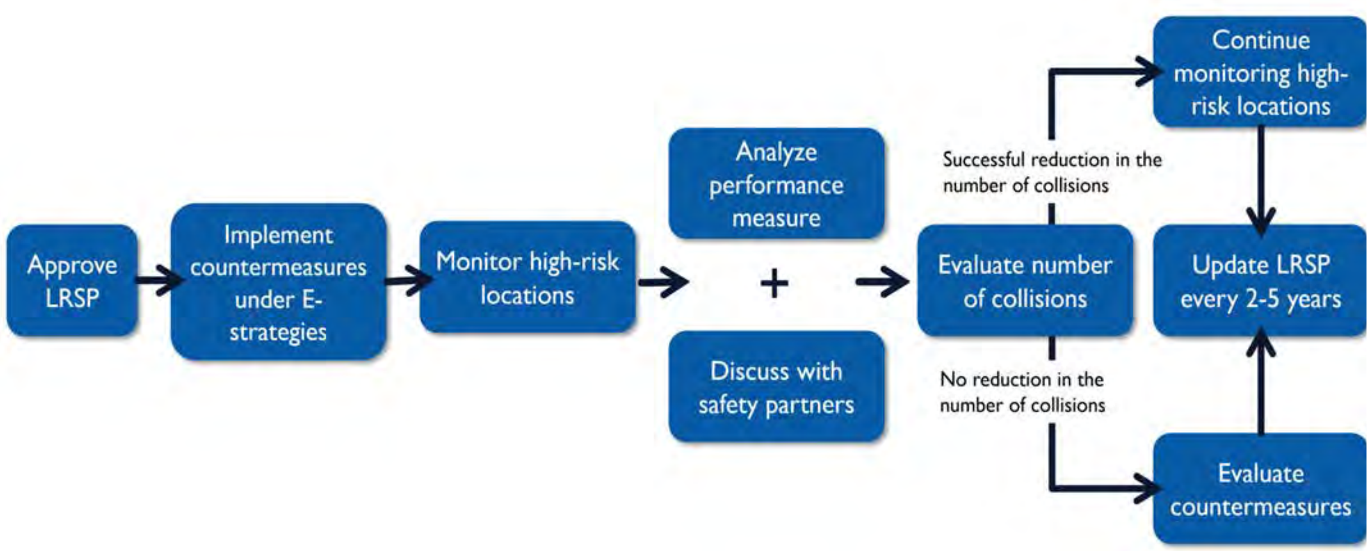
This page is intentionally left blank.

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, 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 Cupertino 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.



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 as listed in **Table 19**.

Table 19. 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	~$650 million per cycle (every two years)	2023	Engineering, Education	Can use used for most active transportation related safety projects as well as education programs. Funding available through Caltrans or MTC.
Highway Safety Improvement Program	Caltrans		May 2024	Engineering	Most common grant source for safety projects.
One Bay Area Grant (OBAG) Cycle 3	MTC (Combines various federal funds)	$750 million for 2023-2026	County & Local Program: 2022	Engineering	Distributes federal funding to cities and counties in MTC region.
Office of Traffic Safety Grants	California Office of Traffic Safety	Varies by grant	Closes January 31st 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		TBD; most recent call in 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	TBD; most recent call in 2020	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	TBD	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.

Funding Source	Funding Agency	Amount Available	Next Estimated Call for Projects	Applicable E's	Notes
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	USDOT	~$1 billion	Current call opened 2022	Engineering	Funds action plans, supplemental action plan activities, and implementation projects that address roadway safety.

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, ensures the effectiveness of the countermeasures for each emphasis area, and help make decisions on the need 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.

APPENDIX A: PUBLIC COMMENTS

Public Outreach

1. Recurring posts on social media accounts Next-door, Facebook and Twitter.
2. Recurring City-wide Emails.
3. E-mailed Safe Route to schools' group, Bicycle Advocacy Groups and SR2S Newsletter.
4. City magazine - Scene Article. (February and March Editions)
5. LRSP Flyer on City's digital signage.
6. LRSP flyer in the library.
7. Requested CUSD and FUHSD staff to spread the message.
8. Requested Walk Bike Cupertino organization to spread the message.
9. Table at Earth and Arbor Day Festival on April 23,2022.
10. Table at Cupertino High School and Monta Vista High School at SR2S Bike Encouragement Event on April 1st, 2022.
11. Presentation at Safe Route to Working Group on February 9th, 2022.
12. Presentation at Bicycle Pedestrian Commission on February 16th, 2022.
13. Two community meetings. (1ST – March 20th,2022; 2nd - July 11th,2022)
14. Dropped a copy of 1st Community meeting presentation in the Senior Center.
15. Two stake holder meetings. (1ST – February 3rd, 2022; 2nd – July 6th, 2022)

Facebook Comments:

Post date – January 19, 2022

Jamie Chen

I live close to McClellan and walk the dog every early in the morning. the other day， I tried to avoid a person walking toward me, so I walked to the bike lane and was tripped by the island, my whole upper body was in the main road。 And I was lucky, that there wasn't any car coming。

so, no matter what you design， be smart， don't let residents get into more traps.

Post date – March 21, 2022

Gail Anne Cleveland

If you want safety and less cars. Cut down on all of this high-rise growth. Vallco is going to make a mess out of our city. High-rise buildings will bring tons of cars. Cupertino traffic is bad enough. Think about it before you create a lager mess for the people of this city.

Twitter Comments:

Post date – December 9, 2021

Kitty Moore @thekittymoore

The collision location and severity map provides some very important information.

Post date – January 19, 2022

$T^{H}(A/\Omega)M^{h}$ @StackThomas

Sounds like a good idea "on paper". How much of what is getting changed in which neighborhood, and how drastically in what ways, are the factors that really matter.

Nextdoor Comments:

Post date – January 19, 2022

San R. • Inspiration Heights

First the mess at Wolfe and Stevens Creek traffic junction has to be undone.

Post date – February 8, 2022

Joe B. • Monta Vista

I would like to see Drivers training offered in the schools, especially with all the student drivers bumper stickers on local vehicles!

1st COMMUNITY WORKSHOP

DATE: 03/30/2022

AGENDA

1. Introduce the LRSP project
2. Project Timeline
3. Your Role
4. Present Collision Analysis Findings
5. Project Online Dashboard and Map Input Platform
6. Open Discussion
7. Next Steps

CITY OF CUPERTINO

LOCAL ROAD SAFETY PLAN

COMMUNITY WORKSHOP

MARCH 30, 2022

CITY OF CUPERTINO

TJKM

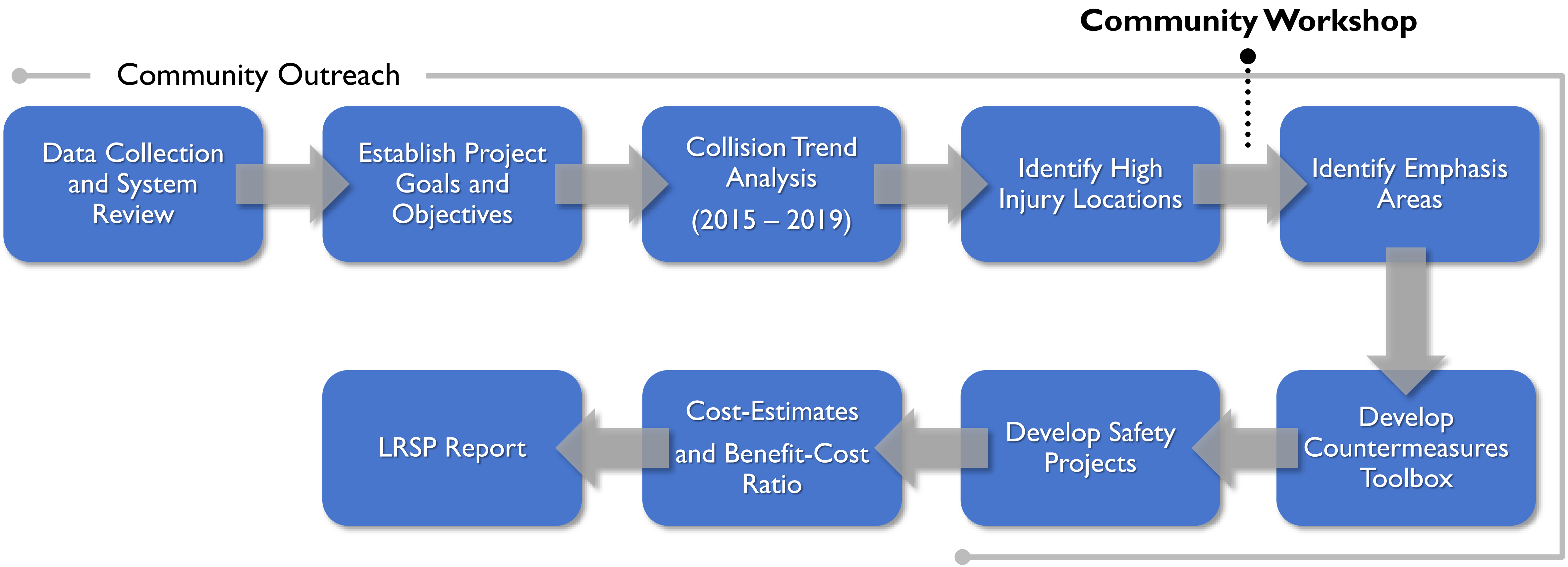
PURPOSE OF TODAY'S MEETING

- Introduce the LRSP project
- Project Timeline
- Your Role
- Present Collision Analysis Findings
- Project Online Dashboard and Map Input Platform
- Open Discussion
- Next Steps

WHAT IS A LOCAL ROAD SAFETY PLAN (LRSP)?

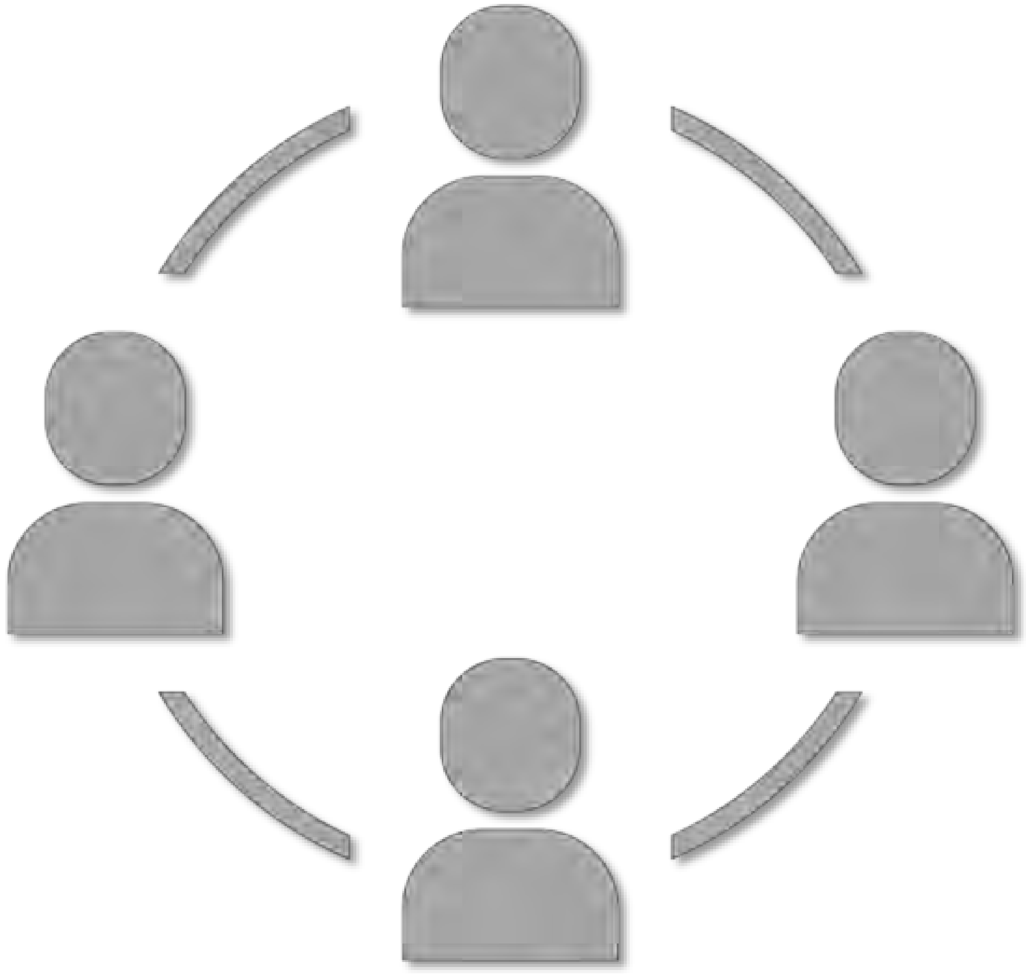
- **Overarching Goals:**
  - To reduce fatalities and severe injuries (F+SI) on the City's roadways and intersections
  - To identify, analyze and prioritize roadway and intersection safety improvements on local roads
  - A required document to be eligible for the Highway Safety Improvement Program (HSIP) grant funding
- **Considers Engineering and Non-engineering Strategies**
  - **4 E's of Traffic Safety:** Education, Enforcement, Engineering and Emergency Medical Services (EMS)

PROJECT STATUS AND MILESTONES

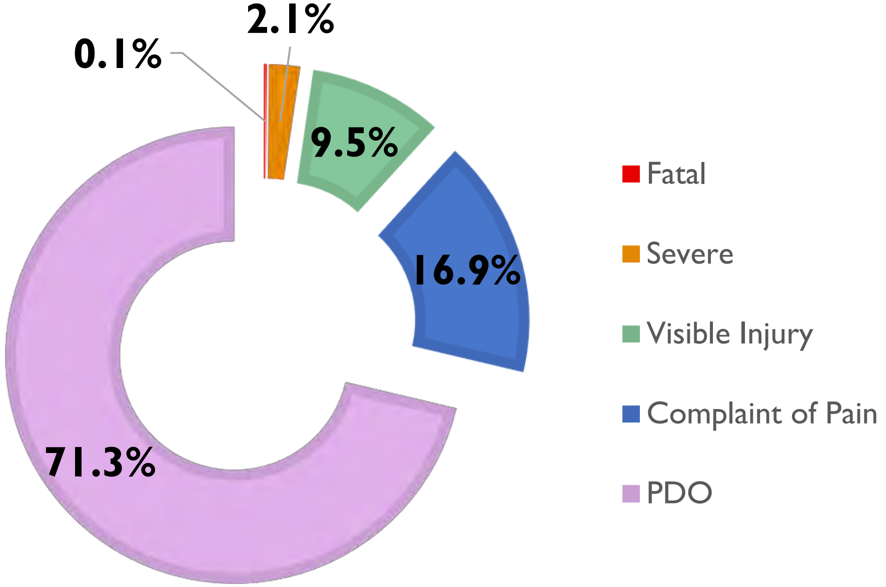


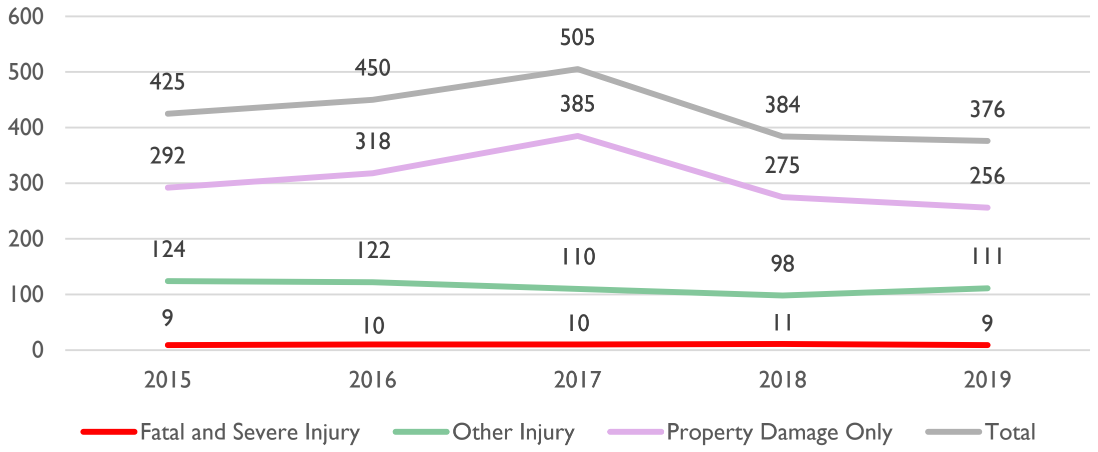
YOUR ROLE AS SAFETY CHAMPIONS

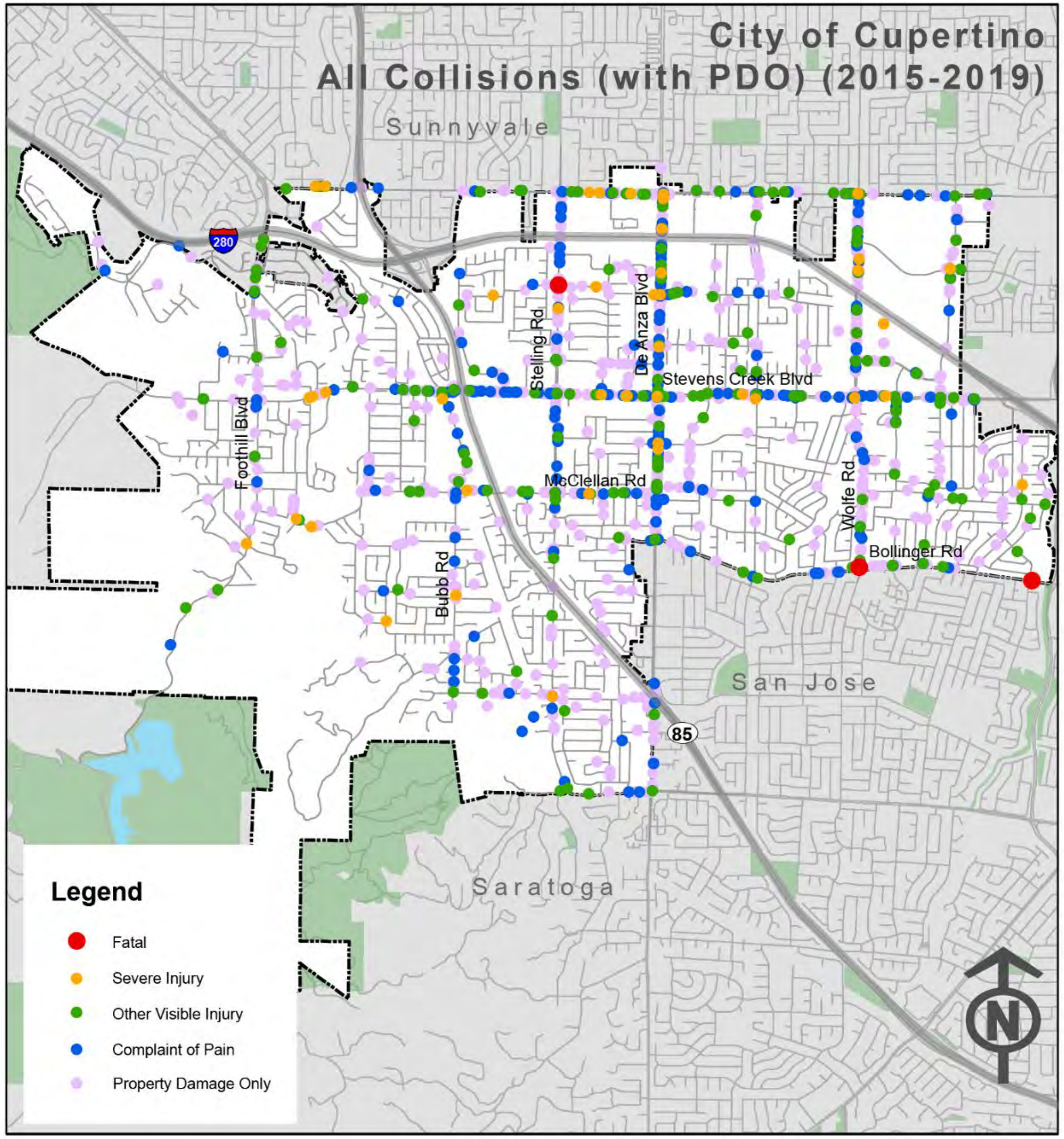
- Tell us about traffic safety related issues
- Tell us what you heard from other members of the community
- Report your concerns in an interactive survey at www.engagecupertino.org/lrsp
- Share the survey with your friends and family
- Stay informed about the project



ANALYSIS FINDINGS (2015 – 2019): ALL COLLISIONS

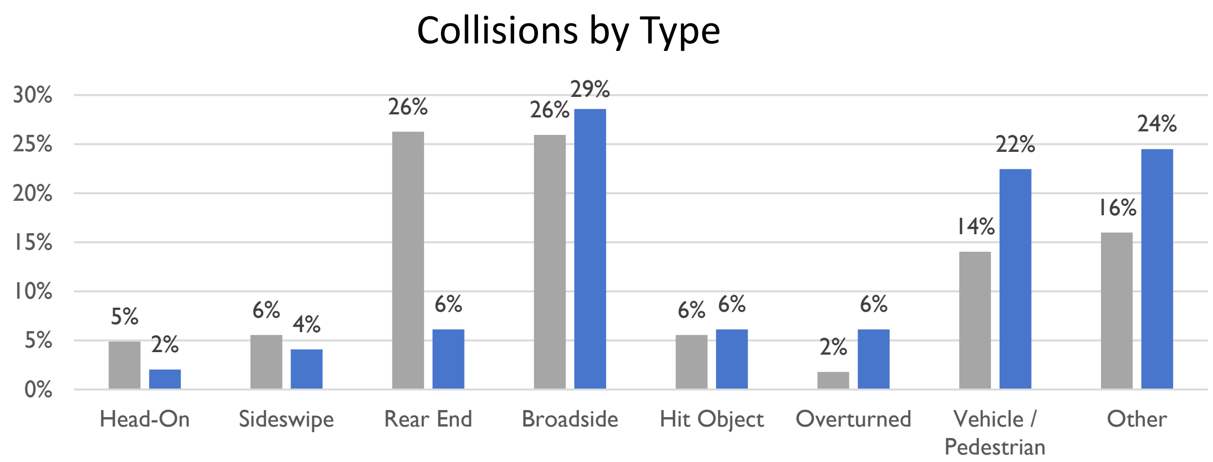


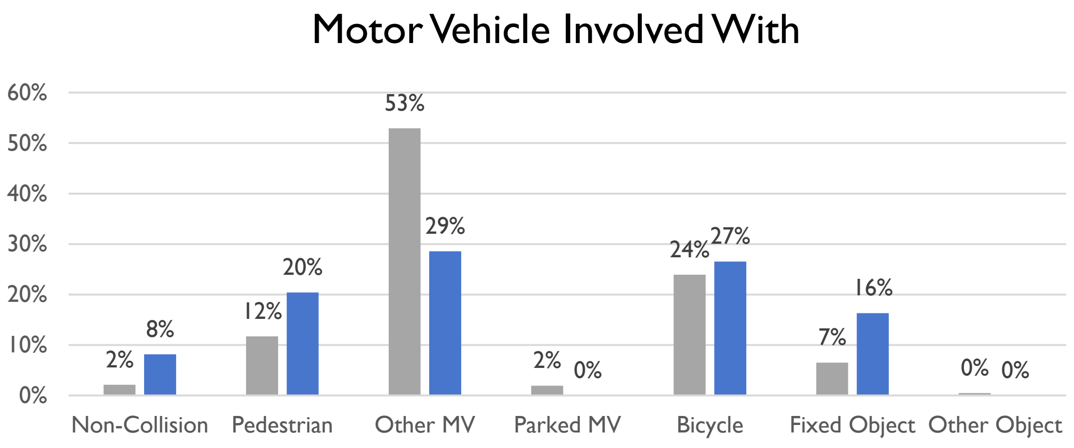


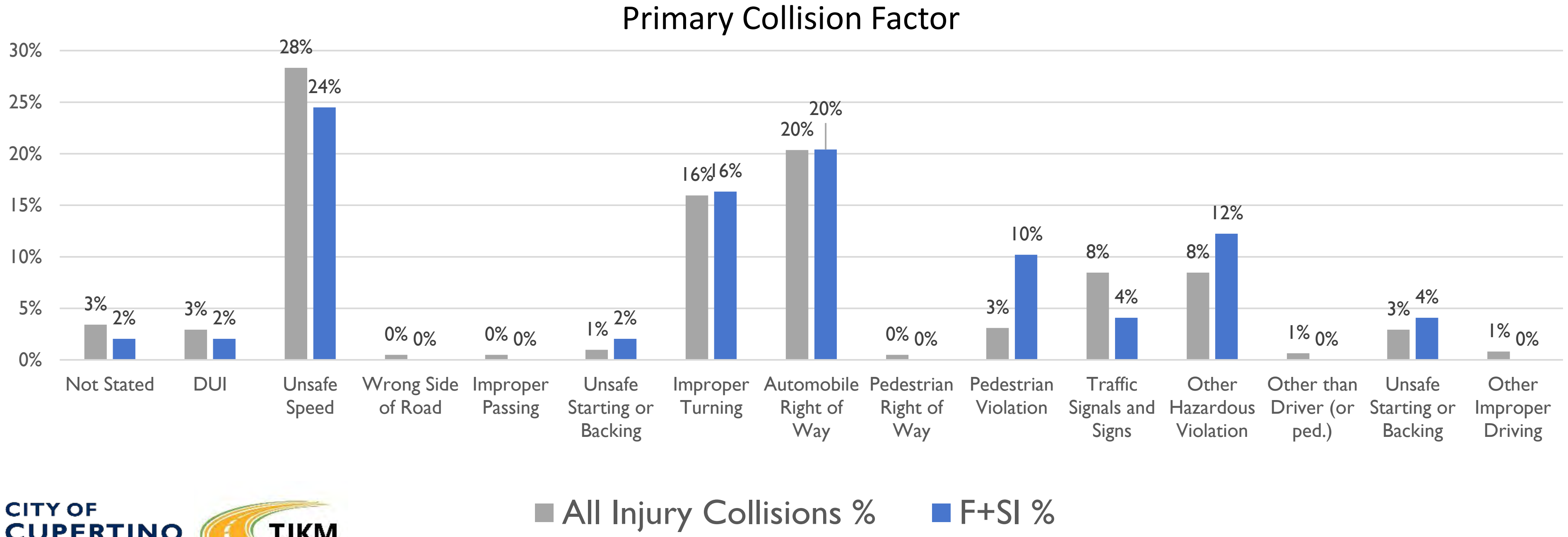


CITY OF CUPERTINO TJKM

ANALYSIS FINDINGS (2015 – 2019): INJURY COLLISIONS





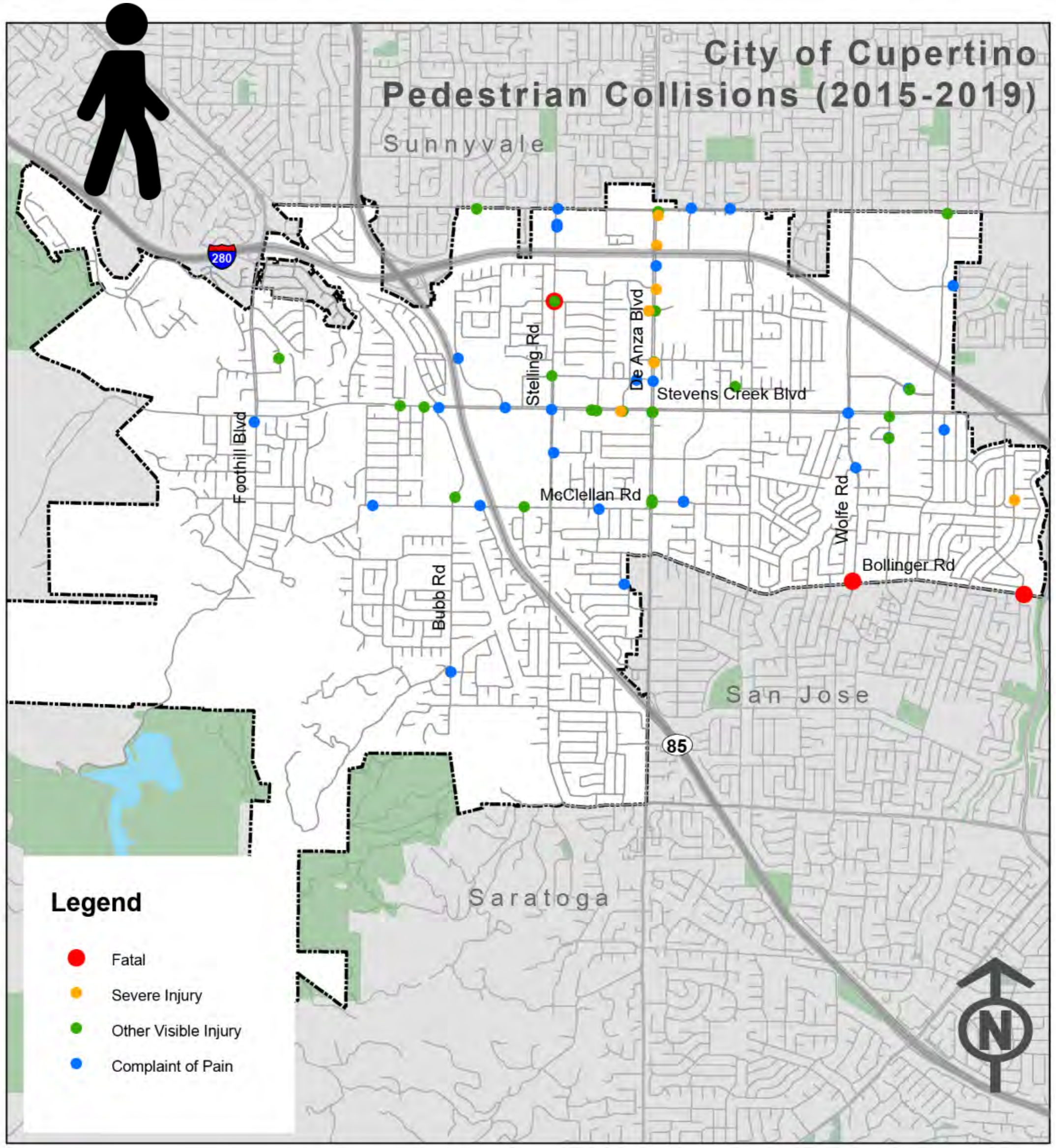


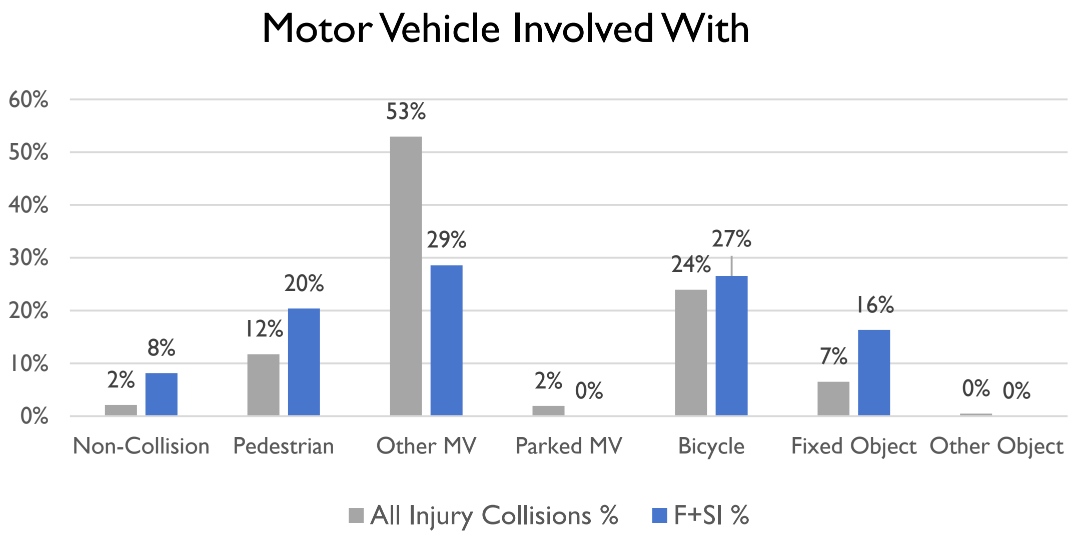
Note:

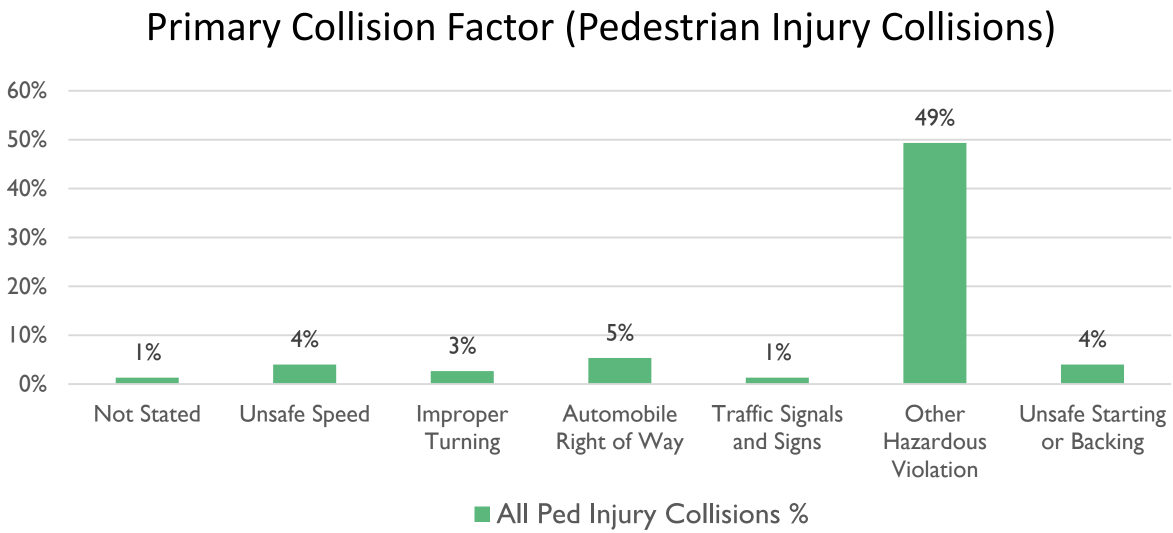
- Injury Collisions – fatal, severe injury, other visible injury and complaint of pain collisions
- F+SI – fatal and severe injury collisions

CITY OF CUPERTINO TJKM

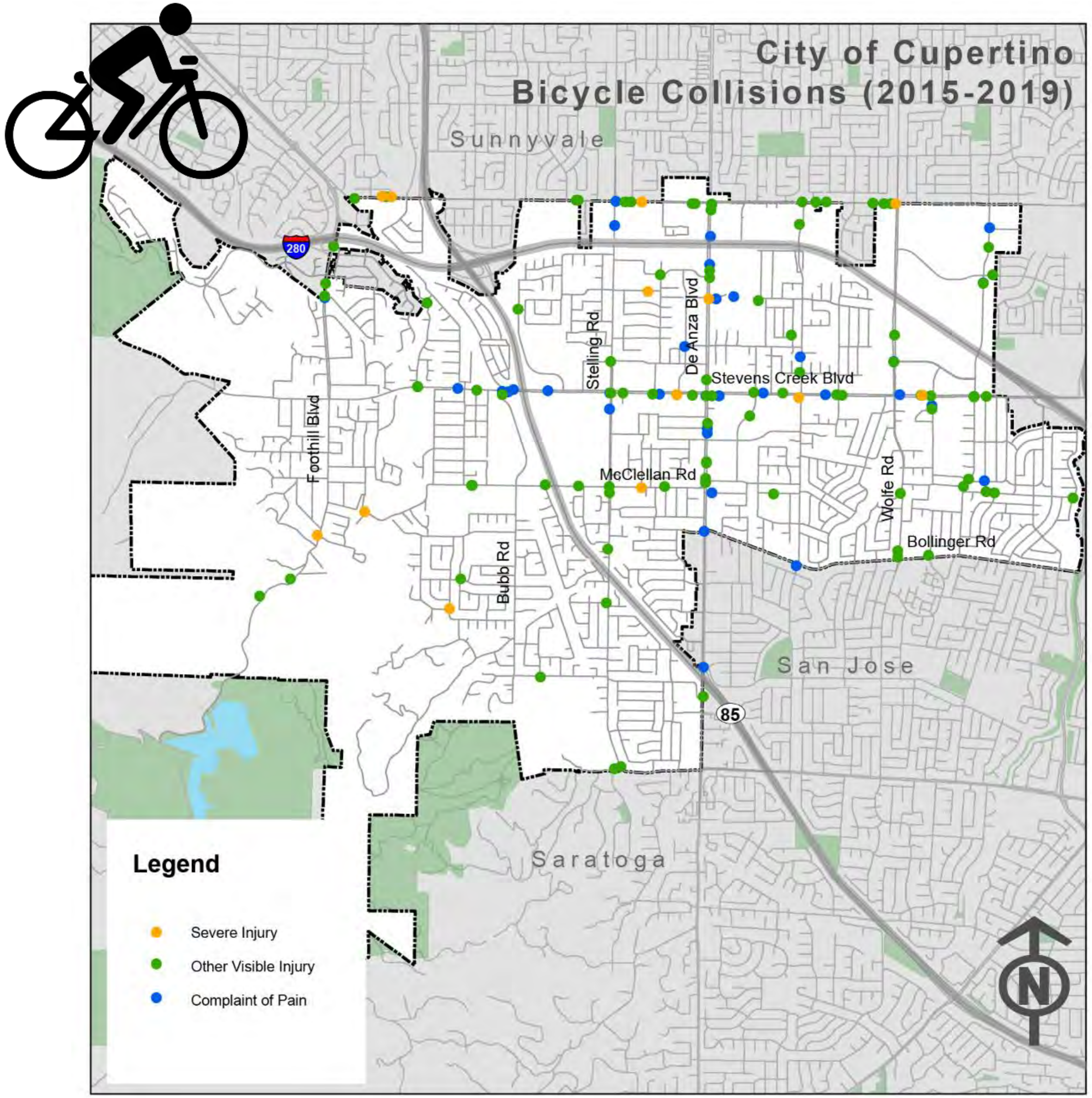
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)

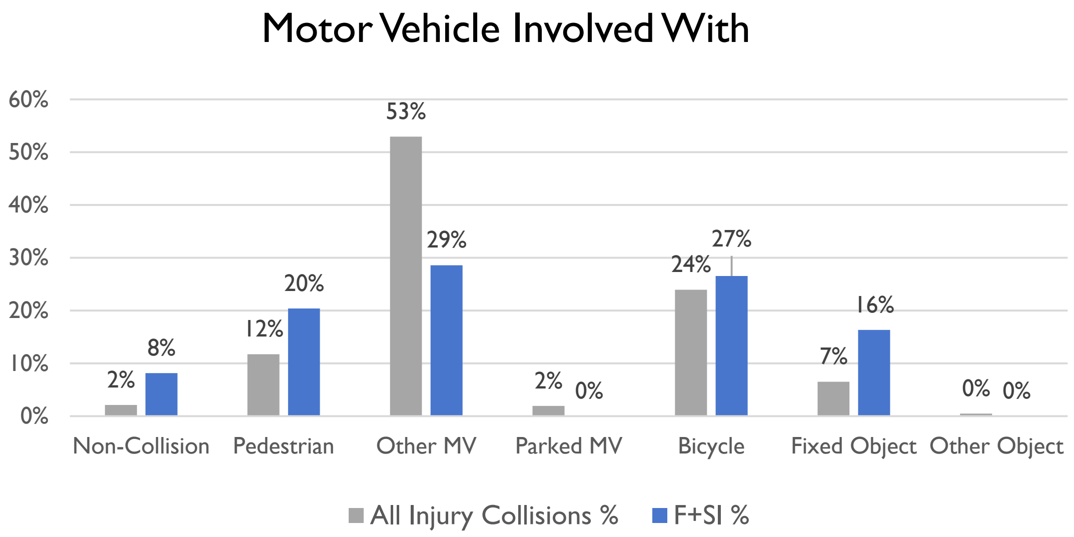


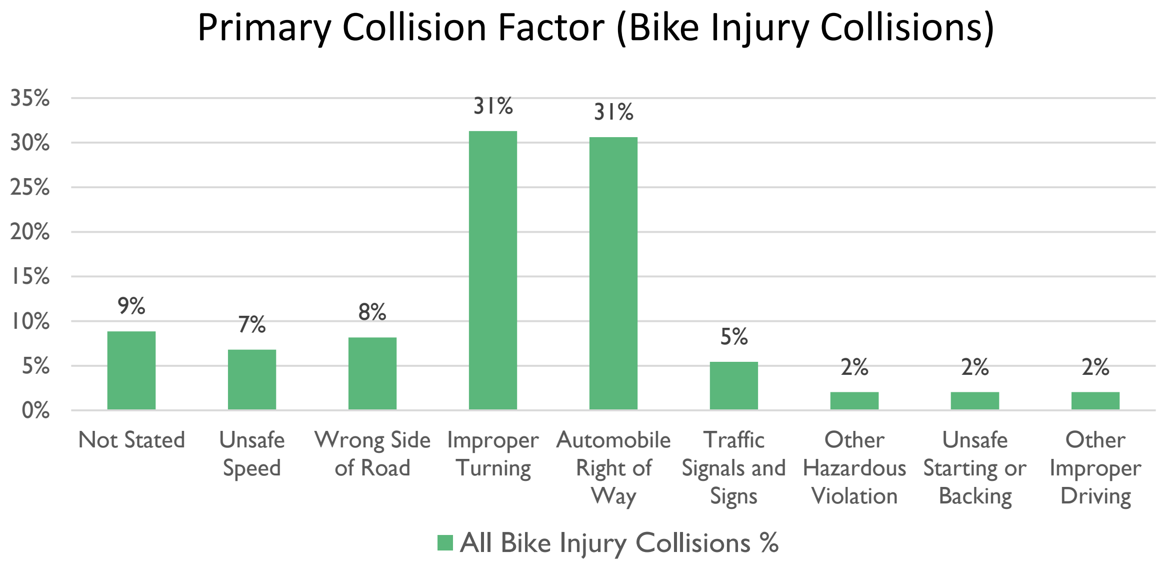




PROMINENT COLLISION TRENDS (INJURY COLLISIONS)







EPDO SCORE

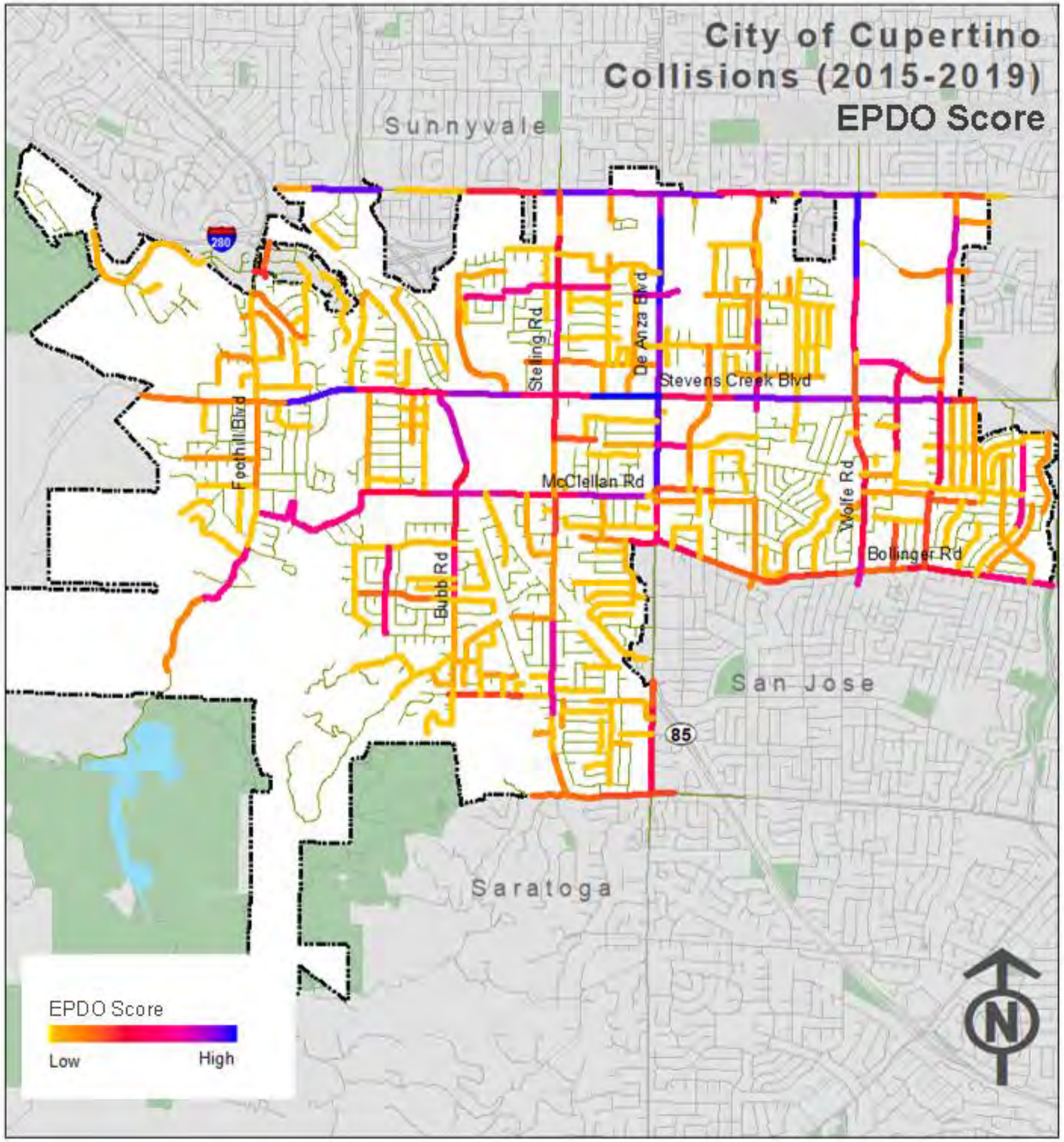
SOURCE : LOCAL ROAD SAFETY MANUAL 2020, CALTRANS

Equivalent property damage only (EPDO) methodology calculates a weighted score to identify locations that are experiencing more severe crashes. Methodology used to prioritize high risk intersections and roadway segments.

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

EPDO Score (HSIP Cycle 10) = (165 x Fatal) + (165 x Severe Injury) + (11 x Other Visible) + (6 x Complaint of Pain) + (1 x PDO)

- **STEP 1:** Divide each roadway into 0.3 mile segments
- **STEP 2:** Find the total number of collisions by severity on each segment
- **STEP 3:** Calculate each segment's EPDO Score
- **STEP 4:** Assign EPDO Score to each roadway segment
- **STEP 5:** Find locations with high severity and most frequency

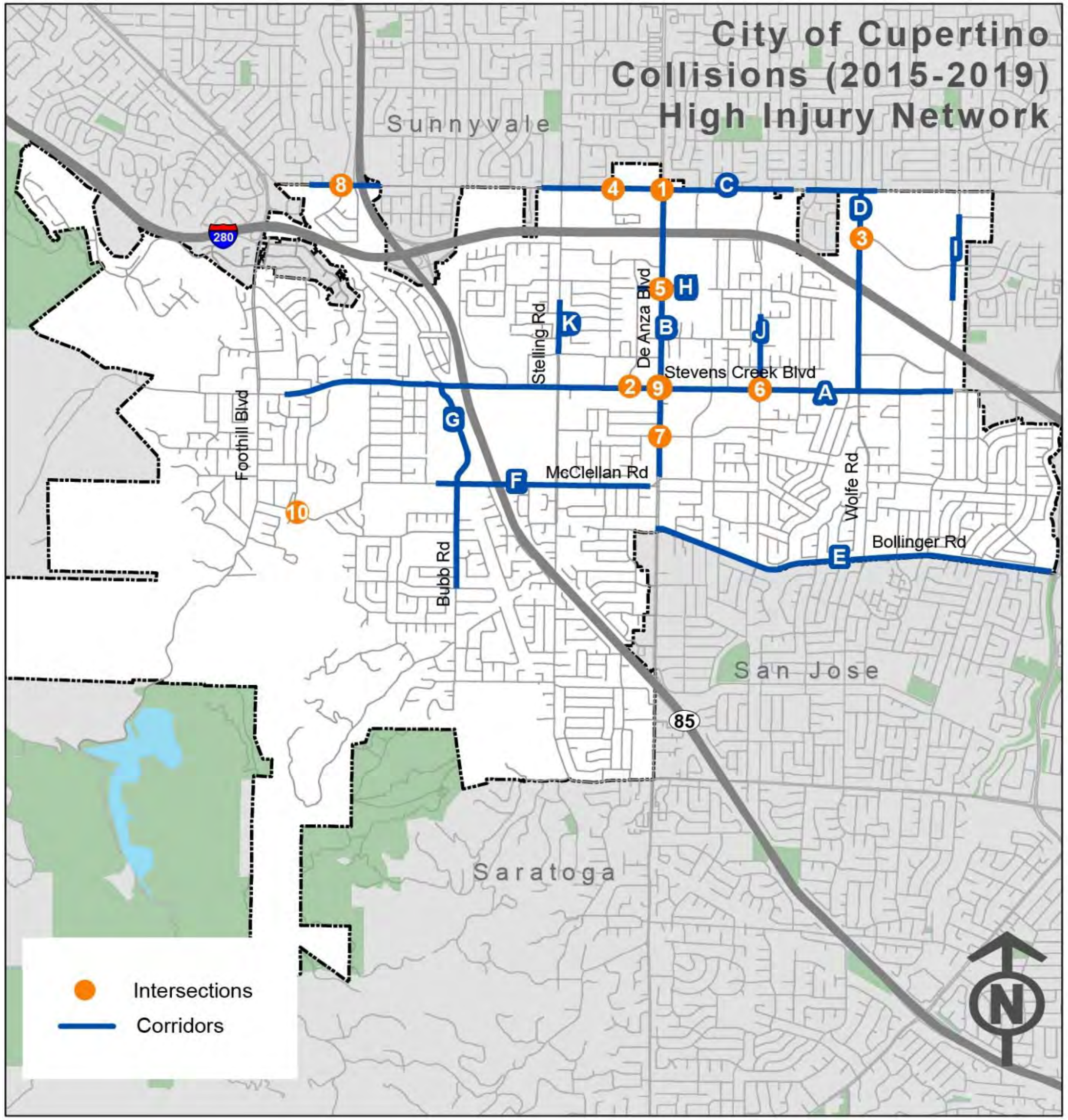


CITY OF CUPERTINO

TJKM

HIGH-RISK INTERSECTIONS

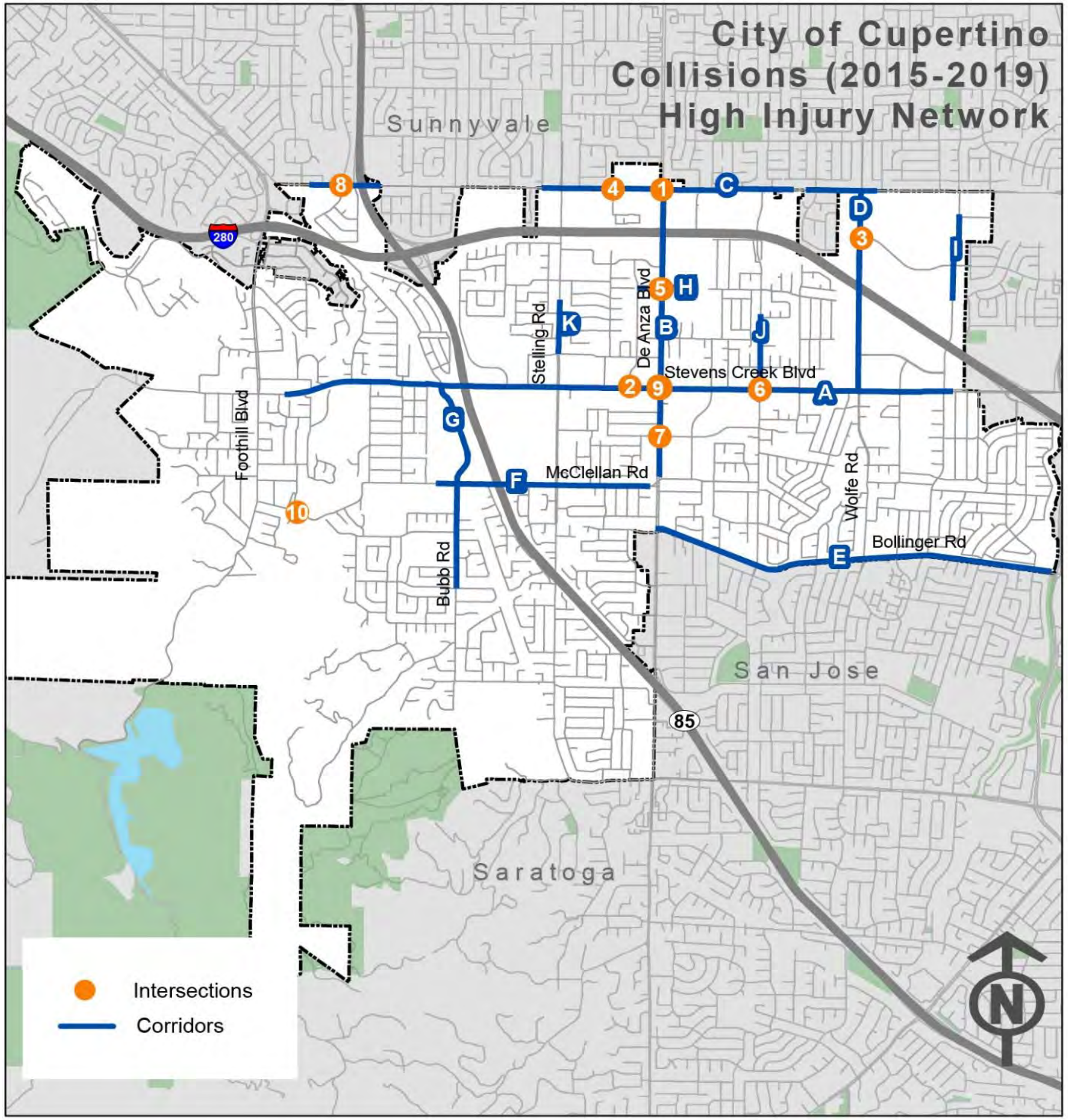
ID	Intersection	EPDO Score
1	De Anza Blvd and Homestead Rd	1,028
2	Bandley Dr and Stevens Creek Blvd	800
3	Prunridge Ave and Wolfe Ave	546
4	Franco Ct/Forge Way and Homestead Rd	545
5	De Anza Blvd and Mariani Ave	465
6	Blaney Ave and Stevens Creek Blvd	400
7	S De Anza Blvd and Rodrigues Ave	388
8	Barranca Dr and Homestead Rd	373
9	De Anza Blvd and Stevens Creek Blvd	373
10	McClellan Rd and Clubhouse Ln	349



CITY OF CUPERTINO
TJKM

HIGH-RISK CORRIDORS

ID	Corridors	EPDO Score
A	Stevens Creek Blvd: Janice Ave to Judy Ave	3,139
B	De Anza Blvd: Pacifica Dr to Homestead Rd	2,096
C	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	1,666
D	Wolfe Rd: Homestead Rd to Bollinger Rd	729
E	Bollinger Rd: Lawrence Expy to De Anza Blvd	562
F	McClellan Rd: Imperial Ave to De Anza Blvd	490
G	Bubb Rd: Stevens Creek Blvd to Columbus Ave	436
H	Mariani Ave: Bandly Dr to Infinite Loop	209
I	Tantau Ave: Forge Dr to Pruneridge Ave	208
J	Blaney Ave: Pear Tree Ln to Stevens Creek Blvd	192
H	N Stelling Rd: Alves Dr to Greenleaf Dr	192



CITY OF CUPERTINO TJKM

OPEN DISCUSSION

- Questions on the project dashboard.
- Questions on the LRSP process and your role.
- Traffic and safety-related concerns on roads.
- Particular areas of concerns (not highlighted here).
- Concerns you may have heard from others.

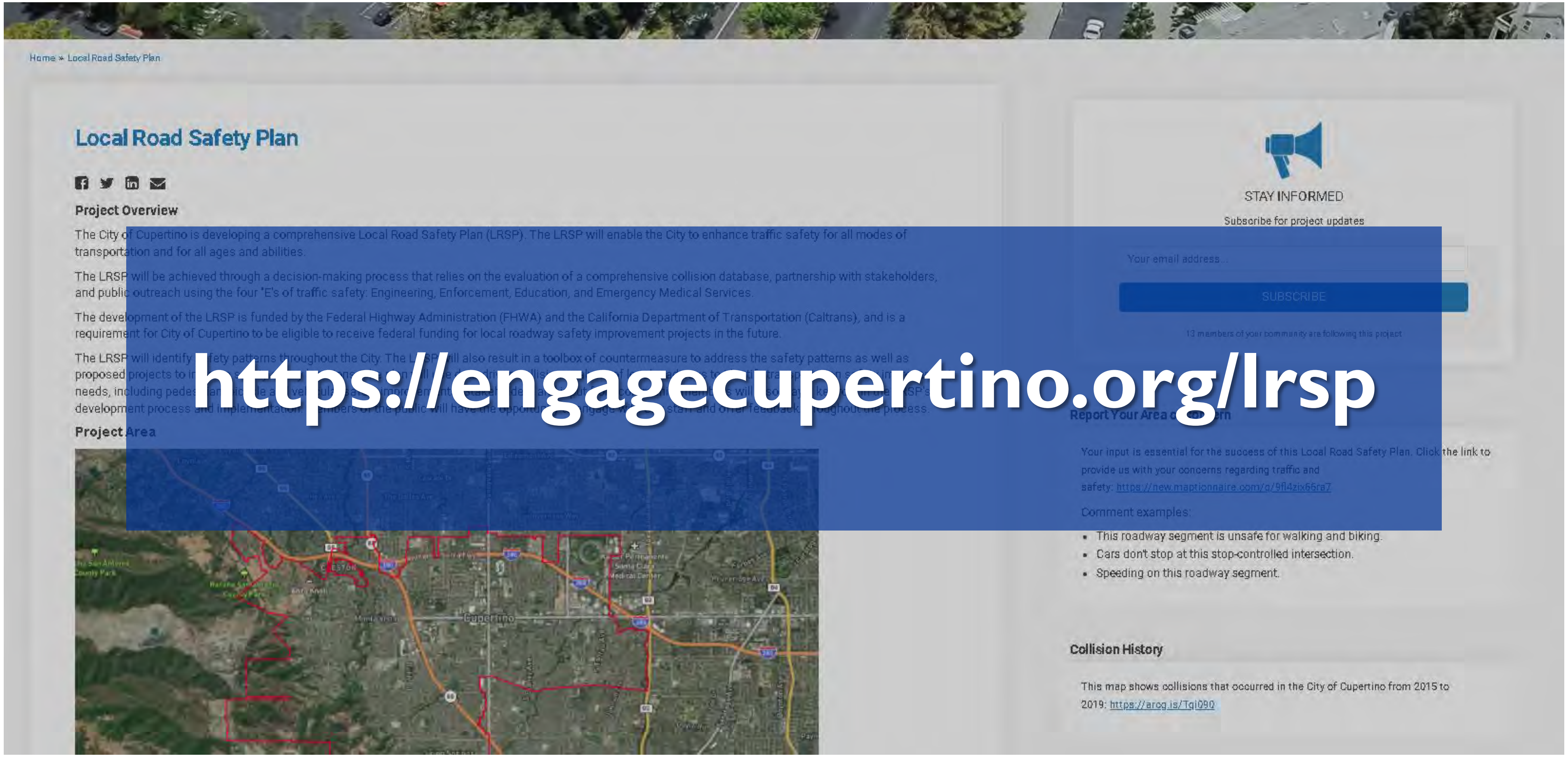
CITY OF CUPERTINO

TJKM

NEXT STEPS

- Summarize public input
- Identify and prioritize engineering countermeasures and non-engineering strategies
- Develop safety projects for all high-risk locations
- Develop final plan

PROJECT DASHBOARD IS LIVE!

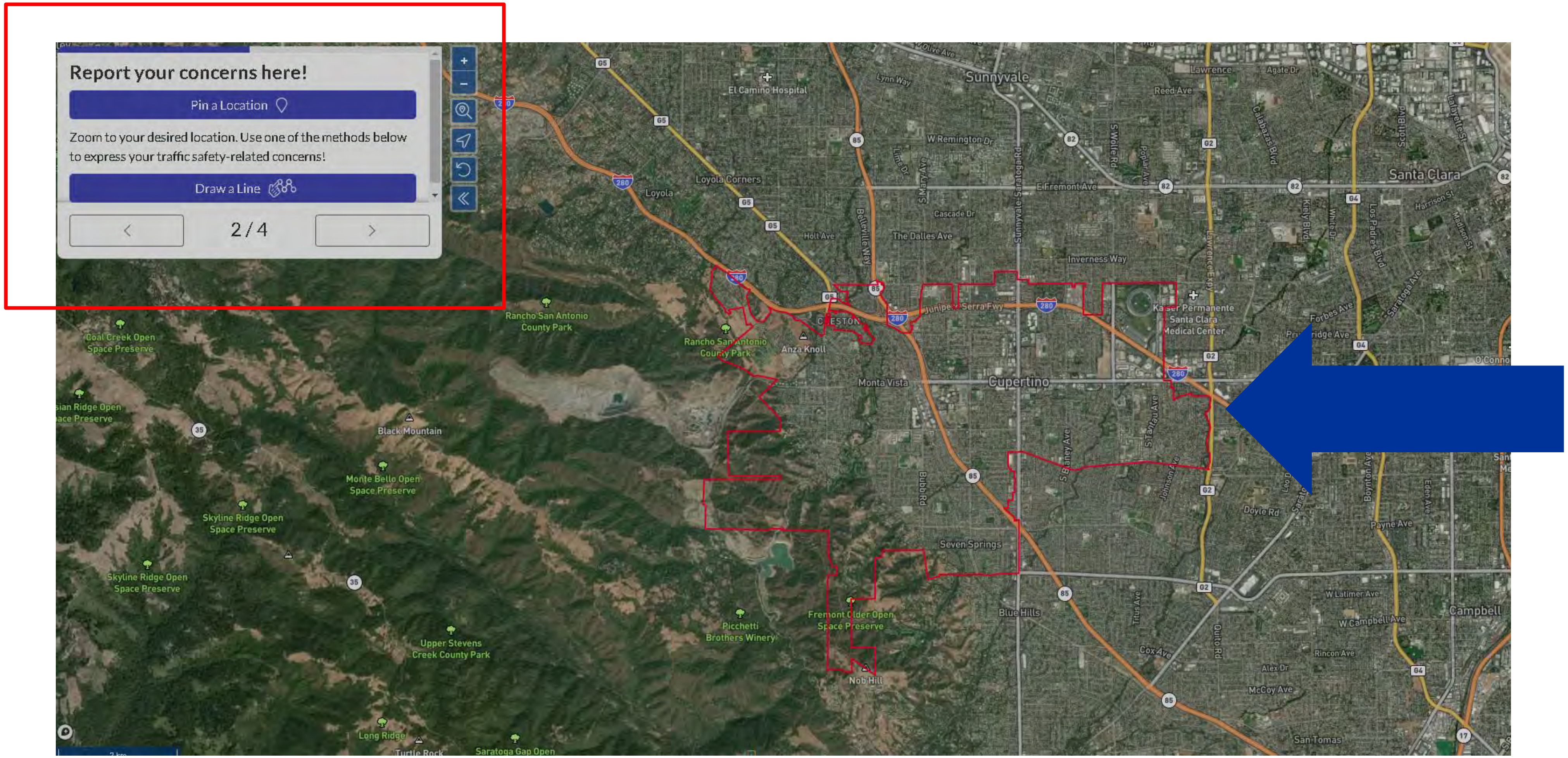


https://engagecupertino.org/lrsp

REPORT YOUR CONCERNS

CITY OF CUPERTINO TJKM

GIVE US LOCATION-BASED FEEDBACK/COMMENTS!



Community Workshop Meeting Minutes

Date: March 30, 2022
Time: 6:00 pm to 7:00 pm

Attendees
City of Cupertino - Residents, Prashanth Dullu, David Stillman
TJKM - Ruta Jariwala, Riya Debnath

Meeting Notes

1. David Stillman (City of Cupertino) starts the presentation with an introduction to the project and the project development team members.
2. Ruta Jariwala (TJKM) describes the purpose of the community workshop:
    a. The project timeline
    b. Community's role
    c. Collision analysis findings
    d. Project online dashboard and map input platform
    e. Open discussion on traffic and safety concerns of residents
    f. Next steps
3. The overarching goals of the project are described:
    a. To reduce fatal and severe injuries on the City's roadways and intersections
    b. To identify, analyze and prioritize roadway and intersection safety improvements on local roads
    c. As a requirement document to be eligible for the Highway Safety Improvement Program (HSIP)
4. It is further discussed that apart from engineering measures, non-engineering measures such as education, enforcement, and emergency medical services are also considered.
5. The project status and milestones are discussed:
    a. Data collection and system review of relevant planning documents are conducted at the onset of the project
    b. Project goals and objectives are established

c. Conducted collision trend analysis for collision data between 2015 and 2019
d. Identified high injury locations
e. Conducting stakeholder meetings and community workshops to discuss the aforementioned milestones
f. After the community workshop, identify emphasis areas
g. Develop a countermeasure toolbox to explicitly identify countermeasures relevant to the City of Cupertino roads
h. Develop safety projects, cost estimates, and benefit-cost ratio and select the best for HSIP application
i. Develop the LRSP report

6. The role of community members is identified as safety champions. Their role is to:
    a. Inform the project team about their traffic safety-related issues
    b. Inform what they hear from other members of the community
    c. Report their concerns in an interactive survey at www.engagecupertino.org/lrsp
    d. Share the surrey with friends and family
    e. Stay informed about project
7. Riya Debnath (TJKM) informs analysis findings for collision data collected between 2015 and 2019:
    a. Chart demonstrating the percentage division of fatal, severe injury, visible injury, complaint of pain, and property damage only (PDO) collisions
    b. Yearly collision trend
    c. Map illustrating the distribution of collisions
8. Additional collision analysis illustrated for injury collisions only (fatal, severe injury, visible injury, and complaint of pain):
    a. Collision types
    b. Motor vehicle involved with or modes involved
    c. Primary collision factors
9. Pedestrian and bicycle injury collision trends illustrated:
    a. Maps illustrating pedestrian and bicycle collisions
    b. Charts demonstrating primary collision factors responsible for pedestrian and bicycle injury collisions

10. Equivalent property damage only (EPD) scoring explained: methodology to calculate a weighted score to identify locations experiencing more severe crashes. A map illustrates low to high EPDO scores on roadway segments in the City of Cupertino.
11. Top 10 high-risk intersections informed along with their rank and EPDO scores. A map illustrates the location of the high-risk intersections.
12. Top 10 high-risk corridors informed along with their rank and EPDO scores. A map illustrates the location of the high-risk intersections.
13. The presentation opened to the participants for any questions about the project dashboard, the LRSP process, and the community's role. Participants were encouraged to raise their hands in zoom and discuss their traffic and safety-related concerns, and particular areas of concern.
14. Project online dashboard demonstrated with a quick tutorial on how to access, the contents of the dashboard, and how to participate in the interactive survey to provide their traffic safety concerns.
15. Prashanth Dullu (City of Cupertino) facilitates the meeting.
16. Resident comment 1: Did not see accidents on Bollinger Road near Estates Drive that involved their residence. So, wondered about the accuracy of data collection and if collisions reported through San Jose on Bollinger were not included in the analysis.
    a. Project team answers: collision may be reported in the City of San Jose, for the maps we only included collisions that were reported in the City of Cupertino. But overall, we accounted for multi-jurisdictional collisions on the shared roads.
17. Resident comment 2: Founder of Walk-Bike Cupertino. Great roads attract traffic - commuter traffic is a safety problem for Cupertino. Speed dampening is required throughout the City. Additionally, right-turn on red should be eliminated throughout the City as it is a problem for pedestrians crossing intersections.
18. Resident comment 3: San Jose is developing a Costco near Westgate Shopping Center which is at Lawrence-Saratoga-Prospect. Concerns regarding increased traffic and delivery vehicles/trucks which could impede traffic on Lawrence and Bollinger. Right-turn on red should not be eliminated on Cupertino roads or else it may cause backlogs.
19. Resident comment 4: Regarding right-turn on red, going east on Stevens Creek (across from Main Street/Finch Avenue) - Why is there a whole new light system wrapped with a plastic bag - it has been well over a year but it is at the same stage.

  a. Project team answers: The same system was installed at Stevens Creek and Wolfe Road but there were some complications in the operations part and the City wanted to get it right at the Wolfe before starting operations at Stevens Creek/Main Street/Finch Avenue. At the moment it is working well at Wolfe Road and improvements at Finch Avenue will be made to mimic the operation.
  b. Right-turn only restriction from the right lane will be removed.

20. Resident comment 5: Other Cities put out signs that there's a change in the traffic system. The City of Cupertino should implement warning signage to inform the residents of such changes. Inform the schools to educate students on what to do while using active modes of transportation.
21. Resident comment 6: Schools have educated parents and students about how to use bike lanes. Students representing Safe Routes to School created a traffic safety video and shared it with all the students and parents of Cupertino schools in 2021. The changes at Finch and Stevens Creek and good and safe for school students. Concern about the LRSP - it seems the plan is focused on collision data (with reported accidents). Maps are brought to walk and bike school days where students are asked to point out on a map where they had near misses.
    a. Project team answers: Yes, it seems plans like LRSP, SSAR focuses on collision data. But they are just means of a start to get a preliminary idea of what the situation is. That is why we conduct community outreach to gather information on those near misses.
    b. Participants were encouraged to spread the word about the survey.
22. Resident comment 7: Where can we find this information in the future? Is there any targeted outreach done for people with specific needs like wheelchair users, limited mobility, and seniors? Ambassadors at the intersections with no right-turn on red to pass the information on flyers to motorists. In intersections with unprotected left turns like Pacifica and S Blaney - there is limited visibility at the intersection. Revisit some of the speed limits. For example, S Blaney is a residential street but the speed limit is 30 mph and school students use the road to commute.
    a. Project team answers: Project website link shared in the chatbox.
23. David Stillman (City of Cupertino) concludes the meeting.

2^{ND} COMMUNITY WORKSHOP

DATE: 07/11/2022

AGENDA

1. Project Status and Milestones
2. Collision Analysis Findings
3. Emphasis Areas
4. Draft Engineering & Non-Engineering Countermeasures
5. Questions/Comments
6. Implementation/Next Steps

CITY OF CUPERTINO

LOCAL ROAD SAFETY PLAN

2ND COMMUNITY WORKSHOP

JULY 11, 2022

CITY OF CUPERTINO

TJKM

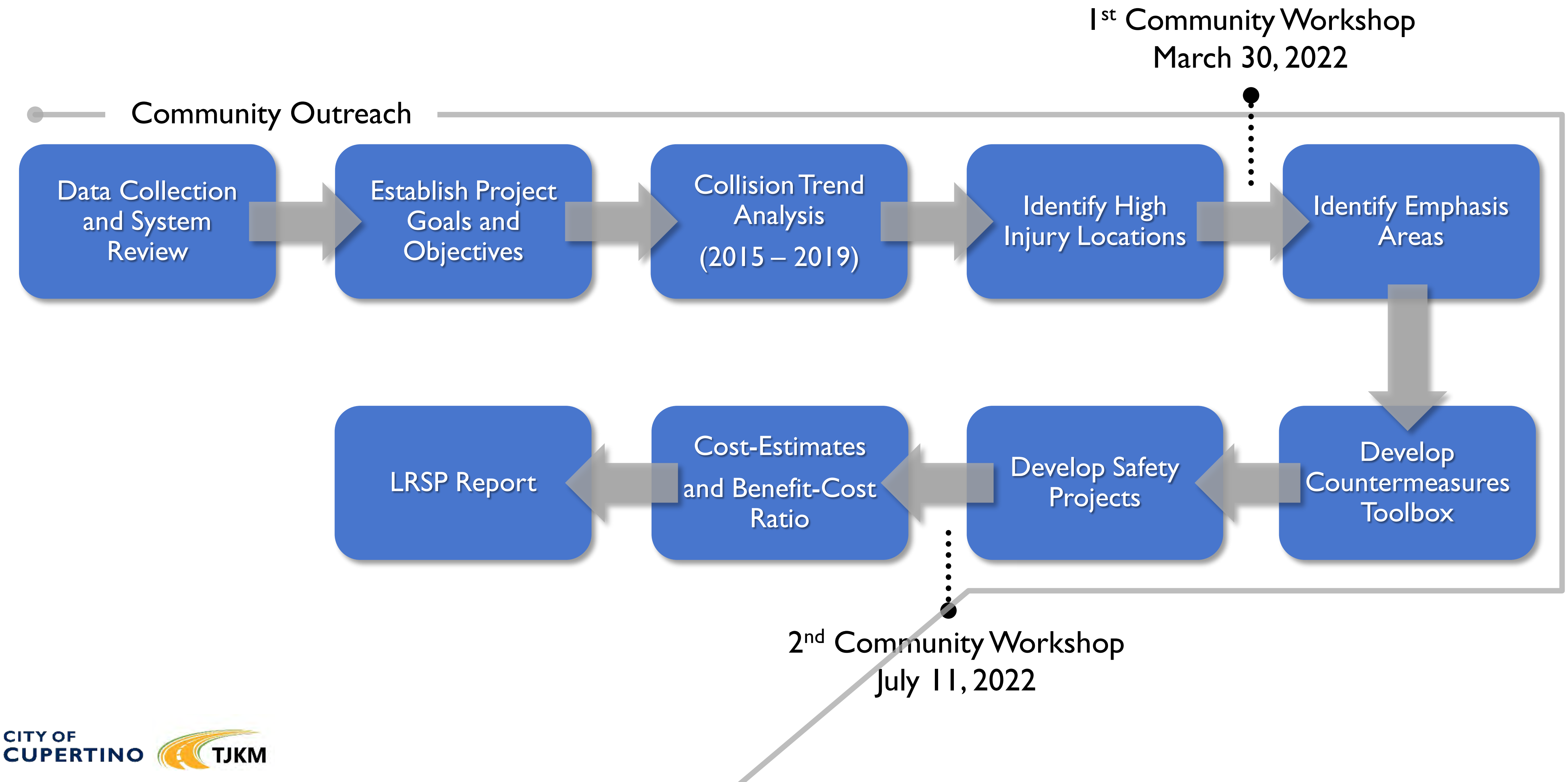
PURPOSE OF TODAY'S MEETING

- Project Status and Milestones
- Collision Analysis Findings
- Emphasis Areas
- Draft Engineering & Non-Engineering Countermeasures
- Questions/Comments
- Implementation/Next Steps

WHAT IS A LOCAL ROAD SAFETY PLAN (LRSP)?

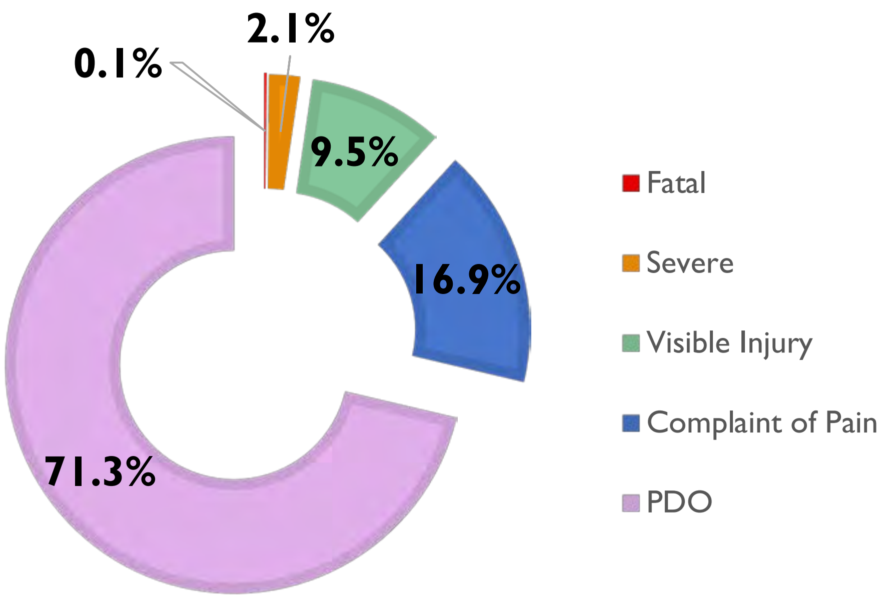
- **Overarching Goals:**
  - To reduce fatalities and severe injuries (F+SI) on the City's roadways and intersections
  - To identify, analyze and prioritize roadway and intersection safety improvements on local roads
  - A required document to be eligible for the Highway Safety Improvement Program (HSIP) grant funding
- **Considers Engineering and Non-engineering Strategies**
  - **4 E's of Traffic Safety:** Education, Enforcement, Engineering and Emergency Medical Services (EMS)

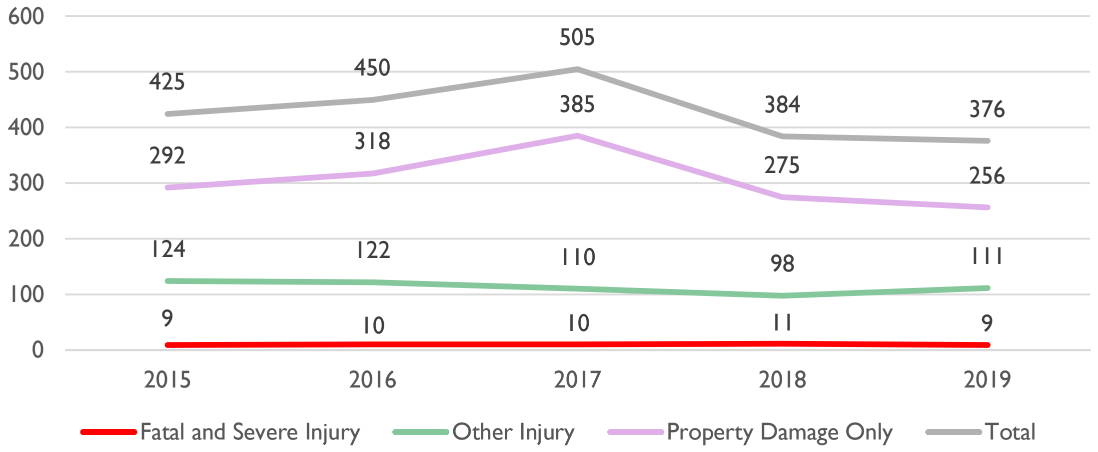
PROJECT STATUS AND MILESTONES

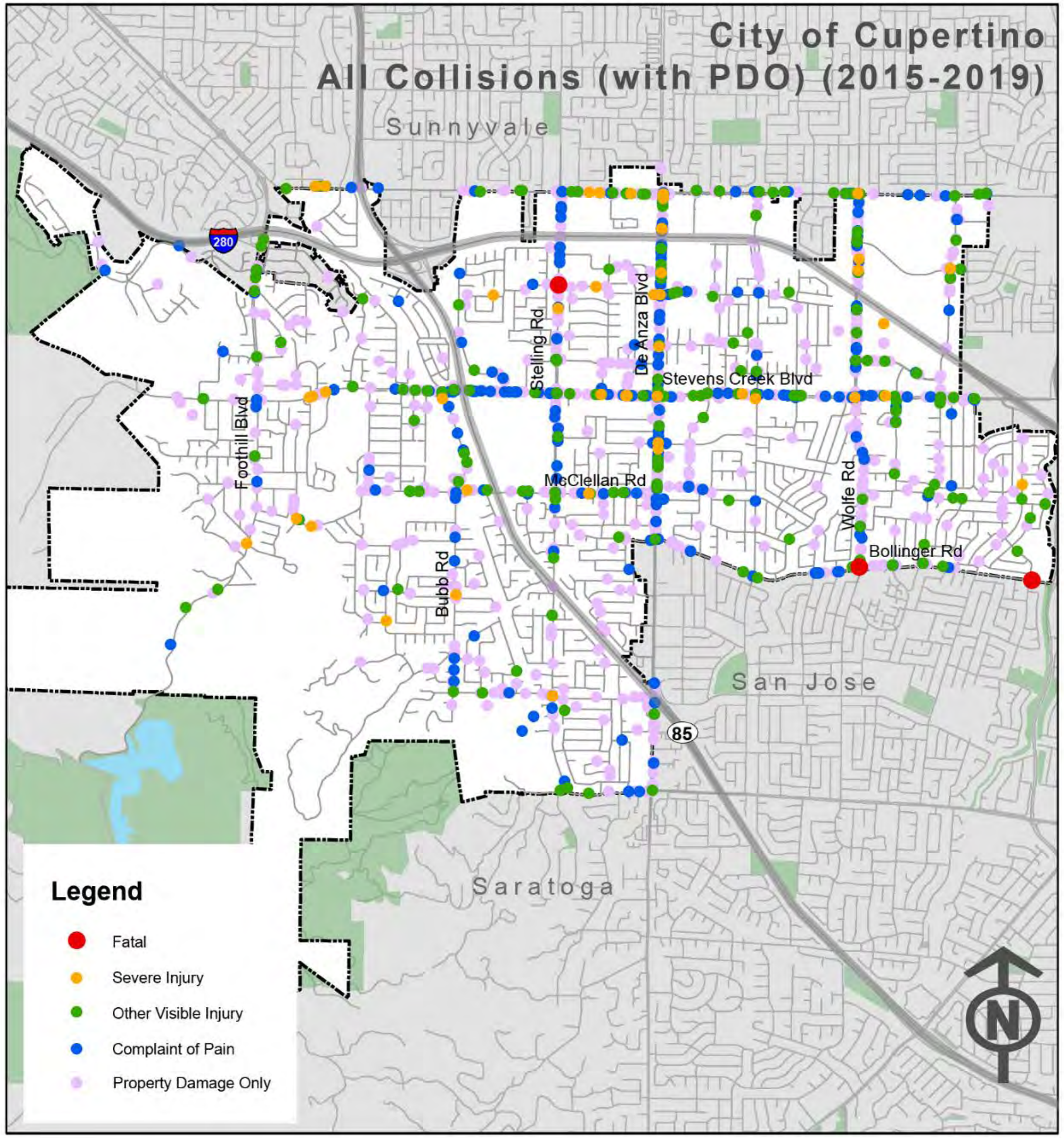


CITY OF CUPERTINO TJKM

ANALYSIS FINDINGS (2015 – 2019): ALL COLLISIONS

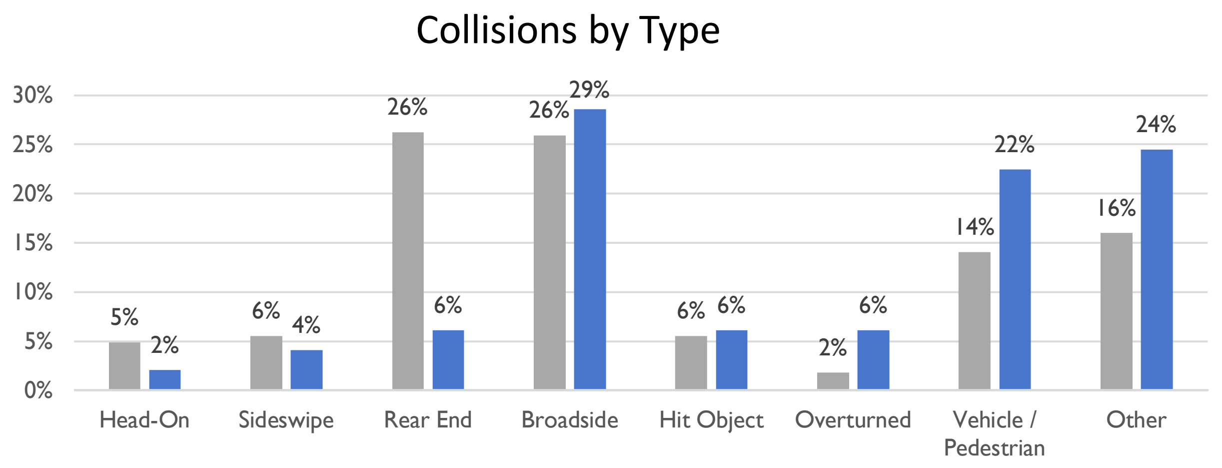


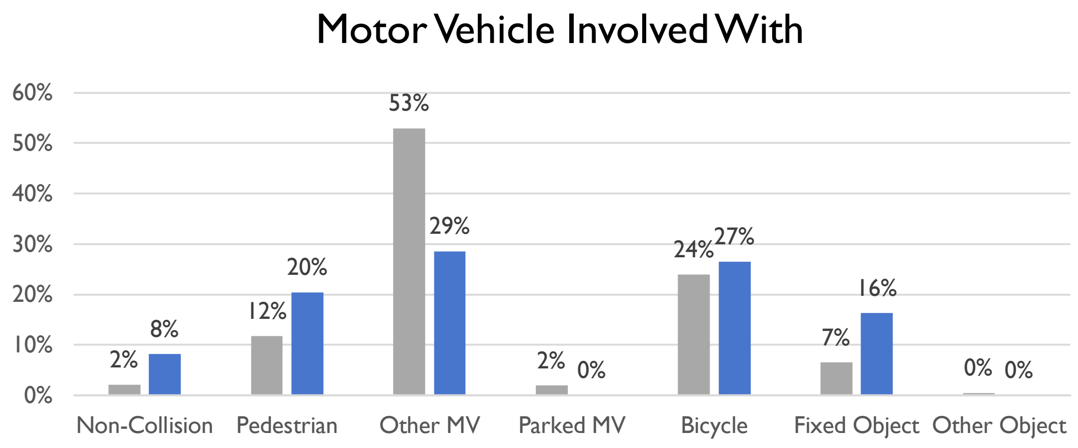


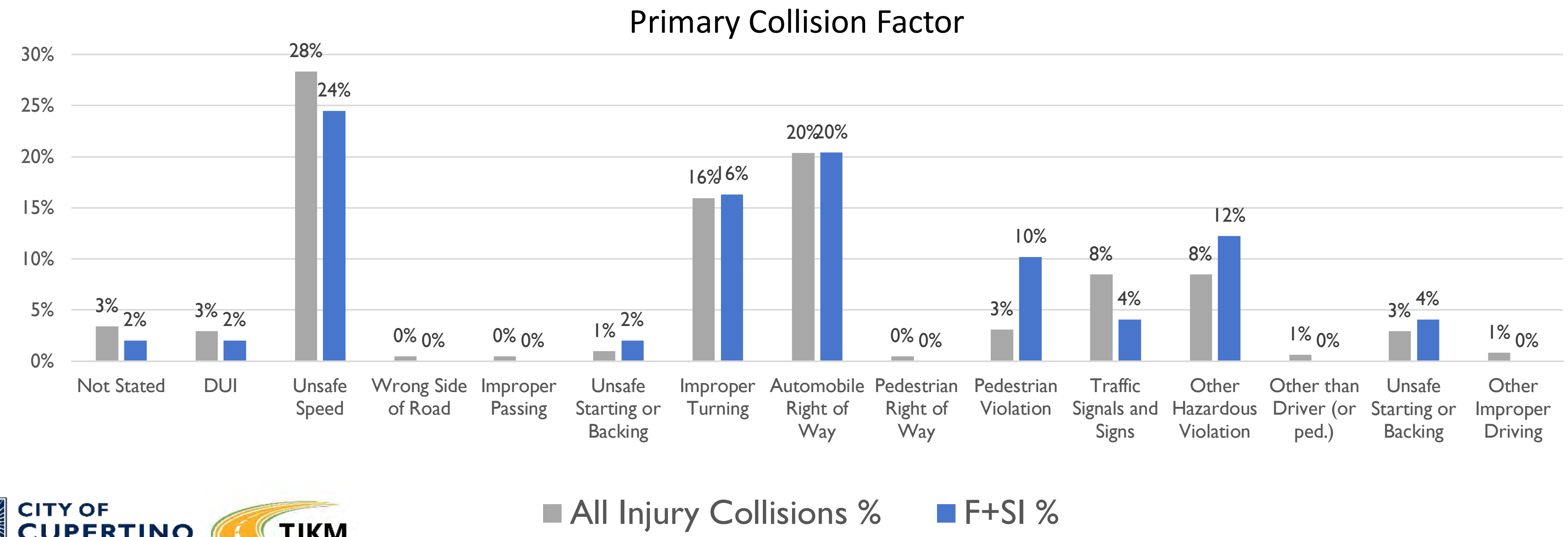


CITY OF CUPERTINO TJKM

ANALYSIS FINDINGS (2015 – 2019): INJURY COLLISIONS







Note:

- Injury Collisions – fatal, severe injury, other visible injury and complaint of pain collisions
- F+SI – fatal and severe injury collisions

EPDO SCORE

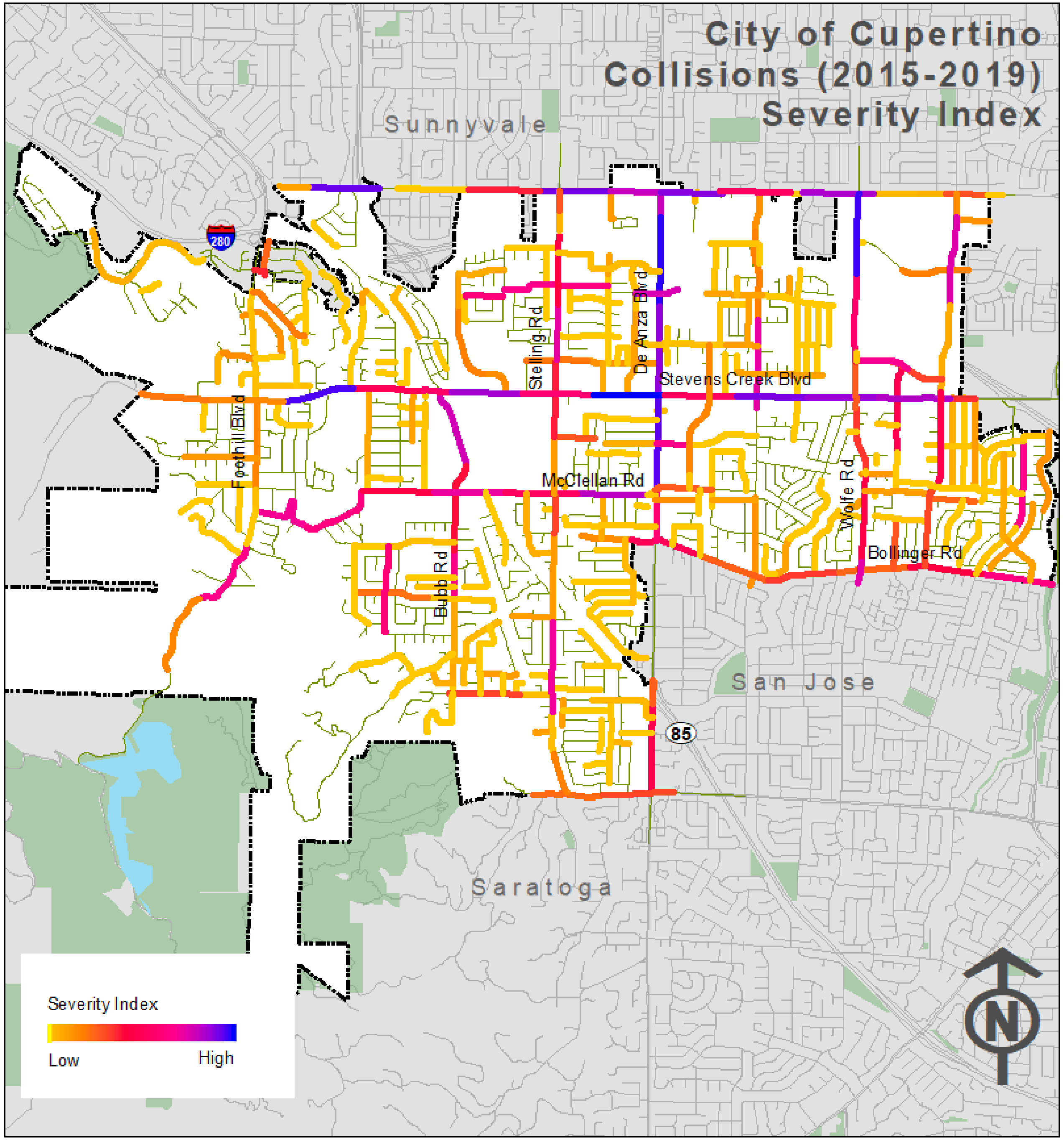
SOURCE : LOCAL ROAD SAFETY MANUAL 2020, CALTRANS

Equivalent property damage only (EPDO) methodology calculates a weighted score to identify locations that are experiencing more severe crashes. Methodology used to prioritize high risk intersections and roadway segments.

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

EPDO Score (HSIP Cycle 10) = (165 x Fatal) + (165 x Severe Injury) + (11 x Other Visible) + (6 x Complaint of Pain) + (1 x PDO)

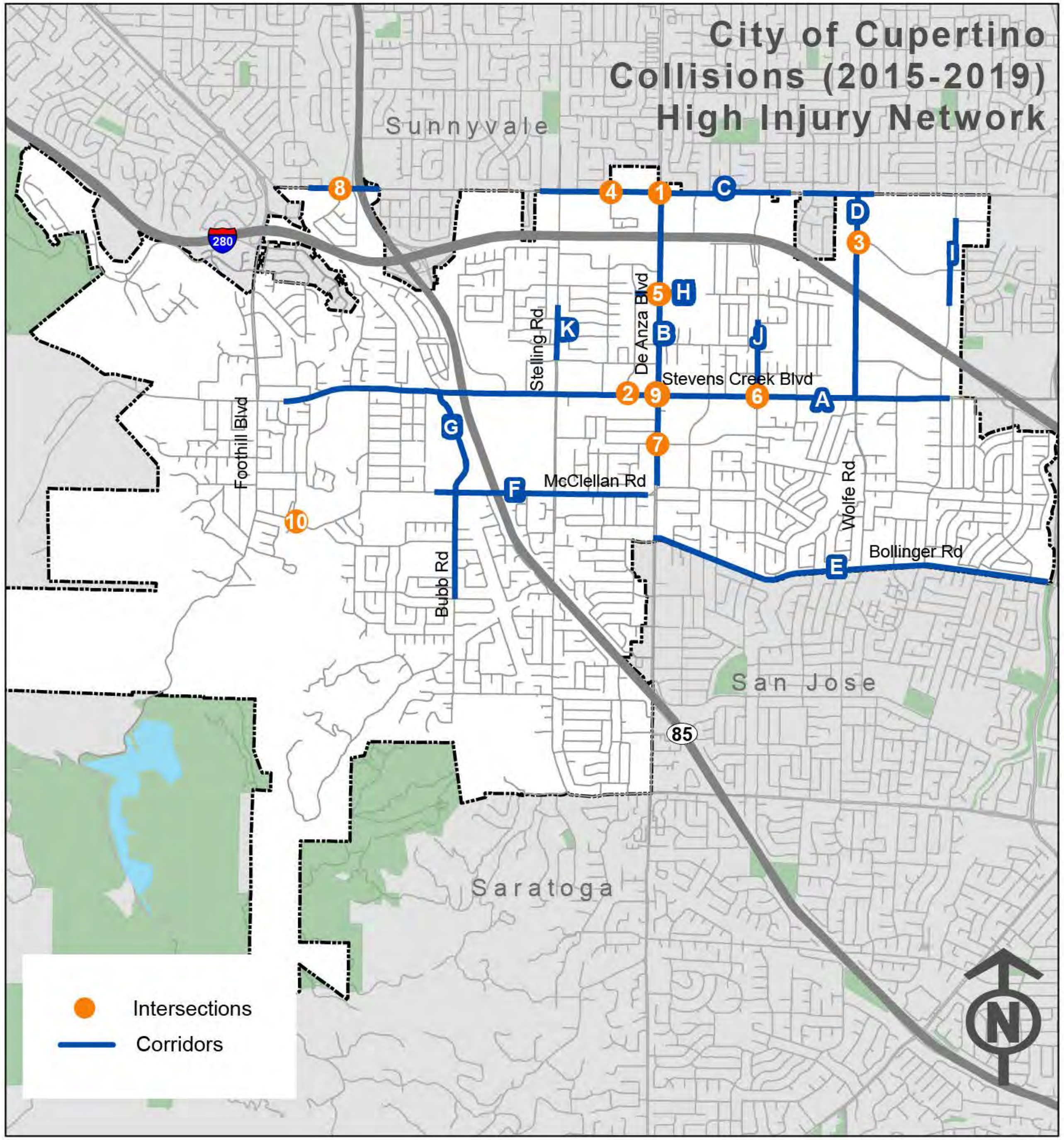
- **STEP 1:** Divide each roadway into 0.3 mile segments
- **STEP 2:** Find the total number of collisions by severity on each segment
- **STEP 3:** Calculate each segment's EPDO Score
- **STEP 4:** Assign EPDO Score to each roadway segment
- **STEP 5:** Find locations with high severity and most frequency



CITY OF CUPERTINO TJKM

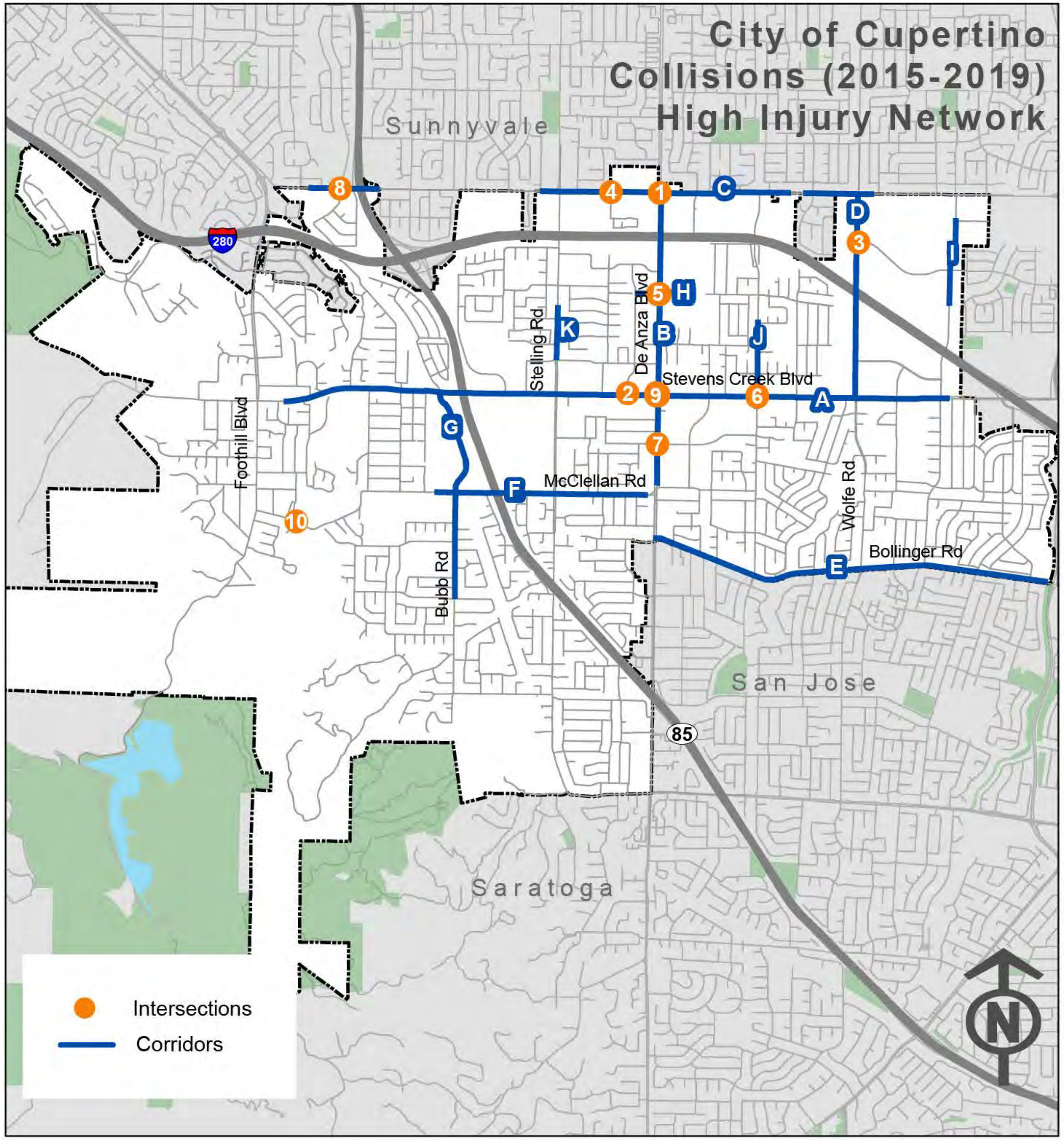
HIGH-INJURY INTERSECTIONS

ID	Intersection	EPDO Score
1	De Anza Blvd and Homestead Rd	1,028
2	Bandley Dr and Stevens Creek Blvd	800
3	Prunridge Ave and Wolfe Ave	546
4	Franco Ct/Forge Way and Homestead Rd	545
5	De Anza Blvd and Mariani Ave	465
6	Blaney Ave and Stevens Creek Blvd	400
7	S De Anza Blvd and Rodrigues Ave	388
8	Barranca Dr and Homestead Rd	373
9	De Anza Blvd and Stevens Creek Blvd	373
10	McClellan Rd and Clubhouse Ln	349



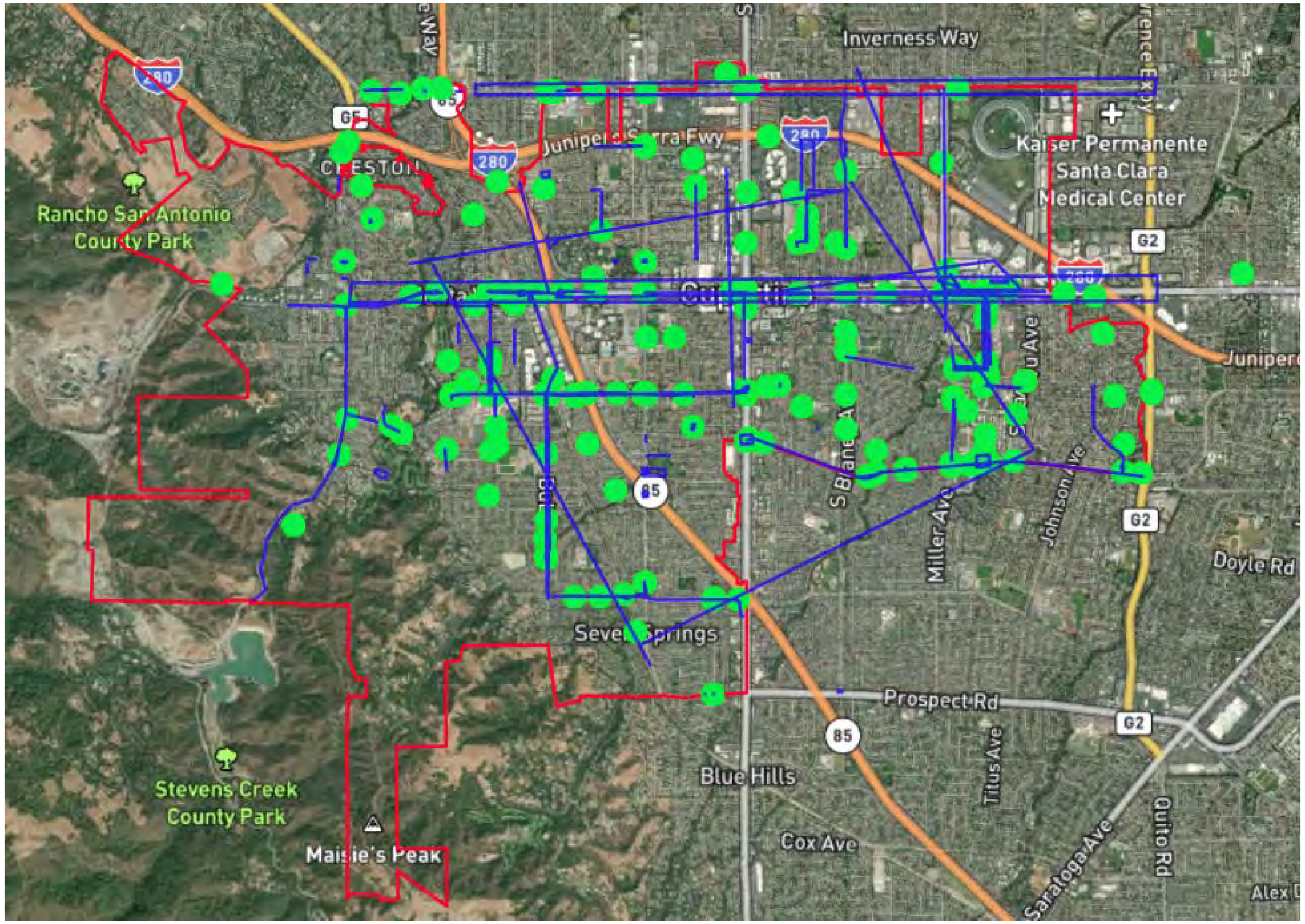
HIGH-INJURY CORRIDORS

ID	Corridors	EPDO Score
A	Stevens Creek Blvd: Janice Ave to Judy Ave	3,139
B	De Anza Blvd: Pacifica Dr to Homestead Rd	2,096
C	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	1,666
D	Wolfe Rd: Homestead Rd to Bollinger Rd	729
E	Bollinger Rd: Lawrence Expy to De Anza Blvd	562
F	McClellan Rd: Imperial Ave to De Anza Blvd	490
G	Bubb Rd: Stevens Creek Blvd to Columbus Ave	436
H	Mariani Ave: Bandly Dr to Infinite Loop	209
I	Tantau Ave: Forge Dr to Pruneridge Ave	208
J	Blaney Ave: Pear Tree Ln to Stevens Creek Blvd	192
K	N Stelling Rd: Alves Dr to Greenleaf Dr	192



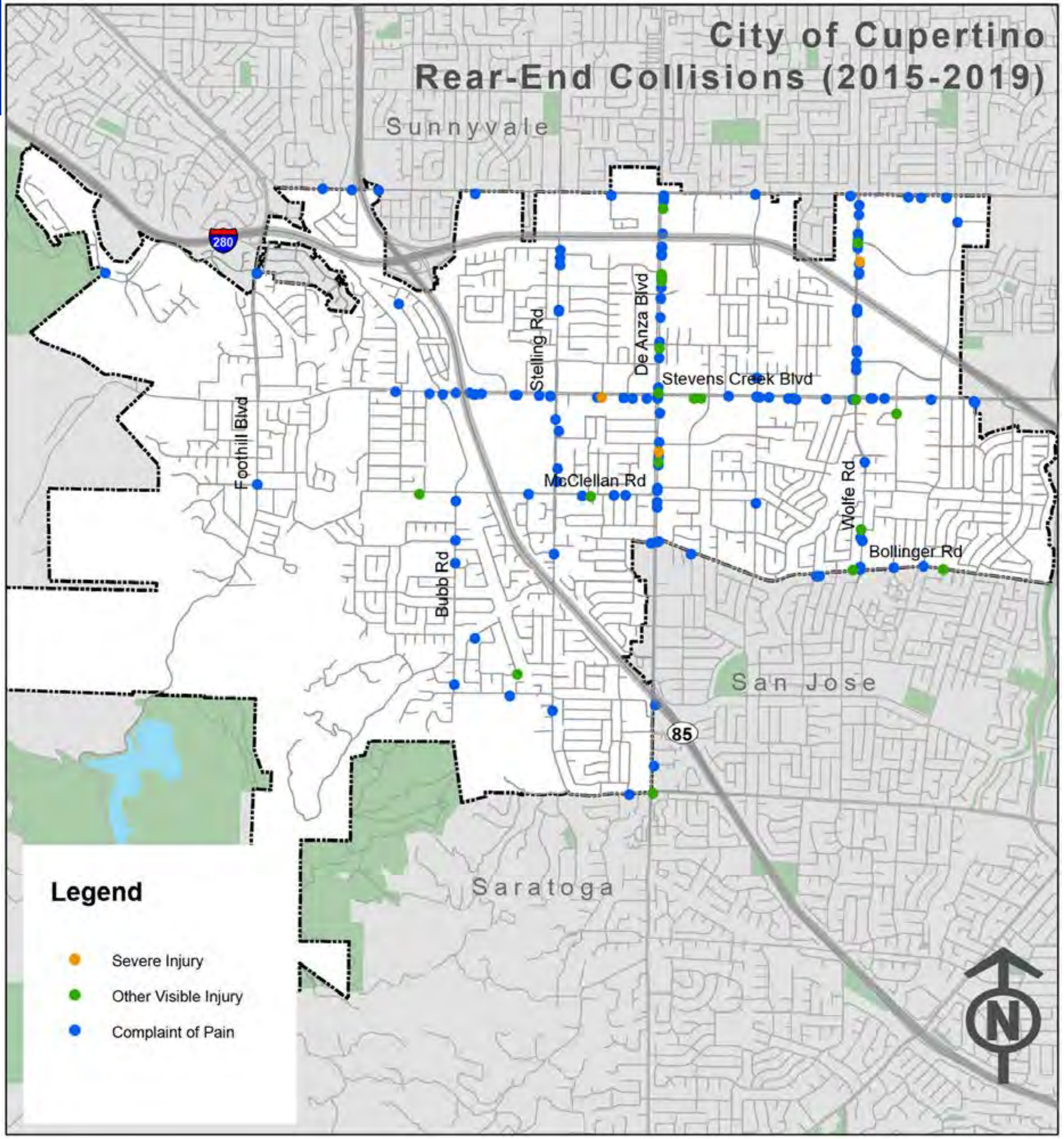
PROJECT WEBSITE

- 390 comments received on interactive map
  - 243 points
  - 147 lines
- Many comments concentrated on Stevens Creek Blvd corridor



TOP EMPHASIS AREAS

- Improve Intersection Safety
- Reduce Unsafe Speed Collisions
- Reduce Automobile Right-of-Way Violations
- Improve Pedestrian and Bicyclist Safety
- Reduce Nighttime Collisions
- Reduce Rear End Collisions
- Reduce Broadside Collisions
- Reduce Improper Driving Collisions
- Reduce Collisions near Schools

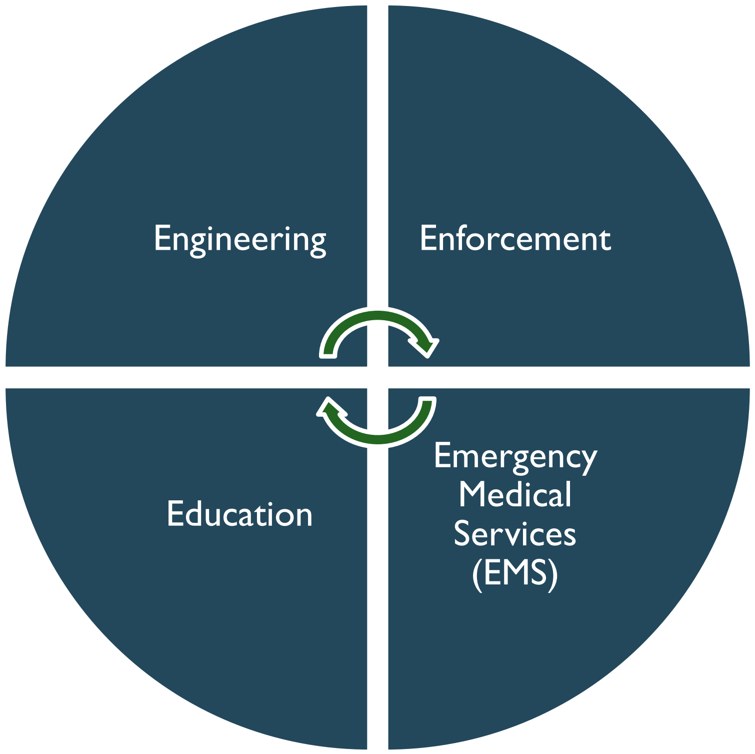


CITY OF CUPERTINO TJKM

THE 4 E'S OF TRAFFIC SAFETY

- HSIP eligible countermeasures
- E.g.: Improve intersection lighting, install median refuge island, install bulb outs, improving signs and striping

- Targeted enforcement at high risk intersections
- Place high priority on enforcement of violation type that contribute to the most fatalities and severe injuries



- Conduct focused public information and education campaigns
- Create pocket guides and informational fliers with pedestrian laws, stop sign violations, etc.
- Safe Routes to School education programs

- Improve deployment to collision sites
- Ensure emergency routes are defined and clear

CITY OF CUPERTINO TJKM

EMPHASIS AREAS STRATEGIES

Table 2. 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/ Sheriff's 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.	-	Sheriff's Department
Engineering	• S01, Install 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) • 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) • S16/NS04/NS05, Convert intersection to roundabout	Number of intersections improved.	City

DRAFT COUNTERMEASURE TOOLBOX – SIGNALIZED INTERSECTIONS

HSIP Code	Countermeasure
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number
S03	Improve signal timing (coordination, phases, red, yellow, or operation)
S04	Provide Advanced Dilemma Zone Detection for high speed approaches*
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)
S11	Improve pavement friction (High Friction Surface Treatments)
S12	Install raised median on approaches (signalized intersection)
S13PB	Install pedestrian median fencing on approaches
S20PB	Install advance stop bar before crosswalk (Bicycle Box)
S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

DRAFT SIGNALIZED INTERSECTION IMPROVEMENTS

Improve Signal Hardware & Timing

Improve pavement friction

Convert signal to mast arm

Install raised pavement markings

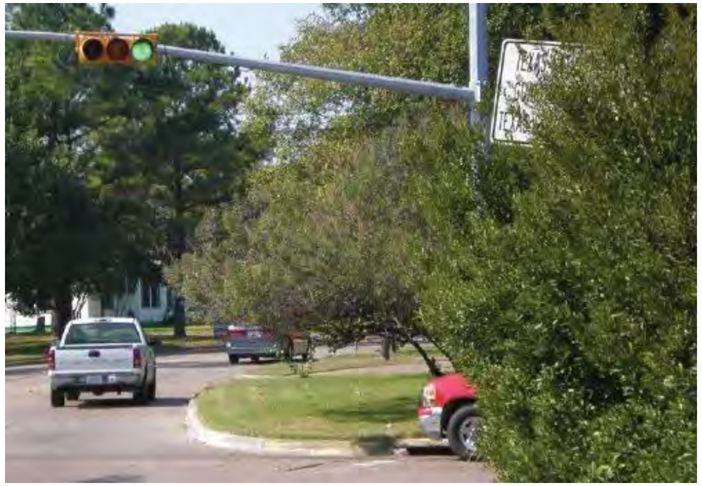
Advance Stop Bar (Bicycle Box)

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

DRAFT COUNTERMEASURE TOOLBOX – UNSIGNALIZED INTERSECTIONS

HSIP Code	Countermeasure
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
NS09	Install flashing beacons as advance warning (non-signalized intersection)
NS10	Install transverse rumble strips on approaches
NS11	Improve sight distance to intersection (Clear Sight Triangles)
NS12	Improve pavement friction (High Friction Surface Treatments)
NS14	Install raised median on approaches (NS.I.)
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)

DRAFT UNSIGNALIZED INTERSECTION IMPROVEMENTS



Improve sight distance

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

Install flashing beacons as advance warning

Install/upgrade pedestrian crossing (with enhanced safety features)

Improve pavement friction

DRAFT COUNTERMEASURE TOOLBOX – ROADWAY SEGMENTS

HSIP Code	Countermeasure
R01	Add Segment Lighting
R08	Install raised median
R10PB	Install pedestrian median fencing
R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn lane and bike lanes)
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)
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
R25	Install curve advance warning signs with flashing beacon
R26	Install dynamic/variable speed warning signs
R27	Install delineators, reflectors, and object markers

DRAFT COUNTERMEASURE TOOLBOX – ROADWAY SEGMENTS

HSIP Code	Countermeasure
R30	Install centerline rumble strips/stripes
R33PB	Install Separated Bike Lanes
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)

DRAFT ROADWAY SEGMENT IMPROVEMENTS

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

Improve pavement friction

Install delineators, reflectors, and/or object markers

Install/upgrade pedestrian crossing (with enhanced safety features)

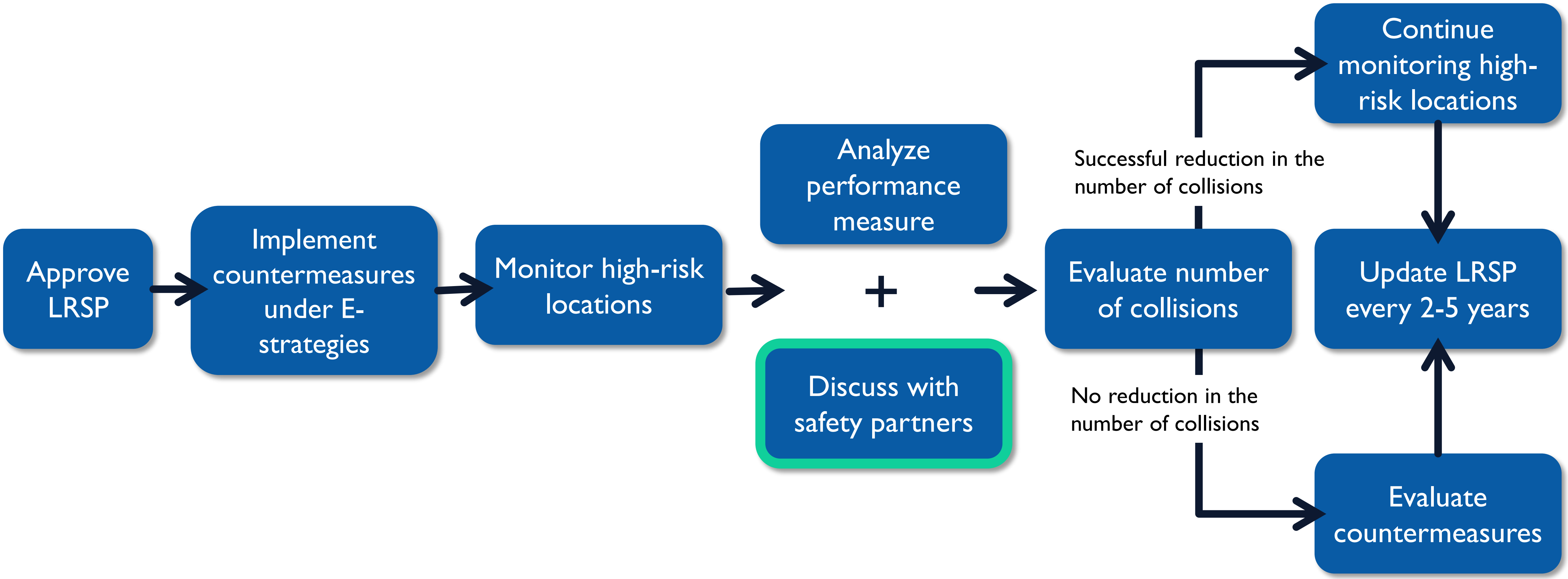
Install Separated Bike Lane

Install centerline rumble strips

DRAFT NON ENGINEERING STRATEGIES

- Education
  - Conduct public information and education campaign for intersection safety laws, unsafe speeds, distracted driving, improper turning and driving under the influence.
  - Conduct bicycle and pedestrian safety campaigns and outreach to raise their awareness of bicycle and pedestrian safety needs through media outlets and social platforms in Cupertino every 3-5 years
- Enforcement
  - Targeted enforcement at high-injury locations.
  - Increase the number of personnel who have completed Advanced Roadside impaired Driving Enforcement (ARIDE) training
- EMS
  - Install emergency vehicle pre-emption systems
  - Increase the number of EMS/fire control personnel taking Traffic Incident Management Training

IMPLEMENTATION



NEXT STEPS

- Finish developing safety projects for all high-injury locations
- Draft Report
- HSIP Applications

OPEN DISCUSSION

- Questions or comments on the Emphasis Areas and proposed countermeasures

CITY OF CUPERTINO

TJKM


THANK YOU!
CITY OF CUPERTINO
TJKM

1ST STAKEHOLDER MEETING

DATE: 02/03/2022
TIME: 2:30 PM to 3:30 PM

ZOOM LINK
https://us06web.zoom.us/j/84063310803?pwd=Nm4xTUlXWWNyNVhDWHhwL1hXWnVlUT09
Meeting ID: 840 6331 0803
Passcode: 249097

AGENDA

1. Project Team Introduction
2. Project Introduction
    a. What is a Local Road Safety Plan (LRSP)?
    b. LRSP Development Process
3. Analysis Findings (2015 to 2019 collision data)
4. Prominent Collision Trends
5. High-Risk Locations
    a. Intersections
    b. Corridors
6. Stakeholder Role
7. Online Dashboard Demo
8. Open Discussion
9. Next Steps

CITY OF CUPERTINO

LOCAL ROAD SAFETY PLAN

1ST STAKEHOLDER MEETING

FEBRUARY 3, 2022

CITY OF CUPERTINO

TJKM

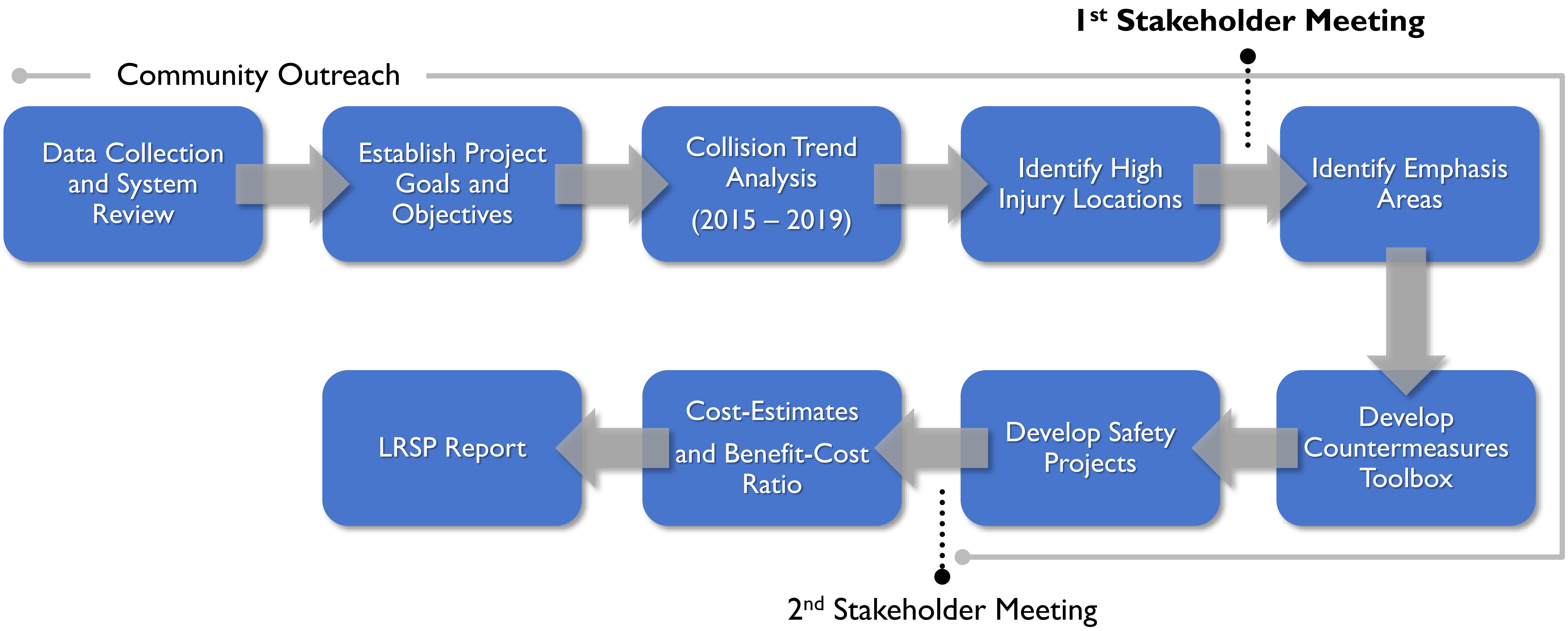
PURPOSE OF TODAY'S MEETING

- Introduce the LRSP project
- Project Timeline
- Your Role
- Present Collision Analysis Findings
- Project Online Dashboard and Map Input Platform
- Open Discussion
- Next Steps

WHAT IS A LOCAL ROAD SAFETY PLAN (LRSP)?

- **Overarching Goals:**
  - To reduce fatalities and severe injuries (F+SI) on the City's roadways and intersections
  - To identify, analyze and prioritize roadway and intersection safety improvements on local roads
  - A required document to be eligible for the Highway Safety Improvement Program (HSIP) grant funding
- **Considers Engineering and Non-engineering Strategies**
  - **4 E's of Traffic Safety:** Education, Enforcement, Engineering and Emergency Medical Services (EMS)

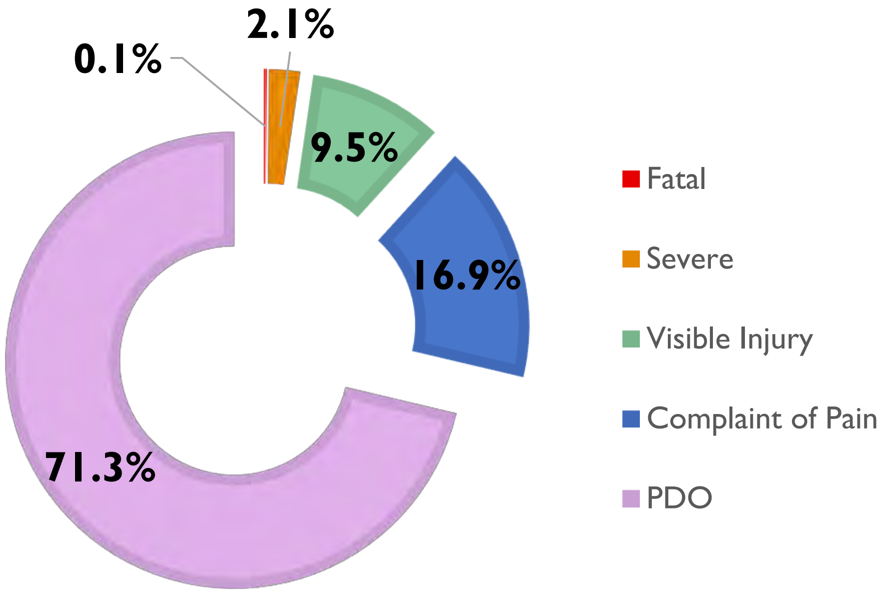
PROJECT STATUS AND MILESTONES

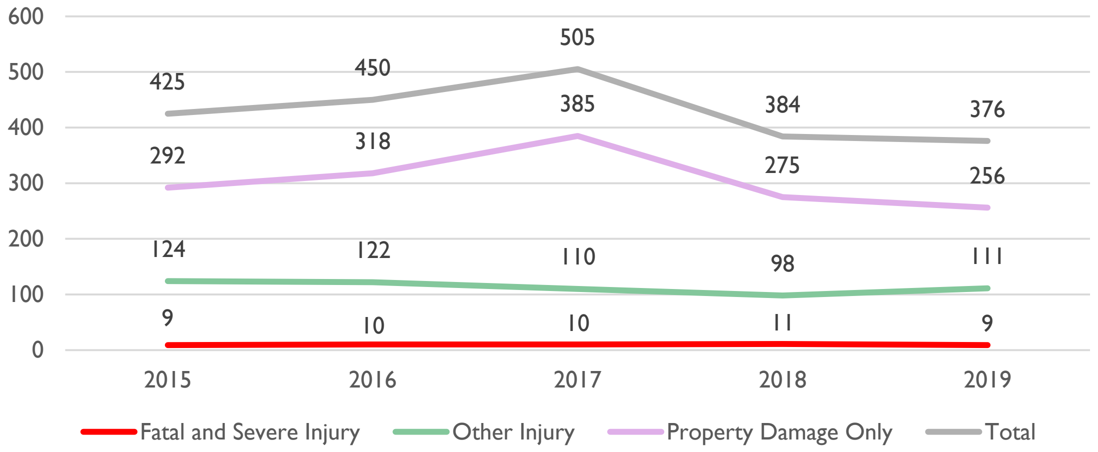


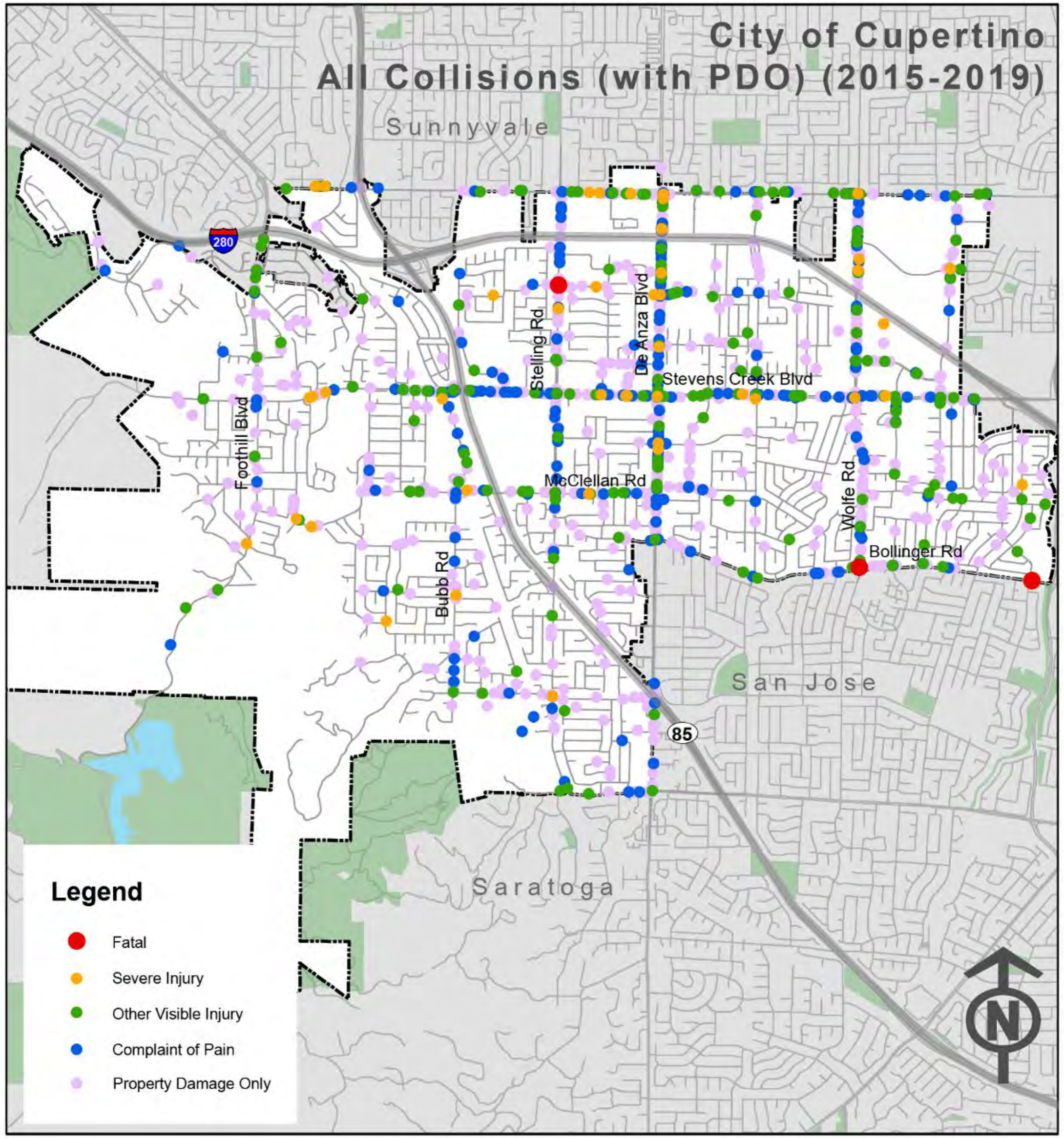
YOUR ROLE AS SAFETY CHAMPIONS

- Tell us about traffic safety related issues
- Tell us what you heard from the members of the community
- Help set the goals and objectives of the LRSP
- Share with us any existing programs/safety measures under the E categories (Education, Enforcement, Engineering and Emergency Medical Services)
- Report your concerns in an interactive survey at www.engagecupertino.org/lrsp - Share the survey within your organization
- Give us feedback on our deliverables and strategies as developed
- Stay informed about the project

ANALYSIS FINDINGS (2015 – 2019): ALL COLLISIONS

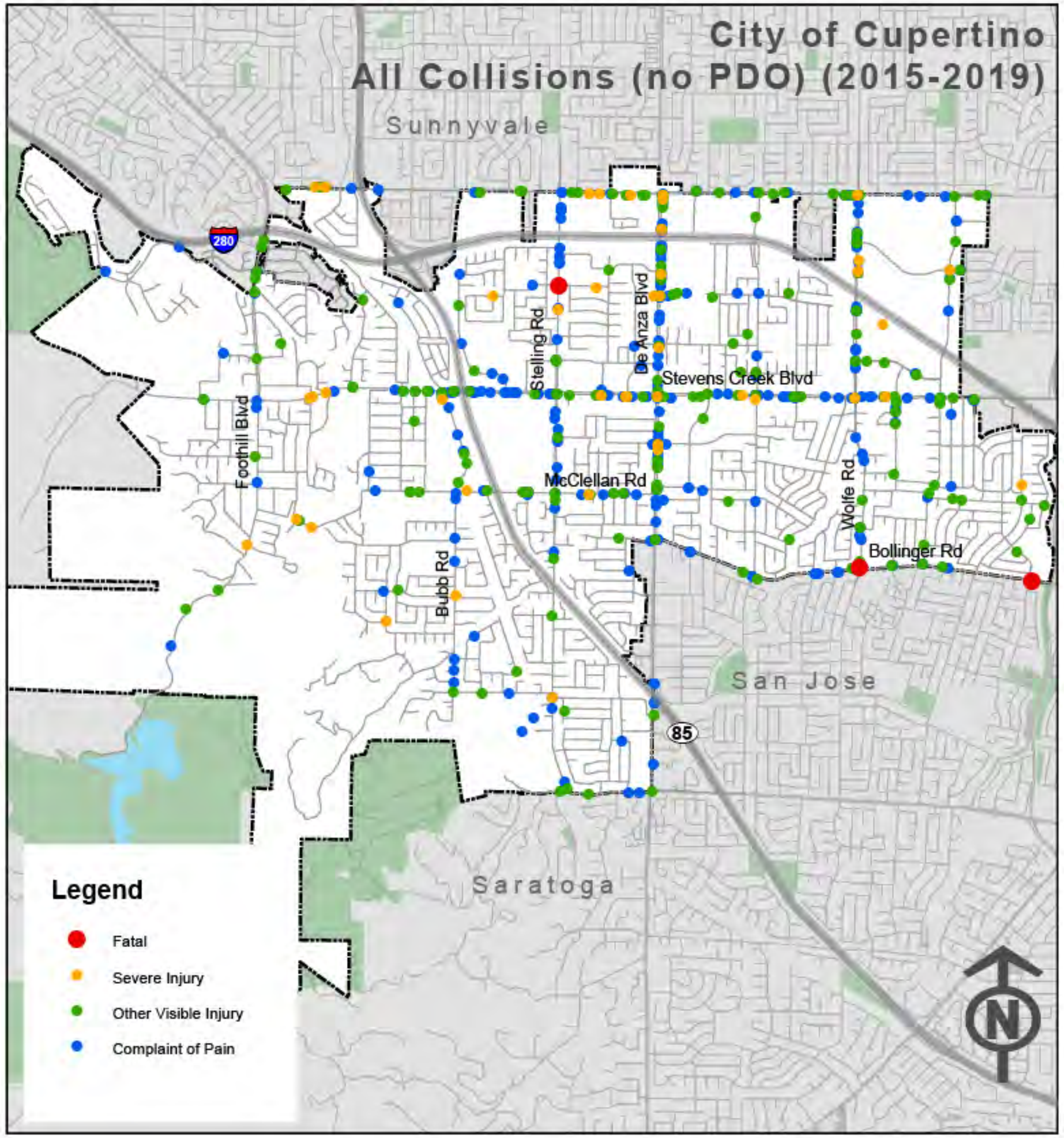


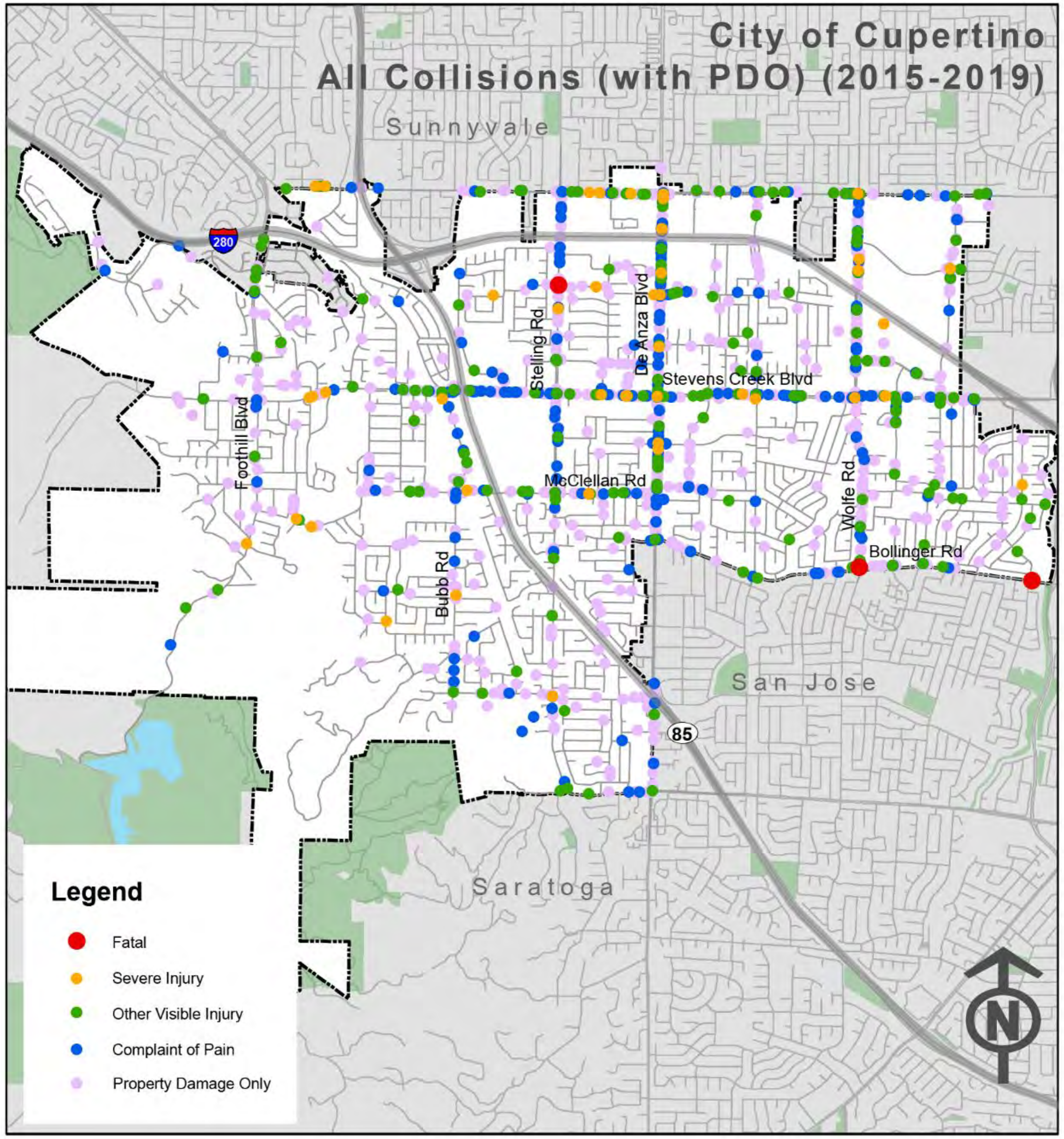




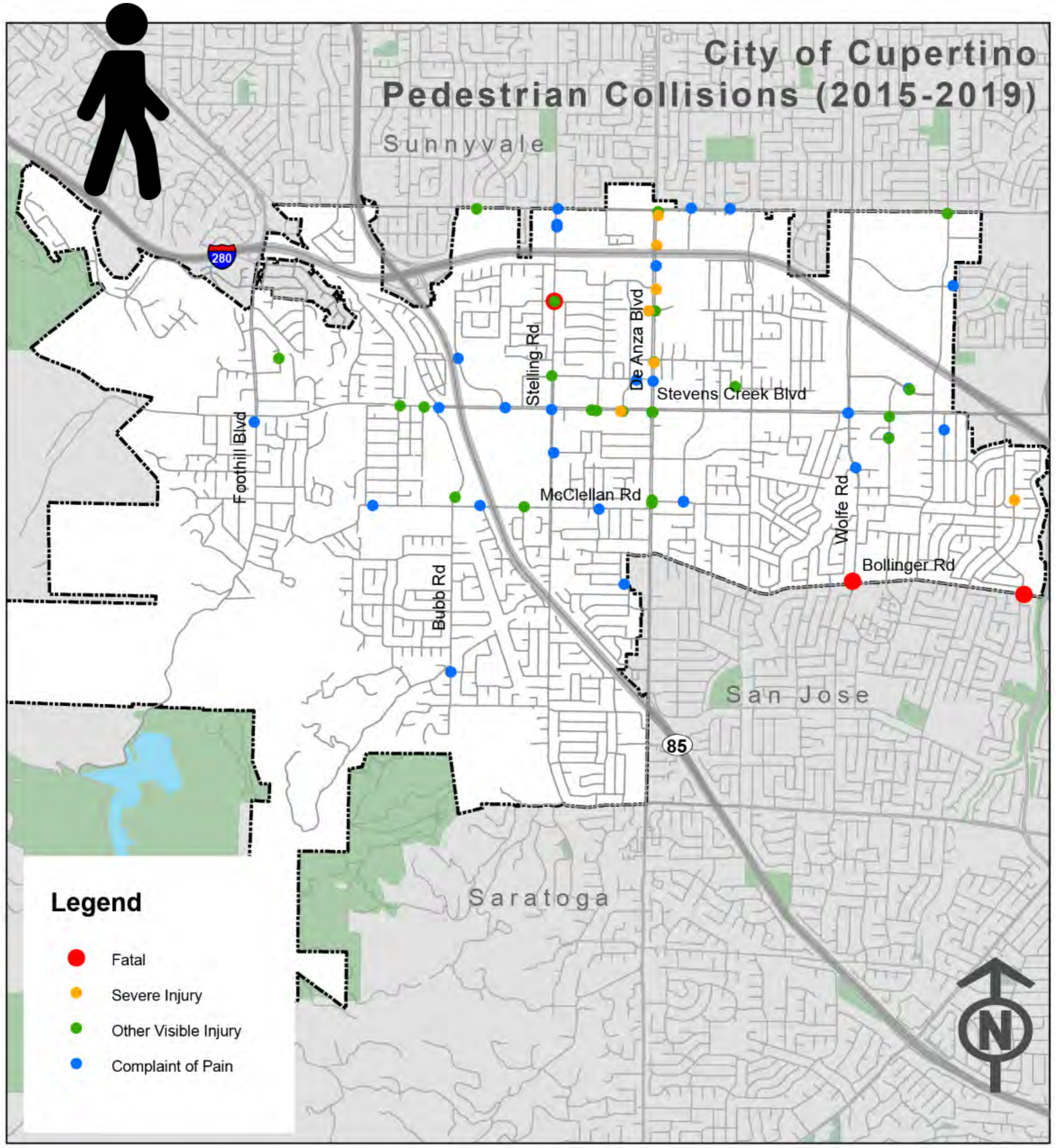
CITY OF CUPERTINO
TJKM

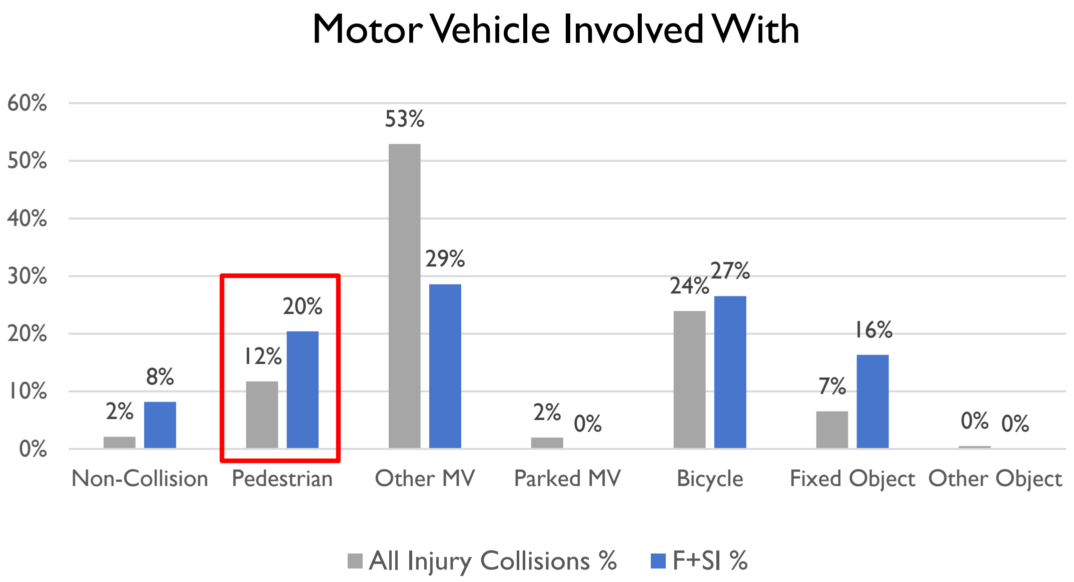
ANALYSIS FINDINGS (2015 – 2019): INJURY VS ALL COLLISIONS

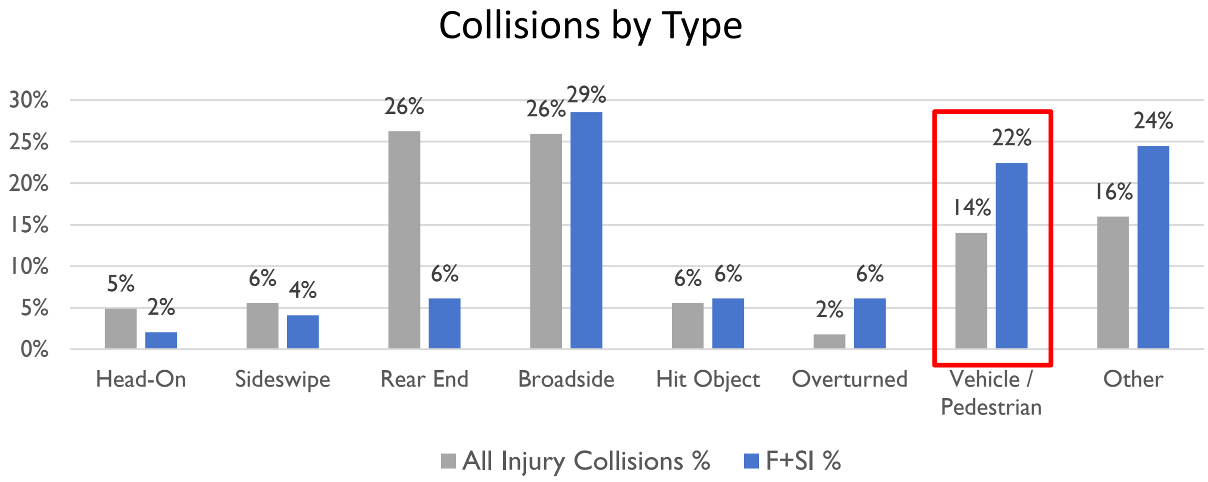




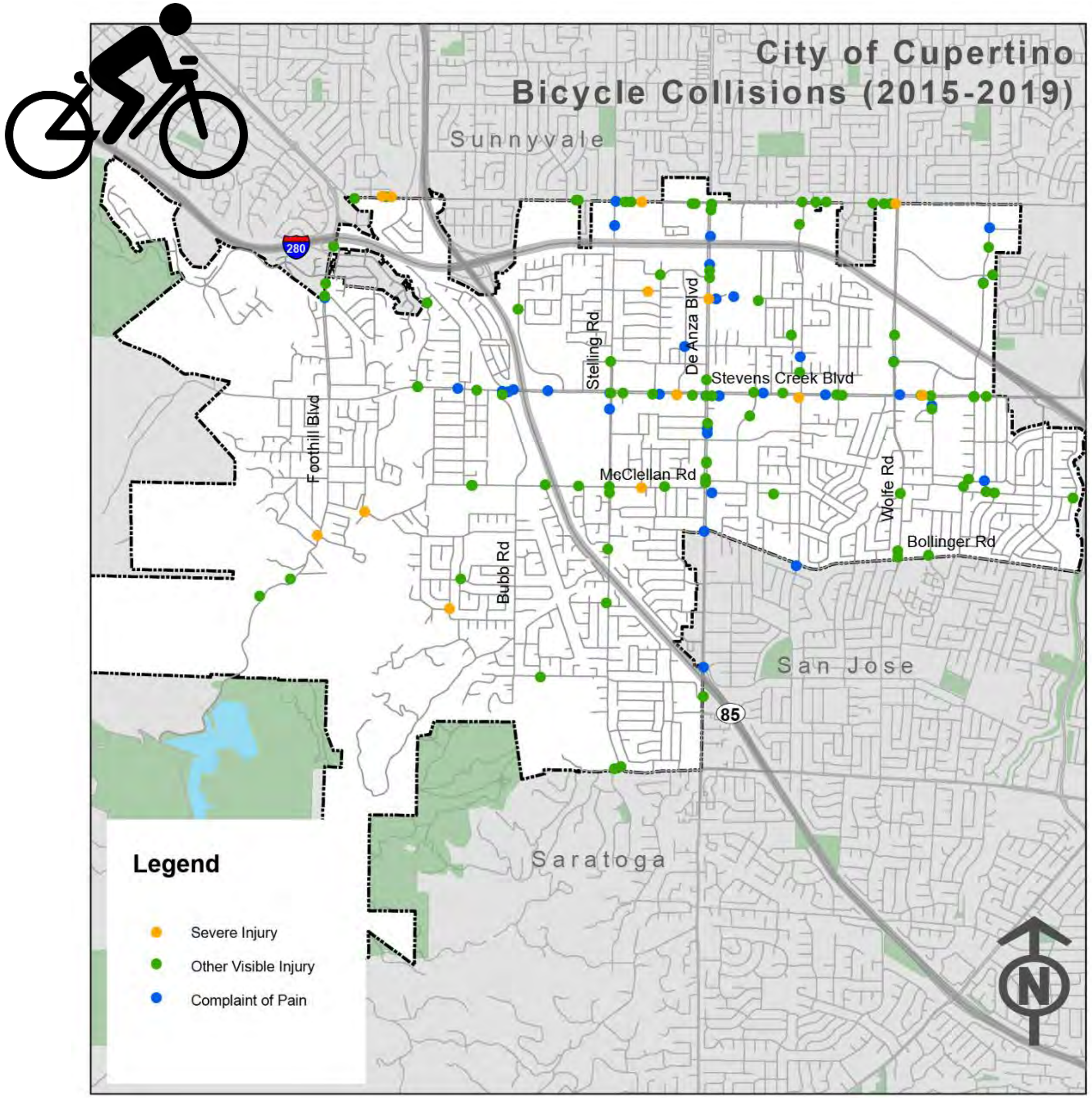
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)

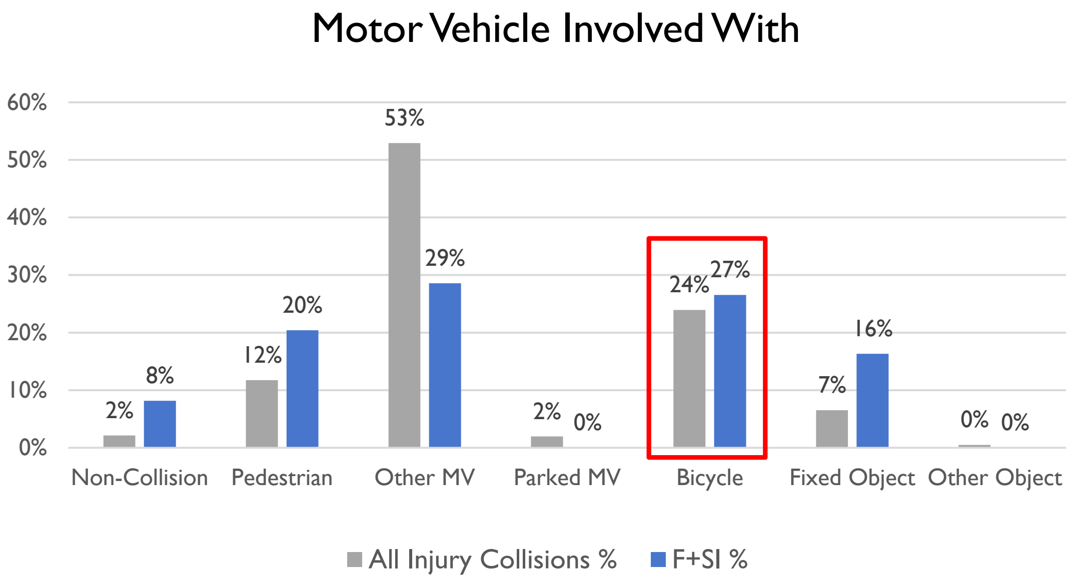


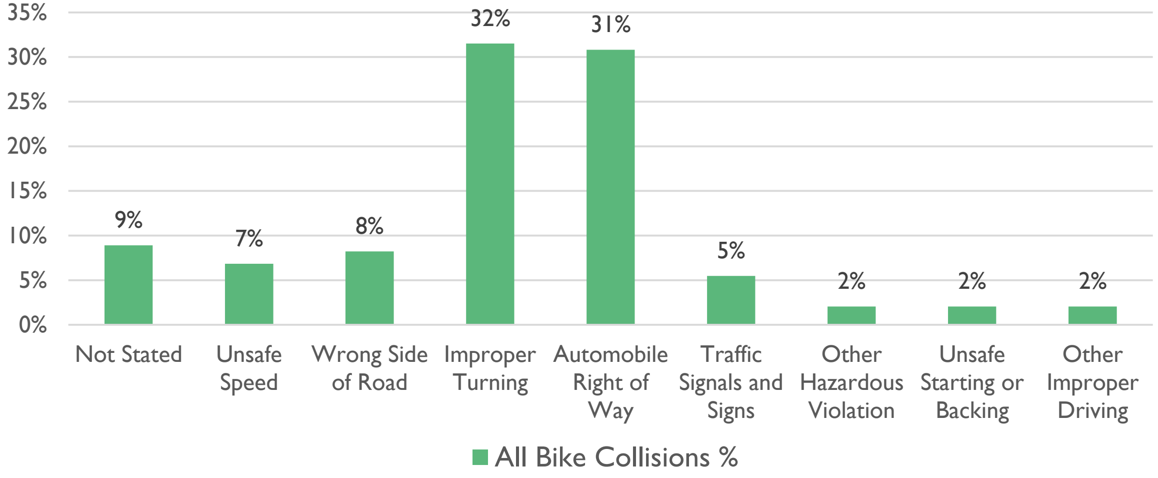




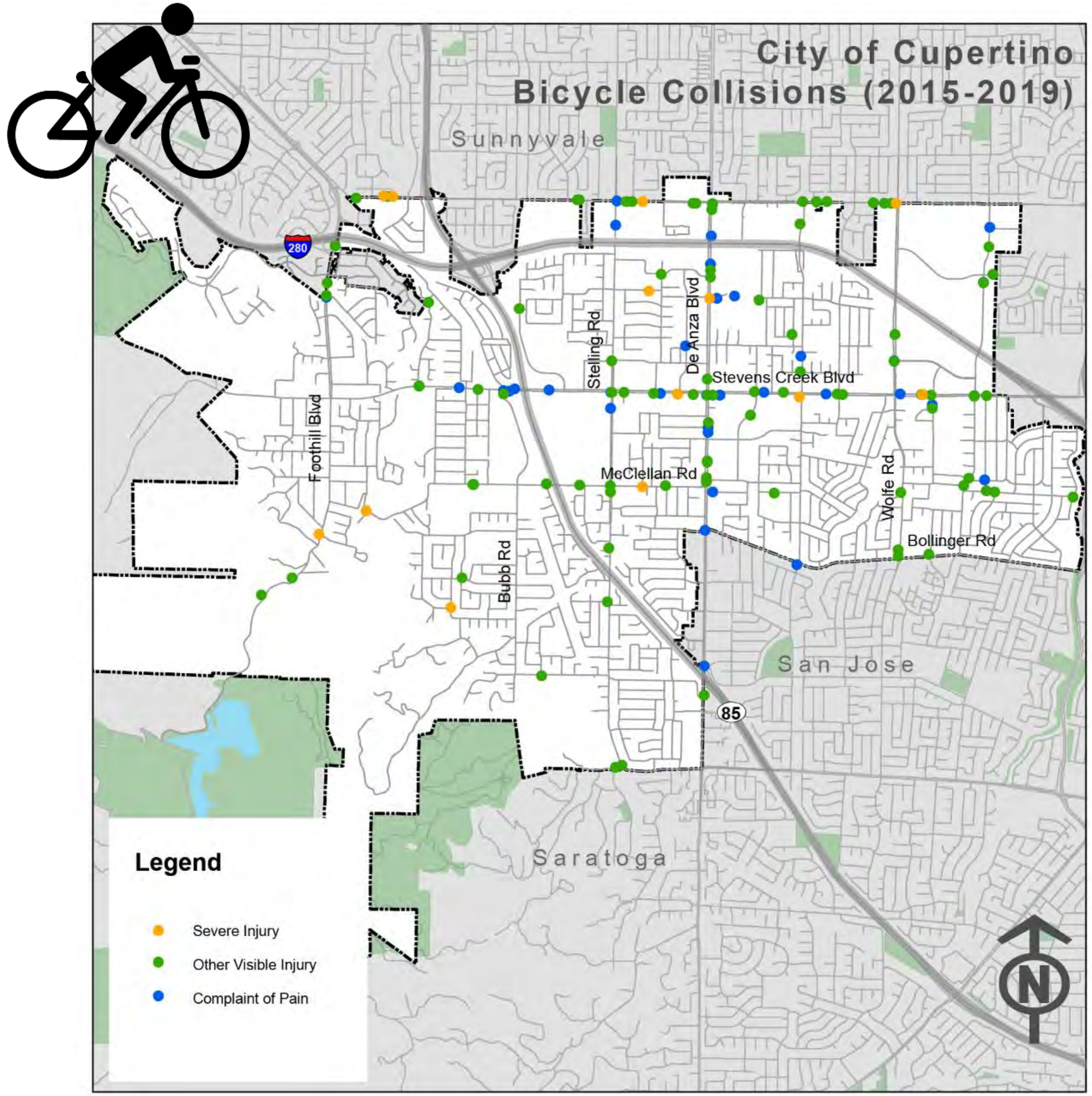
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)

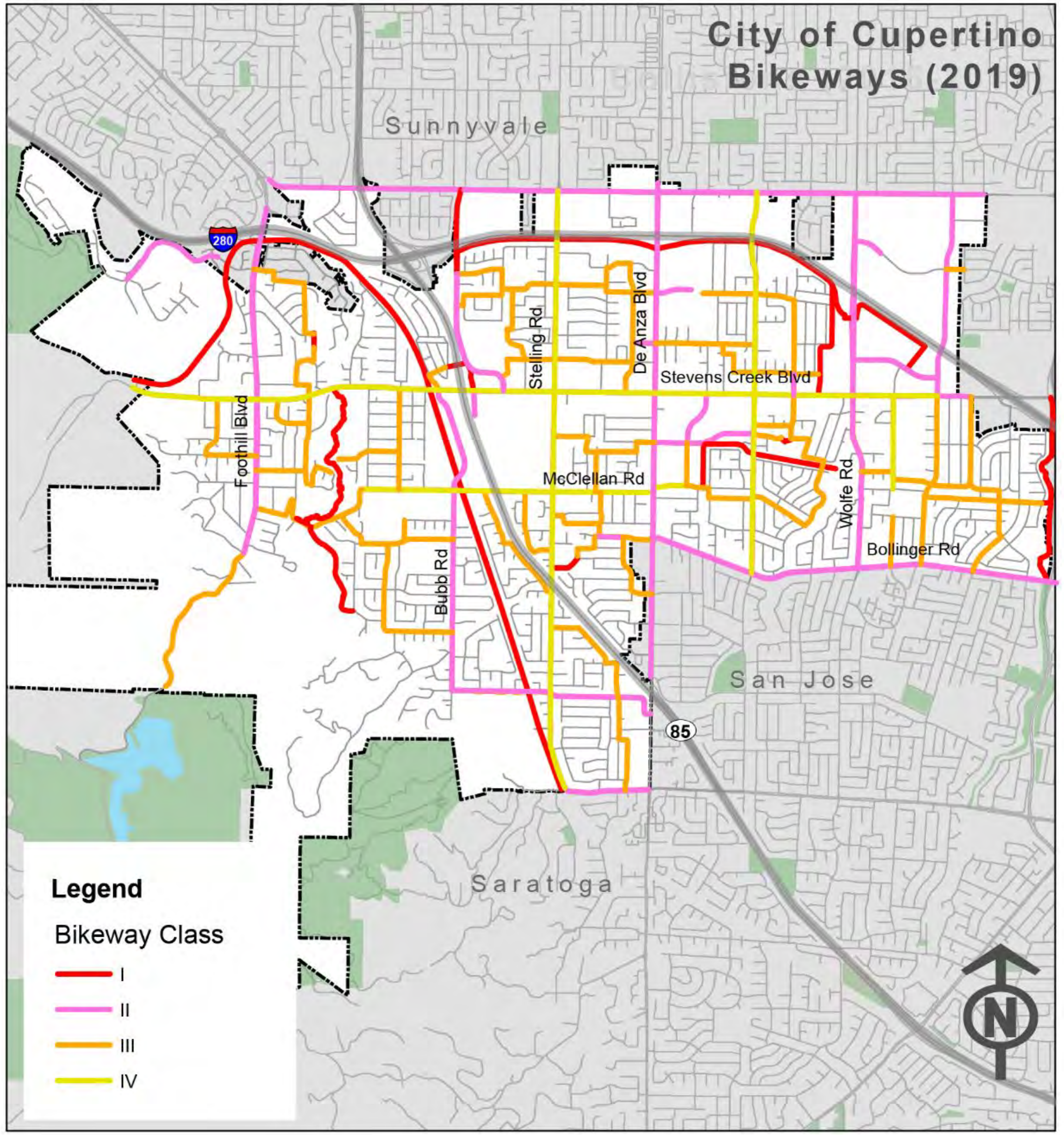




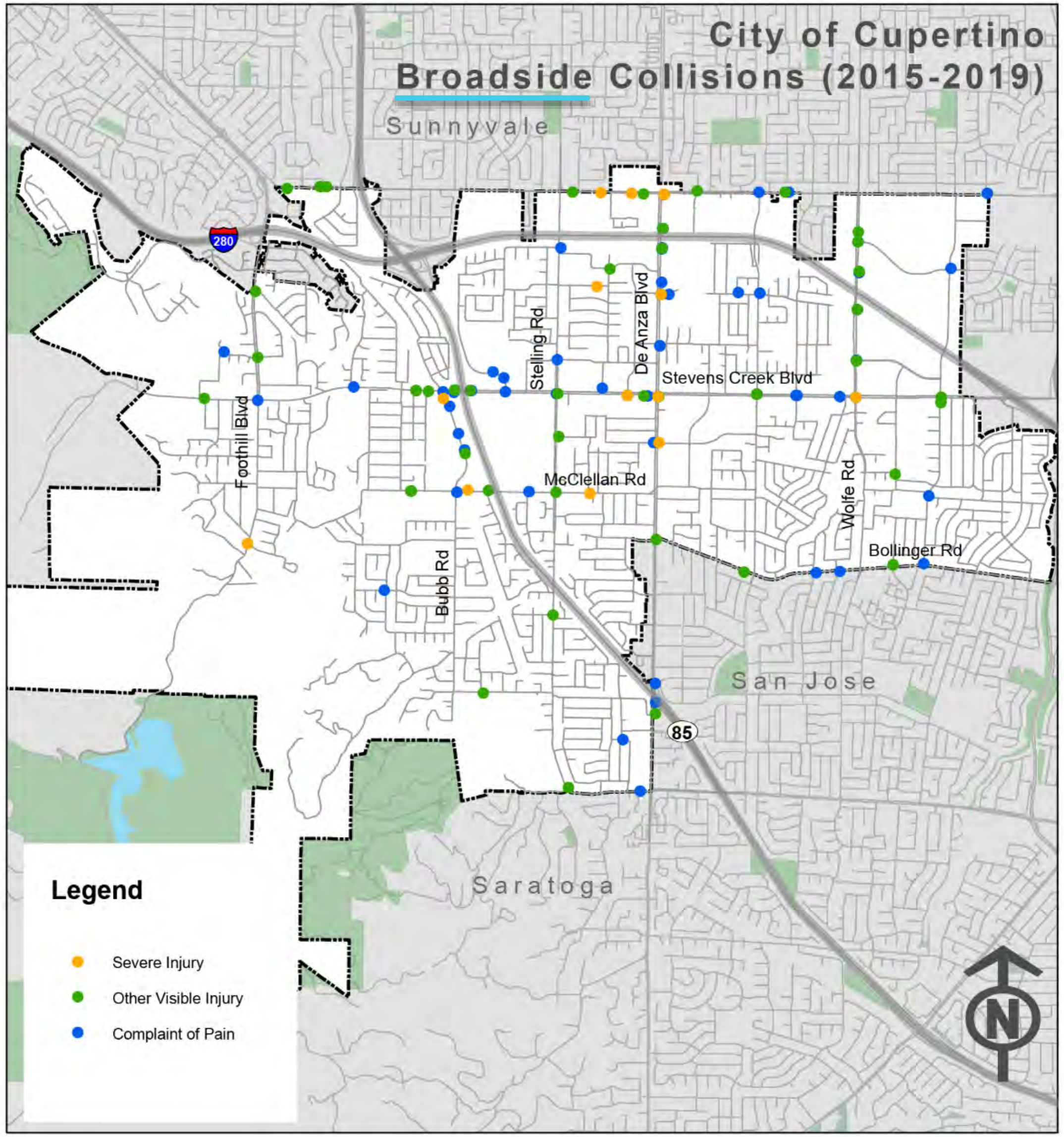


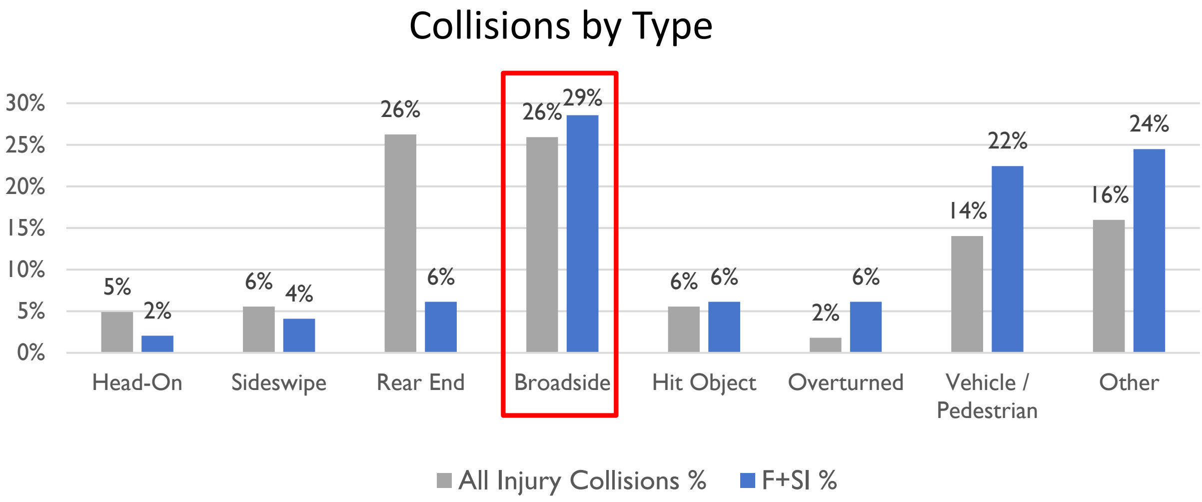
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)



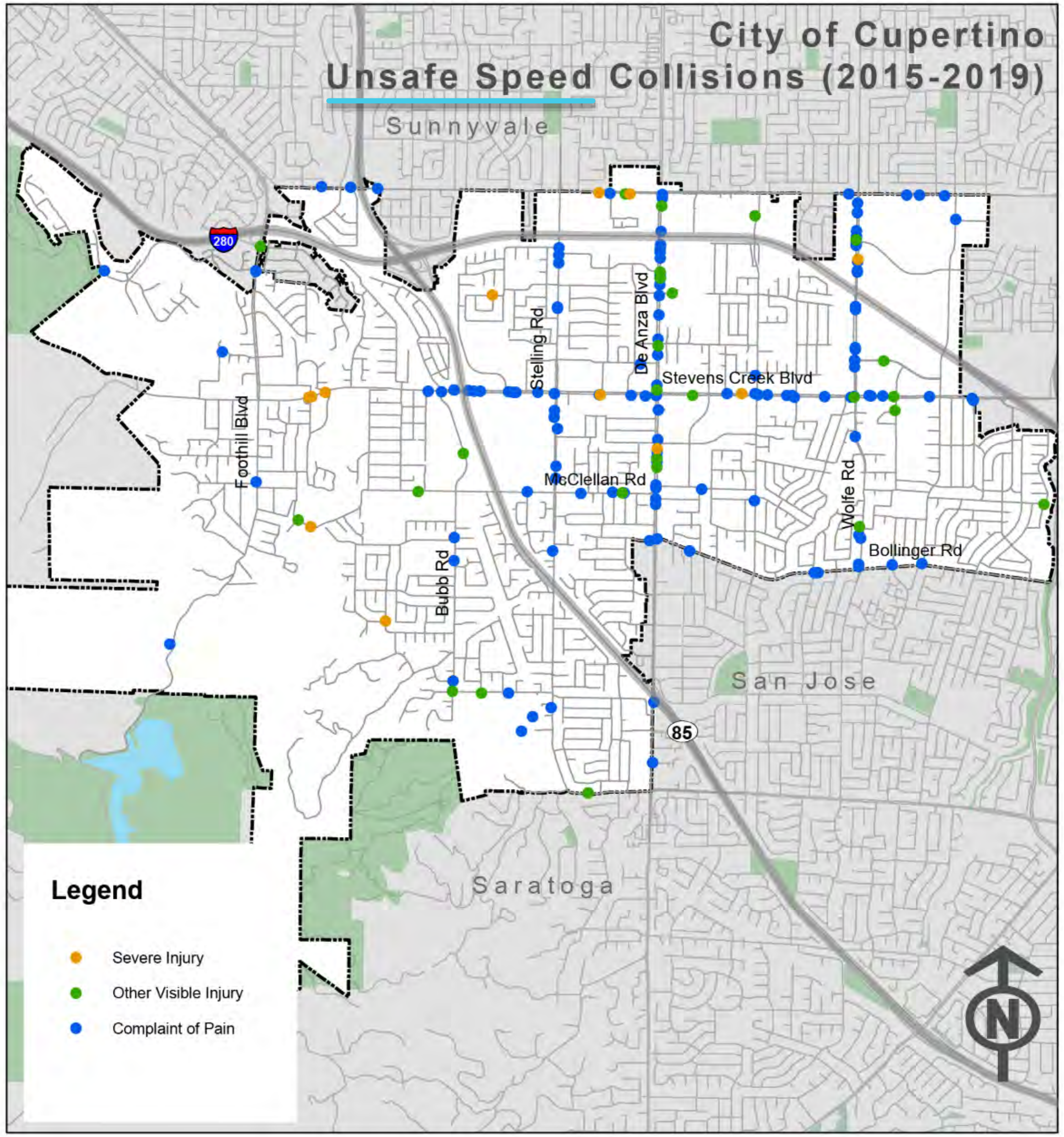


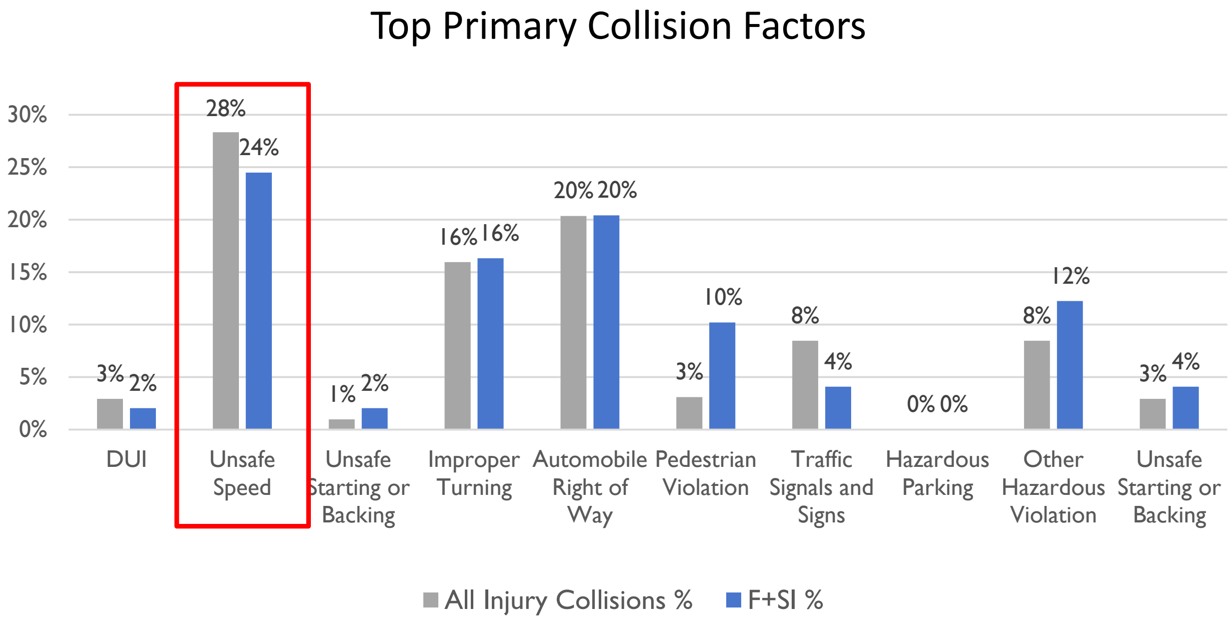
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)



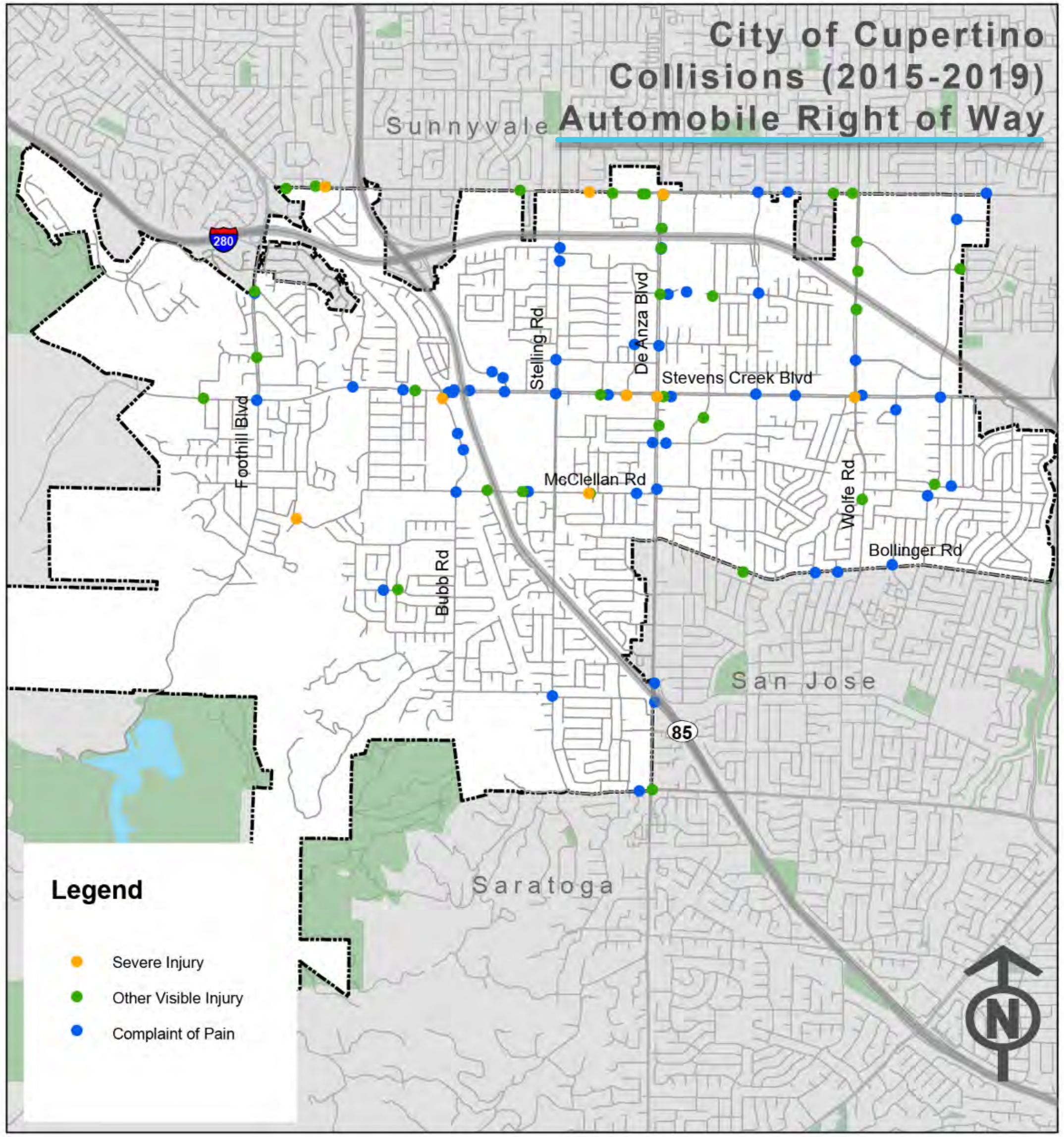


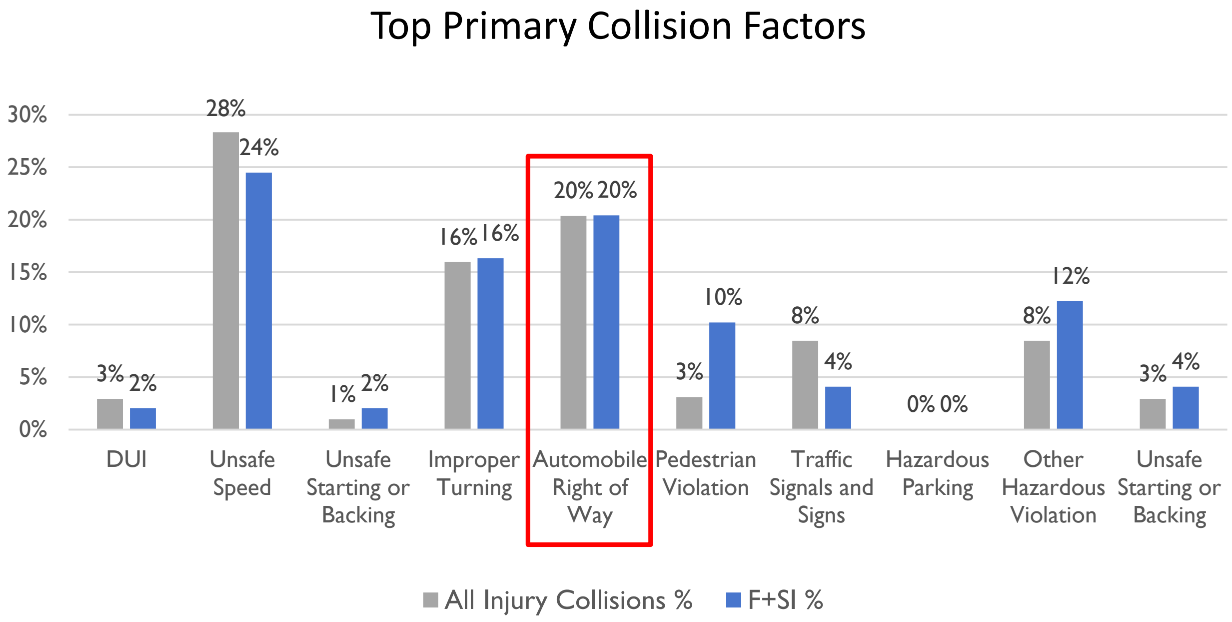
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)



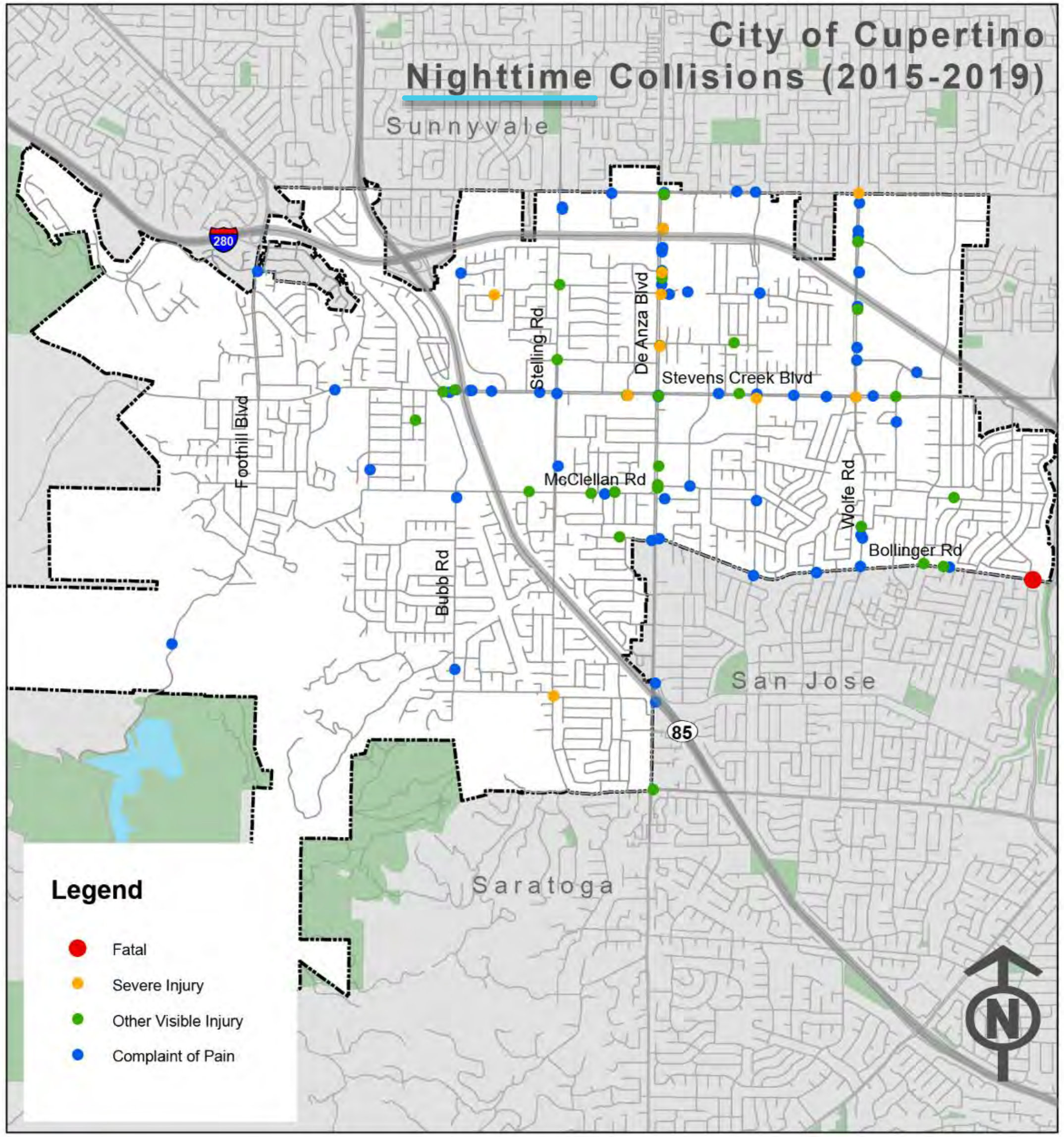


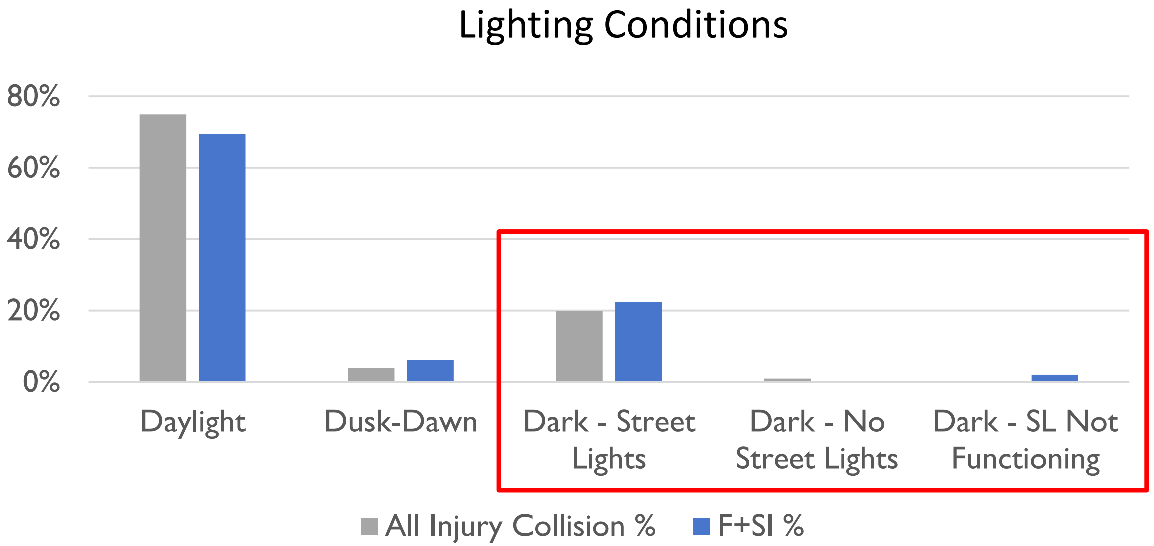
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)



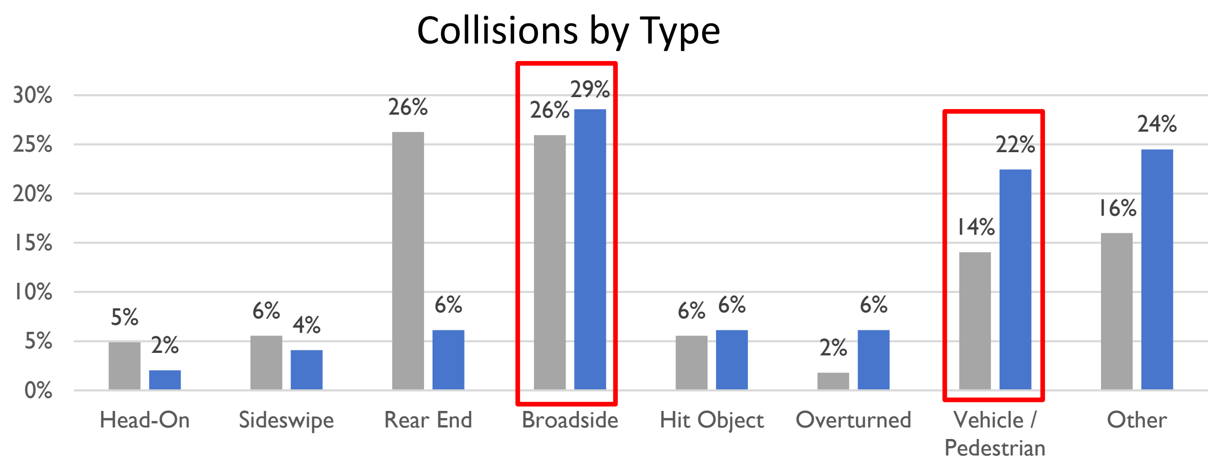


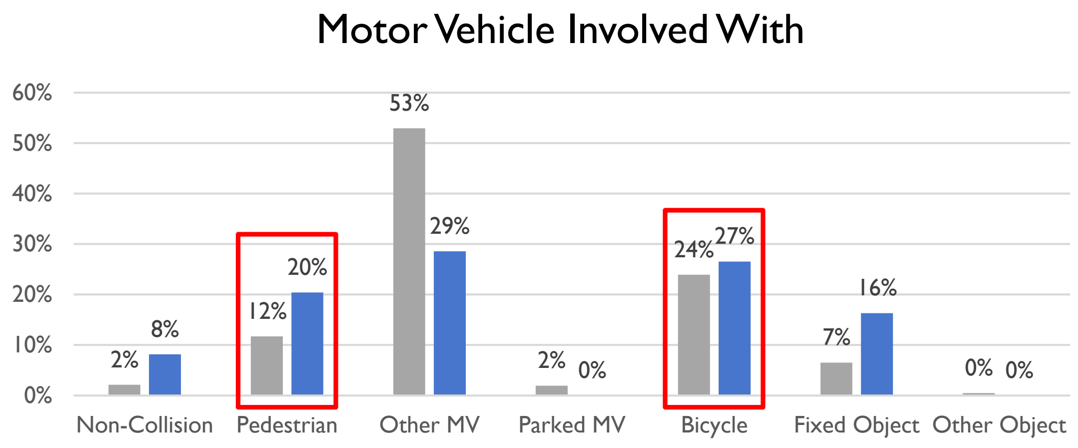
PROMINENT COLLISION TRENDS (INJURY COLLISIONS)

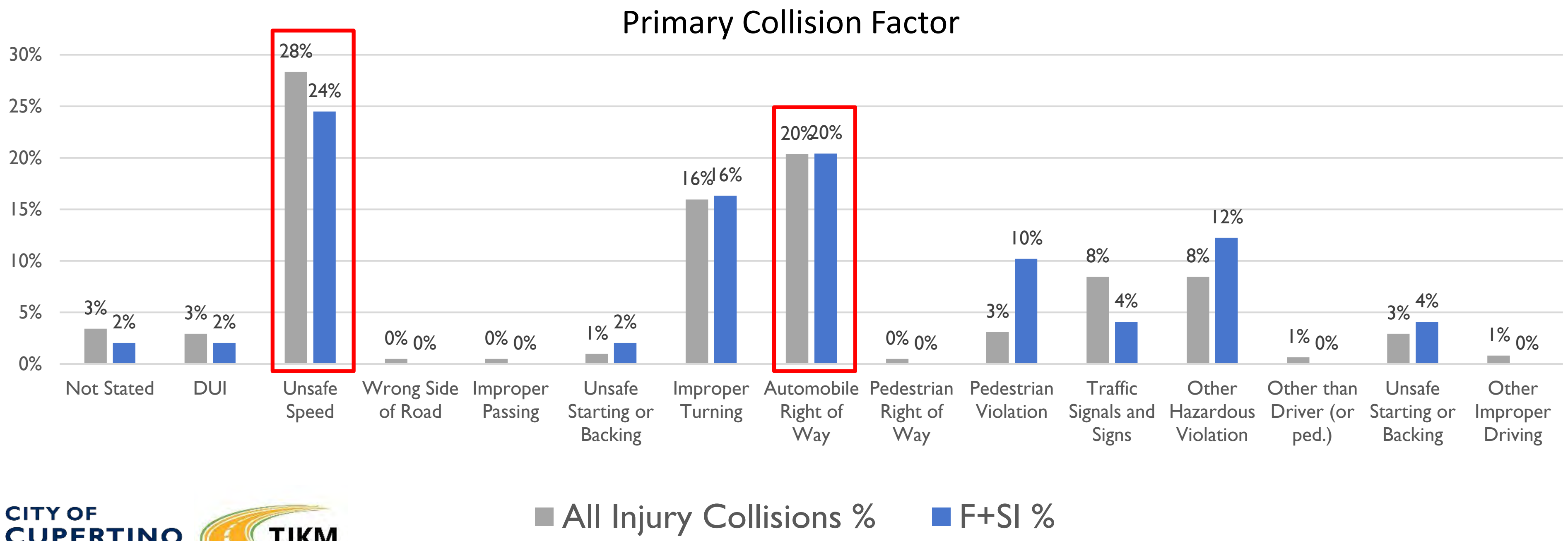




ANALYSIS FINDINGS (2015 – 2019): INJURY COLLISIONS







Note:

- Injury Collisions – fatal, severe injury, other visible injury and complaint of pain collisions
- F+SI – fatal and severe injury collisions

CITY OF CUPERTINO TJKM

EPDO SCORE

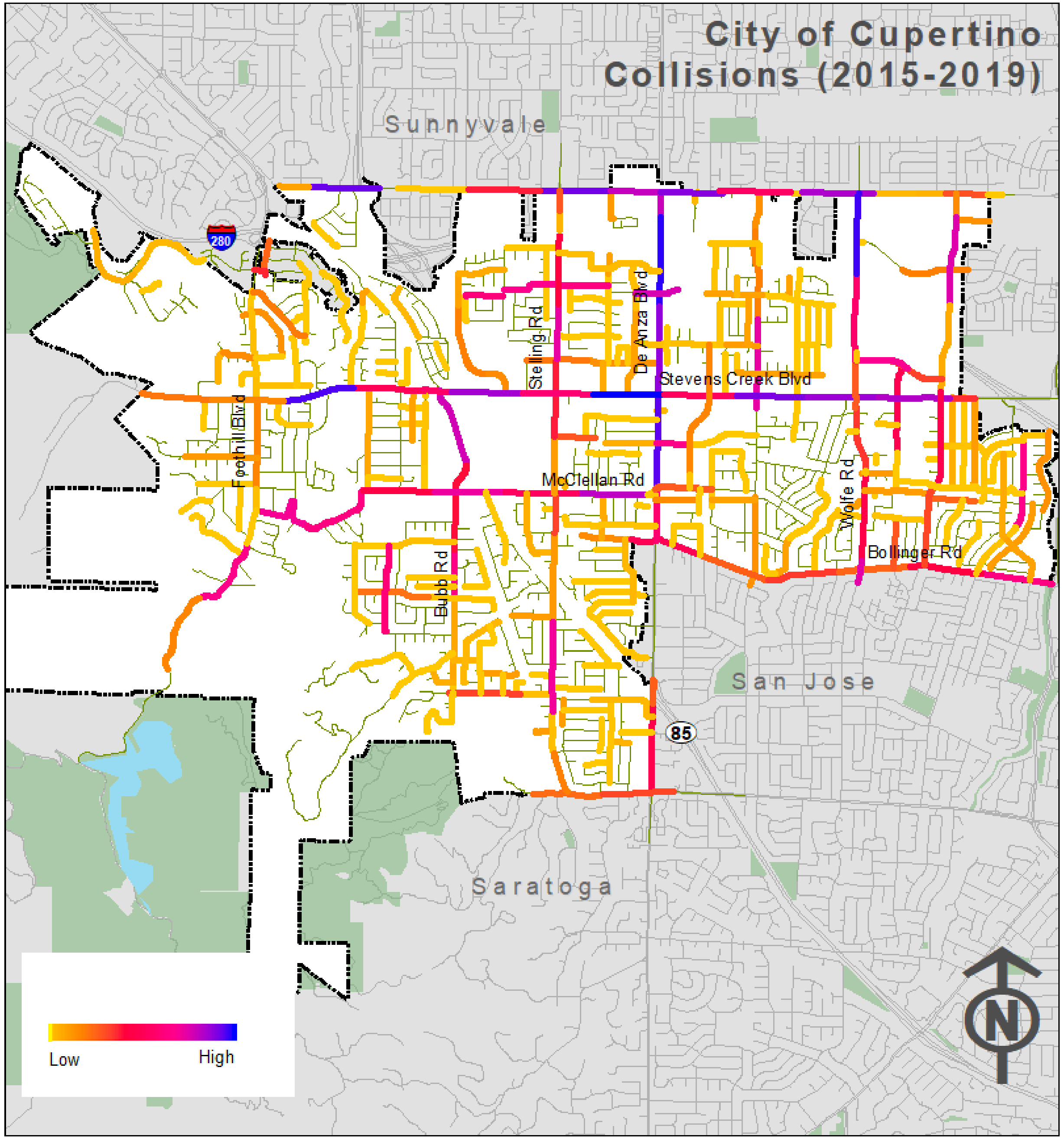
SOURCE : LOCAL ROAD SAFETY MANUAL 2020, CALTRANS

Equivalent property damage only (EPDO) methodology calculates a weighted score to identify locations that are experiencing more severe crashes. Methodology used to prioritize high risk intersections and roadway segments.

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

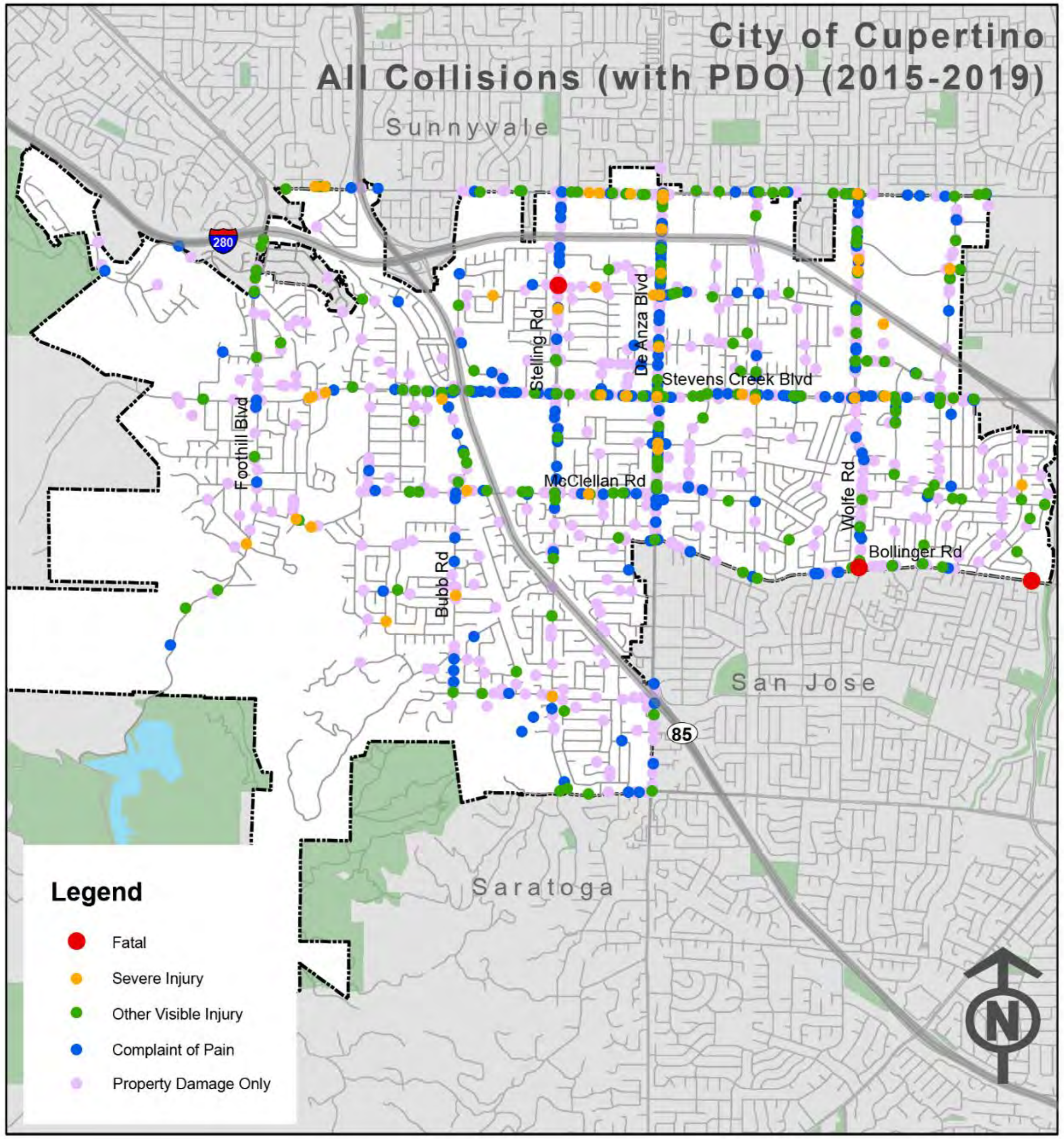
EPDO Score (HSIP Cycle 10) = (165 x Fatal) + (165 x Severe Injury) + (11 x Other Visible) + (6 x Complaint of Pain) + (1 x PDO)

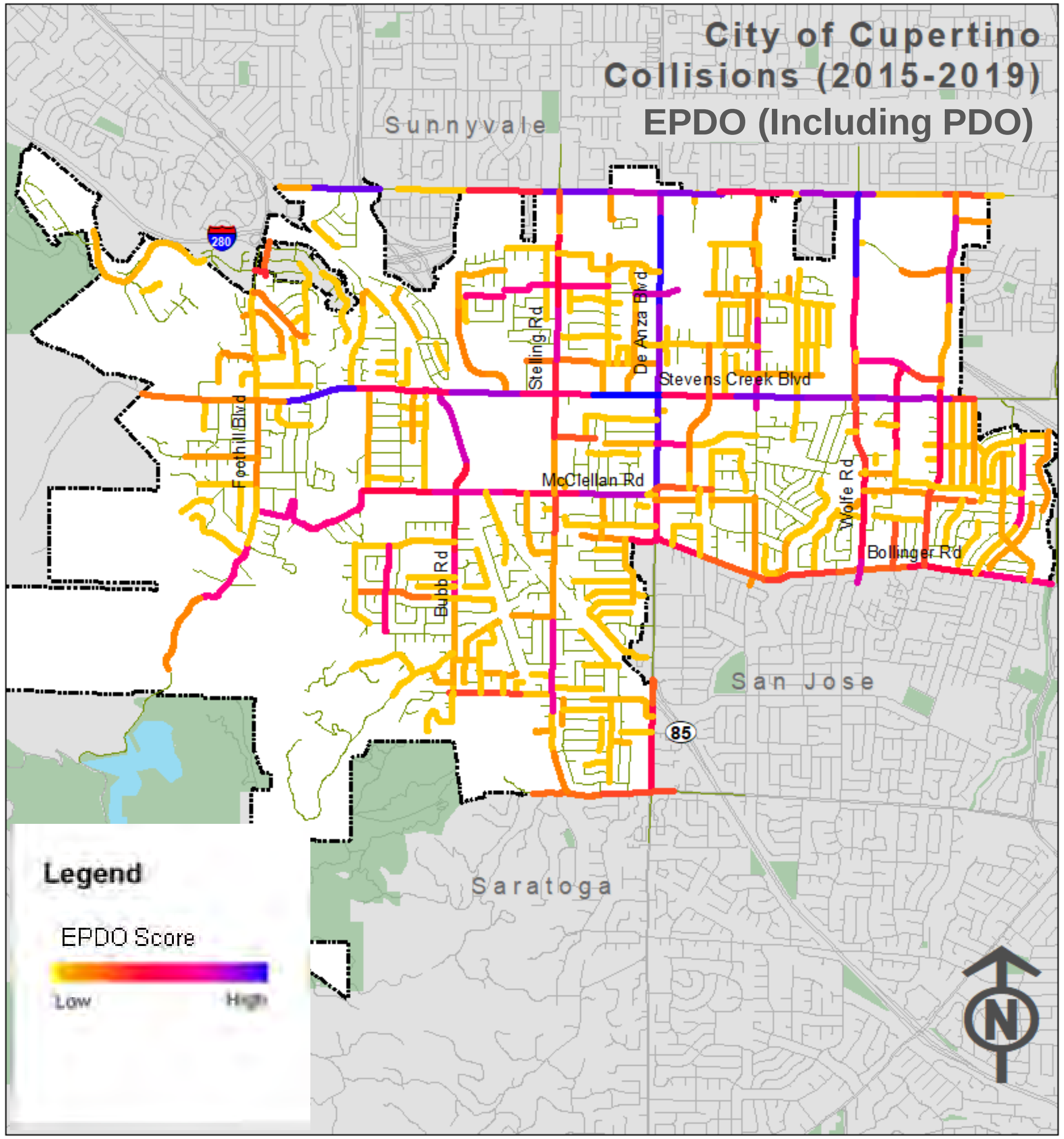
- **STEP 1:** Divide each roadway into 0.3 mile segments
- **STEP 2:** Find the total number of collisions by severity on each segment
- **STEP 3:** Calculate each segment's EPDO Score
- **STEP 4:** Assign EPDO Score to each roadway segment
- **STEP 5:** Find locations with high severity and most frequency



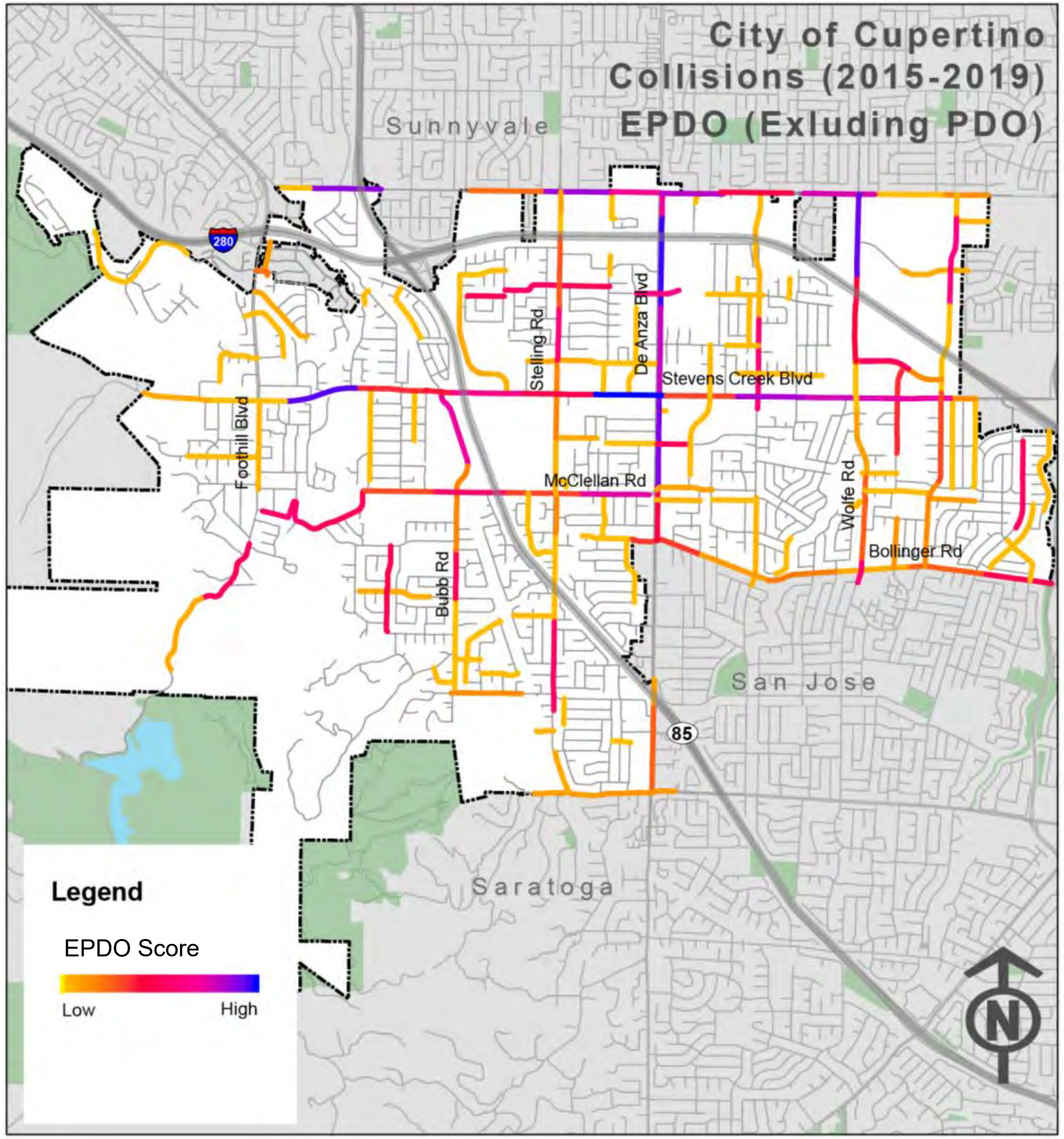
CITY OF CUPERTINO   TJKM

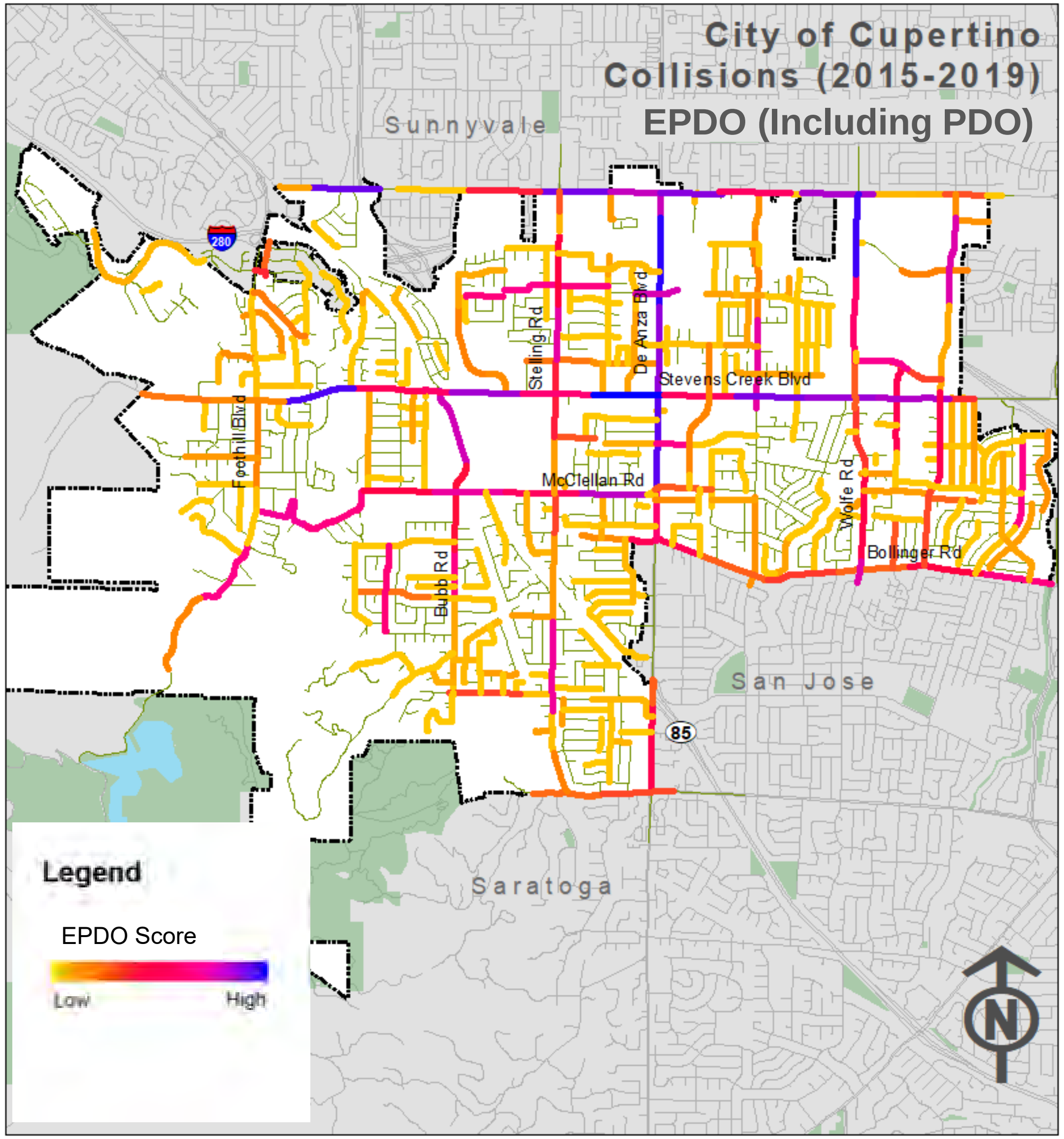
EPDO SCORE MAP COMPARISON





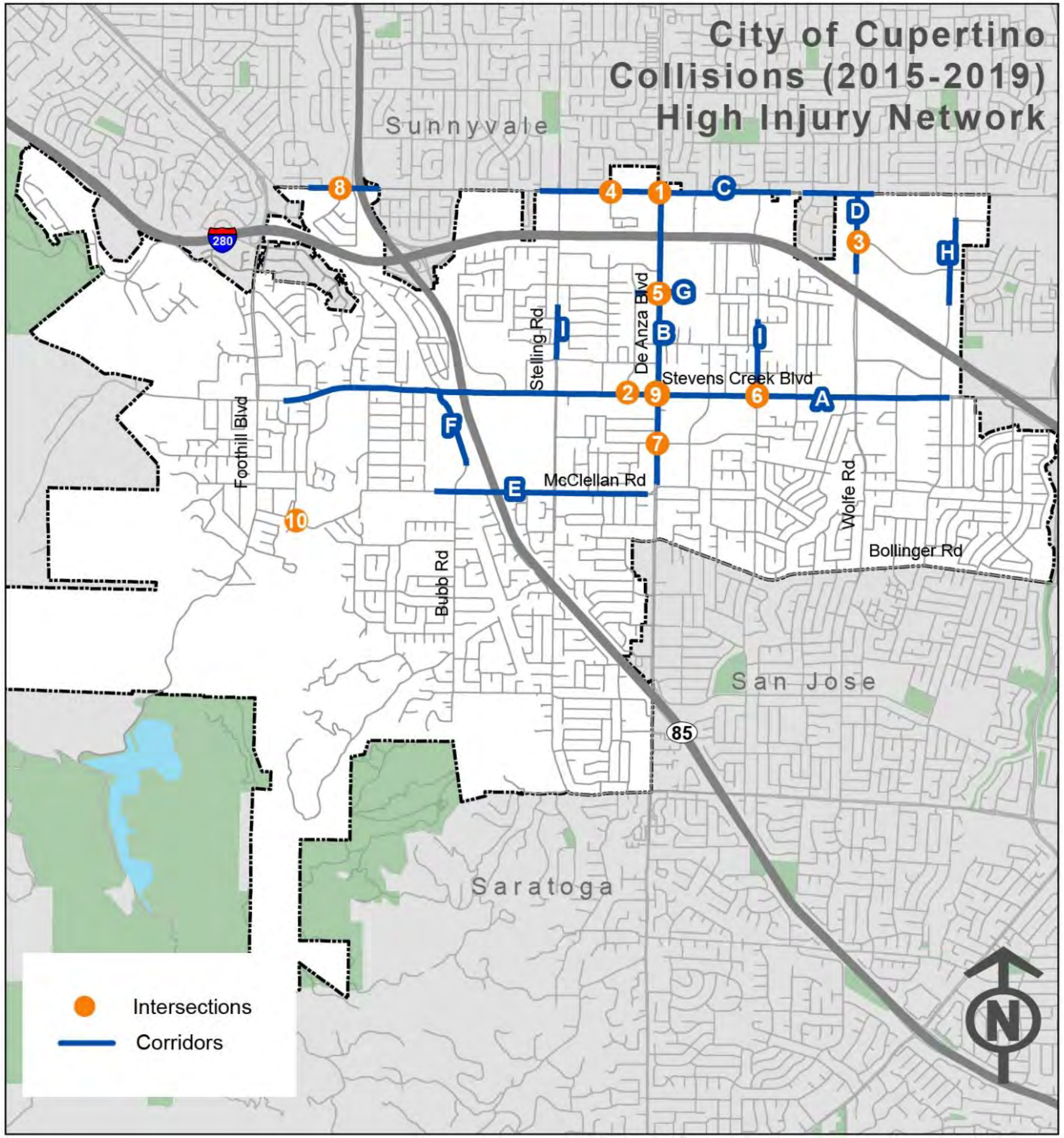
EPDO SCORE MAP COMPARISON: PDO VS NON PDO





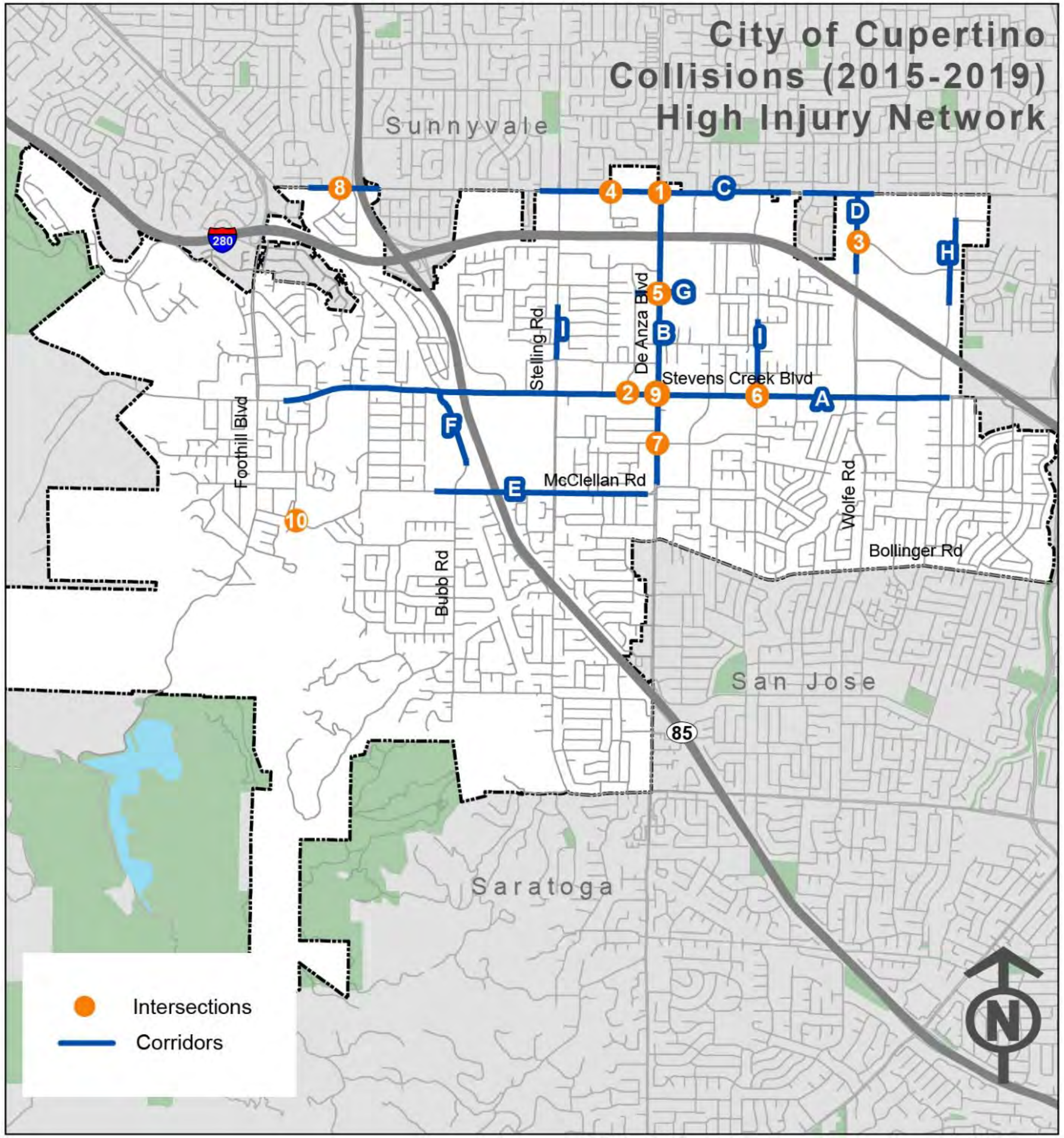
HIGH-RISK INTERSECTIONS

ID	Intersection	EPDO Score
1	De Anza Blvd and Homestead Rd	1,028
2	Bandley Dr and Stevens Creek Blvd	800
3	Prunridge Ave and Wolfe Ave	546
4	Franco Ct/Forge Way and Homestead Rd	545
5	De Anza Blvd and Mariani Ave	465
6	Blaney Ave and Stevens Creek Blvd	400
7	S De Anza Blvd and Rodrigues Ave	388
8	Barranca Dr and Homestead Rd	373
9	De Anza Blvd and Stevens Creek Blvd	373
10	McClellan Rd and Clubhouse Ln	349



HIGH-RISK CORRIDORS

ID	Corridors	EPDO Score
A	Stevens Creek Blvd: Janice Ave to Judy Ave	3,139
B	De Anza Blvd: Pacifica Dr to Homestead Rd	2,096
C	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	1,666
D	Wolfe Rd: Homestead Rd to Pruneridge Ave	570
E	McClellan Rd: Imperial Ave to De Anza Blvd	490
F	Bubb Rd: Stevens Creek Blvd to 2,000 ft south of Stevens Creek Rd	220
G	Mariani Ave: Bandly Dr to Infinite Loop	209
H	Tantau Ave: Forge Dr to Pruneridge Ave	208
I	Blaney Ave: Pear Tree Ln to Stevens Creek Blvd	192
J	N Stelling Rd: Alves Dr to Greenleaf Dr	192



OPEN DISCUSSION

- Questions on the project dashboard.
- Questions on the LRSP process and your role.
- Traffic and safety-related concerns on roads.
- Particular areas of concerns (not highlighted here).
- Concerns you may have heard from others.
- Existing programs/safety measures under Education, Enforcement, Engineering and Emergency Medical Services

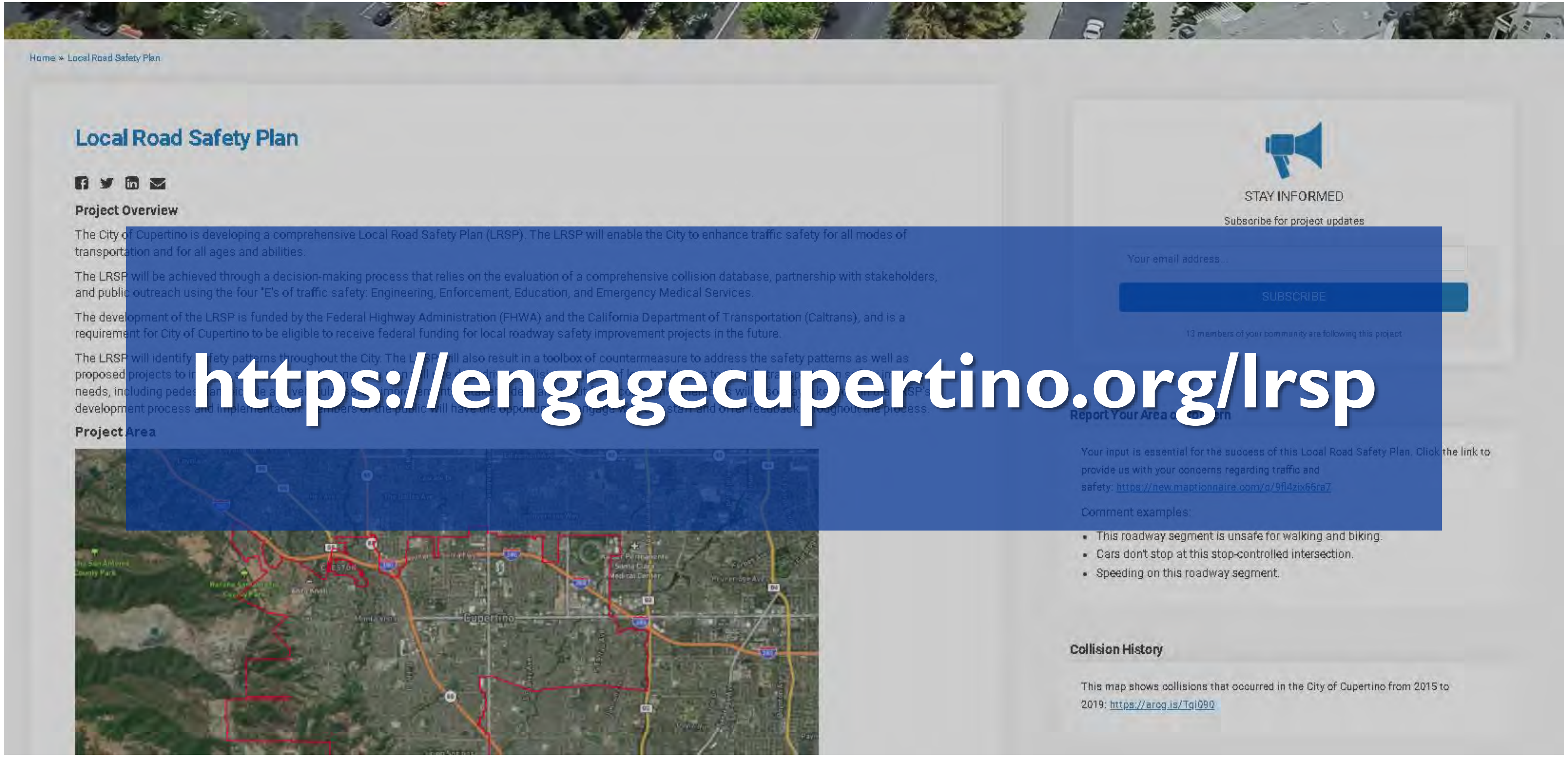
CITY OF CUPERTINO

TJKM

NEXT STEPS

- Summarize stakeholder and public input
- Identify and prioritize engineering countermeasures and non-engineering strategies
- Develop safety projects for all high-risk locations
- Hold 2nd Stakeholder Meeting

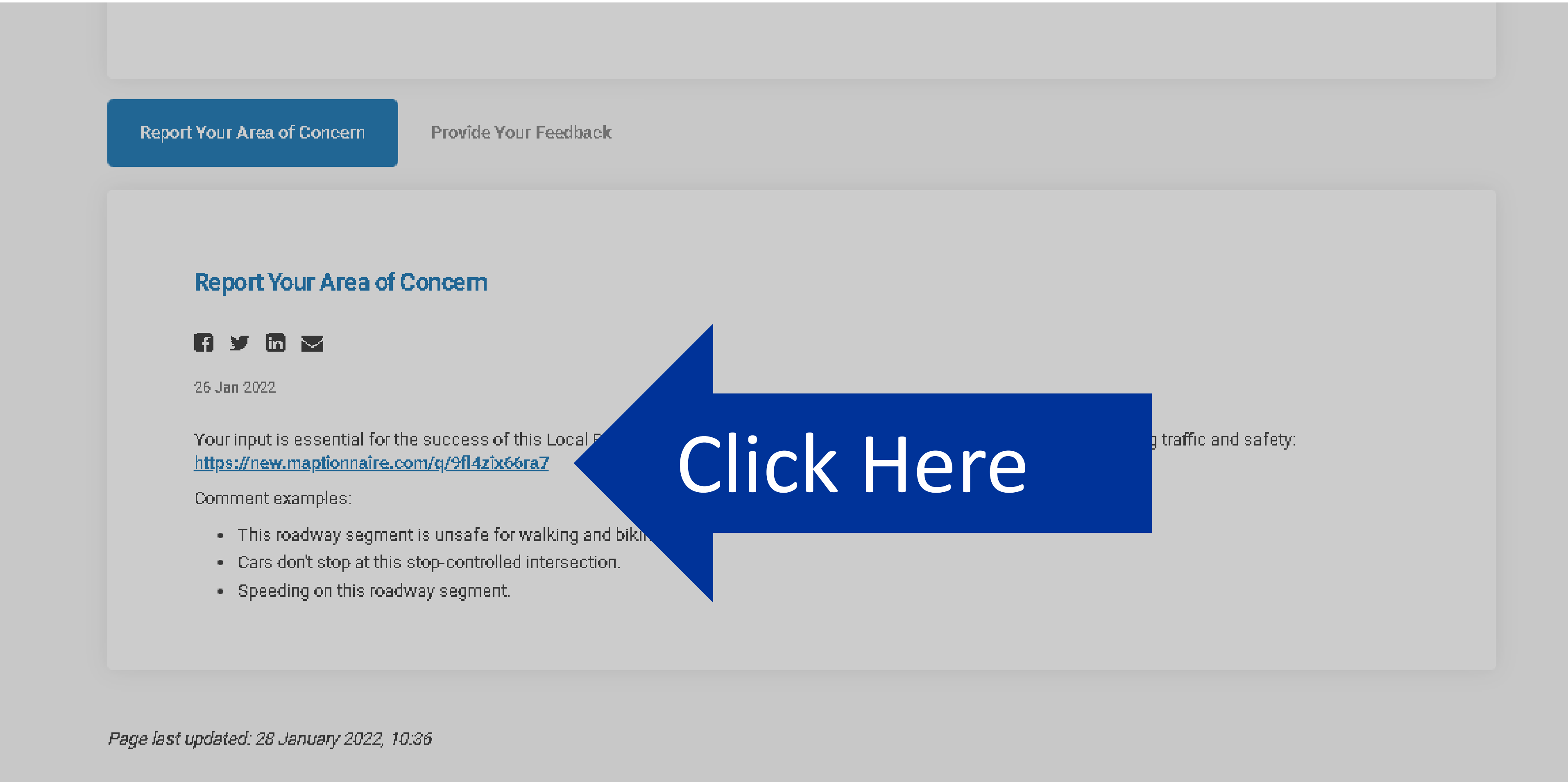
PROJECT DASHBOARD IS LIVE!



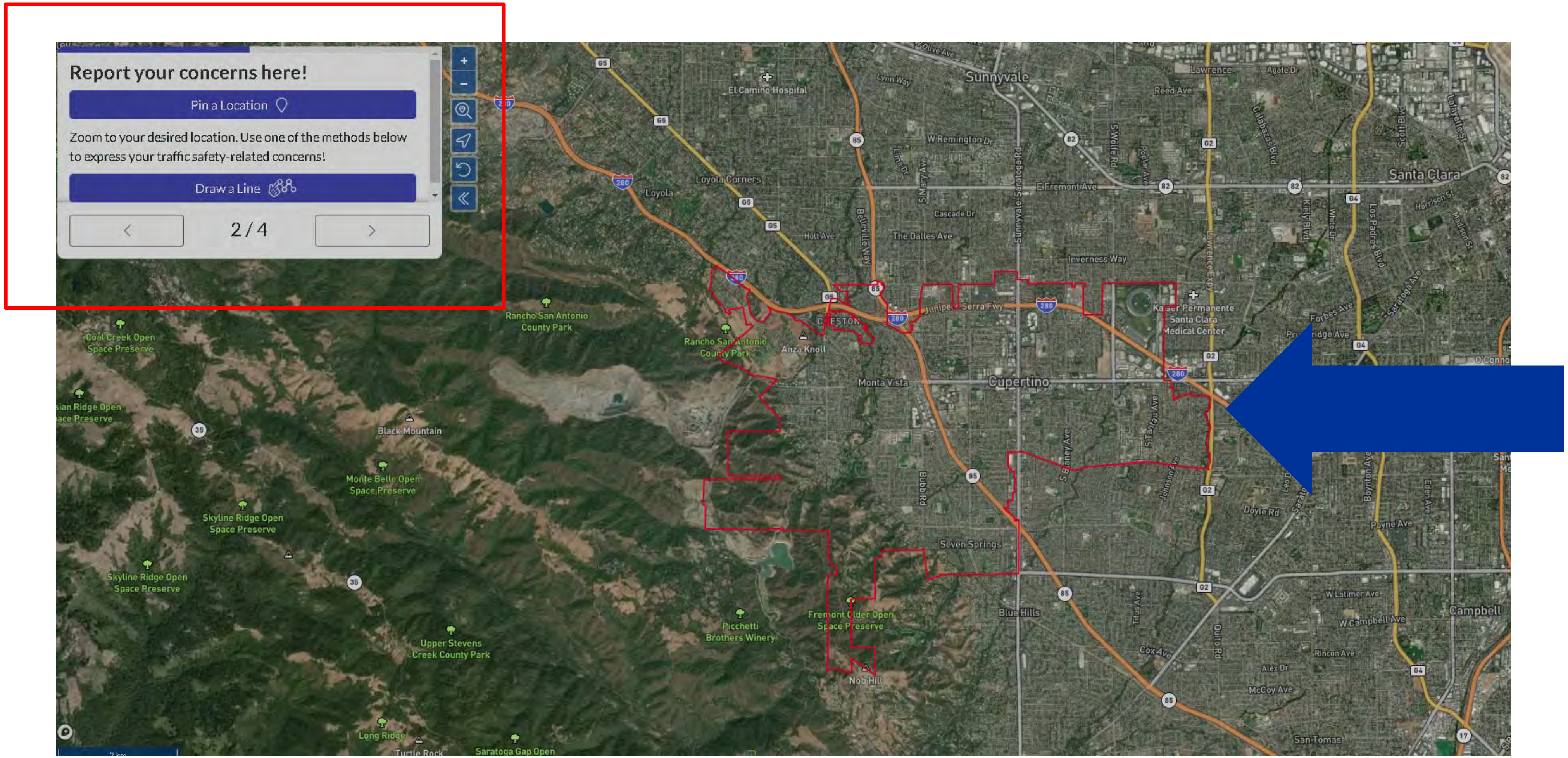
https://engagecupertino.org/lrsp

CITY OF CUPERTINO TJKM

REPORT YOUR CONCERNS



GIVE US LOCATION-BASED FEEDBACK/COMMENTS!



JURISDICTION:	Cupertino
Project Name:	Local Roadway Safety Plan (LRSP) Stakeholder Meeting
Location:	Zoom
Date:	July 6, 2022; 1:00 p.m.

AGENDA

1. Project Status and Milestones
2. Collision Analysis Findings
3. Emphasis Areas
4. Draft Engineering & Non-Engineering Countermeasures
5. Open Discussion/Comments
6. Implementation/Next Steps

CITY OF CUPERTINO

LOCAL ROAD SAFETY PLAN

2ND STAKEHOLDER MEETING

JULY 6, 2022

CITY OF CUPERTINO

TJKM

PURPOSE OF TODAY'S MEETING

- Project Status and Milestones
- Collision Analysis Findings
- Emphasis Areas
- Draft Engineering & Non-Engineering Countermeasures
- Open Discussion/Comments
- Implementation/Next Steps

WHAT IS A LOCAL ROAD SAFETY PLAN (LRSP)?

- **Overarching Goals:**
  - To reduce fatalities and severe injuries (F+SI) on the City's roadways and intersections
  - To identify, analyze and prioritize roadway and intersection safety improvements on local roads
  - A required document to be eligible for the Highway Safety Improvement Program (HSIP) grant funding
- **Considers Engineering and Non-engineering Strategies**
  - **4 E's of Traffic Safety:** Education, Enforcement, Engineering and Emergency Medical Services (EMS)

PROJECT STATUS AND MILESTONES

1st Stakeholder Meeting
February 3, 2022

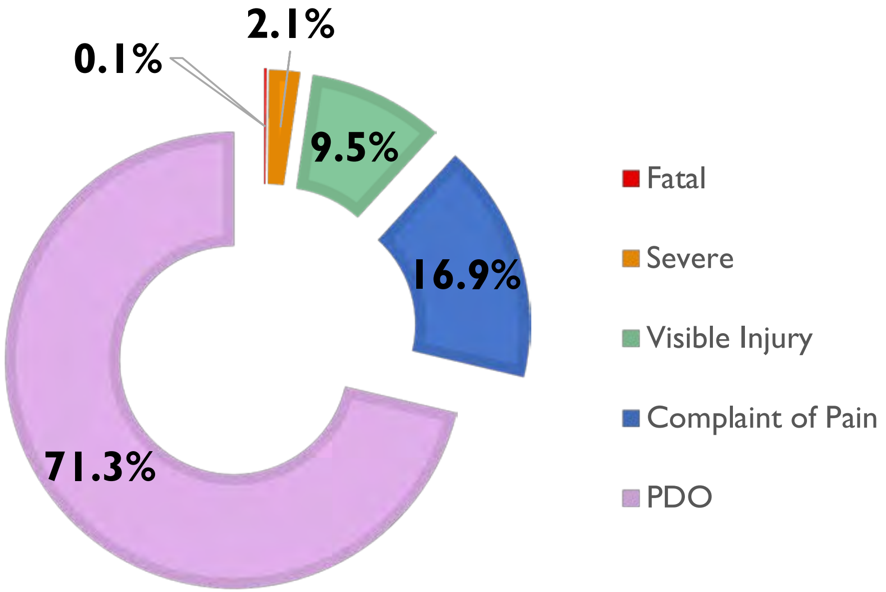
Community Outreach

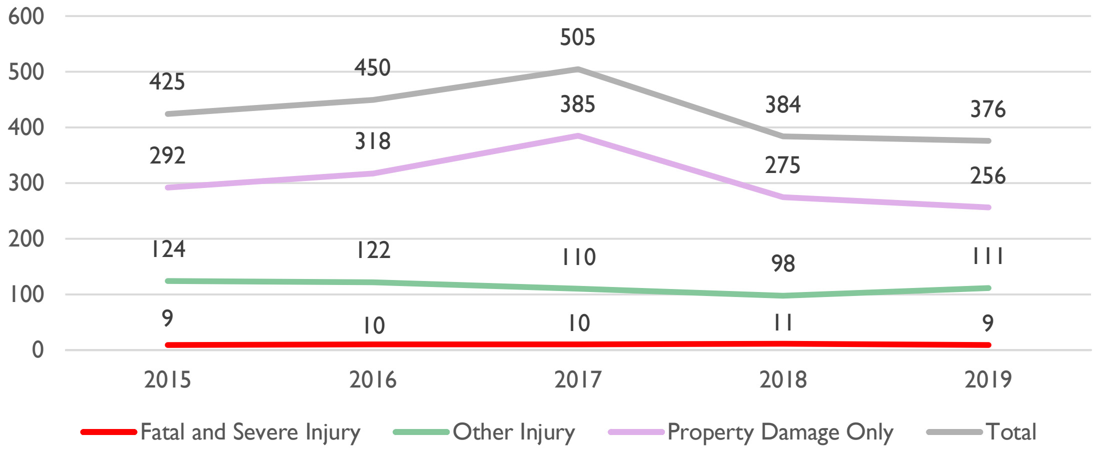
Data Collection and System Review → Establish Project Goals and Objectives → Collision Trend Analysis (2015 – 2019) → Identify High Injury Locations → Identify Emphasis Areas

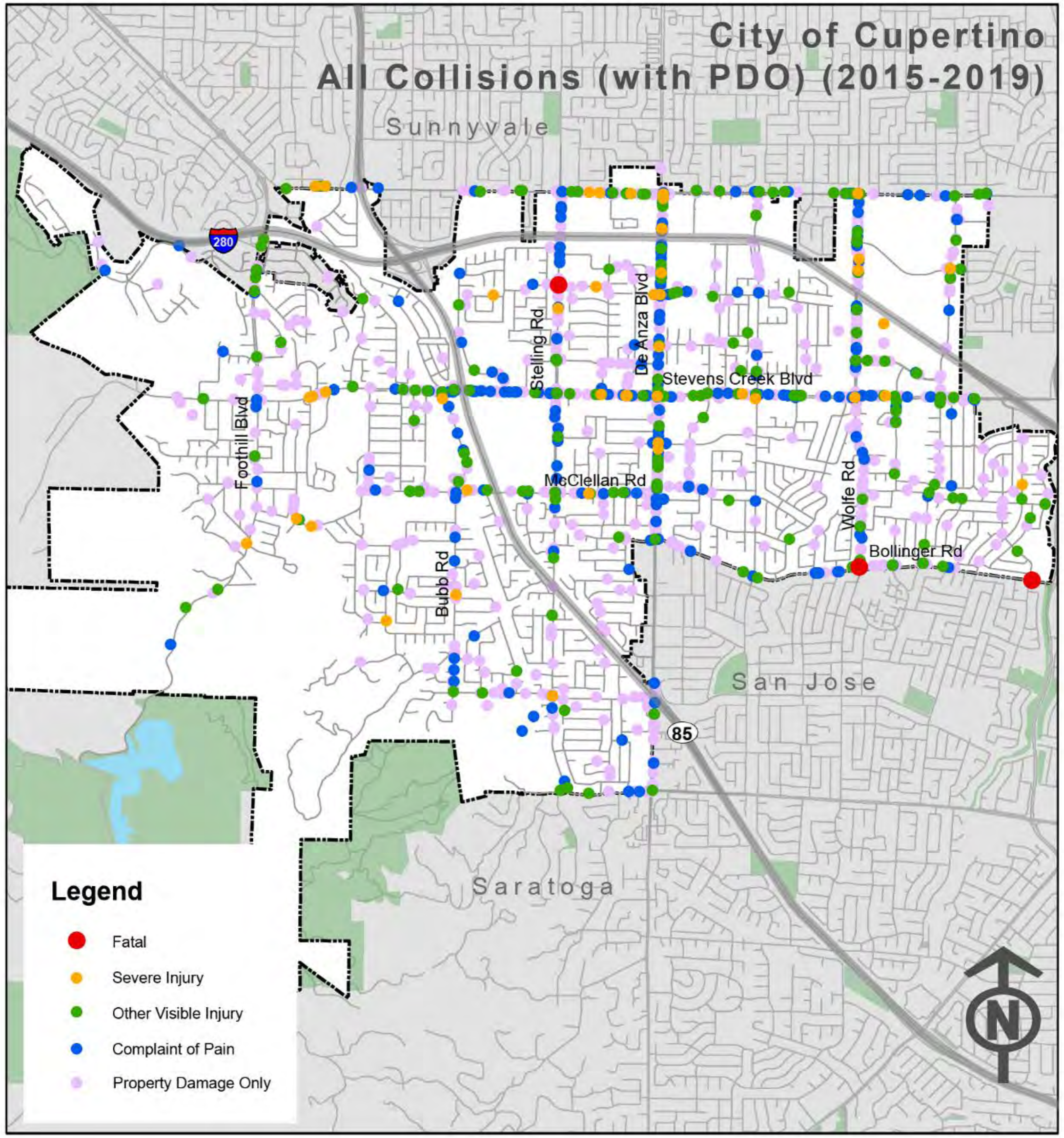
→ Develop Countermeasures Toolbox → Develop Safety Projects → Cost-Estimates and Benefit-Cost Ratio → LRSP Report

2nd Stakeholder Meeting
July 6, 2022

ANALYSIS FINDINGS (2015 – 2019): ALL COLLISIONS



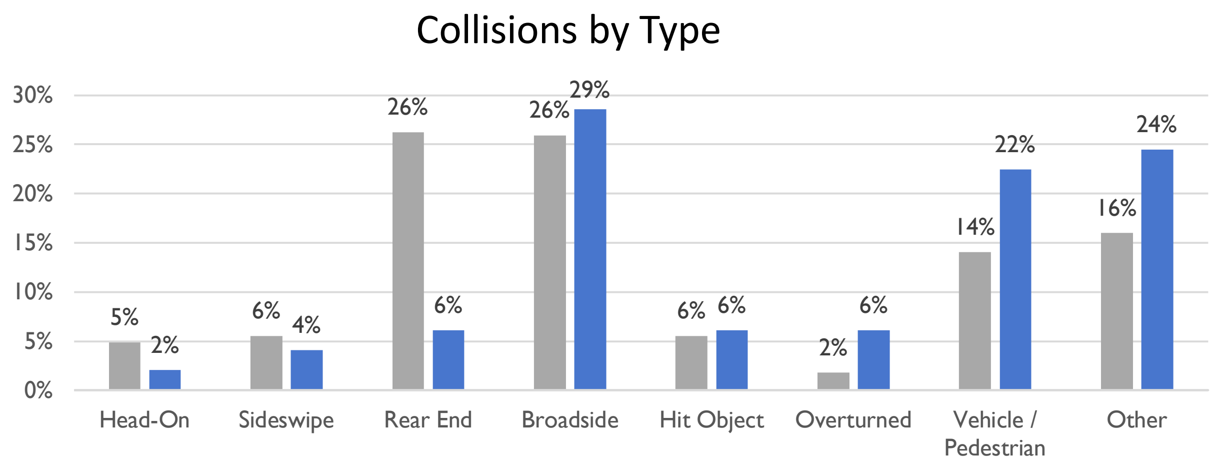


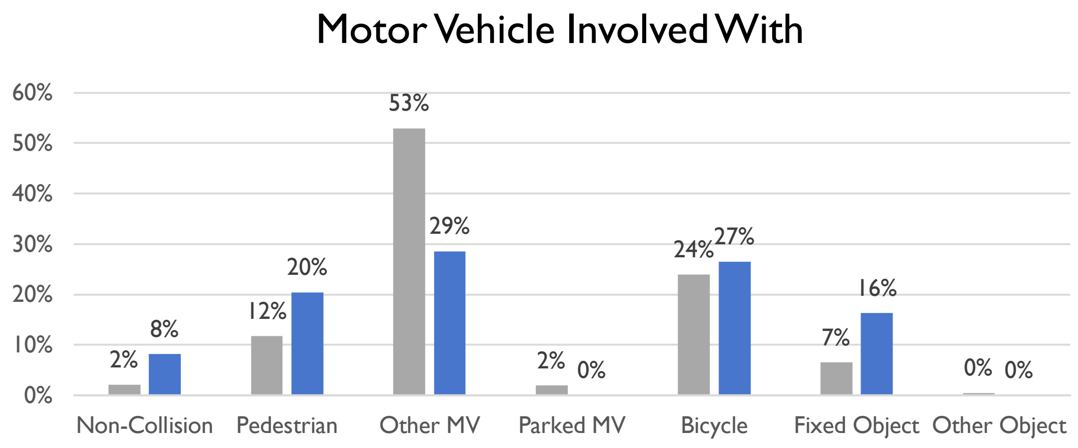


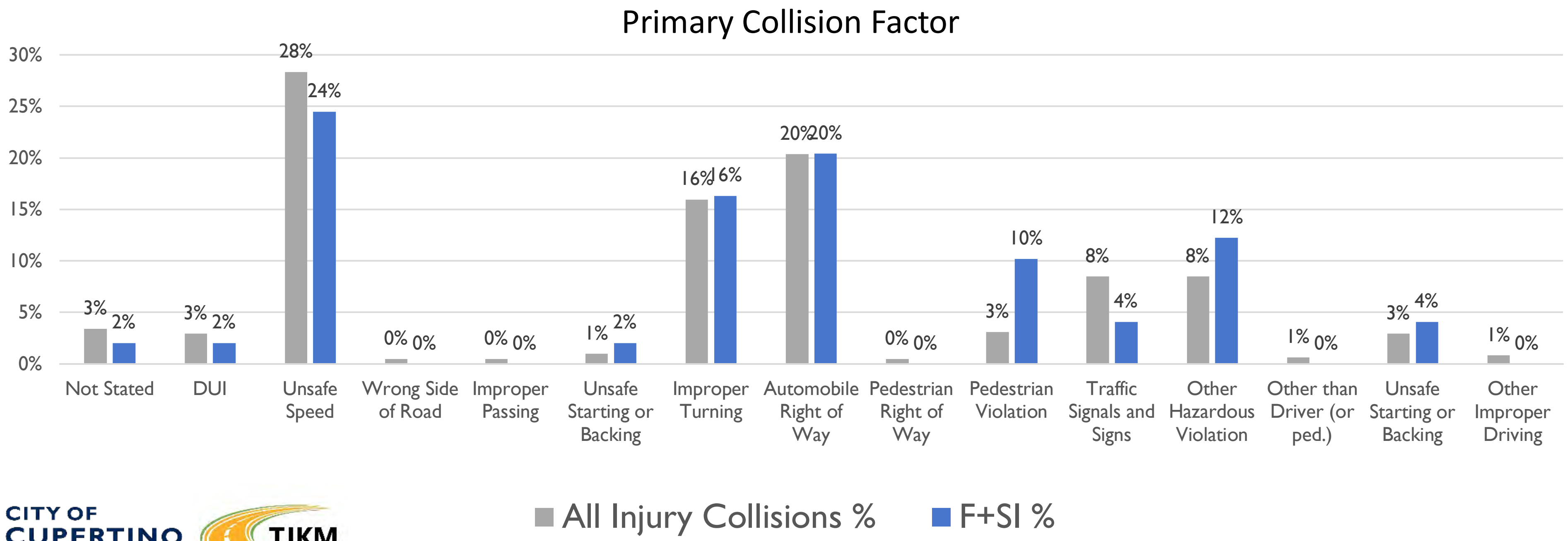
CITY OF CUPERTINO

TJKM

ANALYSIS FINDINGS (2015 – 2019): INJURY COLLISIONS







Note:

- Injury Collisions – fatal, severe injury, other visible injury and complaint of pain collisions
- F+SI – fatal and severe injury collisions

CITY OF CUPERTINO TJKM

EPDO SCORE

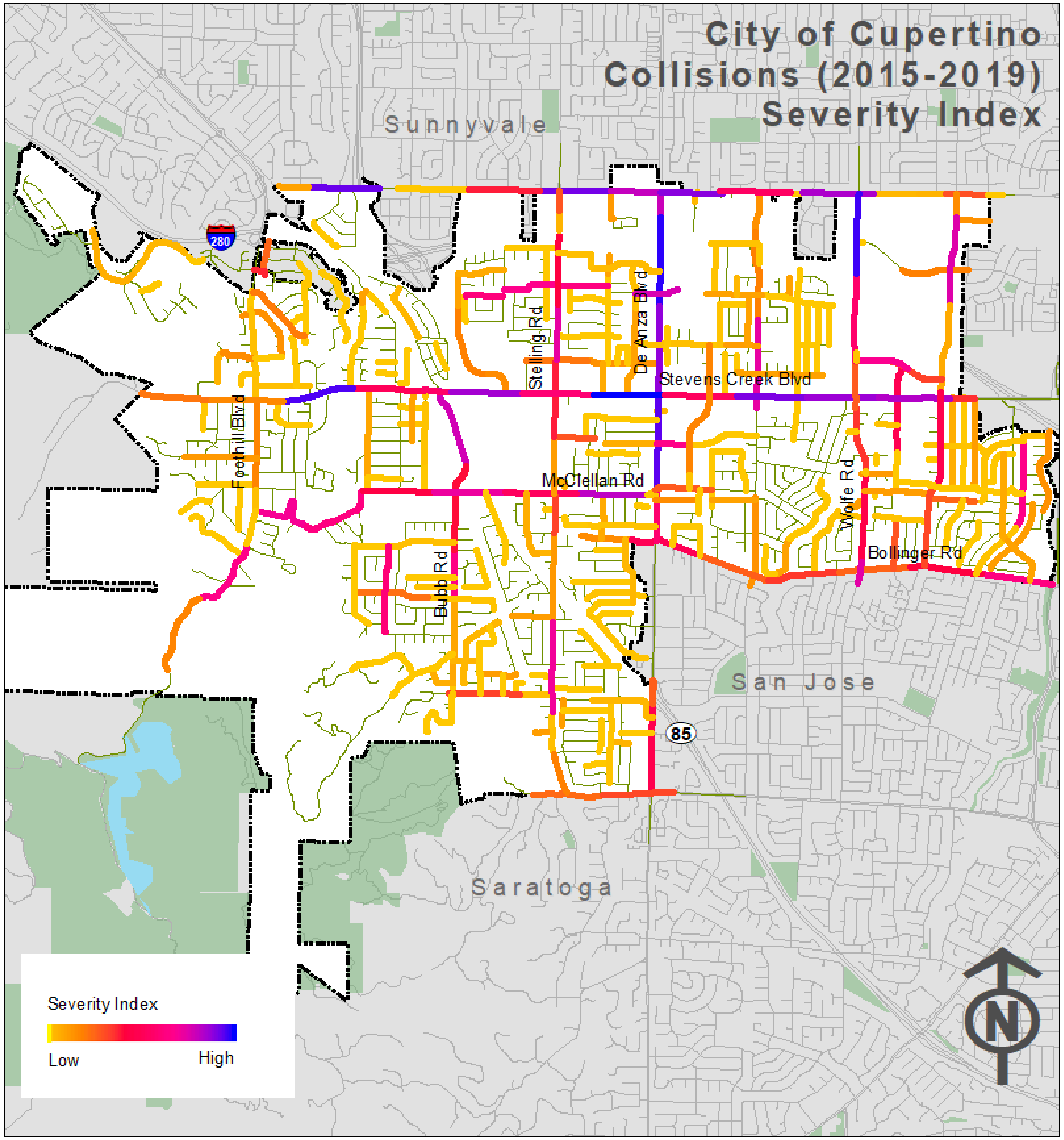
SOURCE : LOCAL ROAD SAFETY MANUAL 2020, CALTRANS

Equivalent property damage only (EPDO) methodology calculates a weighted score to identify locations that are experiencing more severe crashes. Methodology used to prioritize high risk intersections and roadway segments.

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

EPDO Score (HSIP Cycle 10) = (165 x Fatal) + (165 x Severe Injury) + (11 x Other Visible) + (6 x Complaint of Pain) + (1 x PDO)

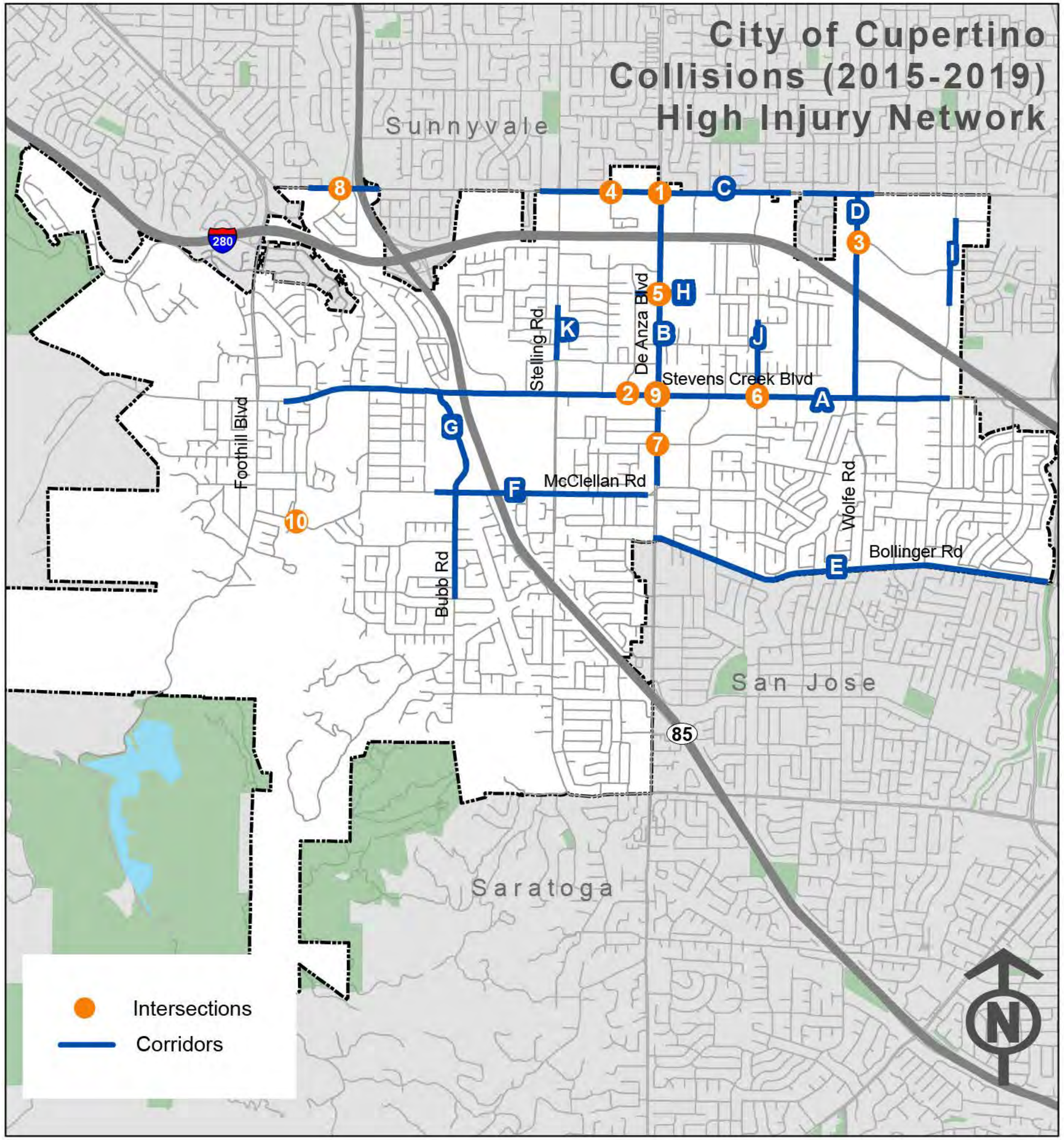
- **STEP 1:** Divide each roadway into 0.3 mile segments
- **STEP 2:** Find the total number of collisions by severity on each segment
- **STEP 3:** Calculate each segment's EPDO Score
- **STEP 4:** Assign EPDO Score to each roadway segment
- **STEP 5:** Find locations with high severity and most frequency



CITY OF CUPERTINO TJKM

HIGH-INJURY INTERSECTIONS

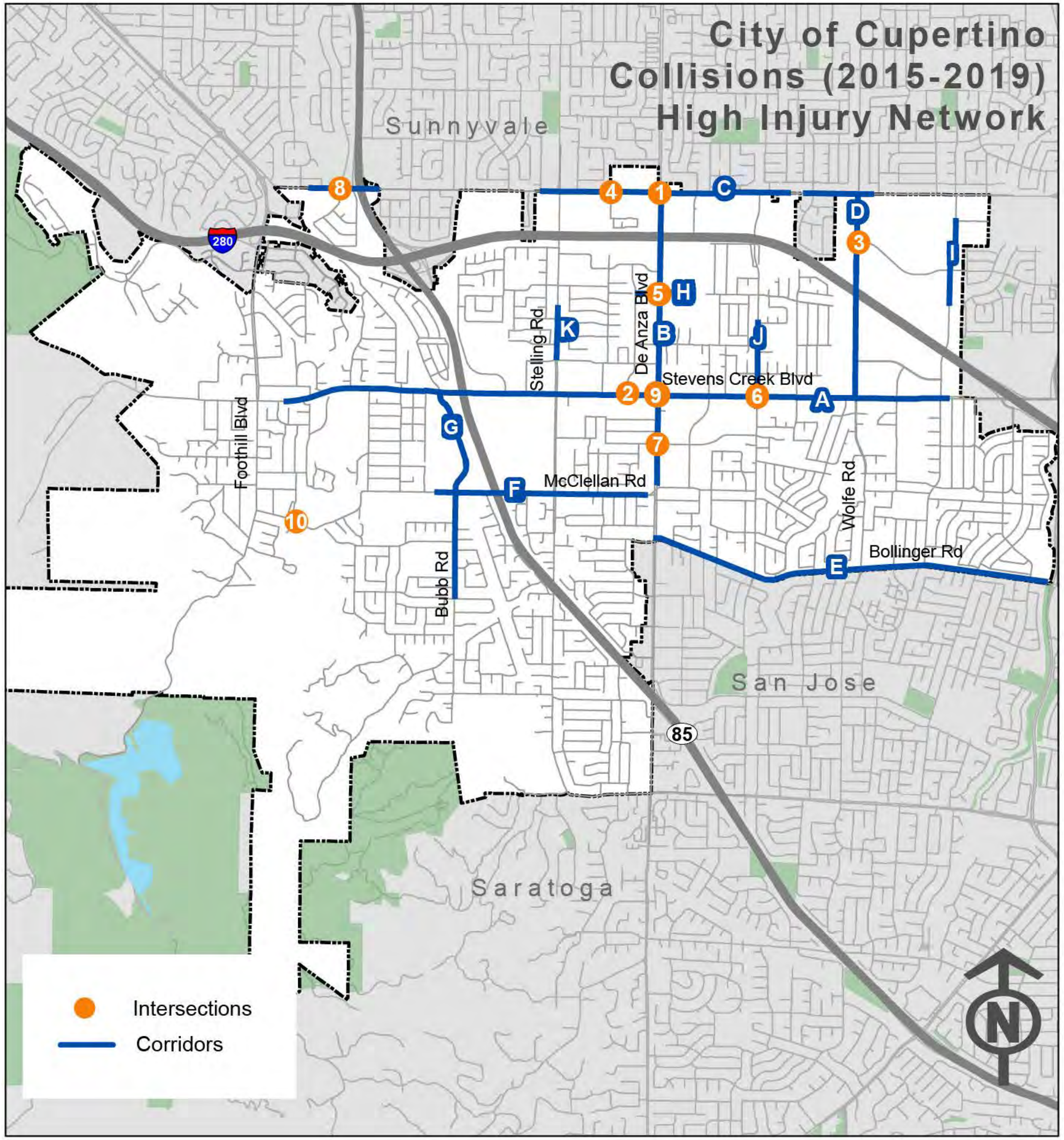
ID	Intersection	EPDO Score
1	De Anza Blvd and Homestead Rd	1,028
2	Bandley Dr and Stevens Creek Blvd	800
3	Prunridge Ave and Wolfe Ave	546
4	Franco Ct/Forge Way and Homestead Rd	545
5	De Anza Blvd and Mariani Ave	465
6	Blaney Ave and Stevens Creek Blvd	400
7	S De Anza Blvd and Rodrigues Ave	388
8	Barranca Dr and Homestead Rd	373
9	De Anza Blvd and Stevens Creek Blvd	373
10	McClellan Rd and Clubhouse Ln	349



CITY OF CUPERTINO
TJKM

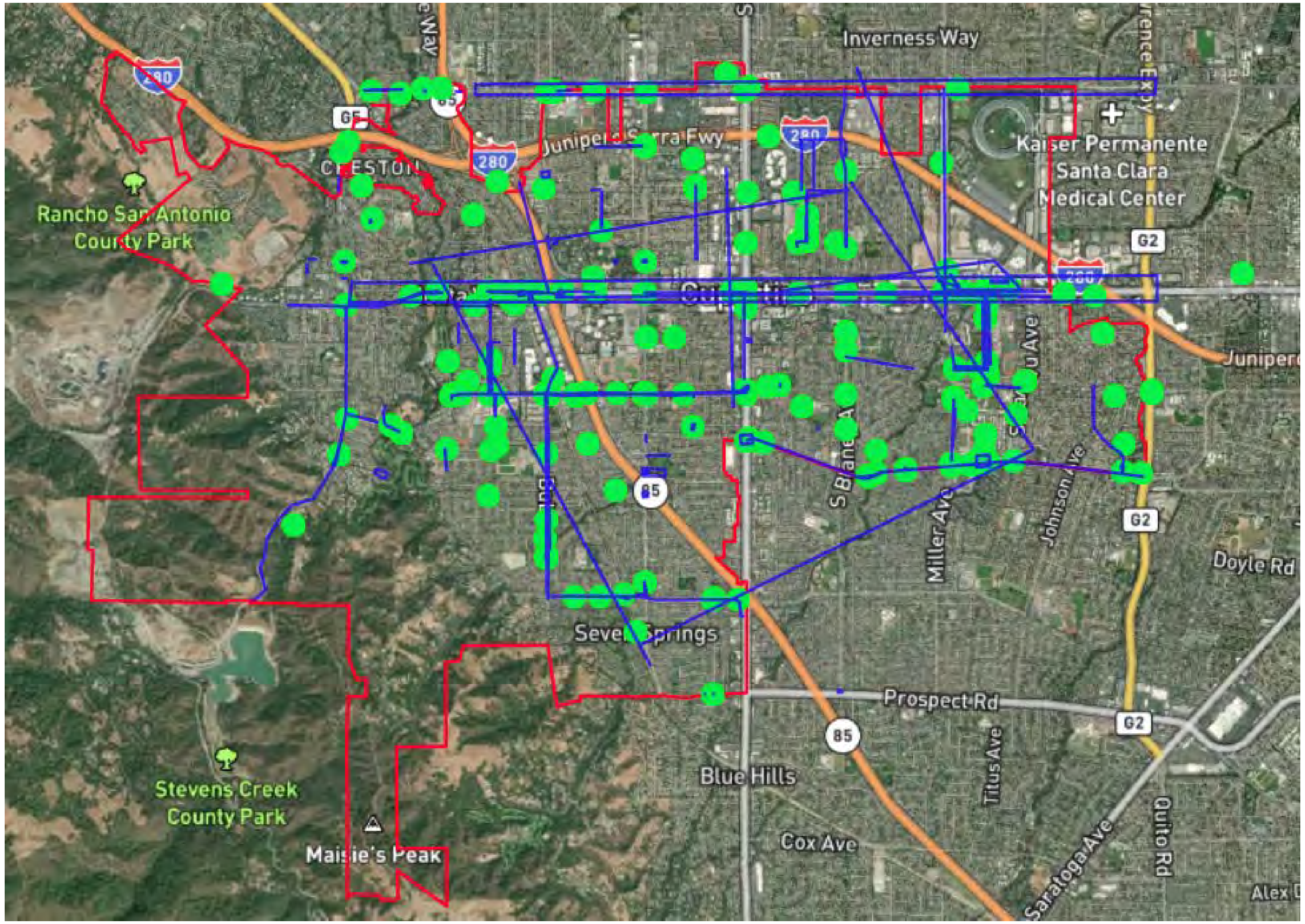
HIGH-INJURY CORRIDORS

ID	Corridors	EPDO Score
A	Stevens Creek Blvd: Janice Ave to Judy Ave	3,139
B	De Anza Blvd: Pacifica Dr to Homestead Rd	2,096
C	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	1,666
D	Wolfe Rd: Homestead Rd to Bollinger Rd	729
E	Bollinger Rd: Lawrence Expy to De Anza Blvd	562
F	McClellan Rd: Imperial Ave to De Anza Blvd	490
G	Bubb Rd: Stevens Creek Blvd to Columbus Ave	436
H	Mariani Ave: Bandly Dr to Infinite Loop	209
I	Tantau Ave: Forge Dr to Pruneridge Ave	208
J	Blaney Ave: Pear Tree Ln to Stevens Creek Blvd	192
K	N Stelling Rd: Alves Dr to Greenleaf Dr	192



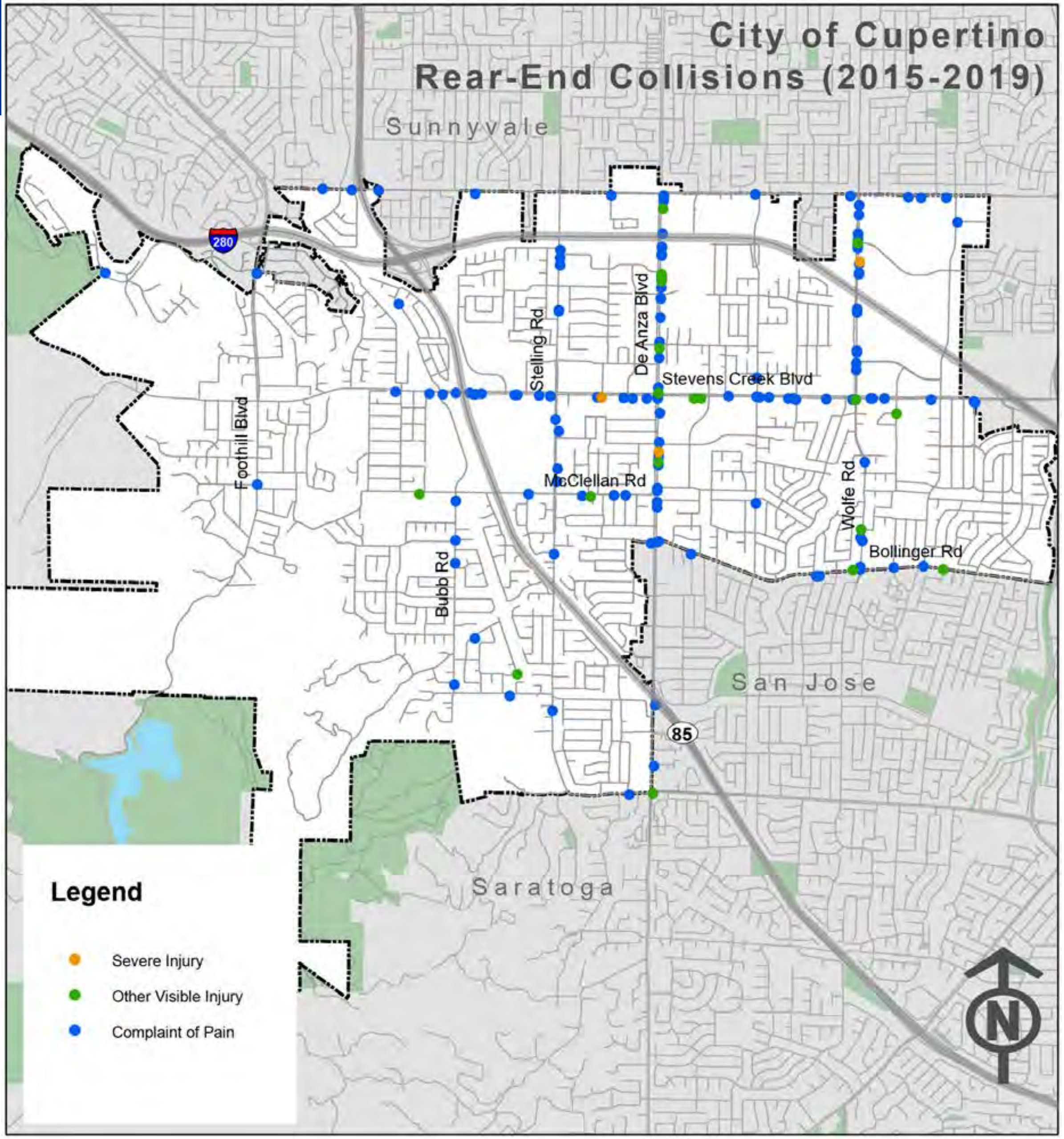
PROJECT WEBSITE

- 390 comments received on interactive map
  - 243 points
  - 147 lines
- Many comments concentrated on Stevens Creek Blvd corridor



TOP EMPHASIS AREAS

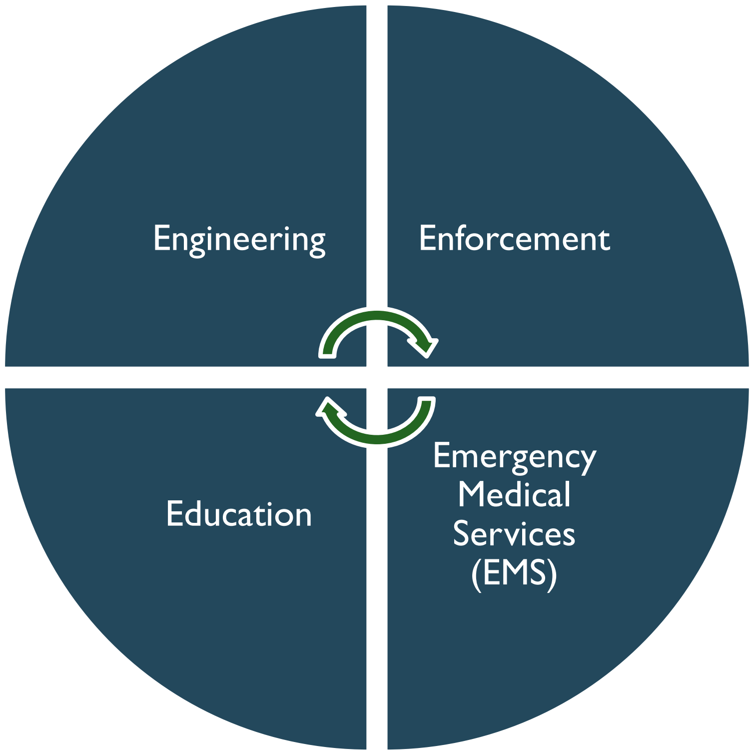
- Improve Intersection Safety
- Reduce Unsafe Speed
- Reduce Automobile Right-of-Way Violations
- Improve Pedestrian and Bicyclist Safety
- Reduce Nighttime Collisions
- Reduce Rear End Collisions
- Reduce Broadside Collisions
- Reduce Improper Driving Collisions
- Reduce Collisions near Schools



THE 4 E'S OF TRAFFIC SAFETY

- HSIP eligible countermeasures
- E.g.: Improve intersection lighting, install median refuge island, install bulb outs, improving signs and striping

- Targeted enforcement at high risk intersections
- Place high priority on enforcement of violation type that contribute to the most fatalities and severe injuries



- Conduct focused public information and education campaigns
- Create pocket guides and informational fliers with pedestrian laws, stop sign violations, etc.
- Safe Routes to School education programs

- Improve deployment to collision sites
- Ensure emergency routes are defined and clear

EMPHASIS AREAS STRATEGIES

Table 2. 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/ Sheriff's 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.	-	Sheriff's Department
Engineering	• S01, Install 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) • 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) • S16/NS04/NS05, Convert intersection to roundabout	Number of intersections improved.	City

DRAFT COUNTERMEASURE TOOLBOX – SIGNALIZED INTERSECTIONS

HSIP Code	Countermeasure
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number
S03	Improve signal timing (coordination, phases, red, yellow, or operation)
S04	Provide Advanced Dilemma Zone Detection for high speed approaches*
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)
S11	Improve pavement friction (High Friction Surface Treatments)
S12	Install raised median on approaches (signalized intersection)
S13PB	Install pedestrian median fencing on approaches
S20PB	Install advance stop bar before crosswalk (Bicycle Box)
S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

DRAFT SIGNALIZED INTERSECTION IMPROVEMENTS

Improve Signal Hardware & Timing

Improve pavement friction

Convert signal to mast arm

Install raised pavement markings

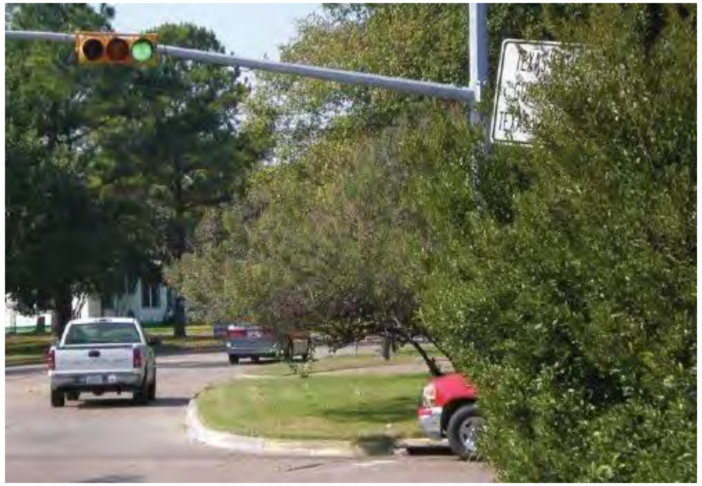
Advance Stop Bar (Bicycle Box)

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

DRAFT COUNTERMEASURE TOOLBOX – UNSIGNALIZED INTERSECTIONS

HSIP Code	Countermeasure
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
NS09	Install flashing beacons as advance warning (non-signalized intersection)
NS10	Install transverse rumble strips on approaches
NS11	Improve sight distance to intersection (Clear Sight Triangles)
NS12	Improve pavement friction (High Friction Surface Treatments)
NS14	Install raised median on approaches (NS.I.)
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)

DRAFT UNSIGNALIZED INTERSECTION IMPROVEMENTS



Improve sight distance

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

Install flashing beacons as advance warning

Install/upgrade pedestrian crossing (with enhanced safety features)

Improve pavement friction

DRAFT COUNTERMEASURE TOOLBOX – ROADWAY SEGMENTS

HSIP Code	Countermeasure
R01	Add Segment Lighting
R08	Install raised median
R10PB	Install pedestrian median fencing
R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn lane and bike lanes)
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)
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
R25	Install curve advance warning signs with flashing beacon
R26	Install dynamic/variable speed warning signs
R27	Install delineators, reflectors, and object markers

DRAFT COUNTERMEASURE TOOLBOX – ROADWAY SEGMENTS

HSIP Code	Countermeasure
R30	Install centerline rumble strips/stripes
R33PB	Install Separated Bike Lanes
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)

DRAFT ROADWAY SEGMENT IMPROVEMENTS

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

Improve pavement friction

Install delineators, reflectors, and/or object markers

Install/upgrade pedestrian crossing (with enhanced safety features)

Install Separated Bike Lane

Install centerline rumble strips

DRAFT NON ENGINEERING STRATEGIES

- Education
  - Conduct public information and education campaign for intersection safety laws, unsafe speeds, distracted driving, improper turning and driving under the influence.
  - Conduct bicycle and pedestrian safety campaigns and outreach to raise their awareness of bicycle and pedestrian safety needs through media outlets and social platforms in Napa every 3-5 years
- Enforcement
  - Targeted enforcement at high-injury locations.
  - Increase the number of personnel who have completed Advanced Roadside impaired Driving Enforcement (ARIDE) training
- EMS
  - Install emergency vehicle pre-emption systems
  - Increase the number of EMS/fire control personnel taking Traffic Incident Management Training

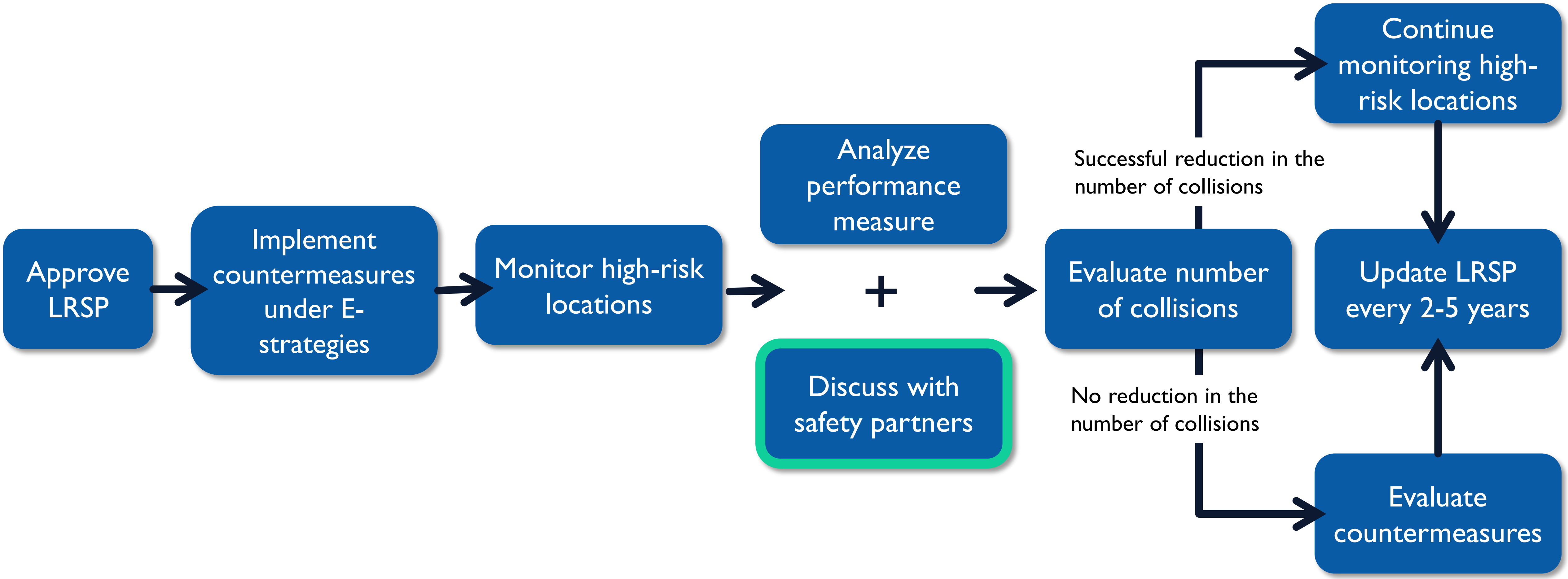
OPEN DISCUSSION

- Questions or comments on the Emphasis Areas and proposed countermeasures

CITY OF CUPERTINO

TJKM

IMPLEMENTATION



NEXT STEPS

- Finish developing safety projects for all high-injury locations
- Draft Report
- HSIP Applications

THANK YOU!

CITY OF CUPERTINO TJKM

Respondent ID	Location	Name	What traffic-related concern do you have at this location?	Mode	Issue
	Tertiary Road	Calvert Drive	The road is very short but cars often have to change lanes here. The condition is prone to accidents. I try to avoid this route if possible, especially during rush hours.	Motor Vehicle	Other
	Tertiary Road	Finch Ave, Sorenson Ave	bike lane suddenly disappears and forces bikers into mixed traffic	Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Please add bicycle friendly sensors or buttons here. The N/S light won't trigger unless there's a car or if the pedestrian button is pushed.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Please add bicycle friendly sensors or buttons here. The N/S light won't trigger unless there's a car or if the pedestrian button is pushed.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	South Blaney Avenue	When the trail opens, will there be stop signs at this midblock crosswalk? Cars drive past this spot pretty fast, so it will be dangerous for pedestrians and cyclists to cross.	Bicyclist	Bicycle Safety
	Secondary Road	Homestead Road	Drivers use this bicycle lane every day to sit and wait in their cars, even though there are 2 car lanes plus car turn lane. Need bollards to protect the bicycle lane. The drivers can just use the right car lane instead, so no impact on them.	Bicyclist	Bicycle Safety
	Local Street	Mary Avenue	This new protected bike lane is great!! Maybe redraw FUHSD attendance district so local students here can go to HHS via the bike bridge.	Bicyclist	Bicycle Safety
	Tertiary Road	Bollinger Road	When going west on Bollinger, light timing is too short to cross De Anza. If you start crossing and it immediately turns yellow, you don't have enough time to make it across on a bicycle before De Anza traffic has green light (measured about 5-6 seconds).	Bicyclist	Bicycle Safety
	Tertiary Road	Mary Ave Path Sunnyvale Side	The bike paths here are confusing	Bicyclist	Bicycle Safety
	Tertiary Road	Rainbow Drive	People biking on the trail and crossing the street do not know that the cross traffic does not stop. If there is a stop sign placed for the cars, it will be easier for people walking and biking to cross the street.	Bicyclist	Bicycle Safety
	Local Street	Seven Springs Parkway	People biking on the trail and crossing the street do not know that the cross traffic does not stop. If there is a stop sign placed for the cars, it will be easier for people walking and biking to cross the street.	Bicyclist	Bicycle Safety
	Secondary Road	North Foothill Boulevard	Off ramp traffic is unable to see any cyclist on the lane here, due to very high vegetation at the corner. It is a very simple fix to have it cleared. I had reported this to the bike commission more than a year ago. I do not see any improvements. I have has a couple of close calls here.	Bicyclist	Bicycle Safety
	Secondary Road	McClellan Road	The whole bike lane along McClellan are dangerous for cars & bikes on trash day & the day before because the bins are in the bike lane & even sticking out into the car lane, especially after they are emptied. Many bikes have to stop & walk around trash bins on their sides or scattered in the bike lane after the trucks empty them. On regular residential streets, the bins are often out in the traffic lane, but with the bike curbs, they become hazardous. I have had bikes dart out into the car traffic lanes to avoid the blocked bike lanes. I slow for them as I ride a lot, but many cars do not look because the bike lanes are there.	Bicyclist	Bicycle Safety
	Local Street	Pacifica Drive	Trash bins along this street often block the bike lanes, especially after the trucks empty them & scatter them, sometimes on their sides in the bike lane & the car traffic lanes	Bicyclist	Bicycle Safety
	Primary Rd	Junipero Serra Freeway	A separate bike lane would be safer on Da Anza blvd	Bicyclist	Bicycle Safety
	Secondary Road	Homestead Road	This painted bicycle gutter (aka bike lane) is way too narrow and exposed for anyone to feel safe, especially with the speed of traffic here.	Bicyclist	Bicycle Safety
7ud677lee3a3	Secondary Road	McClellan Road	Sometimes residents leave garbage bins in the protected bike lane, forcing cyclists to swerve or even get onto the sidewalk	Bicyclists	Bicycle Safety
2l8his8ef269	Tertiary Road	Sutton Park Place	There needs to be done more to ensure safety on the roads for cyclists. Especially on busy roads such as Wolfe there is hardly anything provided to ensure the safety of cyclists. Cars go too fast and drive so closely to bikers.	Bicyclists	Bicycle Safety
86gna3db4op4	Secondary Road	Bubb Road	no biking road for students	Bicyclists	Bicycle Safety
6os9n8tbu224	Tertiary Road	Beardon Drive	Bike lanes / safer walking (sidewalks) for students who walk/bike to school, neighbors who walk their dogs, parents pushing strollers Streetlights for people who walk at night	Bicyclists	Bicycle Safety

7s4zrg34a2za	Tertiary Road	Mira Vista Road	This area sees a number of children biking to Kennedy Middle School on weekday mornings. They have to self navigate the intersections and hills during increased, school related traffic.	Bicyclists	Bicycle Safety
9d2vwt9g6op9	Tertiary Road	Shannon Court	Really unsafe for bicyclists. Please build physical divider just like on McClellan.	Bicyclists	Bicycle Safety
3s3ycy2gzi47	Secondary Road	Stevens Creek Boulevard	No boxed lane for bikes. A lot of children bike to school and back from school here through blackberry farm	Bicyclists	Bicycle Safety
8ee2ugl6ua23	Secondary Road	McClellan Road	The concrete bike lane barriers are dangerous to cars and bikes. For cars, the concrete wall is hard to see at night because it's low and dark. There's paint but it wears out. Bollards would be higher and more visible and cheaper. For bikes, there's no way out. Trash days are dangerous for all, even pedestrians. The cans are in the street, in the bike lane, on the sidewalk. Everyone "benefits negatively" from this!	Bicyclists	Bicycle Safety
4uz89b89blk6	Secondary Road	Wolfe Road & Stevens Creek Boulevard	Bike lane separators are not designed to be seen and are high enough to throw a bike. I almost accidentally steered my bike into one and could have been thrown into traffic. Wolfe Rd. intersection changes have made it much more dangerous. Turning cars don't know what to do and it is more difficult to see bikers. I have almost been run over twice. Please undo.	Bicyclists	Bicycle Safety
6iz9sbh3fj28	Secondary Road	Wolfe Road	Lack of bike lane and relatively speedy traffic makes heading northbound on Miller Avenue from Creekside Park to Stevens Creek Boulevard somewhat dangerous.	Bicyclists	Bicycle Safety
6iz9sbh3fj28	Secondary Road	Miller Avenue	Lack of bike lane with curve often means "sharing" road with fast traffic. Fast traffic not always willing to share (or attentive). Southbound Miller Avenue from Stevens Creek Boulevard to Creekside Park.	Bicyclists	Bicycle Safety
2j3dla9ciw78	Secondary Road	Stevens Creek Boulevard	Need boxed bike lane to go to Blackberry Farm. Lots of kids bike to school on this route.	Bicyclists	Bicycle Safety
4hue8shj62da	Secondary Road	Miller Avenue	This stretch along Wolfe Road is extremely dangerous for bicyclists. Cars tend to speed onto the on ramps and will tailgate people on bikes. Adding some sort of bike lane protection and traffic control would help it feel much safer to cross this overpass.	Bicyclists	Bicycle Safety
4hue8shj62da	Secondary Road	South Foothill Boulevard	The shoulder / bike lane for Stevens Canyon Rd is not well maintained and is dangerous for cyclists. This is a common route that cyclists take to get to Stevens Creek Reservoir and/or continue onto Mt. Eden Rd / Pierce Rd. There are often debris and rocks littered along the shoulder, and make it hazardous for bikes. Not to mention, the high volume of large trucks that pass by. There are many turns and blind spots along this route and there should be more blind spot mirrors and traffic calming measures to reduce the risk of collision.	Bicyclists	Bicycle Safety
4hue8shj62da	Secondary Road	McClellan Road	Protected bicycle lanes are fantastic. I love them. But, they often have debris and rocks that make it unsafe for bicycles. Street sweeping would help significantly. Also, sometimes, there will be city vehicles (or other vehicles doing maintenance / road work) that will park in the lane or block it.	Bicyclists	Bicycle Safety
8v3dz77jlc86	Secondary Road	McClellan Road	Students on bicycles must compete with automobiles making a left turn on to get to the bike lane especially in the last 10 minutes before school begins in the morning.	Bicyclists	Bicycle Safety
8v3dz77jlc86	Secondary Road	McClellan Road	Automobiles use the bike lane and or block the sidewalk especially during morning commute hours	Bicyclists	Bicycle Safety
8v3dz77jlc86	Secondary Road	McClellan Road	The bike ped lane is not marked or separated, students must ride in the automobile lane to pass, suggest a wider bike lane separated with markers and or creating an alternate entrance for automobiles at the other end of the parking lot	Bicyclists	Bicycle Safety
8v3dz77jlc86	Secondary Road	McClellan Road	students must cross the access lane to the teachers parking lot to park their bikes in the bike lot, suggest a marked crosswalk	Bicyclists	Bicycle Safety
8v3dz77jlc86	Tertiary Road	Tomki Court	It is difficult for cyclists to get onto stelling from the area south of Jollyman, most are forced to ride through the park, suggest a cycle trail, perhaps along the creek?	Bicyclists	Bicycle Safety
8v3dz77jlc86	Secondary Road	South De Anza Boulevard	the traffic light sensors on rodriguez are not sensitive enough to sense cycllists, a cyclist going straight must cross the right turn lane to push the crosswalk signal, then is in the path of vehicles turning right.	Bicyclists	Bicycle Safety
8v3dz77jlc86	Secondary Road	South Blaney Avenue	The road sensors do not detect a bicycle, this requires cyclists to cross the right turn lane, push the button, then cross again to make a left turn, bike sensors would help	Bicyclists	Bicycle Safety
34oij94bew3a	Tertiary Road	Craft Drive	Bike lane is shared with automobiles, with lots of parked cars, suggest a dedicated bike lane on the school side	Bicyclists	Bicycle Safety
34oij94bew3a	Tertiary Road	Mary Avenue	difficult for bikes to make a left turn when travelling south off the bridge	Bicyclists	Bicycle Safety

34oij94bew3a	Tertiary Road	Willowgrove Lane	Cars illegally que up in the bike lane here, suggest adding a driveway so cars can que up on the side street vs bollinger	Bicyclists	Bicycle Safety
9tp7nji9vii3	Tertiary Road	Pacifica Drive	The middle left turn lane drivers encroach on the going straight ahead (right) lane if both cars start at the same time when the light changes. This endangers the cars & if there are any bikes going straight they are endangered too. I have seen many close calls there since I cross here 5 days a week.	Bicyclists	Bicycle Safety
8t7noc4moy2a	Secondary Road	South Stelling Road	I have seen groups of cyclists use this stretch of the park to cross from Stelling to DeAnza via city streets. Casual use of bicycles in this area by kids seems fine, but having adults use it as a part of the commute seems dangerous. Possible to either create a bike path here, or prohibit cycling on the path? Or at least add a speed limit sign?	Bicyclists	Bicycle Safety
7v6asg7asm47	Tertiary Road	Calle de Barcelona	Cars are too close to bikers traveling to Cupertino High each day. It's dangerous and feels unsafe.	Bicyclists	Bicycle Safety
7v6asg7asm47	Tertiary Road	Vista Drive	Dangerous for students biking to school as there are many conflicts on a narrow two-lane road where young middle-school students are biking and parents are trying to drop-off for school and are not looking. Crossing into bike cage particularly bad.	Bicyclists	Bicycle Safety
7v6asg7asm47	Tertiary Road	Vista Drive	There is not enough room for students to safely bike currently, with two lanes of cars and parking on both sides. Bikers go onto the sidewalk, but this is hard with students who walk. This is a dangerous area with several reported near-miss accidents.	Bicyclists	Bicycle Safety
7v6asg7asm47	Secondary Road	Miller Avenue	No bike lanes. Very unsafe for cylists as traffic is always speeding. This is a common path for students biking to school so they end up using the sidewalk.	Bicyclists	Bicycle Safety
7v6asg7asm47	Secondary Road	McClellan Road	Unsafe for cyclists traveling on McClellan around this curve.	Bicyclists	Bicycle Safety
2rm2rxs6x8ga	Tertiary Road	Mary Avenue	The Via-Cupertino Shuttles have bicycle racks on the back. They are not very visible and are very close to the roadway. I can easily see some car running into them.	Bicyclists	Bicycle Safety
2yfj3y7lbe99	Secondary Road	Stevens Creek Boulevard	Signal coordination for the stretch along Stevens Creek Road between Orange Ave. and SR85 southbound offramps does not exists during afternoon peak hour. While this could be viewed as more safe for pedestrians and bicyclists, as vehicles stop at every signal. It is intact unsafe for them. Drivers get frustrated with having to stop at every signal with school traffic, which makes them more aggressive and this aggressiveness is not safe for pedestrians and bicyclists, most of them are school children. The ramps signals are typically controlled by Caltrans and the City may not have control over signal timings. However, in order to address safety Caltrans have modified there signal timings before at other locations. We would like the City to work with Caltrans and update the signal timings along this stretch to enhance safety for pedestrians and bicyclists. Regards, Ali	Bicyclists	Bicycle Safety
84krz8tb4f29	Tertiary Road	Miller Avenue	CHS student: dangerous to bike here. Limited or no bike lanes, parked cars (worried about being "doored"). Must use this as route to school and it feels unsafe.	Bicyclists	Bicycle Safety
84krz8tb4f29	Secondary Road	Stevens Creek Boulevard	CHS student: too many cars and drivers that are rushing along Finch. Cars don't follow rules and students feel unsafe walking and biking.	Bicyclists	Bicycle Safety

	Secondary Road	Stevens Creek Boulevard	I was almost killed in the bike lane here. A driver at the traffic light, (they missed the turn out to the on ramp) decided to turn right after the light to get onto the 85 north on ramp. No warning signs (like slow driving, hesitation, turn signal, nothing). As they started their turn (I was next to the vehicle (rear door of a suburban SUV) the only way I escaped with my life and injury was we both were going very slow and that I was quick enough to swerve from the designated bike lane into the the actual on ramp (thankfully there wasn't any cars behind us that would have hit me from behind). I had no other option. Stopping wouldn't have been enough as their turn angle would have easily caused serious injury if not death. Solution: have a ped & bike lane that goes over this on ramp. I'll never ride through this intersection ever again. Maybe walk my bike when there are no cars nearby, but that bike lane, green or not will not save from unsafe drivers.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Mitty Way	Near-miss accident (bike/car) at this location.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Stern Avenue	Bike/car accident at this location.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Near-miss accident for bike, south side of Stevens Creek Blvd	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Car/bike injury accident at Calle de Barcelona and Finch Ave.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Unsafe for crossing student cyclists in the mornings	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Students on bike do not feel safe crossing this intersection as cars turning from Calle de Barcelona and crossing on Finch do not stop	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Near-miss accident between bike and car on Calle de Barcelona.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Injury accident between car and bike on Merritt in front of Lawson Middle School. It was a rainy day.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Injury accident between student biking and car. Car opened door into cyclist.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Near-miss accident between car and biker.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Near-miss accident between student biking and car.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Near-miss accident between Apple cyclist and car.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Injury accident between student biker and car. Student was biking on sidewalk (no bike lanes on Miller here on commute path for students).	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Students going to Cupertino High from the south always bike on sidewalk as there are no bike lanes and high car speeds on Miller.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Dangerous corner for both cyclists and pedestrians. Too narrow of road and poor sightlines mean there are a lot of near-misses between cars and bikes. Most cyclists just avoid this interection when traveling south on Miller.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Northwest corner of this intersection is extremely dangerous for bikers as there is no room and cars are making a separate lane to turn right. No bike lanes at all on Miller either.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Boulevard	Cars do not stop for bikes at this intersection. Feels unsafe for cyclists.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Finch Avenue	Near-miss accident on bike.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Finch Avenue	Near-miss accident on bike.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	North Blaney Avenue	Near-miss accident between student cyclist and car here.	Pedestrian, Bicyclist	Bicycle Safety

	Tertiary Road	McClellan Road	Injury accident between a car and a student biking to school	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	McClellan Road	Injury accident between bike and student cyclist at this location.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Blvd	Cars do not watch for cyclists when they make a right turn.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	Linda Vista Drive	Near-miss accident here between car and student cyclist.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	McClellan Road	Near-miss accident between student cyclist and car exiting Monta Vista High School.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Byrne Avenue	Injury accident between car turning onto McClellan from Byrne and a student cyclist.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Bubb Road	Near-miss accident at this intersection between a cyclist and a car.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Bubb Road	Students report this intersection feels unsafe for those traveling east/west and biking to school.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	McClellan Road	Students report speeding cars and feeling unsafe biking to school over this bridge.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	McClellan Road	Car leaving DeAnza and student on bike near-miss accident at this location.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Monta Vista	Injury accident of student cyclist and car at this location.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Blvd	Injury accident between car and student on bike at this location.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Homestead Road	Cars turning right out of the parking lot onto Homestead eastbound can't see bikes and pedestrians crossing north on Mary (this is where my son (cyclist) was hit by a car while crossing northbound on Mary.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	McClellan Road	When bikers are going straight on McClellan (away from Monta Vista), and a car is turning right onto Stelling (also away from Monta Vista), the car cuts in front of the bike. The only thing preventing a collision is a small "yield for bikes" sign at the side of the road, which drivers tend to miss/ignore. Accidents and near-accidents occur frequently, with bikers getting hurt.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	West Homestead Road	Every morning just before school starts, dozens of middle school kids bike on the wrong side of the road across the bridge (over 85) to get to Cupertino Middle School - it's surprising that no one's been hit by a car yet, at least as far as I've seen.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	West Homestead Road	Every morning just before school starts, dozens of middle school kids bike on the wrong side of the roadboth on the sidewalk as well as in the street, to get to Cupertino Middle School - it's surprising that no one's been hit by a car yet, at least as far as I've seen.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	Vista Drive	CHS student: near-miss accident with car while biking.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Blvd	CHS student: Near-miss bike accident with car--car turned in front of bike.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Calle de Barcelona	CHS student: Near-miss bike accident, when bike was going straight and car turned left into Calle de Barcelona from Miller.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Flinch Ave	CHS student: Accident on bike. Car pulled out from parking space and hit cyclist.	Pedestrian, Bicyclist	Bicycle Safety
	Primary Rd	Lawrence Expressway	CHS student: had an accident on my bike with a car at this intersection. I was crossing Lawrence to get to school, the car was turning onto Lawrence.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Blvd, Mary Ave	MV student: This intersection feels unsafe as cars are turning, especially at the red lights, while I am going straight on my bike.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Blvd, Imperial Ave	MV student: Nervous to bike on Imperial Ave. Many parents dropping off students, and with all the parked cars, it's hard to see ahead.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	McClellan Rd, Budd Rd	MV student: near miss accident on bridge over CA-85. Only painted bike lane and it is narrow.	Pedestrian, Bicyclist	Bicycle Safety

	Tertiary Road	McClellan Rd, Budd Rd	MV student: near-miss bike accident on McClellan heading toward MV High School.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Budd Rd, Regnart Rd	MV student: near-miss bike accident at this intersection.	Pedestrian, Bicyclist	Bicycle Safety
	Tertiary Road	Budd Rd, Regnart Rd	MV student: near-miss bike accident on Bubb road east side here.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	Rainbow Dr, Yorkshire Dr	MV student: near-miss bike accident here on Rainbow.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	McClellan Rd, Byrne Ave	MV student: Near-miss accident here.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	McClellan Rd, Byrne Ave	MV student: feels unsafe riding bike here.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	McClellan Rd, Byrne Ave	MV student: no safe way to get across McClellan on bike.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	McClellan Rd, Orange Ave	MV student: near-miss biking accident on way to school.	Pedestrian, Bicyclist	Bicycle Safety
	Secondary Road	Stevens Creek Blvd, Pasadena Ave	MV student: car hit me on my bike at this intersection.	Pedestrian, Bicyclist	Bicycle Safety
	Local Street	Vista Dr	Students who need to get to the bike cage at Lawson Middle School have no safe, efficient way to get there. They either have to bike north in the vehicular lane, and turn left across unexpecting oncoming cars, or they have to ride on the narrow sidewalk, which endangers students who are walking.	Pedestrian, Bicyclists	Bicycle Safety
	Secondary Road	McClellan Road	When traveling by bike along McClellan, it is not possible to force the signal change at the DeAnza intersection-forcing cyclists to move out of the bike lane and cross traffic at McClellan over to the cross walk. Once across DeAnza, you are now on the wrong side of the road, and must cross McClellan again to continue safely. Please put in a cross walk button to activate the signal at this location		Bicycle Safety
232f33oan2a7	Secondary Road	Stevens Creek Boulevard	School and commute traffic coupled with post office vehicle create high congestion in this area. I've had to wait until the 3rd traffic signal cycle to make an exit from a side street. When it's trash pickup day, the situation is even worse!	Motor Vehicle	Congestion
2ecu9yr7uyw8	Secondary Road	North Blaney Avenue	Lots of traffic and lots of younger children 3x a day	Motor Vehicle	Congestion
4vy6fad3l676	Secondary Road	Orange Avenue	Main road to/from 2 schools, very narrow road, heavy traffic both cars and pedestrian. On Wednesday also used by garbage collection trucks	Motor Vehicle	Congestion
72mjy7297syk	Tertiary Road	La Salle Drive	Too many traffic lights, mos or all unsynchronized, leads to unnecessary congestion, pollution, and collisions	Motor Vehicle	Congestion
72mjy7297syk	Tertiary Road	Cupertino Road	Too many mostly unsynchronized traffic lights leads to excessive collisions, delays, congestion, and pollution.	Motor Vehicle	Congestion
8foi2864uau3	Secondary Road	Bubb Road	Heavy traffic during school drop-off and pick-up time which coincides with office hours. Traffic will now worsen due to closing of Regart Elementary. Unsafe for kids walking and biking down the Bubb road. Very unsafe for kids to cross the roads to go to and from their schools. Please work with CUSD to not worsen the traffic for safety of kids in Bubb Road neighorhood.	Motor Vehicle	Congestion
	Secondary Road	Stevens Creek Boulevard	It's just confusing here. See other comments. Should be sorted out before the new development is completed. I think there will be more traffic when that is completed.	Motor Vehicle	Congestion
	Local Street	Parkwood Drive	With the pending development of the Westport complex, I am concerned about potential traffic challenges on Stevens Creek Blvd between Mary and Hwy 85.	Motor Vehicle	Congestion
	Secondary Road	North De Anza Boulevard	School pick-ups happen here on weekday afternoons and cars get backed up waiting for kids.	Motor Vehicle	Congestion
	Secondary Road	Stevens Creek County Park Rim Trail	San jose is trying to put a Costco at Westgate shopping center and this will cause tremendous more traffic and gridlock on lawrence expressway and saratoga ave.	Motor Vehicle	Congestion
	Secondary Road	Bubb Rd	Bubb road and mc cullen road have a large amount of traffic on the way to and from school every day, especially closing the regnart school will cause serious traffic jams and traffic safety hazards in lincoln primary school and monta visa high school mc cullen road. In particular, high school students who ride bicycles and drive on and off are opposed to the school district's arbitrary closure of schools regardless of the safety of children from nearby residents.	Motor Vehicle, Pedestrian, Bicyclists	Congestion

	Local Street	Festival Court	Bubb road and mc cullen road have a large amount of traffic on the way to and from school every day, especially closing the regnart school will cause serious traffic jams and traffic safety hazards in lincoln primary school and monta visa high school mc cullen road. In particular, high school students who ride bicycles and drive on and off are opposed to the school district's arbitrary closure of schools regardless of the safety of children from nearby residents.	Motor Vehicle, Pedestrian, Bicyclists	Congestion
4fe493ab4sl3	Tertiary Road	Mary Avenue	With the pending development of the Westport complex, I am concerned about potential traffic issues on Stevens Creek Blvd between Mary Avenue and Hwy 85.	Motor Vehicle	Corridor Safety
7si94i9w98c4	Secondary Road	South De Anza Boulevard	Bollinger Road is a big mess and I hope the suggestions from the Bollinger Road Safety Study with San Jose are taken into account.	Motor Vehicle	Corridor Safety
44u8xln7ogh7	Local Street	Alves Drive	The corner of Alves and Anton is unsafe because the wide rode Alves changes to narrow rode, Anton. The large Harker school bus, large RV, large trucks often short cut from Stelling to Stevens Creek. Those large cars can't turn properly at corner, so that they drive over the center bumps. Those big cars also sometimes almost hit the other side of cars coming from Stevens Creek at corner. Can you put a sign for "NO VEHICLES OVER 5 TONS" at Stelling/Alves and Stevens Creek/Anton?	Motor Vehicle	Corridor Safety
	Tertiary Road	McClellan Road	Road is very narrow here. Difficult to make a right from Bubb onto Mclellan. High risk of damaging tires or wheels for wider/larger cars	Motor Vehicle	Corridor Safety
	Tertiary Road	McClellan Road	Need soft barriers at red painted curbside to prevent cars improperly dropping off kids at red zone during morning school drop off creating safety issue for students crossing and cars trying to squeeze through.	Motor Vehicle	Corridor Safety
	Secondary Road	Monta Vista	School children crossing over safely.	Pedestrian	Corridor Safety
	Secondary Road	Estates Dr, Bollinger Rd	Blind spot due to S curve for vehicles turning right from Estates Dr onto Bollinger Vehicles turning left onto Bollinger from Estates Dr, against the sign not to, due to lack of middle divider on Bollinger/some barrier on the middle of the Bollinger road preventing vehicles to turn left onto Bollinger from Estates Dr	Motor Vehicle	Corridor Safety
	Tertiary Road	Bubb Road	Bike lane barrier curb starts too soon after the curve in the road. Multiple cars have hit this curb before and ended up with damage	Motor Vehicle	Corridor Safety
	Tertiary Road	Main Street Driveway	Finch & Stevens Creek…The new right-turn-only lane is more dangerous than what we had before! For cars going east on SCB, many times cars in the new right-turn-only lane go straight anyway so there's more chance for collisions! The lane backs up now, just like it did before. There's no difference except now you've added the possibility that cars will go straight when not expected.	Motor Vehicle	Corridor Safety
	Tertiary Road	East Homestead Road	Driving southbound on Saratoga-Sunnyvale Rd (coming from Sunnyvale) and turning left onto Homestead Rd going towards the Apple Spaceship…The outermost left turn lane is dangerous IF the traffic northbound on Saratoga Sunnyvale Rd turns left at the same time. There isn't enough clearance for both outer left turn lanes to safely make the turn. If someone isn't paying attention it can be a head-on collision. NOTE: Sometimes, the Saratoga-Sunnyvale Rd northbound and southbound left turns don't go at the same time and that is SO MUCH safer!	Motor Vehicle	Corridor Safety
	Secondary Road	North Stelling Road	Gardena Drive is a shortcut used to get from Mary Ave. to Stelling. During rush hours, trying to turn left onto Stelling to go northbound towards Sunnyvale can be very dangerous.	Motor Vehicle	Corridor Safety
	Tertiary Road	Miller Avenue	Unsafe Leftturns	Motor Vehicle	Corridor Safety
	Secondary Road	Stevens Creek Boulevard	Addition of controlled bike lane and forced right turn lane creates confusion for cars traveling west on Stevens Creek. Results in dangerous merges from right lane to center lane. Controlled bike lane here is not a good idea and actually creates a more dangerous intersection.	Motor Vehicle	Corridor Safety
	Secondary Road	Stevens Creek Boulevard	Wolfe & Stevens Creek…The new right-turn-only lane is more dangerous than what we had before! For cars going west on SCB, many times cars in the new right-turn-only lane go straight anyway so there's more chance for collisions! For cars turning right onto Wolfe northbound, the turn is VERY sharp. Pedestrians wanting to cross Wolfe were more visible to a car when they were standing on the island waiting to cross.	Motor Vehicle	Corridor Safety
	Local Street	Pacifica Drive	This intersection would benefit from traffic calming measures. A traffic circle? 3-way stop? Also, consider adding a west crosswalk across Pacifica.	Motor Vehicle	Intersection Safety
4ig6ref2asz3	Secondary Road	West Homestead Road	Traffic related to student pick up and drop off not adhering to road rules. - not keeping the intersection clear and stopping on Homestead to pick up or drop off.	Motor Vehicle	Intersection Safety
	Secondary Road	Stevens Creek Boulevard	Dangerous uncontrolled intersection. Difficult to safely exit postoffice/starbucks parking lots.	Motor Vehicle	Intersection Safety

	Local Street	Barnhart Avenue	There are no stop signs on Barnhart Ave crossing Johnson. There are only two on Johnson. People who are not familiar with this part of the city assume that there are stop signs and the cars coming toward Johnson will stop. I have witnessed cars almost crashing in this intersection several times. It is also dangerous for pedestrians. I think It is necessary to add stop signs here. Other intersections have 4 stop signs in this part of the town. Why not this one? Thank you!	Motor Vehicle	Intersection Safety
	Tertiary Road	South Blaney Avenue	This intersection needs some reworking. The east west roads (Suisin and Clifford) are misaligned and as a result, the stop line for vehicles on Blaney coming from the north [north vehicles] are much closer into the intersection compared to vehicles on Clifford coming from the east [east vehicles], to the point where north vehicles need to look almost behind them to see the east vehicles. There are many instances where the vehicles on the north will skip the east vehicles' turn. Moving back the stop line so that east vehicles are more in north vehicles' line of sight would help address this problem.	Motor Vehicle	Intersection Safety
	Local Street	Wunderlich Drive	we need a traffic light between the Bollinger Rd and Wunderlich Rd. It's very dangerous today without one. Thank you	Motor Vehicle	Intersection Safety
	Tertiary Road	Orange Avenue	This area gets extremely around 8:30am and again around 3pm. It will be great to have a traffic light here. Once the crossing guards leave, school children are crossing McClellan at great peril, as there is no light on McClellan after Bubb, and people drive very fast in this segment. It's also almost impossible to make a left turn onto McClellan from Orange at these busy times.	Motor Vehicle	Intersection Safety
	Secondary Road	Stevens Creek Boulevard	The criss-cross of bikes/cars at Stevens Creek and the 85 North ramp is really bad with cars accelerating onto the ramp. I hope that this will be rethought as part of the replacement for the Oaks.	Motor Vehicle	Intersection Safety
232f33oan2a7	Secondary Road	Stevens Creek Boulevard	From 280 N to 85 S, it's dangerous to merge to the right to exit Stevens Creek to make a right turn. Drivers heading south on 280 and taking 85 S will use the far right lane to try and speed past others before cutting back to the left to head get onto 85 S.	Motor Vehicle	Intersection Safety
2xf3yey6utz6	Secondary Road	Bollinger Road	S curve blind spot for vehicles turning right onto Bollinger from Estates Dr, very difficult to merge due to difficulty seeing incoming traffic. Incoming traffic on Bollinger also can't see the vehicles on Estates Dr trying to turn right onto Bollinger. S curve also makes it hard for vehicles traveling on Bollinger towards Lawrence Expy to see parked vehicles on San Jose side of Bollinger, right along the curve in front of Estates Dr, which sometimes try to make a U-turn towards De Anza Blvd, resulting in a crash between vehicles and crash of car into Cupertino homes whose backyard faces Bollinger. Even though there's a sign on Estates Dr saying no left turn, I observed cars turning left onto Bollinger from Estates Dr, again super dangerous due to the bind spot at that S curve vehicles turning left can't really see incoming traffic on Bollinger traveling towards S De Anza Blvd	Motor Vehicle	Intersection Safety
7zx67hdw2a23	Tertiary Road	Calle de Barcelona	There is no protected left turn. Turning left to Calle De Barcelona from Miller is not possible with the amount of traffic coming from the other side.	Motor Vehicle	Intersection Safety
8fy8dpv28jy3	Tertiary Road	Alderbrook Lane	It is extremely difficult to navigate into Alderbrook lane from Bollinger during weekdays. If there is a turn signal it would be helpful. During weekdays the traffic backs up and become impossible to turn left onto Bollinger from Alderbrook lane. Or turn into alderbrook from bollinger with oncoming traffic	Motor Vehicle	Intersection Safety
2ei3xwa7j6k9	Tertiary Road	Stevens Creek Boulevard	When you are going down Wolfe and need to turn right on Stevens Creek - the new corner is very dangerous. Peds get the walk sign and by the time they start walking the drivers get the green light. Peds are put in jeopardy for walking because drivers think they can just go and not look for walkers. I have driven this corner and walked this corner. Also, the right turn is very sharp and some drivers are not good at the turn. It makes drivers have to use 2 lanes to turn right/. Put back the right turn island for peds and smoother turns	Motor Vehicle	Intersection Safety
2ei3xwa7j6k9	Secondary Road	Bubb Road	The right turn lane and corner going on Wolfe towards Stevens Creek - that corner Wolfe/Stevens Creek Peds get the walk sign first and start to walk. When right turn drivers get the green - they go and don't watch out for Peds. Have been almost hit several times while trying to cross Stevens Creek. Also when I drive and try to turn right, the corner is so sharp it takes more than one lane to turn for many drivers. We want the old right turn lane/island we had before. Drivers knew to watch out out for peds and bikes and it was much safer	Motor Vehicle	Intersection Safety

44gih9tf3ce6	Secondary Road	Bubb Road	There are two lanes turning right onto Stevens Creek: 1. It's unclear if you can turn right on a red light (after a stop) from the second to the right lane. 2. People turning right from the right-most lane often drift into one of the left turn lanes to get onto 85 north. I've had several near-misses from people doing that. Recommendations: 1. Have a sign indicating if a right on red is allowed or not fro the second to the right lane. 2. Heavier lines across the intersection to show that the rightmost lane goes to the non-freeway lanes.	Motor Vehicle	Intersection Safety
8t7noc4moy2a	Secondary Road	Rainbow Drive	Traffic light is confusing for left turn from Rainbow onto Stelling. The light is turned in such a way that it's not clear which direction it's pointed. Light should be modernized and placed in a less confusing way.	Motor Vehicle	Intersection Safety
4oj28rth87t9	Tertiary Road	Barranca Drive	making left turn onto Homestead from Barranca, it's impossible to see or be seen by traffic because of the trees. Also, Sunnyvale has the sensor set to favor coming from Belleview. The Cupertino side has to wait for up to 5 minutes.	Motor Vehicle	Intersection Safety
	Local Street	Imperial Avenue	This area has no intuitive way to get onto west-bound Stevens Creek Blvd from the south (aka with a left turn). As a result, I see cars having to make strange maneuvers or resorting to unpermitted left turns / u-turns.	Motor Vehicle	Intersection Safety
	Tertiary Road	Rainbow Drive	Road is too narrow to accommodate both cars and bicycles. Of special concern are days when garbage cans block the street even further	Motor Vehicle	Intersection Safety
	Local Street	Mapletree Place	Map is hard to read; I may have marked it incorrectly. Intersection of Wolf & Homestead has a shopping center with an exit to Homestead. Often, I have been behind drivers who stop on Homestead (heading N) to turn left into that center. They are not supposed to do so. The signs need enlarging or a barrier needs to be installed. Two times I witnessed a car turning left out of center and a car turning left from homestead basically doing a U-turn almost collide.	Motor Vehicle	Intersection Safety
	Tertiary Road	Finch Avenue	Right hand turn clogs the stevens creek	Motor Vehicle	Intersection Safety
	Secondary Road	Stevens Creek Blvd	Right hand turn lane clogs Stevens creek until Miller intersection	Motor Vehicle	Intersection Safety
	Secondary Road	South De Anza Boulevard	Unsafe left turn	Motor Vehicle	Intersection Safety
	Secondary Road	Bollinger Road	Turning left onto Tantau here is scary. The left hand turn lane is just kind of crammed in and there is not enough room for all the lanes.	Motor Vehicle	Intersection Safety
	Secondary Road	Stevens Creek Blvd, S Tantau Ave	Cars driving on Stevens Creek from east to west, and want to pull into this driveway seem to need to stop suddenly, making a sudden backup for cars behind them in this lane who are not making a right into this driveway.	Motor Vehicle	Intersection Safety
	Secondary Road	Stevens Creek Blvd, N Wolfe Rd	This protected left turn median is somewhat misaligned from the driveway to enter the residential/retail area of 19501 Stevens Creek Blvd (Lattea, T4, etc.). Cars who are unaware and make a left turn into that driveway will scrap the curb of the median.	Motor Vehicle	Intersection Safety
	Secondary Road	Stevens Creek Blvd, S de Anza Blvd	For some reason, the cars making a right turn out of this parking lot seem to miss seeing the pedestrians who are crossing this driveway from west to east.	Motor Vehicle	Intersection Safety
	Tertiary Road	N Wolfe Rd, Vallco Pkwy	There is a driveway here to go into the residential/office area of this complex. The driveway is very narrow, so when one car is making a right turn into the driveway and another car is leaving, there's very little space to maneuver. This causes the car driving down Wolfe who is turning into the driveway to slow down significantly to make the tight right turn, causing the traffic behind to stop suddenly as well.	Motor Vehicle	Intersection Safety
2j3dla9ciw78	Secondary Road	Stevens Creek Boulevard	Can you mark the lanes more clearly? It's a little confusing which lane one is supposed to be in to go straight on Stevens Creek and which lane to be when one wants to go on 85. Lots of near misses.	Motor Vehicle	Other
2j3dla9ciw78	Secondary Road	Bubb Road	Can both of these lanes from Bubb do a right turn when it is red? It is unclear. Lots of people honking and causing frustration. A sign to clarify would be nice so drivers have some guidance.	Motor Vehicle	Other
3tx3jvn39ctv	Local Street	John Drive	Loose manhole covers. Clank clank all day long. If they're loose enough to clank, someone's going to fall in.	Motor Vehicle	Other
	Secondary Road	Stevens Creek Boulevard	Pedestrians often cross the road illegally at this location. Barriers should be put up to prevent pedestrian crossing when there is a crosswalk 20 feet away.	Motor Vehicle	Pedestrian Safety
	Tertiary Road	McClellan Rd, Bubb Rd	Unsafe for pedestrian crossing	Pedestrian	Pedestrian Safety

	Tertiary Road	North Stelling Road	In need of a traffic signal. It is very hard for cars to make a left turn from Gardena dr on Stelling Road. Also, there are many kids who bike to Lawson Middle school and a pedestrian and bike crossing at the proposed traffic signal would be a big help.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Bubb Road	Bubb Road is a major roadway where students ride their bicycles to school and parent drive their children to school. It is also a major bicycle roadway used by resident on weekends. Cars are also allowed to park on Budd during weekends and garbage bins block the bicycle lanes during pickup days. People riding on Budd feel uncomfortable safely riding their bicycles on Rainbow when the bicycle lanes are blocked. Bubb should be made narrower for cars and wider for bicycle lane and a buffer. Something needs to be done to make Bubb Road safer for bicycle riding.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Beardon Drive	A three way stop sign for cars and a bike crossing at this intersection will help kids cross safely to Lawson Middle School	Pedestrian	Pedestrian Safety
	Local Street	Granada Avenue	No sidewalk with electrical poles on road. So kids have to walk on the road to go to school / play. This is also a main road of sorts for cars to go to monta vista / Lincoln schools - so school pick up and drop off is very busy	Pedestrain	Pedestrian Safety
	Local Street	Pacifica Drive	There are often people walking across here but during the night, it's hard for the driver to see them when they wear dark clothes. Please add some flashing light here for people to safely walk across. It's also for the driver's safety. Thank you.	Motor Vehicle, Pedestrian	Pedestrian Safety
4jp9bxd3enk4	Secondary Road	Stevens Creek Boulevard	Bubb Road from Stevens Creek to McClellan needs better sidewalks. Or add better pedestrian path along Union Pacific Right-of-Way. Bubb from McClellan to Rainbow needs better traffic management for School hours.	Pedestrian	Pedestrian Safety
8oul4sag2e43	Tertiary Road	Ann Arbor Avenue	No continuous sidewalk, you either have to cross the street without a crosswalk to stay on a sidewalk, or walk on the street.	Pedestrian	Pedestrian Safety
3gt2iet88p73	Tertiary Road	Imperial Avenue	lots of business parking in this residential area; Narrowed way due to double parking in front of business; unsafe for pedestrian due to heavy business traffic	Pedestrian	Pedestrian Safety
6rpf2v2wtj98	Tertiary Road	Ann Arbor Avenue	There is no continuous sidewalk on Ann Arbor Ave. You either have to walk on the street for part of the way, or you have to cross the street without a crosswalk.	Pedestrian	Pedestrian Safety
9cz9go9l7wya	Secondary Road	Stevens Canyon Road	The large quarry trucks come up and down Stevens Canyon Road speeding along with other cars. There are also no sidewalks on one side so my young kids and I have to run across the street from San Juan Road. This area needs the flashing crosswalk lights similar to the ones on McClellan near Blackberry Farm. At the very minimum, there should be a crosswalk.	Pedestrian	Pedestrian Safety
4ze3bhc44ae9	Secondary Road	Stevens Creek Boulevard & Phar Lap Drive	Cars going east on Stevens Creek is going downhill, a little difficult to stop in time when there is a pedestrian waiting at the signal light. Need another pedestrian crossing or bridge between the junction of Stevens Creek & S Foothill Blvd and junction of Phar Lap Dr & Stevens Creek. There are MANY residents walking along Stevens Creek to cross over between these 2 junctions to get to Blackberry Farm or Mcclellan Ranch for the trails. It's not SAFE as there are many cars plying up and down that section.	Pedestrian	Pedestrian Safety
9fx4oxy3i4o8	Tertiary Road	Olive Avenue	No sidewalk and speed bumper. Many students are walking to school (Lincoln elementary, Kennedy middle school, month vista high) on this road, but often some cars are driving fast, and even don't full stop at stop sign.	Pedestrian	Pedestrian Safety
9fx4oxy3i4o8	Tertiary Road	Orange Avenue	No sidewalk, and some cars are parked on the side, so students walking to school have to walk in the orange road, and in the morning a lot of cars on the road.	Pedestrian	Pedestrian Safety
7cr2bau77e3z	Secondary Road	Phil Lane	1) Parents turning left into the pick up/drop off circle 2) Non-parents driving on the wrong side of the road to go around the huge back up of cars waiting to pick up/drop off. 3) Cars backed up into the cross walks. 4) Pedestrians crossing 2 active driveways to get to the school entrance gate. The big gate at the end of the sidewalk next to the parking lot was open pre-pandemic. But now the school campus is more closed off, and students have to go in the gate closest to the building. Twice a day this area is extremely dangerous!	Pedestrian	Pedestrian Safety
9yx2fgn6mhl7	Tertiary Road	Orange Avenue	There in no sidewalk, the street is narrow. It is dangerous for the kids to walk to school	Pedestrian	Pedestrian Safety
9v4ep4s6sie2	Tertiary Road	Pacifica Drive	When I'm crossing this street on foot, lots of cars don't stop or yield. There is a pedestrian sign but no stop sign so I think drivers don't know that they have to yield to pedestrians. I've had many dangerous encounters here with cars not stopping so I stopped crossing the street here, and instead walk over to the next intersection that has a stop sign.	Pedestrian	Pedestrian Safety

7wyn883g6to4	Tertiary Road	Granada Avenue	Side walk doesnt exist on this road with poles which are almost at the middle of the road - this is a heavily trafficked road especially during school hours	Pedestrian	Pedestrian Safety
3s3ycy2gzi47	Secondary Road	North Foothill Boulevard	No side walk	Pedestrian	Pedestrian Safety
3s3ycy2gzi47	Tertiary Road	Silver Oak Way	No stop light to cross	Pedestrian	Pedestrian Safety
3s3ycy2gzi47	Secondary Road	Salem Avenue	No stop light to cross	Pedestrian	Pedestrian Safety
3s3ycy2gzi47	Secondary Road	Stevens Creek Boulevard	Insufficient pedestrian/bicycle area due to to a protruding corner	Pedestrian	Pedestrian Safety
8m3afj8fvc99	Secondary Road	South Stelling Road	There is no sidewalk on the Stelling portion or the Rainbow portion. The Rainbow portion is particularly dangerous. The sidewalk is all broken up, goes up a grade, slopes to the side, has a tree (or telephone pole) in the middle of it, and has no adjacent bike lane. It is a tripping hazard, unsafe for the elderly, and impossible for those in wheelchairs to navigate. The road is narrow in that section making it dangerous for bikes and especially for kids going to Regnart, Kennedy, Monte Vista. Neither the sidewalk nor the road is safe for bikes. This is a very busy intersection for people going to or coming from schools.	Pedestrian	Pedestrian Safety
77ofj7li9i27	Tertiary Road	South Foothill Boulevard	This short stretch of Foothill Blvd. (on the west side) does not have any sidewalk, so pedestrians must walk in the bike lane. This makes it dangerous for pedestrians, cyclists, and drivers.	Pedestrian	Pedestrian Safety
8ij38fir9v93	Secondary Road	Stevens Creek Boulevard	I'd love to have some professionals analyze the traffic patterns during CHS' morning dropoff and afternoon pickup times. Finch and Calle de Barcelona are heavily impacted with impatient drivers. There are several near-misses of cars vs pedestrians/cyclists. Pls look up the school bell schedule for the day to catch the traffic at its peak.	Pedestrian	Pedestrian Safety
8u93w8hjf7f7	Tertiary Road	Columbus Avenue	LACK OF SIDEWALKS. Way overdue to fix Bubb Road east side for pedestrians and students heading to Kennedy.	Pedestrian	Pedestrian Safety
2j3dla9ciw78	Tertiary Road	Vista Knoll Boulevard	There should be a crosswalk here. Many people cross here to get to school. It will alert drivers that there will be pedestrians here. Also, it will guide the schoolkids to walk on a certain path and not meander on Vista Knoll while crossing.	Pedestrian	Pedestrian Safety
2j3dla9ciw78	Tertiary Road	Salem Avenue	Need traffic light here so that pedestrians can cross over. There is only one traffic light at Foothill/Stevens Creek and one at Foothill/Starling Drive. Nothing in between. So when you walk to school, there is not a safe and efficient way to cross over. The last part on Foothill towards Starling has no sidewalk. So a place to cross over will be useful here.	Pedestrian	Pedestrian Safety
2cc4b9nfy2h4	Tertiary Road	Seven Springs	Rainbow between Stelling and Bubb is a major roadway used by pedestrians, bicycles, and cars. Bicycles and cars must share the same roadway as cars since Rainbow is too narrow for a separate bicycle lane. Students and casual bicycle riders like myself can't ride safely on the street when Rainbow is busy with traffic and are forced to ride on the sidewalk illegally. Something must be done to make riding bicycles safely on Rainbow or make it legal to ride on the sidewalk.	Pedestrian	Pedestrian Safety
2x6ret7eud8f	Secondary Road	Bubb Road	There are no sidewalks on east side of Bubb. Makes it unsafe for pedestrians and bikers.	Pedestrian	Pedestrian Safety
4wj2dmt6wmf6	Secondary Road	Homestead Road	The segment of Homestead Road has both heavy pedestrian and vehicle traffic. The speed limit is too high at 35mph, there is a cross walk yet a pedestrian has to run the gauntlet as many driver do not stop. As this is on the Los Altos/Cupertino border, there are additional issues that the two cities should consider addressing regarding traffic flow. When 280 is backed up, drivers use Homestead as an alternate route.	Pedestrian	Pedestrian Safety
8v3dz77jlc86	Tertiary Road	Tomki Court	Difficult to cross stelling here, suggest a crosswalk with warning lights on the bridge over 85	Pedestrian	Pedestrian Safety
8v3dz77jlc86	Secondary Road	Stelling Road	Difficult to cross stelling here, suggest a crosswalk with lighted warning lights on the bridge over 85 and a stop sign on cross traffic	Pedestrian	Pedestrian Safety
7dy62dlt3xta	Tertiary Road	Hanford Drive	Sidewalk unfinished / unpaved along stretches of Beardon Dr.	Pedestrian	Pedestrian Safety
6hy9j6lcb8o7	Secondary Road	Prospect Road	No stop sign for podestrians to pass the major road - prospect rd. Dangerous to local residents	Pedestrian	Pedestrian Safety

4ju43xni6p97	Secondary Road	Stevens Creek Boulevard	Crossing at this point (west bound) is dangerous because the crosswalk starts at a point where you can't see the oncoming traffic and it can't see you clearly while cars are speeding up here to get on the highway.	Pedestrian	Pedestrian Safety
8t7noc4moy2a	Secondary Road	South Stelling Road	Lack of side-walk on this section of Stelling makes it unsafe to walk.	Pedestrian	Pedestrian Safety
8t7noc4moy2a	Tertiary Road	Seven Spring	Can the city look at adding a sidewalk on this side of Stelling?	Pedestrian	Pedestrian Safety
39zb3sxi7wn4	Tertiary Road	Alves Drive	CROSSWALK ON N STELLING FROM ALVES NEAR QUINLAN CENTER: Many cars often do not stop at crosswalk and drive through with the full speed even the pedestrian(s) is (are) crossing the Stelling from Alves. The drivers do not notice there is a crosswalk or flashing light. Even though they noticed the flashlight, they do not know exact where to stop. There is no visible line to stop. I sometimes see the car drives so fast right in front of the pedestrian and almost hit. My neighbors almost hit a couple times. It is danger crosswalk. Would you please put visible sign, lines, lights, bumps, and also camera for the record in case the collision was happened?	Pedestrian	Pedestrian Safety
7hg48bwm2yna	Tertiary Road	Orange Avenue	No sidewalk Mixed traffic (pedestrians + cars) every morning. With parked cars, 2 way traffic is difficult. Muddy after rain. Adding sidewalk project [Budget Unit 270-90-958, $3.8M] initiated in 2016, no visible progress.	Pedestrian	Pedestrian Safety
7v6asg7asm47	Tertiary Road	Calle de Barcelona	Cars driving along this road, which is a commute path for hundreds of students walking and biking each day, do not stop or watch for cyclists and drive quickly. Some cars honk horns to get cyclists out of the way.	Pedestrian	Pedestrian Safety
2bz4m8om9p68	Secondary Road	Bubb Road	Along the East side of Bubb Road there are missing segments of the sidewalk. I don't know the exact segments, but people living on that side of this busy road should have a continuous sidewalk all the way from Rainbow to McClellan. Many people of all ages walk this stretch of road to school or for walks around the block (Stelling, Rainbow, Bubb to the percolation pond, then McClellan and back to Stelling). They should not have to cross to the other side of this busy road to stay on a side walk. Thanks!	Pedestrian	Pedestrian Safety
6xwl9onn8po6	Secondary Road	West Homestead Road	This is a highly traffic area. The kids have to cross over the North bound on ramp to Highway 85 - if you observe this during the morning the cars are just scary I am not surprised more kids are not hurt here. This is a residential area why is there a need for Highway 85 on ramp anyways? Fremont Avenue and Stevens Creek where cars can access Highway 85 both directions where Kids do not walk. This on and off ramp to Highway 85 from Homestead is it really necessary - the commuters are the main users and not the residents in the area - fact during distance learning lockdown this was not an issue. The traffic was extremely low, and kids were still walking here and there, actual residents were the main drivers (not the commuters) I would suggest fixing this so its safer for kids to walk and bike to Cupertino Middle School and Homestead High School. Thank you	Pedestrian	Pedestrian Safety
8fkl9e7wcm48	Tertiary Road	Orange Avenue	Major local road leading to all 3 schools - no sidewalk. Only two lines, very narrow in one place with cars parked on both sides, lots of traffic including garbage collection on Wednesday. Sidewalk is planned for long time but still no work is done. What are we waiting for? Kids getting in accident?	Pedestrian	Pedestrian Safety
8fkl9e7wcm48	Tertiary Road	Byrne Avenue	Great new sidewalk but mailboxes are installed right in the middle of it - very dangerous and basically reducing useful width of sidewalk to less than 3ft. Please move mailboxes to another side of the street where there is a divider and thus mailboxes will not infringe on the sidewalk	Pedestrian	Pedestrian Safety
7si94i9w98c4	Secondary Road	Stevens Creek Boulevard	This whole area should be pedestrian only for all of time. No vehicles ever.	Pedestrian	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd, Byrne Ave	No walking path in Blackberry entrance puts Pedestrians at risk . Please check if we can have a dedicated walking path for Pedestrians	Pedestrian	Pedestrian Safety
	Local Street	Dolores Ave	No walking path on Dolores Ave	Pedestrian	Pedestrian Safety
	Local Street	Orange Ave, San Fernando Ave	Lot of students walk on Orange Ave everyday. We do not have a walking path. Orange has lot of traffic especially during the school hours.	Pedestrian	Pedestrian Safety
	Tertiary Road	Bollinger Rd	There is no crosswalk in front of the school	Pedestrian	Pedestrian Safety

	Tertiary Road	Bollinger Rd	No crossroads	Pedestrian	Pedestrian Safety
	Tertiary Road	Bollinger Rd	No crossroads or traffic lights for pedestrians or bikers to safely cross Bollinger	Pedestrian	Pedestrian Safety
	Local Street	Beardon Dr	Crosswalk for students walking to Garden Gate Elementary from Beardon area neighborhoods	Pedestrian	Pedestrian Safety
	Local Street	Beardon Dr	Crosswalk for students walking to Garden Gate	Pedestrian	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd	No crosswalk to enter Ann Arbor Ave.	Pedestrian	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	The road is wide, sometimes I am not able to notice pedestrian waiting to cross or already on the crossing until I'm very close and had to stop suddenly. The crossing itself is not black and white, a little difficult to see ESPECIALLY when it's sunset and the sun is right in front of driver's view. I avoid taking driving on this road when its around sunset time. Not all pedestrians use the traffic signal. Lots of shops and cars on the left and right of this road, it's a very busy part and lots of things/people moving, it's hard for driver to notice pedestrians.	Motor Vehicle	Pedestrian Safety
	Secondary Road	Rainbow Drive	Instead of flags, we need an on-demand only push button with flashing lights so pedestrians can use use to cross this street.	Pedestrian	Pedestrian Safety
	Local Street	Squirehill Court	Where the sidewalk ends, the barrier forces pedestrians to walk around that barrier directly into an adjacent bike lane before they can enter the "safety" of the concrete parking areas in front of the next few houses. There is no more sidewalk from this point to Rainbow Drive, the next cross street. There are three issues here. 1. Ideally the sidewalk would continue to Rainbow and around the corner to the west. 2. Alternatively, the barrier should be changed so that pedestrians can proceed to those concrete "driveway/parking" areas without having to enter the bike lane. That is a dangerous spot because the pedestrians have their back to the oncoming bicycles. If they are jogging, chatting, texting, paying attention to an uncooperative dog or child, etc., they may not stop to turn around to see if a bicycle is approaching. There really is no need for the walking public to have to walk around that barrier into the bike lane. 3. Handicapped accessibility	Bicyclist	Pedestrian Safety
	Tertiary Road	North Foothill Boulevard	No way to cross over here. Should have one stop light between Stevens Creek and Starling Dr. It need not be right at Salem, but somewhere in the middle here. I see people cross over because Stevens Creek stoplight is too far and to get to Starling, there is no sidewalk. So they cross over in the middle here. Yikes!	Pedestrian	Pedestrian Safety
	Local Street	Rodrigues Avenue	This intersection is very strange since it only has marked pedestrian crosswalks on the west side and north side. It would help to standardize it and make it crossable on all four sides. The east side is already implicitly used as an unmarked crosswalk, but it does not feel safe to cross on the south side.	Pedestrian	Pedestrian Safety
	Tertiary Road	Forest Avenue	Unsafe for peds to cross here - we need a crosswalk here	Pedestrian	Pedestrian Safety
	Tertiary Road	Forest Avenue	Unsafe for Pedestrians	Pedestrian	Pedestrian Safety
	Tertiary Road	Saint Joseph Avenue	An excellent new bike path in Rancho San Antonio County Park leads to a dead end due to a locked gate. On the other side, A safe bicycle and pedestrian route from Cupertino neighborhoods, along Stevens Creek Blvd, leads to the locked gate instead of connecting the neighborhoods safely to the County Park. There is no train danger posed to people crossing the railway. Just need to open the gate.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Homestead Road	Too many parking driveways into the same strip mall. This bicycle lane and sidewalk are heavily used by local school kids every day. They are in danger of people driving across the bike lane and the sidewalk to get in and out of the parking lots: counting about 8 in and out car access within 150 yards! Extremely dangerous design.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	McClellan Road	Fast traffic comes shooting down the hill on McClellan Rd towards Linda Vista Rd. Safety concern for pedestrians and cyclists (even with the pedestrian crosswalks, not all vehicles stop).	Pedestrian, Bicyclist	Pedestrian Safety

	Tertiary Road	North Stelling Road	There is a cross walk on N. Stelling on Alves near to Quinlan Center. Many drivers do not notice there is a crosswalk and do not notice people are crossing the road. I often see the cars are driving even people are crossing. Even the yellow warning light is flashing, the driver miss the light. My neighbors almost got hit a couple times. Even the drivers saw a person is crossing, they do not know where to stop. No visible line for cars to stop.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Columbus Avenue	Add a 4-way stop sign. Currently drivers on Columbus don't have a stop and often drive fast. During school drop off hours this can be a safety concern, especially for kids walking/riding their bikes to school.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	Bollinger Road	No crosswalk, people often jay-walking to cross from neighborhood to the other side to get to safeway, plaza. Would advocate for crosswalk with flashing lights.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Shadygrove Drive	People traveling fast on Tantau, make turns onto the side streets (like shadygrove in this case), have seen near-misses with pedestrians crossing Shadygrove.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Tilson Avenue	When I commute to school in the mornings, cars often block the crosswalk or go immediately after another car has gone, making it unpredictable and unsafe to walk.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Near-miss accident: pedestrian/car at this intersection. Cars do not wait for pedestrians to cross.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Unsafe pedestrian crossing at this intersection: due to slope /angle of the road, pedestrians cannot be seen when crossing and cars turning right therefore don't stop.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Unsafe- cars turn in front of pedestrians crossing on southwest corner	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Cars go through crosswalk and don't wait for pedestrians.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Unsafe intersection- cars on Finch don't stop for pedestrians or cyclists in crosswalk	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Students walking here do not feel safe as cars do not stop in intersection or do not stop long enough (stop too briefly).	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Student does not feel comfortable crossing here as feels unsafe as a pedestrian.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	Finch Avenue	Near-miss accident between student pedestrian and car.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	Finch Avenue	Cars turning onto Finch don't wait for pedestrians.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	South Blaney Avenue	Safety concern at this intersection for walking students.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	McClellan Road	Crossing for pedestrians feels unsafe (per student).	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	South Stelling Road	Crossing here for pedestrians feels unsafe as cars waiting here going south cannot see pedestrians well on the opposite side when they are crossing.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	Terrace Drive	Feels unsafe for pedestrians crossing here.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Budd Rd	Near miss accident between student and car here (east side).	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Wilkinson Avenue	Near- miss accident here between student pedestrian and car.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Monta Vista	Injury accident between car and pedestrian at this intersection.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd	Several students report feeling unsafe at this intersection, as cars must 'dart out' to turn left onto Stevens Creek and don't watch for walkers or cyclists.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd	Students feel unsafe at this intersection due to many cars crossing and making turns.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd	Near-miss accident between car and student walking across Stevens Creek at this intersection. Cars do not stop for crosswalk lights.	Pedestrian, Bicyclist	Pedestrian Safety

	Secondary Road	Monta Vista	Cars do not watch for pedestrians crossing onto Cupertino road and are driving too fast.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd	Students report unsafe intersection, due to cars not being able to see pedestrians crossing because of angled crosswalks.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	McClellan Road	Crosswalk is difficult to navigate for students walking and biking, when there are cars trying to turn left onto Mclellan towards the schools. Sidewalk on Mclellan eastbound at September intersection is poorly maintained (dirt and weeds) - either homeowner or city should address it.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Riverside Drive	Foothill Blvd is used by bikers and pedestrians and it is unsafe for both. I was nearly run over one day trying to walk to Stevens Creek County Park. Bicyclists have died in the past as well. It should be widened to allow for pedestrians and bicyclists to use the road safely.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	Finch Avenue	Cars coming out of the lot often miss pedestrians because of a bush	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	East Estates Drive	Pedestrians crossing the sidewalk here aren't seen by westbound car traffic due to the curve of Bollinger here	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Farallone Drive	Although there is a sign to yield to pedestrians crossing the street here, many cars don't follow the sign.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	South De Anza Boulevard	Pedestrian and cyclist safety is of greatest concern at this intersection. Vehicles often turn right too quickly without checking for pedestrians entering and exiting the crosswalks. Traffic moves quickly in all directions. I have witnessed or experienced too many close calls with pedestrians at this intersection.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	South De Anza Boulevard	Pedestrian safety. There is high demand for a crosswalk at this location. Cupertino residents walking to Trader Joe's or nearby businesses, Trader Joe's employee's who park in Cupertino neighborhood's, and anyone traveling to/from the Route 25 bus stop crosses Bollinger at Clifden. But 4 lanes is a lot to cross without a crosswalk and flashing crossing lights. Please consider safety mitigations for pedestrians at this location.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	South De Anza Boulevard	This intersection needs a southern crosswalk on De Anza Blvd. It is unreasonable to expect pedestrians to cross 3 streets to travel from southeast De Anza to southwest De Anza, especially with connecting bus routes located on adjacent streets. The new bike lane connecting westbound Pacifica with McClellan is an improvement, but even with the restriping, it still hugs the vehicle lane too close. As drawn, there's not 3 feet between cyclists and vehicles.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	South Blaney Avenue	Consider adding a south crosswalk on Blaney at this intersection. Not having a south crosswalk encourages people walking on the south side of Rodrigues to cross Rodrigues mid-street to get to the north side before the intersection. Visibility on Rodrigues is not great is some places, so the mid-street cut acrosses can be dangerous.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Ugh. Consider giving pedestrians and cyclists a head start light when it is their turn to cross. Also, Fremont has done some innovative work its busiest intersections to create safer crossings for pedestrians and cyclists. Check out Fremont Blvd/ Mowry, Fremont Blvd/Stevenson, Walnut/Paseo Padre in Fremont, for example.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Bollinger Road	I am concerned about pedestrians who are crossing Alderbrook going or coming from the bus stop. Cars are driving fast around the bend in the road at Calabazas Creek. It would be good to have a cross-walk there to slow cars down.	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	McClellan Rd, Bubb Rd	At this location, the south bound traffic is stopped well before the intersection due to the intersection's curved nature. When the light turns green, the cars may turn right. At the same time, the white light for the pedestrians gives them the right to cross McClellan. The driver cannot see the pedestrian and begins to turn. The pedestrian may not see the car, since they may be walking in either direction. It is a pedestrian death waiting to happen. I note that there are many, many intersections where the green light for cars and the white light for pedestrians sets up the same problem. They should all be fixed. What makes the McClellan/De Anza intersection even more dangerous is the distance that the cars must stop before the intersection because of its curved nature.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd, Saich Wy	This intersection has a lot of cars making right turns on red that do not see pedestrians crossing on their green. I have had 2 near-misses walking across this intersection where cars almost hit me, and I've observed a few other cases of other pedestrians being nearly hit. I suggest having no-turn-on-red for cars at this intersection. There are too many cars and pedestrians who use this intersection.	Pedestrian, Bicyclist	Pedestrian Safety

	Secondary Road	Stevens Creek Blvd, N Wolfe Rd	The traffic signals have changed multiple times at this intersection, and my concerns are specifically about the pedestrian/bike crossing on the north side of Stevens Creek crossing Wolfe. First, pedestrians do not have protections from cars making right turns from Stevens Creek onto Wolfe. The green light for both cars and pedestrians occur at the same time, so cars are pulling up into the crosswalk right as pedestrians are walking into the crosswalk, and I've seen cars either not see approaching pedestrians and cutting them off, or suddenly stopping to avoid hitting pedestrians. I suggestion either making no-right-turn if a pedestrian walk light is on/pressed, or allowing pedestrians to walk first before the green light for cars are on. Second, the no-right-turn light turns on when a bicycle hits the intersection, but this light is too sudden, and I've seen cars miss this light or not be able to stop in time and continue making the right turn.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Edminton Dr, Farmingham Wy	Need stop sign enforcement here. Drivers ignore them and there is a lot of foot traffic for people accessing the creek trail and the pool.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	I tried drawing the area of concern, but couldn't draw, so I dropped a point. The area of concern is Stevens Creek Boulevard...from Bubb Road to SR85 NB Ramps. We have a number if signalized intersections in this small stretch and absolutely no coordination between them. During the afternoon peak period, when the school gets off, we have a number of students on bicycle on Stevens Creek Boulevard, along with heavy traffic (school traffic). Lack of signal coordination between these intersections frustrates motorist who wants to clear the intersection on yellow or even all red phase. This puts pedestrians and bicyclists in harms way. Note that this happens at all signalized intersections in this small stretch. While I understand that ramp signals are controlled by Caltrans and the City cannot change their timings, Coordination can we done with Caltrans who are very supportive of LRSP projects.Also, it would be beneficial if Piano Tiles crosswalks are implemente t all signalized Ints	Pedestrian, Bicyclist	Pedestrian Safety
	Tertiary Road	San Tomas Aquino	It's hard to see bikes and pedestrians coming off the trail as you turn right off of Lawrence Expressway. Cars also take this curve too fast. This should be a right hand turn instead (maybe with a dedicated lane?).	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Flinch Ave, Calle De Barcelona	CHS student: near-miss accident with car by pedestrian. Cars do not stop at this intersection for pedestrians, but try to "beat" them through the intersection. Also have seen near-miss accidents with bikes.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	Flinch Ave, Calle De Barcelona	CHS student: intersection doesn't feel safe as cars turning left don't wait (they get impatient) or cars crossing on Finch don't stop.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd, Saich Wy	MV student: I was hit by a car at this intersection.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd, Mary Ave	MV student: Near-miss accident here (walking) by entrance to 85. Crossing the onramp seems very dangerous.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd, Imperial Ave	MV student: Imperial Ave. feels unsafe to walk on. Lots of people backing out and limited sidewalks.	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	S Stelling Rd, Orogrande Pl	MV student: lots of traffic at the intersection make it unsafe for many people walking. Cars turn but do not look for people before doing so.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	McClellan Rd, Orange Ave	MV student: near miss in crosswalk when walking to school.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	McClellan Rd, Orange Ave	MV student: does not feel safe crossing here.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	McClellan Rd, Orange Ave	MV student: Cars do not stop here for pedestrians in crosswalk.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	McClellan Rd, Orange Ave	MV student: cars get impatient and do not wait for students crossing here.	Pedestrian, Bicyclist	Pedestrian Safety
	Local Street	McClellan Rd, Byrne Ave	MV student: this intersection feels unsafe for students.	Pedestrian, Bicyclist	Pedestrian Safety

	Secondary Road	Homestead Road	Car slip lane for right turn puts pedestrians and bicycles in danger	Pedestrian, Bicyclist	Pedestrian Safety
	Secondary Road	Homestead Road	Student cyclists exiting HHS campus riding their bikes across the scramble-walk/pedestrian crossing, weaving between pedestrians. Often riding at speed. Have witnessed at least one pedestrian knocked to the ground by a cyclist already.	Bicyclist	Pedestrian Safety
	Secondary Road	Stevens Creek Blvd, Bubb Rd	Vehicles turning right from Bubb Road onto South/East bound Stevens Creek Blvd. from 2 right lanes against red light almost hit pedestrians and bicyclists. Please add No Right Turn on Red to this intersection.	Pedestrian	Pedestrian Safety
	Secondary Road	North De Anza Blvd, Mariani Ave	Roads at this location are far too wide, making it difficult to cross. I regularly see older people struggle to make it through in time and it's very dangerous with the high traffic speeds.	Pedestrian	Pedestrian Safety
	Secondary Road	Homestead Road	When this crosswalk has a green light, the traffic coming from the street also has green light and turn light. This puts pedestrians in the path line of left turning drivers coming from behind them. So if you walk south in the crosswalk to the school, and a car comes south from the neighborhood and makes a left, both of you have green light and the car might hit you from behind. Should not have both green lights at the same time.	Pedestrian	Pedestrian Safety
	Secondary Road	Stevens Canyon Rd, St Andrews Ave	Much used crosswalk is all but invisible to heavy traffic, speeding cars and trucks. It is at an angle which adds to poor visibility and poor lighting. Have seen near pedestrian misses (kids especially) when one car stops and car in next lane keeps moving. Please put up blinking lights and illuminate pavement.	Pedestrian	Pedestrian Safety
	Tertiary Road	Hyde Ave	There is a lot of traffic dropping off their students in the morning or picking them up. This causes a lot of congested traffic, but more importantly: unsafe circumstances for children, pedestrians and bikers.	Pedestrian, Motor Vehicle	Pedestrian Safety
	Local Street	Willowgrove Ln	There is a lot of traffic dropping off their students in the morning or picking them up. This causes a lot of congested traffic, but more importantly: unsafe circumstances for children, pedestrians and bikers.	Pedestrian, Motor Vehicle	Pedestrian Safety
	Local Street	Willowgrove Ln	There is a lot of traffic dropping off their students in the morning or picking them up. This causes a lot of congested traffic, but more importantly: unsafe circumstances for children, pedestrians and bikers.	Pedestrian, Motor Vehicle	Pedestrian Safety
	Local Street	Hartman Dr	Traffic coming down Hartman do not stop (or often look) turning right on to Chace Drive. It's a hazard for pedestrians or cars traveling down Chace.	Pedestrian, Motor Vehicle	Pedestrian Safety
	Local Street	September Drive	Cars and pedestrians crossing during school days morning/afternoons in small area. Poor visibility and lighting especially at night.	Motor Vehicle, Pedestrian	Pedestrian Safety
	Local Street	September Drive	Better lighting needed at intersection to see pedestrians and trim trees for visibility	Pedestrians	Pedestrian Safety
	Secondary Road	Stevens Creek Boulevard	Unsafe for crosswalk users, both to and from De Anza college and crosswalk from Senior Center to new construction area. Drivers need a better crossing light/no turns signal. I have seen one on the corner of Homestead and Mary, in front of Homestead High school in Sunnyvale.	Pedestrain	Pedestrian Safety
	Tertiary Road	McClellan Road	Cars traveling south on Byrne try to make a left onto McClellan (east bound) during the start of school is dangerous. Drivers tend to be aggressive and often claim right away pulling out in front of students crossing the sidewalk or in front of drivers lined up heading eastbound on McClellan. It's best described as a "chaotic symphony". The flags at the crosswalk really helped to bring pedestrian visibility, but that doesn't address the traffic or flow of traffic issues. I've observed this for 25 years as a teacher driving to school everyday. Please consider 2 obvious solutions, both of which are feasible and should be budget friendly. 1. Hire a crossing guard. The crosswalks by Lincoln just 50 yards away work well for both pedestrian safety and for creating predictable breaks in the flow of east & west bound traffic which allows for vehicles to safely turn onto McClellan from feeder streets and parking lots. 2. Prohibit a left hand turn from Bryne in the AM on school days.	Motor Vehicle	Pedestrian Safety
	Secondary Road	Homestead Road	Red light violations	Motor Vehicle	Red Light & Stop Sign Violations

	Secondary Road	South De Anza Boulevard	Red light runners. It's ridiculous how many cars run the red lights and get away with it. We need cameras.	Motor Vehicle	Red Light & Stop Sign Violations
	Secondary Road	South De Anza Boulevard	Lots of people running red lights because they don't want to wait for another light cycle.	Motor Vehicle	Red Light & Stop Sign Violations
	Secondary Road	Stevens Creek Boulevard	runs red light	Motor Vehicle	Red Light & Stop Sign Violations
	Tertiary Road	Mc Kinley Drive	Cars don't watch (or don't stop long enough) for pedestrians/bikes at this intersection.	Motor Vehicle	Red Light & Stop Sign Violations
	Secondary Road	East Homestead Road	Red-light runners - ALL of the time. Very dangerous for pedestrians and bicyclists. I've stopped walking to the store after almost being hit twice.	Motor Vehicle	Red Light & Stop Sign Violations
	Secondary Road	North De Anza Boulevard	People are constantly running red lights here.	Motor Vehicle	Red Light & Stop Sign Violations
	Local Street	Barbara Lane	Parents driving kids to Faria and picking them up are driving like maniacs. They ignore traffic rules.	Motor Vehicle	Red Light & Stop Sign Violations
	Tertiary Road	Pepper Tree Lane	Parents driving kids back and forth to Faria School seem to have blinders on. A light blue minivan nearly hit us in the crosswalk, after running a red light at the corner of Stelling and Pepper Tree Lane. They did not even slow down for the red light, nor notice us in the crosswalk. We fortunately jumped out of the way of the van, and after walking down Pepper Tree, we saw the vehicle pulled up in front of Faria School. PLEASE put cops out in our neighborhood at school drop off and pick up times.	Motor Vehicle	Red Light & Stop Sign Violations
3ec69gue4t84	Tertiary Road	Vista Drive	We've seen many people using this path as a shortcut from Homestead to Steven's Creek and vice-versa. They tend to blow through Stop signs. There are some speed bumps, but maybe we need more?	Motor Vehicle	Red Light & Stop Sign Violations
7dh26k9g6ka9	Tertiary Road	Ann Arbor Avenue	Car not stopping at STOP sign	Motor Vehicle	Red Light & Stop Sign Violations
7dh26k9g6ka9	Tertiary Road	Parkwood Drive	On stop sign drivers not stopping	Motor Vehicle	Red Light & Stop Sign Violations
6kl6c7svs7v4	Tertiary Road	Valley Green Drive	I have gotten rear-ended three times on this section of road. The fast speed up and slow down between lights -- or running through the red lights to continue speeding -- has resulted in damage to me and my cars. Help please.	Motor Vehicle	Red Light & Stop Sign Violations

33ckv2k9kxo8	Tertiary Road	Drea Road	Vehicles not following the one way street signs. Vehicles making a U-Turn and parking the wrong way.	Motor Vehicle	Red Light & Stop Sign Violations
3w7ujp7m2nc9	Secondary Road	Stevens Creek Boulevard	Garbage truck running red light	Motor Vehicle	Red Light & Stop Sign Violations
	Local Street	Kim Street	Many cars don't stop completely at the traffic stops. Many pickup trucks from Homedepot are speeding through the intersection. Some vehicles go the wrong direction in the 1 way street on Kim st.	Motor Vehicle	Red Light & Stop Sign Violations
	Local Street	Shadygrove Drive	Cars do not stop at this intersection and there is no crosswalk delineation for kids crossing the street.	Motor Vehicle	Red Light & Stop Sign Violations
	Local Street	Vista Drive	Cars racing through the corner at night. Loud and dangerous, especially if there are pedestrians. The situation did not improve even with the safety cones installed last year.	Motor Vehicle	Red Light & Stop Sign Violations
	Local Street	Fort Baker Drive	Many motorists running the stop sign at Ft. Baker, traveling east on Hyannisport.	Motor Vehicle	Red Light & Stop Sign Violations
	Local Street	Vista Dr	People driving up Vistada towards Lawson Middle School do not stop at this stop sign.	Motor Vehicle	Red Light & Stop Sign Violations
	Tertiary Road	John Dr	People don't stop at this stop sign	Motor Vehicle	Red Light & Stop Sign Violations
	Secondary Road	Stevens Creek Blvd	Many speeding cars reported here.	Pedestrian, Bicyclist	Speeding
	Secondary Road	Budd Rd	Cars speed, and don't stop at this stop-controlled intersection.	Motor Vehicle	Speeding
43xwd2yvp2k7	Tertiary Road	Linda Vista Drive	Speeding traveling downhill on Linda Vista Drive.	Motor Vehicle	Speeding
7ud677lee3a3	Secondary Road	Bollinger Road	design here is very conducive to speeding, and there's a lot of fast traffic. not safe for walkers and bikers	Motor Vehicle	Speeding
37joc8ks8mi6	Secondary Road	Stelling Road	speeding cars	Motor Vehicle	Speeding
3ec69gue4t84	Tertiary Road	Larry Way	People drive fast down this street. We need speed bumps.	Motor Vehicle	Speeding
3ec69gue4t84	Tertiary Road	North Blaney Avenue	People drive very fast down this stretch, using it is a shortcut. We need speed bumps installed	Motor Vehicle	Speeding
3ec69gue4t84	Tertiary Road	Lucille Avenue	People drive fast down this street. We need speed bumps installed,	Motor Vehicle	Speeding
44ttu8r8mig6	Secondary Road	Bubb Road	Speeding since no stop signs. not yield to pedestrians on Regnant and Bubb cross	Motor Vehicle	Speeding
7zx67hdw2a23	Tertiary Road	Finch Avenue	There should be a stop sign here. Motorists do not stop for students crossing Finch.	Motor Vehicle	Speeding
426z6zcn4ww6	Secondary Road	Bubb Road	during the school time. cars speed.	Motor Vehicle	Speeding
46zbm92u46h9	Secondary Road	Rainbow Drive	Unsafe Speeding	Motor Vehicle	Speeding
4zv32hks3bb4	Secondary Road	Stevens Canyon Road	Quarry trucks on this steep downhill routinely go at speeds that are too fast to stop - they would skid past the bottom of the hill. This is a disaster waiting to happen.	Motor Vehicle	Speeding
68xp877pra87	Secondary Road	Stevens Creek Boulevard	I believe the speed limit is too high on Stevens Creek Blvd. I would like to see the speed limit lowered from 35 mph to 30 mph. The actual speeds on this segment can be in the range of 45 to 50 mph. Lowering the speeds could enhance both pedestrian and bicycling safety. Also, I seldom see any enforcement of speed limits on this Blvd	Motor Vehicle	Speeding

4hue8shj62da	Secondary Road	South Blaney Avenue	La Mar Drive is a straight shot with absolutely no traffic control, aside from the two radar speed signs which don't really do anything to discourage speeding. There should be at least some traffic calming put in place here.	Motor Vehicle	Speeding
6c9bgn2czr39	Secondary Road	North Blaney Avenue	Speeding is an issue here - We need a dynamic speed sign.	Motor Vehicle	Speeding
4tz4awf4fpw3	Secondary Road	North Blaney Avenue	Speeding is a problem here	Motor Vehicle	Speeding
9je8lla69r43	Secondary Road	Rainbow Drive	Unsafe speeding and cars don't stop at stop signs.	Motor Vehicle	Speeding
9je8lla69r43	Secondary Road	Rainbow Drive	Unsafe speeding - Need speed feed back signs.	Motor Vehicle	Speeding
4yr4c9ehd4ha	Tertiary Road	Wunderlich Drive	Too much traffic for a local road and speeding on this roadway segment (between Tilson and Johnson on Wunderlich)	Motor Vehicle	Speeding
6fc3npk3hb7a	Secondary Road	Stevens Creek Boulevard	Orange SUV speeding in the mornings on the weekends	Motor Vehicle	Speeding
98zsv9yii8ea	Stevens Creek Boulevard	Stevens Creek Boulevard	Speeding	Motor Vehicle	Speeding
7ii48vm2nsu9	Secondary Road	Stevens Creek Boulevard	Many people roll through the red light to Stevens Creek Blvd from Bubb Rd. It is very dangerous for the traffic coming from the west of the Stevens Creek Blvd, both for pedestrians and cyclists. I would like to suggest making it NO TURN ON RED from Bubb Rd turning right to Stevens Creek Blvd.	Motor Vehicle	Speeding
8v3dz77jlc86	Secondary Road	South De Anza Boulevard	Cars often roll the right on red from Northbound Deanza onto Bollinger and from Bollinger onto Northbound Deanza	Motor Vehicle	Speeding
2wp7snn6to73	Tertiary Road	Gardena Drive	speeding. we need speed bumps.	Motor Vehicle	Speeding
3d6mdp8anm38	Secondary Road	McClellan Road	Speeding traffic coming from Foothill Blvd.	Motor Vehicle	Speeding
6hy9j6lcb8o7	Secondary Road	Prospect Road	Most cars in Prospect rd & Via Roncole are speeding! Most cars. Please take measures to control the speeding.	Motor Vehicle	Speeding
4h9k77j697n7	Tertiary Road	Calle de Barcelona	unsafe speeding	Motor Vehicle	Speeding
7si94i9w98c4	Local Street	Newsom Avenue	People come into the neighborhood here at high speeds and then make a U-turn to get out of the neighborhood. I've seen quite a few accidents and near-accidents over the years. This might be a good place for some speed bumps, narrowing the road where Newsom terminates into Wunderlich, Putting a stop sign at the end of Newsom, something so this is not a broad sweep for folks to whip around. Or just shut it off entirely? Wunderlich and Bollinger is such a problematic intersection.	Motor Vehicle	Speeding
	Local Street	East Estates Dr	People speed through E Estates and use it as a cut through.	Motor Vehicle	Speeding
	Local Street	November Drive	Cars drive too fast on November, probably using it as shortcut between Stelling and McLellan, especially during commute times.	Motor Vehicle	Speeding
	Tertiary Road	Wolfe Road	Slip lane with car speeding up to freeway speed does not work well for crossing. Need a right angle turn for cars, just like on Winchester on ramp.	Motor Vehicle	Speeding
	Local Street	Sweet Oak Street,	We need to provide a stop sign or yield sign for vehicles going east or west bound on Homestead Road because bikers are prone to accidents at the intersection between Homestead Street and Sweet Oak Street.	Motor Vehicle	Speeding
	Tertiary Road	North Blaney Avenue	Speeding. Especially after the bridge cars are going down. Bump or hump would help	Motor Vehicle	Speeding
	Tertiary Road	Phil Lane	Cars often do not slow down or stop here, especially when turning from Phil onto Stendhal.	Motor Vehicle	Speeding
	Secondary Road	Bollinger Road	Cars are speeding over the speed limit here, making it dangerous for cars going southbound on Estates Dr trying to turn right onto Bollinger	Motor Vehicle	Speeding
	Tertiary Road	Mann Dr, Meadowview Ln	Speeding cars, lack of sidewalks for pedestrians, pedestrians walking on wrong side of street, lack of speed limit signs, lack of humps to slow traffic.	Pedestrian	Speeding
	Tertiary Road	Rainbow Dr, Gardenside Ln	Speeding down road segments, drivers do not obey the uncovered 15mph sign. They fly down from top of rainbow and sterling road bend corner at about 40 mph,drivers skid through my drive way while turning rainbow Drive at 7330 rainbow Drive Apt3 is I the current tennat that is very much concerned why responsible drivers can not obey the residential street and the amount of pedestrians a d children walking this very busy street. The peak time of all this non stop behavior is ruffle from 7am to 9pm then after 4pm to about 6pm hours usually around the am and pm work/ weekends is variable mostly Saturdays around 10pm and Fridays. My children have felt unsafe crossing the road unfortunately and we have almost gotten struck by ignorant drivers who don't even care to see pedestrians and they keep up the speed to intimidate us. Sherrifs office has been told about the concern. Sargent at the patrol units of Roads etc will be told to monitor rainbow Drive to be more efficient on prioritize spee	Motor Vehicle	Speeding

	Secondary Road	Stevens Creek Boulevard	The intersection of DeAnza and Stevens Creek is particularly dangerous for pedestrian crossings. The road speeds are too high on both these streets and drivers turning right many times fail to yield to pedestrians. I have personally come close to getting hit by an auto. The Cupertino Pedestrian plan recognizes the danger of this intersection to pedestrians but fails to recommend any changes	Pedestrian	Speeding
	Local Street	Prospect Road	I live on Prospect Raceway, or should I say Road, and we have unbelievably fast speeders on my street. And they do not stop for pedestrians. I know that David Stillman is working on this, but in the meantime, it is extremely unsafe. PLEASE DO SOMETHING NOW! Just come over sometime and check out just how bad it is. Thank you.	Motor Vehicle	Speeding
	Primary Rd	Foothill Expressway	Cars don't have a good view of the cross walk and are often speeding on the downhill of Foothill Expressway	Motor Vehicle	Speeding
3hl8rvb4hdy9	Local Street	Alves Drive			Unknown
2l8his8ef269	Secondary Road	Merritt Drive			Unknown
2l8his8ef269	Tertiary Road	Clearcreek Court			Unknown
2l8his8ef269	Secondary Road	South Stelling Road			Unknown
3gt2iet88p73	Tertiary Road	Imperial Avenue			Unknown
8m3afj8fvc99	Tertiary Road	Seven Springs			Unknown
8tk27lkx7wa4	Tertiary Road	Alves Drive			Unknown
4xt976jhn9n6	Tertiary Road	Kirwin Lane			Unknown
4wj2dmt6wmf6	Secondary Road	Homestead Road			Unknown
7srt6vlz7gs9	Secondary Road	Bubb Road			Unknown
8t7noc4moy2a	Secondary Road	McClellan Road			Unknown
8foi2864uau3	Secondary Road	McClellan Road			Unknown
2yfj3y7lbe99	Tertiary Road	Orange Avenue			Unknown
9b6pas9ukp9f	Tertiary Road	South De Anza Boulevard			Unknown
	Local Street	Lazaneo Drive			Unknown
	Tertiary Road	Pheasant Road			Unknown
	Tertiary Road	Calle de Barcelona			Unknown
	Tertiary Road	South Blaney Avenue			Unknown
	Primary Rd	West Valley Freeway			Unknown
	Local Street	Hyannisport Dr			Unknown
	Tertiary Road	East Estates Drive	East bound cars that stop here to turn left to enter Estates Dr. get rear ended due to the reduced visibility of the curve of Bollinger.	Motor Vehicle	Visibility/Lighting
	Tertiary Road	East Estates Drive	Going Southbound on Estates Dr trying to turn right to go west on Bollinger, the visibility of cars coming west on Bollinger is blind due to the curve of Bollinger.	Motor Vehicle	Visibility/Lighting
	Local Street	Loree Avenue	Need an overhead light at Loree and Calvert.	Motor Vehicle	Visibility/Lighting
	Local Street	Alderbrook Lane	Taking right/left on to bollinger road from Alderbrook road is unsafe. The visibility is restricted from parked cars on the bollinger side walk	Motor Vehicle	Visibility/Lighting
2j3dla9ciw78	Tertiary Road	English Oak Way	Blind spot here. There should be no parking at all. When cars are parked there, you can't quite see the road and on coming traffic.	Motor Vehicle	Visibility/Lighting
2j3dla9ciw78	Tertiary Road	English Oak Way	There should be no parking on this side of the road. When both sides of the road is parked with cars, the road narrows into a one vehicle road. One car often has to stop on one side to let the other pass. There is one 'No Parking' sign further up the street but there rest are 'No Parking on 1st and 3rd Tuesdays of the month' during certain hours.	Motor Vehicle	Visibility/Lighting

APPENDIX B: SUMMARY OF PLANNING DOCUMENTS

Appendix B

Document	Relevant Goals, Policies, and Projects
City of Cupertino Bollinger Road Corridor Safety Study (2021)	**Collision Analysis** • Two reported pedestrian collisions occurred in the area, both of which resulted in fatalities. These pedestrian collisions occurred at Miller Avenue and at Wunderlich Drive. • 12% of collisions involved a bicyclist. • 40% of all the collisions reported in the study area were rear-end collisions. • 15% of those rear-end collisions were attributed to unsafe speed. • 16% of the collisions were broadside collisions due to improper turning, driver or bicyclist under the influence, misuse of traffic signals or signage, and right-of-way conflicts. **Community Priorities for Improvement** • New or safer crossings at intersections for pedestrians and bicyclists • Safer or more comfortable bike lanes • Reduce vehicle speeds • Reduce vehicle congestion • Better lighting • Safer or more comfortable sidewalks • Improvements for people with disabilities • Better landscaping • Better access and amenities at bus stops **Safety Improvement Elements** • **Class IV cycle track:** Cycle tracks provide separated travel lanes for bicycles in the road right-of-way. Separation from vehicle traffic is achieved via raised protection, which may consist of bollards, concrete curbs or planters, parked cars, or a combination of these features. • **Speed feedback signage:** Speed feedback signage provide drivers in vehicles with visual feedback of their speed in relation to the posted speed limit. When complemented with police enforcement, speed feedback signage can be an effective tool for reducing speeds at a desired location.

Document	Relevant Goals, Policies, and Projects
City of Cupertino Bollinger Road Corridor Safety Study (2021) (cont.)	• **High-visibility Pedestrian Crossings:** High-Visibility Pedestrian Crossings help make crosswalks and pedestrians more visible to vehicles, increasing yielding behavior. • **Bike boxes:** Bike boxes are green-painted areas installed at an intersection between the auto stop bar and the pedestrian crosswalk, allowing bicyclists to move to the front of the auto queue, making them more visible as they enter the intersection first. • **Two-Stage Turn Queue Boxes:** Two-stage turn queue boxes are green-painted rectangles installed at intersections. These two-stage boxes allow bicyclists a space to safely queue when attempting a left-turn onto another street as well as improving their ability to safely make their turning movement. • **Curb Radii and Free-Right Turn Removals:** Curb radius affects vehicle turning speeds and pedestrian crossing distances. Reducing the corner radius requires vehicles to slow down and thus be more likely to yield to pedestrians in a crosswalk. • **Leading Pedestrian Intervals (LPI):** LPI allows pedestrians to enter the crosswalk before cars enter the intersection and makes them more visible to drivers that are making a turn.
City of Cupertino Transportation Study Guidelines (2021)	**Intent of the Guidelines** The TS Guidelines outline the City's approach for determining the need for a transportation study and its content, and identifying acceptable transportation improvements for land use and transportation projects proposed within Cupertino. The TS Guidelines establish protocols for performing the following: • Local Transportation Analysis (LTA) for small projects. An LTA focuses on site plan review, assessment of the site integration with the transportation system, and a VMT analysis showing less than 836 daily VMT (the threshold for a small project). • Transportation Analysis (non-CEQA) to assess medium and large projects for consistency with the City's *General Plan* and the Santa Clara County CMP. • Transportation Analysis for analyzing and determining impacts under CEQA. **Project Types** A transportation study is typically prepared for projects before a discretionary action is taken. The following types of projects, which

<table>
<tr><th>Document</th><th>Relevant Goals, Policies, and Projects</th></tr>
<tr><td>City of Cupertino Transportation Study Guidelines (2021) (cont.)</td><td>involve land development and/or construction activity in and around Cupertino and affect the adjacent transportation system, may require a transportation study.

Land use entitlements requiring discretionary approval by Cupertino, which include General Plan amendments, precise roadway plans and specific plans (and related amendments), zoning changes, use permits, planned developments, site plan review committee approval, and tentative subdivision maps.
Land use activity advanced by agencies other than Cupertino, such as school districts that are subject to jurisdictional review under state and federal law, or advanced within Cupertino by agencies other than the City that is inconsistent with the City's General Plan.
Transportation infrastructure modification or expansion, including capital improvement projects on City roads, county roads and state highways that may impact City facilities and services. Certain projects fall under the purview of the state, whereby comments are typically received from Caltrans, and may require a level of impact analysis upon state facilities such highways, freeways, ramps, and intersections.
Subsequent phased projects, such as projects that were phased with no plans of implementation or projects that remained stagnant for more than seven years.

Determining the Level of Transportation Study

Tier 1: Less than 110 daily trips
Tier 2: Between 110 and 1,000 daily trips and less than 100 peak hour trips
Tier 3: Greater than 1,000 daily trips or greater than 100 peak hour trips

Trip Generation and Forecasting Tools
The transportation study for General Plan and CMP consistency is based on vehicle trip generation, while CEQA analysis is based on VMT generation. This section describes how vehicle trip generation and VMT are estimated, and how cumulative traffic forecasts are developed.

Transportation and Circulation Studies (non-CEQA)
The contents and extent of a transportation study depend on the location and size of the proposed development, the prevailing transportation conditions in the surrounding area, and the technical responses to</td></tr>
</table>

Document	Relevant Goals, Policies, and Projects
City of Cupertino Transportation Study Guidelines (2021) (cont.)	address questions being asked by decision-makers and the public. In general, projects will prepare either: a. A Local Transportation Analysis (Tier 1 projects); or, b. A Transportation Analysis (Tier 2 and Tier 3 projects) **Transportation Analysis (CEQA) for Land Use Projects** Projects not screened out through the criteria listed in the *Determining the Level of Transportation Study* section are required to complete a VMT analysis to determine if there would be a significant VMT impact. The impact analysis includes two types of VMT: 1. Total project generated VMT per service population 2. Project's effect on VMT The following scenarios should be evaluated: • **Baseline Conditions** evaluates total project generated VMT per service population under existing with project or baseline with project conditions, and compares the result to the citywide average. • **Cumulative Conditions** evaluates the project's effect on VMT in a future year, linked to the future year used in the most current version of the VTA Travel Model. **Transportation Analysis (CEQA) for Transportation Projects** Transportation projects have the potential to change travel patterns and may lead to additional vehicle travel on the roadway network, also referred to as induced vehicle travel. This is particularly true for roadway capacity expansion projects.
City of Cupertino Neighborhood Traffic Calming Program (2020)	**Guiding Principles** • The primary purpose of the NTCP is to address neighborhood concerns and to reduce the speed and volume of traffic on local residential and residential collector streets with an established speed limit of 25 miles per hour. The NTCP does not apply to roadways designated as arterial roads or collector roads. • Emergency vehicle access will be maintained in all traffic calming plans. Emergency vehicle travel times will also be considered when evaluating traffic calming measures. • Reasonable automobile, pedestrian and bicycle access should be maintained to streets with traffic calming measures. • Removal of some on-street parking spaces may be necessary to install some traffic calming measures. Parking loss at specific locations will be balanced with the neighborhood's desire for the traffic calming device.

Document	Relevant Goals, Policies, and Projects
City of Cupertino Neighborhood Traffic Calming Program (2020) (cont.)	• Only approved traffic calming devices included in this manual will be considered for installation under the NTCP. Transportation Division staff will examine the feasibility of the installation of a particular device before a recommendation is made. • Traffic calming devices will be planned, designed and used in keeping with sound engineering and planning practices. The installation of traffic control devices such as signs, markings and speed humps will be compliant with the State of California Vehicle Code and the Manual of Uniform Traffic Control Devices. • Requests for traffic calming devices shall be evaluated on a first-come, first-served basis and implemented up to the limit of funds available. Eligible traffic calming projects will be prioritized for implementation based upon the severity of traffic conditions. • Traffic calming measures require approval by affected residents and property owners prior to implementation. **The Neighborhood Traffic Calming Process** • Step 1: Initial Inquiry and/or Petition by Residents • Step 2: Traffic Study, Identification of Appropriate Measures and Establishment of Notification/Voting Area • Step 3: Neighborhood Meeting with Affected Residents/Property Owners to Identify Preferred Traffic Calming Measures • Step 4: Postcard Survey • Step 5: Approval by Staff and/or the City Council • Step 6: Installation of Traffic Calming Device(s) **Traffic Calming Measures** • Speed and warning signs • Turn restriction signs • Speed humps / speed tables / speed cushions • Median island • Traffic circles/roundabouts • Bulb-outs / curb extensions
	Master Plan Goals • MP1. CONSERVATION Protect nature, trees and natural areas in parks and throughout the city to support wildlife, ecological

Document	Relevant Goals, Policies, and Projects
City of Cupertino 2020 Parks and Recreation System Master Plan (2020)	functions and a stronger connection to Cupertino's natural environment. • MP2. CONNECTION Provide an interconnected network of multiuse trails, walkways and bikeways, close-to-home parks, and community destinations. • MP3. EQUITABLE ACCESS Distribute parks and facilities throughout the community for easy and equitable access. • MP4. ENHANCEMENT Reinvigorate and revitalize parks and recreation facilities to support broad and inclusive recreation interests. • MP5. ACTIVITY Provide programs, events and services that foster social cohesiveness and lively, diverse activities for people of all ages, abilities, cultures, and interests. • MP6. QUALITY Create high quality recreation experiences, places and services that are welcoming, safe, responsive, comfortable and reflective of Cupertino's unique character. • MP7. SUSTAINABILITY Provide, manage and maintain parks, facilities, programs and services through sound management and stewardship, sustainable choices and the wise use of resources. **Outreach Themes** • **Nature Experience:** Community members want more opportunities to connect to nature. • **Trails & Connectivity:** Residents value trails and desire more opportunities for walking and biking in Cupertino. • **Park & Facility Access:** Residents want easy, enhanced access to parks and recreation opportunities. • **Social Gathering & Celebration:** Residents appreciate community events and would like to see more spaces in Cupertino for bringing people together. • **Extraordinary Play:** Cupertino desires a variety of play experiences for all ages and abilities. • **Recreation Variety:** Residents and visitors desire a wide range of recreation options. • **Youth & Teen Empowerment**: Special attention is needed to engage and empower Cupertino youth and teens. • **Welcoming Places & Services:** Residents expect outstanding customer service and quality facilities that are responsive to community needs.

Document	Relevant Goals, Policies, and Projects
	• **Uniquely Cupertino:** Parks and recreation opportunities should reflect Cupertino's character, heritage and diverse community. • **The Arts:** Cupertino should support the arts by offering a diverse set of arts and culture programming. • **Partnerships:** Strong partnerships can help create unique and diverse parks and recreation programs. • **Cultural Diversity:** Recreation facilities and programs should celebrate Cupertino's cultural diversity.

City of Cupertino Capital Improvement Program FY 2023	**Project Categories**
	
	• **Deferred Projects:** These are deferred projects from FY20/21 due to impacts from COVID-19
	  o All-Inclusive Playground at Jollyman Park
	  o Bike Boulevard Improvements Phases 1-3 (Permanent Improvements)
	  o Orange Avenue Sidewalks
	  o Stevens Creek Corridor Park Chain Master Plan
	• **Category 1 - New Projects:** These are newly proposed projects to be funded in FY 2022-23
	  o 10445 Torre Avenue Improvements
	  o Blackberry Farm Pool Improvements
	  o Carmen Road Bridge Right-of-Way
	  o City Hall and Community Hall Improvements
	  o Electric Vehicle Parking Expansion
	  o Full-sized Outdoor Basketball Court
	  o Homestead/De Anza – Construction
	  o Memorial Park – Amphitheater Improvements
	  o Memorial Park – Pond Resurfacing
	  o Memorial Park – Specific Plan Design
	  o Pumpkin and Fiesta Storm Drain Project, Phase 1 & 2
	  o Stelling and Alves Crosswalk Installation
	  o Stevens Creek Boulevard Class IV Bikeway Phase 2 – Construction
	  o City Lighting LED Transition Assessment
	  o Tree Inventory – Stevens Creek Corridor
	• **Category 2 - Existing Projects – Multi-Year Funding:** These projects have been funded in current or previous budget documents, and continued funding is required to continue implementation.
	  o ADA Improvement

Document	Relevant Goals, Policies, and Projects
	- Street Light Installation – Annual Infill - Park Amenity Improvements - Annual Playground Replacement • **Category 4 - Existing Projects – Completely Funded** (To be carried over): These projects are funded in the current year budget but are not complete, so existing funding will be carried over without augmentation. • **Category 4 - Projects with External Funding:** These projects have secured partial grant funding, are eligible for grant funding or are partially or fully funded by donations.
City of Cupertino Pedestrian Transportation Plan (2018)	**Goals** • **Safety:** Improve pedestrian safety and reduce the number and severity of pedestrian-related collisions, injuries, and fatalities. • **Access:** Increase and improve pedestrian access to community destinations across the City of Cupertino for people of all ages and abilities. • **Connectivity:** Continue to develop a connected pedestrian network that fosters an enjoyable walking experience. **Policy and Program Recommendations** • **Infrastructure and Operations** - Develop and adopt a Complete Streets Design Manual. - Adopt a Complete Streets internal process checklist for project development, design, review and approval, and operations and maintenance. - Ensure design standards/design speeds in pedestrian areas do not contribute to a routine need for traffic calming. • **Neighborhood Traffic Management** - Formalize the City's traffic calming practices. - Employ traffic calming strategies in locations where traffic speeds are too high for high priority pedestrian travel areas. - Expand the traffic calming toolbox. - Reconsider criteria for setting speed limits. - Consider establishing 15 mph school zones and other slow zones near parks, community facilities, or senior housing. - Use new radar speed signs and other technologies to collect speed data.

Document	Relevant Goals, Policies, and Projects

	• **Americans with Disabilities Act (ADA) Accessibility**
	    o Establish an accessible design checklist for design projects.
	    o Conduct ADA trainings for City staff.
	    o Improve representation of people with disabilities.
	• **Evaluation and Planning**
	    o Collect pedestrian and bicycle volumes as part of every traffic count
	    o Conduct annual pedestrian volume counts along the City's high-injury corridors.
	    o Collect pedestrian volume data before and after installation of new pedestrian facilities.
	    o Conduct pedestrian volume counts at existing pedestrian crosswalk locations to determine where warrants for Pedestrian Hybrid Beacons (HAWK signals) or other traffic control devices may be met.
	    o Conduct pedestrian and bicycle counts for the planning and evaluation of the City's trail systems.

City of Cupertino 2016 Bicycle Transportation Plan (2016)	**Vision Statement** The City of Cupertino envisions an exceptional bicycling environment that supports active living and healthy transportation choices, provides for safer bicycling, and enables people of all ages and abilities to access jobs, school, recreation, shopping, and transit on a bicycle as a part of daily life. **Goals** • **Goal 1, Programs:** Increase awareness and value of bicycling through encouragement, education, enforcement, and evaluation programs. • **Goal 2, Safety:** Improve bicyclist safety through the design and maintenance of roadway improvements. • **Goal 3, Mobility:** Increase and improve bicycle access to community destinations across the City of Cupertino for all ages and abilities. **Objectives** • Objective 1.A: Identify and support educational opportunities for those who drive, bicycle, and walk about their rights and responsibilities.

Document	Relevant Goals, Policies, and Projects
	• Objective 1.B: Identify and support encouragement programs that promote bicycling as an ordinary form of transportation. • Objective 1.C: Incorporate active transportation into promotion of tourism and economic development. • Objective 1.D: Identify and support enforcement programs to support improved safety. • Objective 1.E: Identify and support evaluation programs that measure how well Cupertino is progressing to meet this Plan's goals. • Objective 2.A: Reduce the number and severity of pedestrian and bicycle related collisions, injuries, and fatalities. • Objective 3.A: Plan, design, construct, and manage a complete bicycle network that accommodates the needs of all mobility types, users, and ability levels. • Objective 3.B: Work to eliminate barriers to bicycle travel.
City of Cupertino General Plan 2040 Chapter 5: Mobility Element (2015)	**Goals** • GOAL M-1: Actively participate in regional planning processes to coordinate local planning and to advocate for decisions that meet and complement the needs of Cupertino • GOAL M-2: Promote improvements to city streets that safely accommodate all transportation modes and persons of all abilities • GOAL M-3: Support a safe pedestrian and bicycle street network for people of all ages and abilities • GOAL M-4: Promote local and regional transit that is efficient, frequent and convenient and reduces traffic impacts • GOAL M-5: Ensure safe and efficient pedestrian and bicycle access to schools while working to reduce school-related congestion • GOAL M-6: Promote innovative strategies to provide efficient and adequate vehicle parking • GOAL M-7: Review and update TIA policies and guidelines that allow for adequate consideration for all modes of transportation including automobiles, walking, bicycles and transit • GOAL M-8: Promote policies to help achieve state, regional and local air quality and greenhouse gas emission reduction targets • GOAL M-9: Promote effective and efficient use of the city's transportation network and services

Document	Relevant Goals, Policies, and Projects
	• GOAL M-10: Ensure that the City's transportation infrastructure is well-maintained for all modes of transportation and that projects are prioritized on their ability to meet the City's mobility goals
VTP2040 The Long-Range Transportation Plan for Santa Clara County (cont.)	**Objectives** • To facilitate the creation and support of an integrated multimodal transportation system that serves all socio-economic groups efficiently and sustainably. • To pursue, develop, and implement advances in technology, management practices, and policies. • To be the region's foremost advocate for transportation projects, programs and funding. **Themes** • **Efficiency and Mobility:** Improvements in mobility will be largely driven by an interconnected multimodal system that provides people with more travel choices and expands access for those who are limited due to age, disability or income. • **Sustainability and Growth:** The performance of all modes of the transportation system is directly linked with land use and urban form. • **Connectivity and Technology:** VTP 2040 addresses opportunities to better connect existing land uses with multimodal transportation choices, and plan for improved services and facilities to support changing land use patterns. • **Air Quality and Energy Use:** VTP 2040 supports climate protection initiatives by asking our Member Agencies, the public, and ourselves, to support land use changes that make alternative modes more attractive, promote carpooling, encourage people to make fewer/combined trips, and allocate existing and future resources more efficiently. • **Fiscal Sustainability and Responsibility:** As individual capital projects are planned and implemented, the practical lifespan of projects within the context of the whole system must be considered.
	Five E's

Document	Relevant Goals, Policies, and Projects
Cupertino Safe Routes to School Program	Flourishing Safe Routes to School projects see remarkable changes in the way students and parents choose to travel to and from school. These projects succeed by including each of the 'Five E's' of Safe Routes to School to ensure that their project is a well-rounded, multi-pronged and time-tested approach to getting more students walking and bicycling. The Five E's of Safe Routes to School include: 1. Encouragement 2. Education 3. Evaluation 4. Enforcement 5. Engineering **Program Components** **Safety** • Build sidewalks, bicycle paths and pedestrian-friendly infrastructure. • Reduce speeds in school zones and neighborhoods. • Address distracted driving among drivers of all ages. • Educate generations on pedestrian and bicycle safety. **Health** • Reach the recommended goal of 60 minutes of physical activity every day. • Arrive at school energized and ready to learn. • Leave the car behind and reduce dependence on fossil fuels. • Take an active role in their well-being. **Communities** • Build a sense of neighborhood. • Encourage increased parental involvement at school and beyond. • Promote driving safely in school zones and the larger community. • Advocate for improved infrastructure, like sidewalks. **Proposed Transportation Projects for Student Safety** • Lawson Bikeway Feasibility Study • Neighborhood Traffic Calming Program • Projects for Cyclists • Projects for Pedestrians • School Walk Audit Projects

Document	Relevant Goals, Policies, and Projects
	• Pedestrian Scramble (Bubb/McClellan)
City of Cupertino School Walk Audit Report (2016/17)	In 2016/17, Cupertino Safe Routes to School (SR2S) worked with each public school in Cupertino to develop a list of infrastructure improvements that would make walking and biking safer, and drop-off and pick-up smoother. In 2019, Apple, Inc. provided the City a grant to cover the cost of implementing all the improvements which lie on the City's right of way. In 2019/20, SR2S worked with each school to update the list and categorize items into three tiers: **Tiers** • **Tier 1** items include improvements such as installing flexible post bollards, crosswalks, signs, yield lines (shark teeth), "Keep Clear" markings, and vegetation trimming • **Tier 2** items can be done in-house, but require more coordination or are more expensive than Tier 1 items, such as installing rectangular rapid flashing beacons • **Tier 3** items require traffic studies, designs drawings, concrete work, and/or an outside contractor to construct them, such as the installation of sidewalks, ADA-compliant curb ramps, speed bumps, stop sign warrant studies, crossing guard warrant studies, and multi-use paths Tier 1 and 2 items are almost complete, and Tier 3 items are currently being coordinated. The City expects to complete all Walk Audit work by the end of summer 2022, assuming COVID restrictions have lifted enough to allow for the traffic studies that are required for some of the projects.

APPENDIX C: COUNTERMEASURE TOOLBOX

High-risk Intersections

ID	Intersection	Control	Consolidated CMs (HSIP-Eligible - Refer to LRSM* 2020) CM1	CM2	CM3	CM4	CM5	CM6	CM7	Additional CM (non-HSIP)**
1	De Anza Blvd and Homestead Rd	Signalized	S02	S03	S09	S21PB	S13PB	S20PB	S11	Green Bike Lanes
2	Bandley Dr and Stevens Creek Blvd	Signalized	S02	S08	S09	S21PB	S20PB	S04	S03	Split phasing, High Visibility Crosswalks
3	Prunridge Ave and Wolfe Ave	Signalized	S02	S03	S09	S04	S11	S21PB		
4	Franco Ct/Forge Way and Homestead Rd	Signalized	S02	S08	S09	S04	S11	S21PB		Green Bike Lanes, Median Treatment, HVC
5	De Anza Blvd and Mariani Ave	Signalized	S02	S03	S09	S04	S21PB	S13PB	S08	Green Bike Lanes
6	Blaney Ave and Stevens Creek Blvd	Signalized	S02	S04	S09	S11	S08	S20PB		High Visibility Crosswalks
7	S De Anza Blvd and Rodrigues Ave	Signalized	S02	S04	S09	S11	S08			Green Bike Lanes
8	Barranca Dr and Homestead Rd	Signalized	S02	S03	S09	S12	S20PB	S11		Green Bike Lanes, High Visibility Crosswalks
9	De Anza Blvd and Stevens Creek Blvd	Signalized	S02	S03	S09	S21PB	S20PB	S11		
10	McClellan Rd and Clubhouse Ln	Stop Controlled	NS06	NS11	NS10	NS21PB	NS09			Bike Safety
Additional Intersection										
11	Calle De Barcelona & Miller Ave	Signalized	S02	S03	S09	S21PB	S20PB	S07		

ID	EA - 1 Improve Intersection Safety CM1	CM2	CM3	EA - 2 Reduce Unsafe Speed Violations CM1	CM2	CM3	EA - 3 Reduce Automobile Right-of-Way Violations CM1	CM2	CM3	EA - 4 Improve Pedestrian and Bicyclist Safety CM1	CM2	CM3
1	S02	S03	S09	S03			S02	S03	S09	S21PB	S13PB	S20PB
2	S02	S03	S09	S03			S02	S08	S09	S21PB	S13PB	S20PB
3	S02	S03	S09	S03			S02	S03	S09			
4	S02	S03	S09	S03			S02	S08	S09			
5	S02	S03	S09	S03			S02	S03	S09	S21PB	S13PB	S20PB
6	S02	S03	S09	S03			S02	S08	S09			
7	S02	S03	S09	S03			S02	S08	S09			
8	S02	S03	S09	S03	S12		S02	S08	S09			
9	S02	S03	S09	S03			S02	S03	S09	S21PB	S13PB	S20PB
10	NS06	NS11	NS14	NS10	NS07	NS11	NS07	NS08	NS11	NS21PB		
11	S02	S03	S09	S03	S12		S02	S03	S07	S21PB	S13PB	S20PB

ID	EA - 5 Reduce Nighttime Collisions CM1	CM2	CM3	EA - 6 Reduce Rear End Collisions CM1	CM2	CM3	EA - 7 Reduce Broadside Collisions CM1	CM2	CM3	EA - 8 Reduce Improper Driving Collisions CM1	CM2	CM3	EA - 9 Reduce Collisions near Schools CM1	CM2	CM3
1	S02	S09		S02	S11		S02	S03	S09	S09	S11				
2	S02	S09		S02	S11		S02	S08	S09	S09	S11	S08			
3	S02	S09		S02	S11		S02	S03	S09	S09	S11				
4	S02	S09		S02	S11		S02	S08	S09	S09	S11	S08			
5	S02	S09		S02	S11		S02	S03	S09	S09	S11				
6	S02	S09		S02	S11		S02	S08	S09	S09	S11	S08	S09	S21PB	
7	S02	S09		S02	S11		S02	S08	S09	S09	S11	S08			
8	S02	S09	S12	S02	S11		S02	S08	S09	S09	S11	S08	S09	S21PB	
9	S02	S09		S02	S11		S02	S03	S09	S09	S11				
10							NS07	NS08	NS11	NS07	NS10	NS12			
11	S02	S09		S02	S11		S03	S07	S08	S09	S11		S09	S21PB	

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)
S04	Provide Advanced Dilemma Zone Detection for high speed approaches
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/regulatory signs
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))

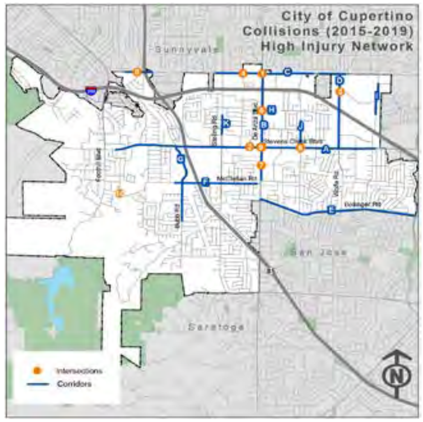
High-risk Roadway Segments

ID	Roadway Segment	Consolidated CMs (HSIP-Eligible - Refer to LRSM* 2020)							Additional CM (non-HSIP)**	EA - 1 Improve Intersection Safety			EA - 2 Reduce Unsafe Speed Violations			EA - 3 Reduce Automobile Right-of-Way Violations			EA - 4 Improve Pedestrian and Bicyclist Safety		
		CM1	CM2	CM3	CM4	CM5	CM6	CM7		CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3
A	Stevens Creek Blvd: Janice Ave to Judy Ave	R22	R27	R21	R35PB	R26	R25	R33PB	High Visibility Crosswalk				R22	R26		R22	R27		R33PB	R35PB	
B	De Anza Blvd: Pacifica Dr to Homestead Rd	R22	R27	R21	R35PB	R10PB	R33PB		High Visibility Crosswalk				R22	R26		R22	R27		R33PB	R35PB	R10PB
C*	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R22	R27	R21	R33PB	R35PB	R08	R10PB					R22	R26		R22	R27	R08	R33PB	R35PB	
D	Wolfe Rd: Homestead Rd to Bollinger Rd	R22	R27	R21	R35PB	R33PB			Traffic Calming				R22	R26		R22	R27		R33PB	R35PB	
E*	Bollinger Rd: Lawrence Expy to De Anza Blvd	R22	R27	R21	R35PB	R30	R26	R14					R22	R26		R22	R27	R08	R33PB	R35PB	
F	McClellan Rd: Imperial Ave to De Anza Blvd	R22	R27	R21	R08	R30	R35PB						R22			R22	R27	R08			
G	Bubb Rd: Stevens Creek Blvd to Columbus Ave	R22	R27	R26	R30	R08	R26	R35PB					R22	R26		R22	R27	R08	R33PB	R35PB	
H	Mariani Ave: Bandly Dr to Infinite Loop	R22	R27	R21	R08	R30	R10PB						R22			R22	R27	R08	R33PB	R35PB	R10PB
I	Tantau Ave: Forge Dr to Pruneridge Ave	R22	R27	R21	R08	R30	R26	R35PB					R22			R22	R27	R08	R33PB	R35PB	
J	Blaney Ave:Homestead to Stevens Creek Blvd	R22	R27	R30	R33PB	R08	R26	R35PB					R22			R08			R33PB		
K	N Stelling Rd: Alves Dr to Greenleaf Dr	R22	R27	R33PB	R21	R35PB							R22			R22	R27	R08	R33PB	R35PB	

ID	EA - 5 Reduce Nighttime Collisions			EA - 6 Reduce Rear End Collisions			EA - 7 Reduce Broadside Collisions			EA - 8 Reduce Improper Driving Collisions			EA - 9 Reduce Collisions near Schools		
	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3
A	R01	R22	R27	R21	R22	R27				R22	R27	R30	R22	R35PB	
B	R01	R22	R27	R21	R22	R27				R22	R27	R30			
C*	R01	R22	R27	R21	R22	R27				R22	R27	R08	R22	R35PB	
D	R01	R22	R27	R21	R22	R27				R22	R27	R30			
E*	R01	R22	R27	R21	R22	R27				R22	R27	R30	R22	R35PB	
F	R01	R22	R27	R21	R22	R27				R22	R27	R30	R22	R35PB	
G	R01	R22	R27	R21	R22	R27				R22	R27	R30	R22	R35PB	
H	R01	R22	R27	R21	R22	R27				R22	R27	R30			
I	R01	R22	R27	R21	R22	R27				R22	R27	R30			
J				R21	R22	R27				R22	R30	R31	R22	R35PB	
K	R01	R22	R27	R21	R22	R27				R22	R27	R30	R22	R35PB	

* Corridors are shared with other jurisdictions (Homestead Road is shared with the City of Sunnyvale, and Bollinger Road is shared with the City of San Jose). For the purposes of this analysis, only collisions that were coded in Cupertino's Crossroads collision database were considered. Additional collision data for these corridors will be included in the final report.

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



	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
Emergency Medical Services (EMS)	S05, Install emergency vehicle pre-emption systems	EMS vehicle response time.	Local Emergency Services Agency
	Increase the number of EMS/fire controll personnel taking Traffic Incident Managmenet Training	number of EMS/fire controll personnel taking Traffic Incident Managmenet Traising	Local Emergency Services Agency

APPENDIX D: 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.

Caltrans

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.

Table of Contents

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):

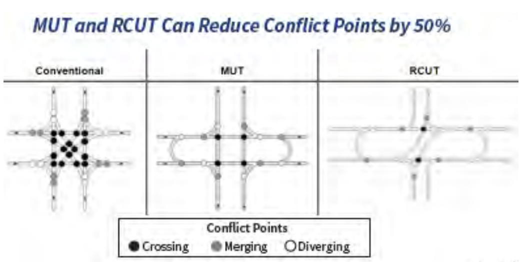
The RCUT intersection modifies the direct left-turn and through movements from cross-street approaches. Minor road traffic makes a right turn followed by a U-turn at a designated location (either signalized or unsignalized) to continue in the desired direction.

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.



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 **the new splitter island on the minor road approaches.**		

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):

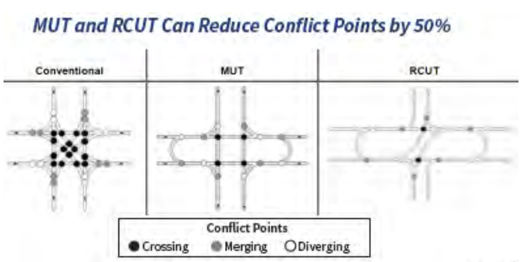
The RCUT intersection modifies the direct left-turn and through movements from cross-street approaches. Minor road traffic makes a right turn followed by a U-turn at a designated location (either signalized or unsignalized) to continue in the desired direction.

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.



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. **Agencies need to consider and document impacts of additional turning movements at nearby intersections.**				
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 safety 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/striping 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/striping 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/striping 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 roadways 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/marking 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/stripes

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 %

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 E:
B/C RATIO CALCULATIONS

Cost, Benefit and B/C Ratio Calculation Table

Years of Collision Data 5

													15%	5%	CM R22 use 25% 25% 10%	0%	0%	15%					1	2	3	4	0	1	2	3	4	0		
																						Collisions (2014-2018)						Ped and Bike Collisons (2014-2018)						
FID	Location	CM 1	CM 2	CM 3	CM1_CRF	CM2_CRF	CM3_CRF	M1_Life(Year)	M2_Life(Year)	M3_Life(Year)	Unused & Desired CM	CM Cost	Contingency Cost	Environmental Cost	PS&E Cost	Right of Way Engineering Cost	Appraisals, Acqusitions & Utilities Cost	Construction Engineering (CE) Cost	Cost Per Location	All Locations (Cost 2022)	20% More	Total #Collisions	Fatal	Severe Injury	Other Visible Injury	Compliant of Pain	PDO	Fatal	Severe Injury	Other Visible Injury	Compliant of Pain	PDO	Fatal	Severe Injury
	Project 1: Safety at Signalized Intersections - Unsafe Speed & Rear End																																	
1	De Anza Blvd and Homestead Rd	S02		S11	0.15	0.1	0.55	10	10	10		$ 321,050	$ 48,158	$ 16,053	$ 32,105			$ 48,158	$ 465,523			62		2	5	11	44						$ -	$ -
2	Bandley Dr and Stevens Creek Blvd	S02	S09		0.15	0.1		10	10			$ 18,840	$ 2,826	$ 942	$ 1,884			$ 2,826	$ 27,318			44		4	5	9	26						$ -	$ -
3	Prunridge Ave and Wolfe Ave	S02		S11	0.15		0.55	10	10	10		$ 178,310	$ 26,747	$ 8,916	$ 17,831			$ 26,747	$ 258,550			36			3	6	27						$ -	$ -
4	Franco Ct/Forge Way and Homestead Rd	S02	S09	S11	0.15	0.1	0.55	10	10	10		$ 97,155	$ 14,573	$ 4,858	$ 9,716			$ 14,573	$ 140,875			18			1	1	16						$ -	$ -
5	De Anza Blvd and Mariani Ave	S02			0.15	0.1		10	10			$ 18,100	$ 2,715	$ 905	$ 1,810			$ 2,715	$ 26,245	$ 2,077,306	$ 2,492,768	34		2	2	5	25						$ -	$ -
6	Blaney Ave and Stevens Creek Blvd	S02	S09	S11	0.15	0.1	0.55	10	10	10		$ 197,700	$ 29,655	$ 9,885	$ 19,770			$ 29,655	$ 286,665			45		3	5	10	27						$ -	$ -
7	S De Anza Blvd and Rodrigues Ave	S02	S09	S11	0.15	0.1	0.55	10	10	10		$ 164,150	$ 24,623	$ 8,208	$ 16,415			$ 24,623	$ 238,018			20		2		4	14						$ -	$ -
8	Barranca Dr and Homestead Rd	S02		S11	0.15		0.55	10	10	10		$ 98,020	$ 14,703	$ 4,901	$ 9,802			$ 14,703	$ 142,129			6		2		4							$ -	$ -
9	De Anza Blvd and Stevens Creek Blvd	S02		S11	0.15	0.1	0.55	10	10	10		$ 321,020	$ 48,153	$ 16,051	$ 32,102			$ 48,153	$ 465,479			63		1	6	6	50						$ -	$ -
10	Calle De Barcelona & Miller Ave	S02	S09		0.15	0.1		10	10			$ 18,280	$ 2,742	$ 914	$ 1,828			$ 2,742	$ 26,506			3					3						$ -	$ -
	Project 2: Safety at Signalized Intersections - Improper Turning, Auto ROW Violations & Broadside																																	
1	De Anza Blvd and Homestead Rd	S03			0.15			10				$ 6,500	$ 975	$ 325	$ 650			$ 975	$ 9,425			62		2	5	11	44						$ -	$ -
2	Bandley Dr and Stevens Creek Blvd	S03	S08		0.15	0.3		10	20			$ 136,000	$ 20,400	$ 6,800	$ 13,600			$ 20,400	$ 197,200			44		4	5	9	26						$ -	$ -
3	Prunridge Ave and Wolfe Ave	S03			0.15			10				$ 6,500	$ 975	$ 325	$ 650			$ 975	$ 9,425			36			3	6	27						$ -	$ -
5	De Anza Blvd and Mariani Ave	S03	S08		0.15	0.3		10	20			$ 167,000	$ 25,050	$ 8,350	$ 16,700			$ 25,050	$ 242,150			34		2	2	5	25						$ -	$ -
6	Barranca Dr and Homestead Rd	S03			0.15			10				$ 6,500	$ 975	$ 325	$ 650			$ 975	$ 9,425	$ 783,725	$ 940,470	6		2		4							$ -	$ -
7	De Anza Blvd and Stevens Creek Blvd	S03			0.15			10				$ 6,500	$ 975	$ 325	$ 650			$ 975	$ 9,425			63		1	6	6	50						$ -	$ -
8	Calle De Barcelona & Miller Ave			S07			0.3	10	20	20		$ 5,000	$ 750	$ 250	$ 500			$ 750	$ 7,250			3					3						$ -	$ -
9	De Anza Blvd and Rodrigues		S08			0.3			20			$ 80,500	$ 12,075	$ 4,025	$ 8,050			$ 12,075	$ 116,725			20	0	2	0	4	14						$ -	$ -
10	Blaney Ave and Stevens Creek Rd		S08			0.3			20			$ 126,000	$ 18,900	$ 6,300	$ 12,600			$ 18,900	$ 182,700			25	0	1	1	5	18						$ -	$ -
	Project 3: Safety at Signalized Intersections - Pedestrian and Bicyclist Safety																																	
1	De Anza Blvd and Homestead Rd	S20PB	S21PB		0.15	0.6		10	10			$ 79,300	$ 11,895	$ 3,965	$ 7,930			$ 11,895	$ 114,985										1	4	3			
2	Bandley Dr and Stevens Creek Blvd	S20PB	S21PB		0.15	0.6		10	10			$ 81,460	$ 12,219	$ 4,073	$ 8,146			$ 12,219	$ 118,117										2	4	3			
3	Prunridge Ave and Wolfe Ave		S21PB			0.6			10			$ 5,000	$ 750	$ 250	$ 500			$ 750	$ 7,250															
4	Franco Ct/Forge Way and Homestead Rd	S20PB	S21PB		0.15	0.6		10	10			$ 74,800	$ 11,220	$ 3,740	$ 7,480			$ 11,220	$ 108,460															
5	De Anza Blvd and Mariani Ave	S20PB			0.15			10				$ 89,100	$ 13,365	$ 4,455	$ 8,910			$ 13,365	$ 129,195	$ 1,076,277	$ 1,291,532								2	1	1	1		
6	Blaney Ave and Stevens Creek Blvd	S20PB			0.15			10				$ 117,540	$ 17,631	$ 5,877	$ 11,754			$ 17,631	$ 170,433										2	4	2			
7	Barranca Dr and Homestead Rd	S20PB	S21PB		0.15	0.6		10	10			$ 60,780	$ 9,117	$ 3,039	$ 6,078			$ 9,117	$ 88,131												1			
8	De Anza Blvd and Stevens Creek Blvd	S20PB	S21PB		0.15	0.6		10	10			$ 189,920	$ 28,488	$ 9,496	$ 18,992			$ 28,488	$ 275,384											4	2	1		
9	Calle De Barcelona & Miller Ave	S20PB	S21PB		0.15	0.6		10	10			$ 44,360	$ 6,654	$ 2,218	$ 4,436			$ 6,654	$ 64,322															
	Project 4: Safety on Roadway Segments																																	
1	Stevens Creek Blvd: Janice Ave to Judy Ave	R22	R27		0.15	0.15		10	10			$ 88,275	$ 13,241	$ 4,414	$ 8,828			$ 13,241	$ 127,999					8	34	66							$ -	$ -
2	De Anza Blvd: Pacifica Dr to Homestead Rd	R22	R27		0.15	0.15		10	10			$ 27,950	$ 4,193	$ 1,398	$ 2,795			$ 4,193	$ 40,528					6	19	40							$ -	$ -
3	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R22	R27		0.15	0.15		10	10			$ 66,800	$ 10,020	$ 3,340	$ 6,680			$ 10,020	$ 96,860					6	17	19							$ -	$ -
4	Wolfe Rd: Homestead Rd to Bollinger Rd	R22	R27		0.15	0.15		10	10			$ 33,925	$ 5,089	$ 1,696	$ 3,393			$ 5,089	$ 49,191					3	5	28							$ -	$ -
5	Bollinger Rd: Lawrence Expy to De Anza Blvd	R22	R27		0.15	0.15		10	10			$ 44,550	$ 6,683	$ 2,228	$ 4,455			$ 6,683	$ 64,598				1		6	16							$ -	$ -
6	McClellan Rd: Imperial Ave to De Anza Blvd	R22	R27		0.15	0.15		10	10			$ 55,800	$ 8,370	$ 2,790	$ 5,580			$ 8,370	$ 80,910						4	7								
7	Bubb Rd: Stevens Creek Blvd to Columbus Ave	R22	R27		0.15	0.15		10	10			$ 30,000	$ 4,500	$ 1,500	$ 3,000			$ 4,500	$ 43,500					1	3	7								
8	Mariani Ave: Bandly Dr to Infinite Loop	R22	R27		0.15	0.15		10	10			$ 5,075	$ 761	$ 254	$ 508			$ 761	$ 7,359					1	2	3								
9	Tantau Ave: Forge Dr to Pruneridge Ave	R22	R27		0.15	0.15		10	10			$ 10,800	$ 1,620	$ 540	$ 1,080			$ 1,620	$ 15,660						2	3								
10	Blaney Ave:Homestead to Stevens Creek Blvd	R22	R27		0.15	0.15		10	10			$ 22,475	$ 3,371	$ 1,124	$ 2,248			$ 3,371	$ 32,589						2	4								
11	N Stelling Rd: Alves Dr to Greenleaf Dr	R22	R27		0.15	0.15		10	10			$ 15,750	$ 2,363	$ 788	$ 1,575			$ 2,363	$ 22,838	$ 621,615	$ 745,938		1	1	2	4								
12	Rainbow Dr between Bubb and Stelling.		R27			0.15			10			$ 4,200	$ 630	$ 210	$ 420			$ 630	$ 6,090						2	4								
13	Rainbow Dr between De Anza and Stelling.		R27			0.15			10			$ 900	$ 135	$ 45	$ 90			$ 135	$ 1,305														$ -	$ -
14	McCellan Rd between Byrne Ave and Stevens Canyon Rd.		R27			0.15			10			$ 5,400	$ 810	$ 270	$ 540			$ 810	$ 7,830					2	1								$ -	$ -
15	Miller Ave between Bollinger and SCB.		R27			0.15			10			$ 4,800	$ 720	$ 240	$ 480			$ 720	$ 6,960						3	7							$ -	$ -
16	Calvert Dr between SCB and Tilson Ave.		R27			0.15			10			$ 1,800	$ 270	$ 90	$ 180			$ 270	$ 2,610														$ -	$ -
17	Finch Ave between SCB and Tilson Ave.		R27			0.15			10			$ 2,400	$ 360	$ 120	$ 240			$ 360	$ 3,480						4	2							$ -	$ -
18	Stelling Rd between Rainbow Dr and Prospect Rd.		R27			0.15			10			$ 3,000	$ 450	$ 150	$ 300			$ 450	$ 4,350					1	1	2							$ -	$ -
19	Prospect Rd between Stelling Rd and De Anza (R33PB)		R27			0.15			10			$ 3,600	$ 540	$ 180	$ 360			$ 540	$ 5,220						1	1							$ -	$ -
20	Valley Green Dr between Stelling and Beardon.		R27			0.15			10			$ 1,200	$ 180	$ 60	$ 120			$ 180	$ 1,740						1								$ -	$ -
	Project 5: Safety on Roadway Segments - Unsafe Speed Violations and Rear End																																	
1	Stevens Creek Blvd: Janice Ave to Judy Ave	R21	R26		0.55	0.3		10	10			$ 516,100	$ 77,415	$ 25,805	$ 51,610			$ 77,415	$ 748,345					8	34	66							$ -	$ -
2	De Anza Blvd: Pacifica Dr to Homestead Rd	R21			0.55			10				$ 376,900	$ 56,535	$ 18,845	$ 37,690			$ 56,535	$ 546,505					6	19	40							$ -	$ -
3	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R21			0.55			10				$ 222,700	$ 33,405	$ 11,135	$ 22,270			$ 33,405	$ 322,915					6	17	19							$ -	$ -
4	Wolfe Rd: Homestead Rd to Bollinger Rd	R21			0.55			10				$ 273,600	$ 41,040	$ 13,680	$ 27,360			$ 41,040	$ 396,720					3	5	28							$ -	$ -
5	Bollinger Rd: Lawrence Expy to De Anza Blvd	R21	R26		0.55	0.3		10	10			$ 549,650	$ 82,448	$ 27,483	$ 54,965			$ 82,448	$ 796,993				1		6	16							$ -	$ -
6	McClellan Rd: Imperial Ave to Stelling Rd	R21	R26		0.55	0.3		10	10			$ 178,115	$ 26,717	$ 8,906	$ 17,812			$ 26,717	$ 258,267						4	7							$ -	$ -
7	Bubb Rd: Stevens Creek Blvd to Columbus Ave		R26			0.3			10			$ 28,700	$ 4,305	$ 1,435	$ 2,870			$ 4,305	$ 41,615					1	3	7							$ -	$ -
8	Mariani Ave: Bandly Dr to Infinite Loop	R21			0.55			10				$ 209,800	$ 31,470	$ 10,490	$ 20,980			$ 31,470	$ 304,210					1	2	3							$ -	$ -
9	Tantau Ave: Forge Dr to Pruneridge Ave	R21	R26		0.55	0.3		10	10			$ 309,495	$ 46,424	$ 15,475	$ 30,950			$ 46,424	$ 448,768	$ 4,134,835	$ 4,961,801				2	3							$ -	$ -
10	Blaney Ave:Homestead to Stevens Creek Blvd		R26			0.3			10			$ 28,700	$ 4,305	$ 1,435	$ 2,870			$ 4,305	$ 41,615						2	4							$ -	$ -
11	Rainbow Dr between Bubb and Stelling.		R26			0.3			10			$ 14,350	$ 2,153	$ 718	$ 1,435			$ 2,153	$ 20,808						2	4							$ -	$ -
12	Rainbow Dr between De Anza and Stelling.		R26			0.3			10			$ 14,350	$ 2,153	$ 718	$ 1,435			$ 2,153	$ 20,808														$ -	$ -
13	McCellan Rd between Byrne Ave and Stevens Canyon Rd.		R26			0.3			10			$ 28,700	$ 4,305	$ 1,435	$ 2,870			$ 4,305	$ 41,615					2	1								$ -	$ -
14	Miller Ave between Bollinger and SCB.		R26			0.3			10			$ 28,700	$ 4,305	$ 1,435	$ 2,870			$ 4,305	$ 41,615						3	7							$ -	$ -
15	Stelling Rd between McClellan Rd and Prospect Rd.		R26			0.3			10			$ 28,700	$ 4,305	$ 1,435	$ 2,870			$ 4,305	$ 41,615					1	1	2							$ -	$ -
17	Valley Green Dr between Stelling and Beardon.		R26			0.3			10			$ 14,350	$ 2,153	$ 718	$ 1,435			$ 2,153	$ 20,808						1								$ -	$ -
	Calvert Dr between Stevens Creek Blvd to Tilson Ave		R26			0.3			10			$ 14,350	$ 2,153	$ 718	$ 1,435			$ 2,153	$ 20,808				0	0	0	3							$ -	$ -
	Mary Ave between Parkwood Dr to Meteor Dr		R26			0.3			10			$ 14,350	$ 2,153	$ 718	$ 1,435			$ 2,153	$ 20,808				0	0	1	3	2						$ -	$ -
	Project 6: Safety on Roadway Segments - Improve Pedestrian and Bicyclist Safety																																	
	Stevens Creek Blvd: Janice Ave to Judy Ave	R33PB	R35PB		0.45	0.35		20	20			$ 211,200	$ 31,680	$ 10,560	$ 21,120			$ 31,680	$ 306,240										3	21	20		$ -	$ 6,570,000.00
1	De Anza Blvd: Pacifica Dr to Homestead Rd	R33PB	R35PB		0.45	0.35		20	20			$ 437,200	$ 65,580	$ 21,860	$ 43,720			$ 65,580	$ 633,940											24	23		$ -	$ -
2	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R33PB	R35PB		0.45	0.35		20	20			$ 385,996	$ 57,899	$ 19,300	$ 38,600			$ 57,899	$ 559,694										3	15	4		$ -	$ 6,570,000.00
3	Wolfe Rd: Homestead Rd to SCB		R35PB			0.35		20	20			$ 40,520	$ 6,078	$ 2,026	$ 4,052			$ 6,078	$ 58,754										1	1			$ -	$ 2,190,000.00
4	Bollinger Rd: Lawrence Expy to De Anza Blvd	R33PB	R35PB		0.45	0.35		20	20			$ 416,990	$ 62,549	$ 20,850	$ 41,699			$ 62,549	$ 604,636									1		1	1		$ 2,190,000.00	$ -
5	McClellan Rd: Imperial Ave to Stelling Rd		R35PB			0.35			20			$ 70,000	$ 10,500	$ 3,500	$ 7,000			$ 10,500	$ 101,500												5		$ -	$ -
6	Bubb Rd: Stevens Creek Blvd to Columbus Ave		R35PB			0.35			20			$ 198,400	$ 29,760	$ 9,920	$ 19,840			$ 29,760	$ 287,680											2	1		$ -	$ -
7	Blaney Ave:Homestead to Stevens Creek Blvd		R35PB			0.35			20			$ 120,260	$ 18,039	$ 6,013	$ 12,026			$ 18,039	$ 174,377											2	1		$ -	$ -
8	N Stelling Rd: Alves Dr to Greenleaf Dr	R33PB	R35PB		0.45	0.35		20	20			$ 88,000	$ 13,200	$ 4,400	$ 8,800			$ 13,200	$ 127,600	$ 4,622,174	$ 5,546,608							1		2			$ 2,190,000.00	$ -
9	Rainbow Dr between Bubb and Stelling.		R35PB	R37PB		0.35	0.35		20	20		$ 185,240	$ 27,786	$ 9,262	$ 18,524			$ 27,786	$ 268,598											1	2		$ -	$ -
10	Rainbow Dr between De Anza and Stelling.		R35PB	R37PB		0.35	0.35		20	20		$ 156,300	$ 23,445	$ 7,815	$ 15,630			$ 23,445	$ 226,635														$ -	$ -
11	McCellan Rd between Byrne Ave and Stevens Canyon Rd.		R35PB	R37PB		0.35	0.35		20	20		$ 139,000	$ 20,850	$ 6,950	$ 13,900			$ 20,850	$ 201,550										1				$ -	$ 2,190,000.00
12	Miller Ave between Bollinger and SCB.		R35PB			0.35			20	20		$ 44,700	$ 6,705	$ 2,235	$ 4,470			$ 6,705	$ 64,815											2	1		$ -	$ -
14	Finch Ave between SCB and Tilson Ave.		R35PB	R37PB		0.35	0.35		20	20		$ 202,900	$ 30,435	$ 10,145	$ 20,290			$ 30,435	$ 294,205											3	2		$ -	$ -
15	Stelling Rd between Rainbow Dr and Prospect Rd.		R35PB			0.35			20	20		$ 50,000	$ 7,500	$ 2,500	$ 5,000			$ 7,500	$ 72,500											1			$ -	$ -
16	Prospect Rd between Stelling Rd and De Anza		R35PB	R37PB	0.45	0.35	0.35	20	20	20		$ 278,360	$ 41,754	$ 13,918	$ 27,836			$ 41,754	$ 403,622														$ -	$ -
17	Valley Green Dr between Stelling and Beardon.		R35PB	R37PB		0.35	0.35		20	20		$ 162,640	$ 24,396	$ 8,132	$ 16,264			$ 24,396	$ 235,828											1			$ -	$ -

Years of Collision Data

Cost, Benefit and B/C Ratio Calculation Table

FID	Location	CM 1	CM 2	CM 3	Bike and Ped Crash Costs: Other Visible Injury	Bike and Ped Crash Costs: Compliant of Pain	Bike and Ped Crash Costs: PDO	Bike and Ped Crash Costs: Crash Costs	Crash Costs: Fatal	Crash Costs: Severe Injury	Crash Costs: Other Visible Injury	Crash Costs: Compliant of Pain	Crash Costs: PDO	Crash Costs: Crash Costs	Total Crash Cost	CM Annual Benefit: CM1_Benefit (Annual)	CM Annual Benefit: CM2_Benefit (Annual)	CM Annual Benefit: CM3_Benefit (Annual)	CM Life Benefit: CM1_Benefit (Life)	CM Life Benefit: CM2_Benefit (Life)	CM Life Benefit: CM3_Benefit (Life)	Benefit: Benefit per Location (Life)	Total Benefit: Total_Benefit (Life)		
	Project 1: Safety at Signalized Intersections - Unsafe Speed & Rear End																								
1	De Anza Blvd and Homestead Rd	S02		S11	$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ 711,500	$ 889,900.00	$ 585,200.00	$ 5,366,600.00		$ 160,998.00	$ 107,332.00	$ 590,326.00	$ 1,609,980.00	$ 1,073,320.00	$ 5,903,260.00	$ 8,586,560.00	$ 44,456,370.00	Combined Benefit	$ 44,456,370.00
2	Bandley Dr and Stevens Creek Blvd	S02	S09		$ -	$ -	$ -	$ -	$ -	$ 6,360,000.00	$ 711,500	$ 728,100.00	$ 345,800.00	$ 8,145,400.00		$ 244,362.00	$ 162,908.00	$ -	$ 2,443,620.00	$ 1,629,080.00	$ -	$ 4,072,700.00		Combined Cost	$ 2,077,306
3	Prunridge Ave and Wolfe Ave	S02		S11	$ -	$ -	$ -	$ -	$ -	$ -	$ 426,900	$ 485,400.00	$ 359,100.00	$ 1,271,400.00		$ 38,142.00	$ -	$ 139,854.00	$ 381,420.00	$ -	$ 1,398,540.00	$ 1,779,960.00		B/C	$ 21.40
4	Franco Ct/Forge Way and Homestead Rd	S02	S09	S11	$ -	$ -	$ -	$ -	$ -	$ -	$ 142,300	$ 80,900.00	$ 212,800.00	$ 436,000.00		$ 13,080.00	$ 8,720.00	$ 47,960.00	$ 130,800.00	$ 87,200.00	$ 479,600.00	$ 697,600.00			
5	De Anza Blvd and Mariani Ave	S02			$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ 284,600	$ 404,500.00	$ 332,500.00	$ 4,201,600.00		$ 126,048.00	$ 84,032.00	$ -	$ 1,260,480.00	$ 840,320.00	$ -	$ 2,100,800.00			
6	Blaney Ave and Stevens Creek Blvd	S02	S09	S11	$ -	$ -	$ -	$ -	$ -	$ 4,770,000.00	$ 711,500	$ 809,000.00	$ 359,100.00	$ 6,649,600.00		$ 199,488.00	$ 132,992.00	$ 731,456.00	$ 1,994,880.00	$ 1,329,920.00	$ 7,314,560.00	$ 10,639,360.00			
7	S De Anza Blvd and Rodrigues Ave	S02	S09	S11	$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ -	$ 323,600.00	$ 186,200.00	$ 3,689,800.00		$ 110,694.00	$ 73,796.00	$ 405,878.00	$ 1,106,940.00	$ 737,960.00	$ 4,058,780.00	$ 5,903,680.00			
8	Barranca Dr and Homestead Rd	S02		S11	$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ -	$ 323,600.00	$ -	$ 3,503,600.00		$ 105,108.00	$ -	$ 385,396.00	$ 1,051,080.00	$ -	$ 3,853,960.00	$ 4,905,040.00			
9	De Anza Blvd and Stevens Creek Blvd	S02		S11	$ -	$ -	$ -	$ -	$ -	$ 1,590,000.00	$ 853,800	$ 485,400.00	$ 665,000.00	$ 3,594,200.00		$ 107,826.00	$ 71,884.00	$ 395,362.00	$ 1,078,260.00	$ 718,840.00	$ 3,953,620.00	$ 5,750,720.00			
10	Calle De Barcelona & Miller Ave	S02	S09		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 39,900.00	$ 39,900.00		$ 1,197.00	$ 798.00	$ -	$ 11,970.00	$ 7,980.00	$ -	$ 19,950.00			
	Project 2: Safety at Signalized Intersections - Improper Turning, Auto ROW Violati Broadside																								
1	De Anza Blvd and Homestead Rd	S03			$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ 711,500	$ 889,900.00	$ 585,200.00	$ 5,366,600.00		$ 160,998.00	$ -	$ -	$ 1,609,980.00	$ -	$ -	$ 1,609,980.00	$ 29,968,320.00	Combined Benefit	$ 29,968,320.00
2	Bandley Dr and Stevens Creek Blvd	S03	S08		$ -	$ -	$ -	$ -	$ -	$ 6,360,000.00	$ 711,500	$ 728,100.00	$ 345,800.00	$ 8,145,400.00		$ 244,362.00	$ 488,724.00	$ -	$ 2,443,620.00	$ 9,774,480.00	$ -	$ 12,218,100.00		Combined Cost	$ 783,725
3	Prunridge Ave and Wolfe Ave	S03			$ -	$ -	$ -	$ -	$ -	$ -	$ 426,900	$ 485,400.00	$ 359,100.00	$ 1,271,400.00		$ 38,142.00	$ -	$ -	$ 381,420.00	$ -	$ -	$ 381,420.00		B/C	$ 38.24
5	De Anza Blvd and Mariani Ave	S03	S08		$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ 284,600	$ 404,500.00	$ 332,500.00	$ 4,201,600.00		$ 126,048.00	$ 252,096.00	$ -	$ 1,260,480.00	$ 5,041,920.00	$ -	$ 6,302,400.00			
6	Barranca Dr and Homestead Rd	S03			$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ -	$ 323,600.00	$ -	$ 3,503,600.00		$ 105,108.00	$ -	$ -	$ 1,051,080.00	$ -	$ -	$ 1,051,080.00			
7	De Anza Blvd and Stevens Creek Blvd	S03			$ -	$ -	$ -	$ -	$ -	$ 1,590,000.00	$ 853,800	$ 485,400.00	$ 665,000.00	$ 3,594,200.00		$ 107,826.00	$ -	$ -	$ 1,078,260.00	$ -	$ -	$ 1,078,260.00			
8	Calle De Barcelona & Miller Ave			S07	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 39,900.00	$ 39,900.00		$ -	$ -	$ 2,394.00	$ -	$ -	$ 47,880.00	$ 47,880.00			
9	De Anza Blvd and Rodrigues		S08		$ -	$ -	$ -	$ -	$ -	$ 3,180,000.00	$ -	$ 323,600.00	$ 186,200.00	$ 3,689,800.00		$ -	$ 221,388.00	$ -	$ -	$ 4,427,760.00	$ -	$ 4,427,760.00			
10	Blaney Ave and Stevens Creek Rd		S08		$ -	$ -	$ -	$ -	$ -	$ 1,590,000.00	$ 142,300	$ 404,500.00	$ 239,400.00	$ 2,376,200.00		$ -	$ 142,572.00	$ -	$ -	$ 2,851,440.00	$ -	$ 2,851,440.00			
	Project 3: Safety at Signalized Intersections - Pedestrian and Bicyclist Safety																								
1	De Anza Blvd and Homestead Rd	S20PB	S21PB						$ -	$ 1,590,000.00	$ 6,360,000.00	$ 4,770,000.00	$ -	$ 12,720,000.00		$ 381,600.00	$ 1,526,400.00	$ -	$ 3,816,000.00	$ 15,264,000.00	$ -	$ 19,080,000.00	$ 65,826,000.00	Combined Benefit	$ 65,826,000.00
2	Bandley Dr and Stevens Creek Blvd	S20PB	S21PB						$ -	$ 3,180,000.00	$ 6,360,000.00	$ 4,770,000.00	$ -	$ 14,310,000.00		$ 429,300.00	$ 1,717,200.00	$ -	$ 4,293,000.00	$ 17,172,000.00	$ -	$ 21,465,000.00		Combined Cost	$ 1,076,277
3	Prunridge Ave and Wolfe Ave		S21PB						$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -		B/C	$ 61.16
4	Franco Ct/Forge Way and Homestead Rd	S20PB	S21PB						$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -			
5	De Anza Blvd and Mariani Ave	S20PB							$ -	$ 3,180,000.00	$ 1,590,000.00	$ 1,590,000.00	$ 1,590,000.00	$ 7,950,000.00		$ 238,500.00	$ -	$ -	$ 2,385,000.00	$ -	$ -	$ 2,385,000.00			
6	Blaney Ave and Stevens Creek Blvd	S20PB							$ -	$ 3,180,000.00	$ 6,360,000.00	$ 3,180,000.00	$ -	$ 12,720,000.00		$ 381,600.00	$ -	$ -	$ 3,816,000.00	$ -	$ -	$ 3,816,000.00			
7	Barranca Dr and Homestead Rd	S20PB	S21PB						$ -	$ -	$ -	$ 1,590,000.00	$ -	$ 1,590,000.00		$ 47,700.00	$ 190,800.00	$ -	$ 477,000.00	$ 1,908,000.00	$ -	$ 2,385,000.00			
8	De Anza Blvd and Stevens Creek Blvd	S20PB	S21PB						$ -	$ -	$ 6,360,000.00	$ 3,180,000.00	$ 1,590,000.00	$ 11,130,000.00		$ 333,900.00	$ 1,335,600.00	$ -	$ 3,339,000.00	$ 13,356,000.00	$ -	$ 16,695,000.00			
9	Calle De Barcelona & Miller Ave	S20PB	S21PB						$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -			
	Project 4: Safety on Roadway Segments																								
1	Stevens Creek Blvd: Janice Ave to Judy Ave	R22	R27		$ -	$ -	$ -	$ -	$ -	$ 20,240,000.00	$ 4,838,200	$ 5,339,400.00	$ -	$ 30,417,600.00		$ 912,528.00	$ 912,528.00	$ -	$ 9,125,280.00	$ 9,125,280.00	$ -	$ 18,250,560.00	$ 63,483,150.00	Combined Benefit	$ 63,483,150.00
2	De Anza Blvd: Pacifica Dr to Homestead Rd	R22	R27		$ -	$ -	$ -	$ -	$ -	$ 15,180,000.00	$ 2,703,700	$ 3,236,000.00	$ -	$ 21,119,700.00		$ 633,591.00	$ 633,591.00	$ -	$ 6,335,910.00	$ 6,335,910.00	$ -	$ 12,671,820.00		Combined Cost	$ 621,615
3	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R22	R27		$ -	$ -	$ -	$ -	$ -	$ 15,180,000.00	$ 2,419,100	$ 1,537,100.00	$ -	$ 19,136,200.00		$ 574,086.00	$ 574,086.00	$ -	$ 5,740,860.00	$ 5,740,860.00	$ -	$ 11,481,720.00		B/C	$ 102.13
4	Wolfe Rd: Homestead Rd to Bollinger Rd	R22	R27		$ -	$ -	$ -	$ -	$ -	$ 7,590,000.00	$ 711,500	$ 2,265,200.00	$ -	$ 10,566,700.00		$ 317,001.00	$ 317,001.00	$ -	$ 3,170,010.00	$ 3,170,010.00	$ -	$ 6,340,020.00			
5	Bollinger Rd: Lawrence Expy to De Anza Blvd	R22	R27		$ -	$ -	$ -	$ -	$ 2,530,000.00	$ -	$ 853,800	$ 1,294,400.00	$ -	$ 4,678,200.00		$ 140,346.00	$ 140,346.00	$ -	$ 1,403,460.00	$ 1,403,460.00	$ -	$ 2,806,920.00			
6	McClellan Rd: Imperial Ave to De Anza Blvd	R22	R27						$ -	$ -	$ 569,200	$ 566,300.00	$ -	$ 1,135,500.00		$ 34,065.00	$ 34,065.00	$ -	$ 340,650.00	$ 340,650.00	$ -	$ 681,300.00			
7	Bubb Rd: Stevens Creek Blvd to Columbus Ave	R22	R27						$ -	$ 2,530,000.00	$ 426,900	$ 566,300.00	$ -	$ 3,523,200.00		$ 105,696.00	$ 105,696.00	$ -	$ 1,056,960.00	$ 1,056,960.00	$ -	$ 2,113,920.00			
8	Mariani Ave: Bandly Dr to Infinite Loop	R22	R27						$ -	$ 2,530,000.00	$ 284,600	$ 242,700.00	$ -	$ 3,057,300.00		$ 91,719.00	$ 91,719.00	$ -	$ 917,190.00	$ 917,190.00	$ -	$ 1,834,380.00			
9	Tantau Ave: Forge Dr to Pruneridge Ave	R22	R27						$ -	$ -	$ 284,600	$ 242,700.00	$ -	$ 527,300.00		$ 15,819.00	$ 15,819.00	$ -	$ 158,190.00	$ 158,190.00	$ -	$ 316,380.00			
10	Blaney Ave:Homestead to Stevens Creek Blvd	R22	R27						$ -	$ -	$ 284,600	$ 323,600.00	$ -	$ 608,200.00		$ 18,246.00	$ 18,246.00	$ -	$ 182,460.00	$ 182,460.00	$ -	$ 364,920.00			
11	N Stelling Rd: Alves Dr to Greenleaf Dr	R22	R27						$ 2,530,000.00	$ 2,530,000.00	$ 284,600	$ 323,600.00	$ -	$ 5,668,200.00		$ 170,046.00	$ 170,046.00	$ -	$ 1,700,460.00	$ 1,700,460.00	$ -	$ 3,400,920.00			
12	Rainbow Dr between Bubb and Stelling.		R27						$ -	$ -	$ 284,600	$ 323,600.00	$ -	$ 608,200.00		$ -	$ 18,246.00	$ -	$ -	$ 182,460.00	$ -	$ 182,460.00			
13	Rainbow Dr between De Anza and Stelling.		R27		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -			
14	McCellan Rd between Byrne Ave and Stevens Canyon Rd.		R27		$ -	$ -	$ -	$ -	$ -	$ 5,060,000.00	$ 142,300	$ -	$ -	$ 5,202,300.00		$ -	$ 156,069.00	$ -	$ -	$ 1,560,690.00	$ -	$ 1,560,690.00			
15	Miller Ave between Bollinger and SCB.		R27		$ -	$ -	$ -	$ -	$ -	$ -	$ 426,900	$ 566,300.00	$ -	$ 993,200.00		$ -	$ 29,796.00	$ -	$ -	$ 297,960.00	$ -	$ 297,960.00			
16	Calvert Dr between SCB and Tilson Ave.		R27		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -			
17	Finch Ave between SCB and Tilson Ave.		R27		$ -	$ -	$ -	$ -	$ -	$ -	$ 569,200	$ 161,800.00	$ -	$ 731,000.00		$ -	$ 21,930.00	$ -	$ -	$ 219,300.00	$ -	$ 219,300.00			
18	Stelling Rd between Rainbow Dr and Prospect Rd.		R27		$ -	$ -	$ -	$ -	$ -	$ 2,530,000.00	$ 142,300	$ 161,800.00	$ -	$ 2,834,100.00		$ -	$ 85,023.00	$ -	$ -	$ 850,230.00	$ -	$ 850,230.00			
19	Prospect Rd between Stelling Rd and De Anza (R33PB)		R27		$ -	$ -	$ -	$ -	$ -	$ -	$ 142,300	$ 80,900.00	$ -	$ 223,200.00		$ -	$ 6,696.00	$ -	$ -	$ 66,960.00	$ -	$ 66,960.00			
20	Valley Green Dr between Stelling and Beardon.		R27		$ -	$ -	$ -	$ -	$ -	$ -	$ 142,300	$ -	$ -	$ 142,300.00		$ -	$ 4,269.00	$ -	$ -	$ 42,690.00	$ -	$ 42,690.00			
	Project 5: Safety on Roadway Segments - Unsafe Speed Violations and Rear End																								
1	Stevens Creek Blvd: Janice Ave to Judy Ave	R21	R26		$ -	$ -		$ -	$ -	$ 17,520,000.00	$74,460,000.00	$ 144,540,000.00	$ -	$236,520,000.00		$ 26,017,200.00	$ 14,191,200.00	$ -	$ 260,172,000.00	$ 141,912,000.00	$ -	$ 402,084,000.00	$ 971,922,000.00	Combined Benefit	$ 971,922,000.00
2	De Anza Blvd: Pacifica Dr to Homestead Rd	R21			$ -	$ -		$ -	$ -	$ 13,140,000.00	$41,610,000.00	$ 87,600,000.00	$ -	$142,350,000.00		$ 15,658,500.00	$ -	$ -	$ 156,585,000.00	$ -	$ -	$ 156,585,000.00		Combined Cost	$ 4,134,835
3	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R21			$ -	$ -		$ -	$ -	$ 13,140,000.00	$37,230,000.00	$ 41,610,000.00	$ -	$ 91,980,000.00		$ 10,117,800.00	$ -	$ -	$ 101,178,000.00	$ -	$ -	$ 101,178,000.00		B/C	$ 235.06
4	Wolfe Rd: Homestead Rd to Bollinger Rd	R21			$ -	$ -		$ -	$ -	$ 6,570,000.00	$10,950,000.00	$ 61,320,000.00	$ -	$ 78,840,000.00		$ 8,672,400.00	$ -	$ -	$ 86,724,000.00	$ -	$ -	$ 86,724,000.00			
5	Bollinger Rd: Lawrence Expy to De Anza Blvd	R21	R26		$ -	$ -		$ -	$ 2,190,000.00	$ -	$13,140,000.00	$ 35,040,000.00	$ -	$ 50,370,000.00		$ 5,540,700.00	$ 3,022,200.00	$ -	$ 55,407,000.00	$ 30,222,000.00	$ -	$ 85,629,000.00			
6	McClellan Rd: Imperial Ave to Stelling Rd	R21	R26		$ -	$ -		$ -	$ -	$ -	$ 8,760,000.00	$ 15,330,000.00	$ -	$ 24,090,000.00		$ 2,649,900.00	$ 1,445,400.00	$ -	$ 26,499,000.00	$ 14,454,000.00	$ -	$ 40,953,000.00			
7	Bubb Rd: Stevens Creek Blvd to Columbus Ave		R26		$ -	$ -		$ -	$ -	$ 2,190,000.00	$ 6,570,000.00	$ 15,330,000.00	$ -	$ 24,090,000.00		$ -	$ 1,445,400.00	$ -	$ -	$ 14,454,000.00	$ -	$ 14,454,000.00			
8	Mariani Ave: Bandly Dr to Infinite Loop	R21			$ -	$ -		$ -	$ -	$ 2,190,000.00	$ 4,380,000.00	$ 6,570,000.00	$ -	$ 13,140,000.00		$ 1,445,400.00	$ -	$ -	$ 14,454,000.00	$ -	$ -	$ 14,454,000.00			
9	Tantau Ave: Forge Dr to Pruneridge Ave	R21	R26		$ -	$ -		$ -	$ -	$ -	$ 4,380,000.00	$ 6,570,000.00	$ -	$ 10,950,000.00		$ 1,204,500.00	$ 657,000.00	$ -	$ 12,045,000.00	$ 6,570,000.00	$ -	$ 18,615,000.00			
10	Blaney Ave:Homestead to Stevens Creek Blvd		R26		$ -	$ -		$ -	$ -	$ -	$ 4,380,000.00	$ 8,760,000.00	$ -	$ 13,140,000.00		$ -	$ 788,400.00	$ -	$ -	$ 7,884,000.00	$ -	$ 7,884,000.00			
11	Rainbow Dr between Bubb and Stelling.		R26		$ -	$ -		$ -	$ -	$ -	$ 4,380,000.00	$ 8,760,000.00	$ -	$ 13,140,000.00		$ -	$ 788,400.00	$ -	$ -	$ 7,884,000.00	$ -	$ 7,884,000.00			
12	Rainbow Dr between De Anza and Stelling.		R26		$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -			
13	McCellan Rd between Byrne Ave and Stevens Canyon Rd.		R26		$ -	$ -		$ -	$ -	$ 4,380,000.00	$ 2,190,000.00	$ -	$ -	$ 6,570,000.00		$ -	$ 394,200.00	$ -	$ -	$ 3,942,000.00	$ -	$ 3,942,000.00			
14	Miller Ave between Bollinger and SCB.		R26		$ -	$ -		$ -	$ -	$ -	$ 6,570,000.00	$ 15,330,000.00	$ -	$ 21,900,000.00		$ -	$ 1,314,000.00	$ -	$ -	$ 13,140,000.00	$ -	$ 13,140,000.00			
15	Stelling Rd between McClellan Rd and Prospect Rd.		R26		$ -	$ -		$ -	$ -	$ 2,190,000.00	$ 2,190,000.00	$ 4,380,000.00	$ -	$ 8,760,000.00		$ -	$ 525,600.00	$ -	$ -	$ 5,256,000.00	$ -	$ 5,256,000.00			
17	Valley Green Dr between Stelling and Beardon.		R26		$ -	$ -		$ -	$ -	$ -	$ 2,190,000.00	$ -	$ -	$ 2,190,000.00		$ -	$ 131,400.00	$ -	$ -	$ 1,314,000.00	$ -	$ 1,314,000.00			
	Calvert Dr between Stevens Creek Blvd to Tilson Ave		R26		$ -	$ -		$ -	$ -	$ -	$ -	$ 6,570,000.00	$ -	$ 6,570,000.00		$ -	$ 394,200.00	$ -	$ -	$ 3,942,000.00	$ -	$ 3,942,000.00			
	Mary Ave between Parkwood Dr to Meteor Dr		R26		$ -	$ -		$ -	$ -	$ -	$ 2,190,000.00	$ 6,570,000.00	$ 4,380,000.00	$ 13,140,000.00		$ -	$ 788,400.00	$ -	$ -	$ 7,884,000.00	$ -	$ 7,884,000.00			
	Project 6: Safety on Roadway Segments - Improve Pedestrian and Bicyclist Safety																								
	Stevens Creek Blvd: Janice Ave to Judy Ave	R33PB	R35PB		$ 2,988,300.00	###########	$ -	$11,176,300.00	$ -	$ -	$ -	$ -	$ -	$ -		$ 1,005,867.00	$ 782,341.00	$ -	$ 20,117,340.00	$ 15,646,820.00	$ -	$ 35,764,160.00	$ 111,774,040.00	Combined Benefit	$ 111,774,040.00
1	De Anza Blvd: Pacifica Dr to Homestead Rd	R33PB	R35PB		$ 3,415,200.00	###########	$ -	$ 5,275,900.00	$ -	$ -	$ -	$ -	$ -	$ -		$ 474,831.00	$ 369,313.00	$ -	$ 9,496,620.00	$ 7,386,260.00	$ -	$ 16,882,880.00		Combined Cost	$ 4,622,174
2	Homestead Rd: Fallen Leaf Ln to Wolfe Rd	R33PB	R35PB		$ 2,134,500.00	$ 323,600.00	$ -	$ 9,028,100.00	$ -	$ -	$ -	$ -	$ -	$ -		$ 812,529.00	$ 631,967.00	$ -	$ 16,250,580.00	$ 12,639,340.00	$ -	$ 28,889,920.00		B/C	24.18
3	Wolfe Rd: Homestead Rd to SCB		R35PB		$ 142,300.00	$ -	$ -	$ 2,332,300.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 163,261.00	$ -	$ -	$ 3,265,220.00	$ -	$ 3,265,220.00			
4	Bollinger Rd: Lawrence Expy to De Anza Blvd	R33PB	R35PB		$ 142,300.00	$ 80,900.00	$ -	$ 2,413,200.00	$ -	$ -	$ -	$ -	$ -	$ -		$ 217,188.00	$ 168,924.00	$ -	$ 4,343,760.00	$ 3,378,480.00	$ -	$ 7,722,240.00			
5	McClellan Rd: Imperial Ave to Stelling Rd		R35PB		$ -	$ 404,500.00	$ -	$ 404,500.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 28,315.00	$ -	$ -	$ 566,300.00	$ -	$ 566,300.00			
6	Bubb Rd: Stevens Creek Blvd to Columbus Ave		R35PB		$ 284,600.00	$ 80,900.00	$ -	$ 365,500.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 25,585.00	$ -	$ -	$ 511,700.00	$ -	$ 511,700.00			
7	Blaney Ave:Homestead to Stevens Creek Blvd		R35PB		$ 284,600.00	$ 80,900.00	$ -	$ 365,500.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 25,585.00	$ -	$ -	$ 511,700.00	$ -	$ 511,700.00			
8	N Stelling Rd: Alves Dr to Greenleaf Dr	R33PB	R35PB		$ 284,600.00	$ -	$ -	$ 2,474,600.00	$ -	$ -	$ -	$ -	$ -	$ -		$ 222,714.00	$ 173,222.00	$ -	$ 4,454,280.00	$ 3,464,440.00	$ -	$ 7,918,720.00			
9	Rainbow Dr between Bubb and Stelling.		R35PB	R37PB	$ 142,300.00	$ 161,800.00	$ -	$ 304,100.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 21,287.00	$ 21,287.00	$ -	$ 425,740.00	$ 425,740.00	$ 851,480.00			
10	Rainbow Dr between De Anza and Stelling.		R35PB	R37PB	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -			
11	McCellan Rd between Byrne Ave and Stevens Canyon Rd.		R35PB	R37PB	$ -	$ -	$ -	$ 2,190,000.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 153,300.00	$ 153,300.00	$ -	$ 3,066,000.00	$ 3,066,000.00	$ 6,132,000.00			
12	Miller Ave between Bollinger and SCB.		R35PB		$ 284,600.00	$ 80,900.00	$ -	$ 365,500.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 25,585.00	$ -	$ -	$ 511,700.00	$ -	$ 511,700.00			
14	Finch Ave between SCB and Tilson Ave.		R35PB	R37PB	$ 426,900.00	$ 161,800.00	$ -	$ 588,700.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 41,209.00	$ 41,209.00	$ -	$ 824,180.00	$ 824,180.00	$ 1,648,360.00			
15	Stelling Rd between Rainbow Dr and Prospect Rd.		R35PB		$ 142,300.00	$ -	$ -	$ 142,300.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 9,961.00	$ -	$ -	$ 199,220.00	$ -	$ 199,220.00			
16	Prospect Rd between Stelling Rd and De Anza		R35PB	R37PB	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -			
17	Valley Green Dr between Stelling and Beardon.		R35PB	R37PB	$ 142,300.00	$ -	$ -	$ 142,300.00	$ -	$ -	$ -	$ -	$ -	$ -		$ -	$ 9,961.00	$ 9,961.00	$ -	$ 199,220.00	$ 199,220.00	$ 398,440.00			