SAN RAFAEL
THE CITY WITH A MISSION

Agenda Item No: 6.a

Meeting Date: April 2, 2024

SAN RAFAEL CITY COUNCIL AGENDA REPORT

Department: Public Works

Prepared by: April Miller, Public Works Director **City Manager Approval:** _____

TOPIC: **MARIN COUNTYWIDE LOCAL ROAD SAFETY PLAN**

SUBJECT: **ADOPT THE 2024 MARIN COUNTYWIDE LOCAL ROAD SAFETY PLAN AND ADOPT CHAPTER 16 OF 2024 MARIN COUNTYWIDE LOCAL ROAD SAFETY PLAN AS THE CITY OF SAN RAFAEL LOCAL ROAD SAFETY PLAN**

RECOMMENDATION:

1. Adopt the 2024 Marin Countywide Local Road Safety Plan
2. Adopt Chapter 16 of the 2024 Marin Countywide Local Road Safety Plan as the City of San Rafael Local Road Safety Plan

BACKGROUND:

The 2024 Marin Countywide Local Road Safety Plan (LRSP) was developed as a collaboration between the Transportation Authority of Marin (TAM), the County of Marin, and Marin County's 11 incorporated cities and towns, along with input from various stakeholders. The LRSP updates data and recommendations from the 2018 Marin County Systemic Safety Analysis Report Program. In addition, the Countywide LRSP includes a focused LRSP for each jurisdiction, including Chapter 16, which is an LRSP focused exclusively on the City of San Rafael. The LRSP aims to align each of the participating agencies with the principles of Vision Zero and ensure eligibility for competitive grant programs that require an adopted LRSP. On January 25, 2024, the TAM Board adopted the Countywide LRSP, which includes a Vision Zero Statement and Vision Zero Goals to strive to achieve zero deaths or severe injuries on Marin roadways by 2050. TAM recommends that each jurisdiction also consider adopting the Countywide and agency specific LRSP chapters. The County of Marin's Board of Supervisors adopted the LRSP on February 27, 2024.

The initial chapters of the LRSP consist of an overview of the background and document organization. Chapter 2 presents the Vision Statement & Goals, which is a key component of the LRSP. Subsequent chapters present other existing Countywide and State Plans and Studies that promote and improve safety; present countywide safety data; and present a framework for developing and implementing strategies to increase road user safety across the County, referred to as "Emphasis Areas". The emphasis areas in Chapter 6 present quantifiable goals based on Caltrans Strategic Highway Safety Plan's Five E's (education, enforcement, engineering, emergency response, and emerging technology). The emphasis areas were divided into four

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FOR CITY CLERK ONLY

Council Meeting:

Disposition:

categories: Vulnerable Users, Collision Factors, Collision Types, and External Conditions. The remaining chapters focus on specific jurisdictions.

The LRSP recommends an agency complete a periodic evaluation to monitor safety conditions over time to understand progress and safety conditions. Foremost amongst these should be the number of killed or seriously injured (KSI) collisions as this corresponds directly to the LRSP goals.

ANALYSIS: The LRSP was prepared, in part, to continue the ability for each local jurisdiction to meet the requirements of safety-related grants such as the federal Safe Streets and Roads for All (SS4A) grant, or the state's Highway Safety Improvement Program (HSIP) grant. Additional jurisdictions with an adopted LRSP receive additional points in the highly competitive Active Transportation Program (ATP) administered by the Metropolitan Transportation Commission (MTC). The LRSP, if adopted, satisfies the eligibility requirements for these grant opportunities and potential future opportunities. Staff anticipates call for projects for the next cycle of these grants in spring/summer 2024.

As part of the City Council Goals and Objectives for FY 23-24 & FY 24-25, Goal D states "Coordinate with the TAM and the County of Marin in the analysis and implementation of Vision Zero, or equivalent, to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, equitable mobility for pedestrians, cyclists, and all modes of traffic." The City has actively participated in the creation of the LRSP along with TAM and the County of Marin. The next step is to coordinate and prioritize the ongoing efforts necessary to achieve the Vision Zero Statement and goals of the LRSP. Staff proposes to develop a Vision Zero Action Plan with input from various stakeholders, including enforcement, emergency response, San Rafael Bicycle and Pedestrian Committee (BPAC), community groups, education, public health, advocacy groups, and businesses. The objective of the Vision Zero Action Plan is to develop a common understanding of the issues and strategies leading to a mutual commitment to ongoing actions geared towards eliminating serious injuries and fatalities on San Rafael roadways. This is a significant but important undertaking that is proposed to be carried out with consultant support.

With people engaged in active transportation disproportionately impacted by traffic collisions, addressing their safety through Vision Zero is integral to improving and increasing active transportation. The Department of Public Works will include the development of a Vision Zero Action Plan in its goals & objectives proposal when the City Council considers its next 2-year cycle of goals in the Spring of 2025, however the procurement phase may commence sooner. It should be noted that the Vision Zero Action Plan may identify potential programmatic, capital, or staff costs for consideration as part of future budgets and grant funding opportunities.

The County of Marin plans to issue a Request for Proposal in the upcoming months to solicit interest in qualified consultants. The City of San Rafael is in early discussions with the County about collaborating with the same consultant to potentially develop its Vision Zero action plan. Although the City and County needs may vary due to the urban and rural roadways, there are several overlapping concepts that would benefit from a consistent approach.

In addition to evaluating the LRSP, staff will continue to pursue specific related initiatives to enhance safety for all modes. The City has started work on the "Emphasis Area: Unsafe Speed" identified in the Chapter 16 of the LRSP by recently conducting speed surveys in key locations, so the City can review the draft results with the traffic safety committee and determine how the City can reduce or maintain speed limits using provisions in new state laws like AB 43. The City is also updating the City's Bicycle and Pedestrian Citywide Plan next fiscal year which will look at adding projects along segments identified in the LRSP with high collision rates. The State recently approved Assembly Bill (AB) 413 which established the new "no parking" zones in advance of

crosswalks. This City plans to methodically update areas throughout the city to meet this state law, which helps improve visibility of pedestrians in crosswalks.

PUBLIC OUTREACH: TAM formed a Technical Advisory Committee (TAC) to provide guidance in developing the Vision Zero Statement and Goals, and to oversee the process of developing the contents of the LRSP. The membership consisted of TAM staff, local agency public works staff (including San Rafael), two representatives from the California Highway Patrol, a representative from the Central Marin Police Authority, two representatives from Marin Health and a representative from the Marin County Bicycle Coalition.

On March 12, 2024, the LRSP was presented at the San Rafael BPAC. The City received positive feedback from BPAC members and the community in support of adopting the LRSP and Vision Zero.

As elements in the LRSP become projects and the City works to update the Bicycle and Pedestrian Citywide Plan, additional outreach through the BPAC and other meetings will be performed.

ENVIRONMENTAL DETERMINATION:
This action is statutorily exempt from the California Environmental Quality Act ("CEQA") pursuant to section 15262 of the CEQA Guidelines because the plan provides a framework to identify, analyze, and prioritize potential future roadway safety improvements which the City has not approved, adopted, or funded.

FISCAL IMPACT: There is no fiscal impact associated with adopting the LRSP. Staff will return at future meetings for specific projects associated with the implementation of the LRSP that are identified in the Capital Improvement Program and consultant support on other traffic-related initiatives.

OPTIONS:
1. Adopt the 2024 Marin Countywide Local Road Safety Plan.
2. Do not adopt the LRSP and provide direction to staff. If this option is chosen, there is the potential that the City cannot apply for grants that require an adopted plan.

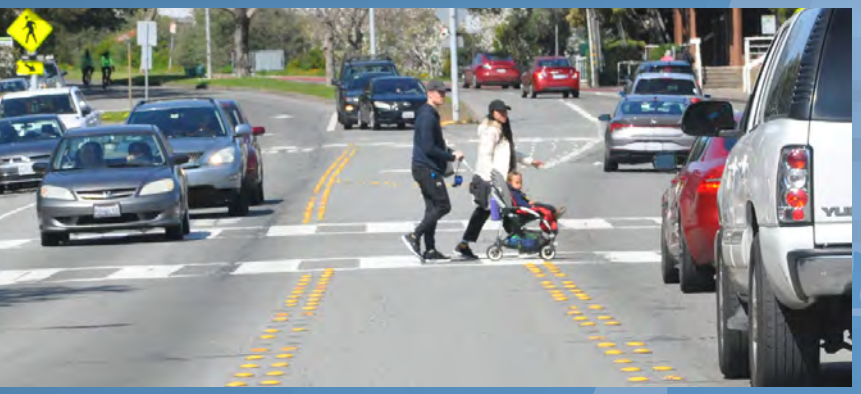
RECOMMENDED ACTION:

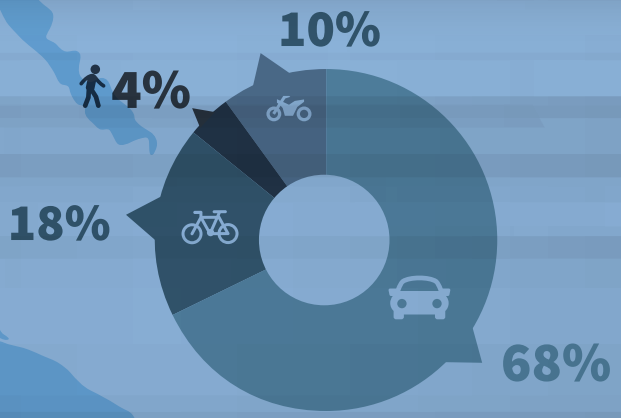
1. Adopt the 2024 Marin Countywide Local Road Safety Plan
2. Adopt Chapter 16 of the 2024 Marin Countywide Local Road Safety Plan as the City of San Rafael Local Road Safety Plan

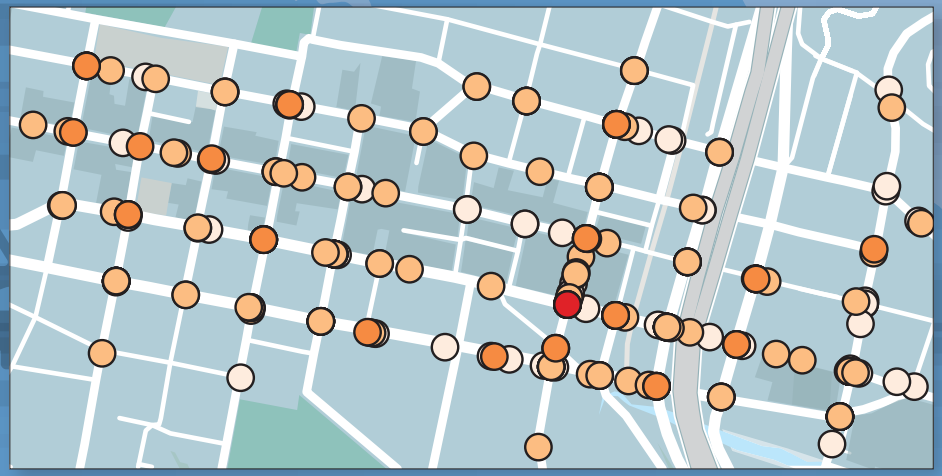
ATTACHMENTS:
1. 2024 Marin Countywide Local Road Safety Plan
2. 2024 Marin Countywide Local Road Safety Plan Appendix

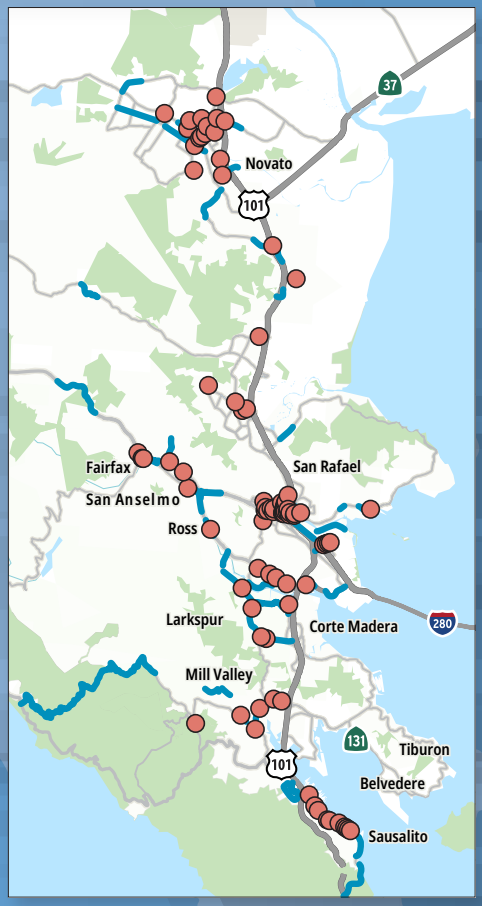
2024 MARIN COUNTY

Local Road Safety Plan









COUNTY OF MARIN · THE TOWN OF CORTE MADERA · MILL VALLEY · CITY OF NOVATO CALIFORNIA · TOWN OF ROSS · TOWN OF SAN ANSELMO · SAN RAFAEL · CITY OF SAUSALITO · TOWN OF TIBURON · TAM Transportation Authority of Marin

JANUARY 2024

Parametrix | Parisi TRANSPORTATION CONSULTING

2024 MARIN COUNTY LOCAL ROAD SAFETY PLAN

Undertaken by the Transportation Authority of Marin and County of Marin
with Support from the 11 Cities and Towns in Marin County

PROJECT PARTNERS

COUNTY OF MARIN
Dan Dawson*
Farid Javandel*
Carey Lando*
John Neville

BELVEDERE
Antony Boyd

CORTE MADERA
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MARIN COUNTY BICYCLE COALITION:
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CONSULTANT TEAM

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Section 148 of Title 23,
United States Code
REPORTS DISCOVERY AND ADMISSION INTO EVIDENCE OF CERTAIN REPORTS, SURVEYS, AND INFORMATION — Notwithstanding any other provisions of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section, shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at the location identified or addressed in the reports, surveys, schedules, lists, or other data.

* Technical Advisory Committee member
ᵒ No longer at noted jurisdiction

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EXECUTIVE SUMMARY

Based on the latest full year of data available, in the United States, almost 43,000 people were killed in motor vehicle collisions in 2021.[1] This is the highest number of traffic-related fatalities since 2005 and marks a 10% increase from the number of fatalities in 2020. In the state of California, 2021 saw almost 4,300 traffic fatalities in 2021, a 7.6% increase from 2020.[2]

To combat this rise in fatal collisions – and collisions more generally – Caltrans developed a Strategic Highway Safety Plan (SHSP). The purpose of the SHSP is to coordinate statewide efforts to reduce serious injuries and fatalities resulting from traffic collisions throughout the state. The SHSP establishes goals, objectives, and emphasis areas to address road user safety.

This Local Road Safety Plan (LRSP) – focused on Marin County's jurisdictions – builds on the foundation of the SHSP while providing the County with an opportunity to address its own, unique roadway safety needs.

WHAT IS AN LRSP?

An LRSP is a plan that provides a framework to identify, analyze, and prioritize potential roadway safety improvements for local and rural roads, thereby increasing safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. It provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges.

This LRSP has been developed as a collaboration between the Transportation Authority of Marin (TAM), the County of Marin's Public Works Department, and Marin County's 11 incorporated cities and towns, with input from a number of stakeholders (described in Chapter 3). It aims to align the County with the principles of Vision Zero.

1 United States Census Bureau 2021
2 California Office of Traffic Safety, California Traffic Safety Quick Stats

VISION ZERO PRINCIPLES

Vision Zero is a broad strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, equitable mobility for all users. It was first implemented in Sweden in the 1990s and has since been adopted by cities throughout Europe, the United States, and elsewhere. Vision Zero differs from traditional approaches in that it recognizes traffic deaths as preventable and integrates the reality and expectation that humans will make mistakes into its multidisciplinary, systemic approach. Vision Zero's safe system approach is holistic, requiring that road systems be considered in their entirety from infrastructure to policy. This LRSP incorporates a safe system approach into its analysis and strategies for improving road user safety in Marin County.

DATA ANALYSIS

The LRSP makes use of reported collision data to identify trends, pinpoint needs, and develop strategies to address road user safety in Marin County. Analyses were conducted using 2017-2021 data from SafeTREC's Transportation Injury Mapping System (TIMS), the most recent full year of data available. Only collisions resulting in an injury or fatality and occurring on non-state route arterials and collectors were included in the analysis: local, residential roads were not considered as they typically have fewer collisions. Collision trends were analyzed at the county level as well as at the level of each individual jurisdiction.

From 2017-2021, a total of 2,164 collisions resulting in an injury or fatality were reported to occur on Marin County's non-state arterial and collector roadways. This includes 28 fatality collisions (1.3%) and 199 severe injury collisions (9.2%), which are collectively classified as "KSI collisions," indicating collisions in which a victim was Killed or Seriously Injured.

Vulnerable road users made up a disproportionate amount of the severe injuries and fatalities in Marin County. Pedestrians were involved in 14% of countywide collisions but 22% of KSI collisions; bicyclists were involved in 19% of collisions but 34% of KSI collisions; and motorcyclists were involved in 7% of collisions but 13% of KSI collisions. Over one quarter (26%) of collisions were a result of unsafe speeds, while improper turning was responsible for 17% of collisions and automobile right-of-way violations resulted in 13% of collisions.

A High Collision Network (HCN) was developed for Marin County, including intersections and road segments with high collision rates. HCN locations were confirmed through coordination with representatives from each of the jurisdictions and unincorporated Marin County. The County's HCN includes 70 road segments and 90 intersections spread throughout its jurisdictions and unincorporated areas. San Rafael, Novato, and Unincorporated Marin County were the highest-represented jurisdictions in the HCN.

Emphasis Areas were identified for each jurisdiction based on the collision analysis results and were refined through stakeholder input. Emphasis Areas are collision characteristics – road users, collision factors, types, or other factors – that can help provide a framework for developing and implementing strategies to increase road user safety across Marin County. Each Emphasis Area is accompanied by quantifiable goals to facilitate evaluation of the plan's effectiveness in reducing collision rates, particularly rates of collisions resulting in severe injuries or fatalities. Strategies are provided to reach each Emphasis Area's goal. These are grouped based on the Caltrans Strategic Highway Safety Plan Five E's: education, enforcement, engineering, emergency response, and emerging technology.

Marin County generally fares better than other California counties when it comes to traffic safety. Based on the Office of Traffic Safety's rankings for 2020, the most recent year of data available, the County ranks 55th out of 58 counties for total fatal and injury collisions1. However, the County's unique characteristics result in high numbers of certain types of collisions compared to the rest of the state's counties. Marin County had the highest number of injury or fatality bicycle collisions of any county in the state, as well as the highest number of injury or fatality collisions involving bicyclists under the age of 15. It also ranked 10th for injury or fatality collisions involving pedestrians over the age of 65 and 22nd for those involving speeding.

PRIORITY PROJECT IDENTIFICATION

Following the creation of the High Collision Network, the collision patterns at intersections and segments were analyzed to determine potential countermeasures. Countermeasures are engineering treatments that have the potential to reduce collisions in locations based on the collision trends (see Appendix A). In collaboration with Marin County jurisdictions, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts.

IMPLEMENTATION & EVALUATION

This LRSP identifies implementation and evaluation considerations that will be important to jurisdictions as they work towards achieving the LRSP goals. These include funding, coordination and partnership, policy support, and timeline considerations. It also provides metrics that can be used to evaluate progress.

This LRSP is meant to be a living document and should be revised as needed to reflect evolving trends, community needs, and priorities. For example, e-bicycle use has increased substantially during this study period and is now an important road safety issue. Future iterations of this LRSP could incorporate e-bicycle collision data if made available.

CHAPTER 1. INTRODUCTION

1.1 LRSP BACKGROUND

A local road safety plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize potential roadway safety improvements for local and rural roads, thereby increasing safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. It provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This LRSP has been developed as a collaboration between the Transportation Authority of Marin (TAM), the County of Marin's Public Works Department, and Marin County's 11 incorporated cities and towns, with input from a number of Marin County stakeholders (see Chapter 3).

1.2 STUDY AREA

Marin County is located north of San Francisco and covers over 800 square miles. It contains a population of over 265,000 residents residing in the county's 11 incorporated cities and towns as well as unincorporated communities. The county includes the following jurisdictions:

- City of Belvedere
- Town of Corte Madera
- City of Fairfax
- City of Larkspur
- City of Mill Valley
- City of Novato
- Town of Ross
- Town of San Anselmo
- City of San Rafael
- City of Sausalito
- Town of Tiburon
- Unincorporated Marin County

A map of the study area is shown in Figure 1.1.

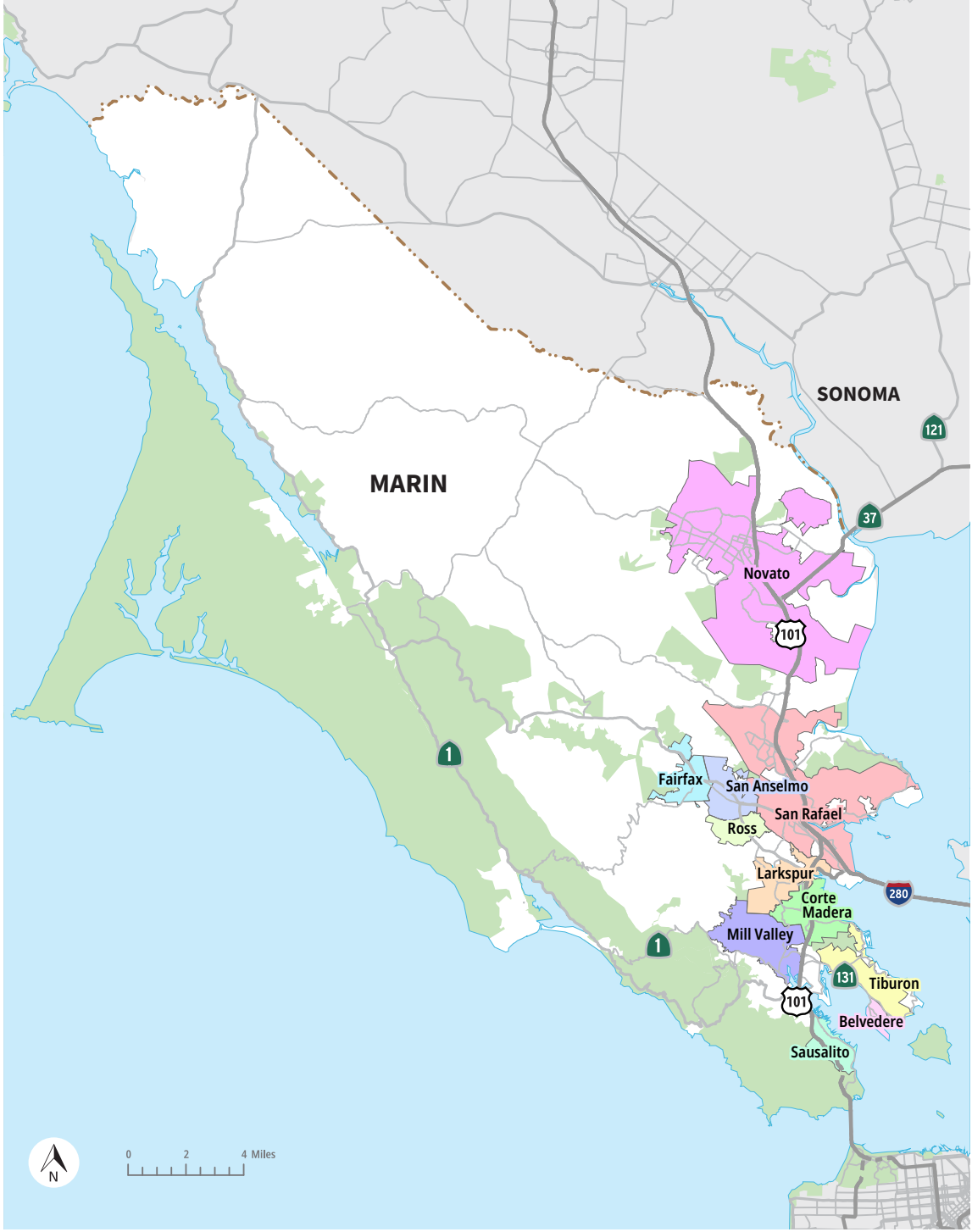


Figure 1.1: Marin County Map

Marin County generally fares better than other California counties when it comes to traffic safety. Based on the Office of Traffic Safety's rankings for 2020, the most recent year of data available, the County ranks 55th out of 58 counties for total fatal and injury collisions.[1] However, the County's unique characteristics result in high numbers of certain types of collisions compared to the rest of the state's counties. Marin County had the highest number of injury or fatality bicycle collisions of any county in the state, as well as the highest number of injury or fatality collisions involving bicyclists under the age of 15. It also ranked 10th for injury or fatality collisions involving pedestrians over the age of 65 and 22nd for those involving speeding.

1.3 DOCUMENT ORGANIZATION

This LRSP is organized into the following chapters:

Chapter 1: Introduction
Gives an overview of LRSPs and the study area, and outlines the plan's structure.

Chapter 2: Vision & Goals
Provides the vision statement and goals that guide the LRSP development and implementation.

Chapter 3: Safety Partners
Introduces the partners who provided advice in developing the LRSP, including the vision statement, goals, emphasis areas, and strategies.

Chapter 4: Process
Describes the methodology used to analyze countywide collision data as well as the process for soliciting feedback during the LRSP development process.

Chapter 5: Existing Efforts
Outlines efforts, activities, programs, policies, and plans in existence or development to address transportation safety in the County.

Chapter 6: Countywide Road Safety
provides an overview of countywide collision trends on arterial and collector roadways, including an introduction to the countywide High Collision Network. This chapter features an overview of emphasis areas, goals, and strategies.

Chapter 7: Implementation & Evaluation
describes the process that will be used to ensure implementation, evaluate the success of the plan, and update the plan as needed.

Chapters 8–18
can be used as standalone plans for individual jurisdictions.
They include a plan vision and goals as well as a detailed collision analysis, including High Collision Networks, at the jurisdiction level. Each chapter provides jurisdiction-specific emphasis areas, goals, strategies, and priority projects.

- **Chapter 8: City of Belvedere & Town of Tiburon**
- **Chapter 9: Town of Corte Madera**
- **Chapter 10: Town of Fairfax**
- **Chapter 11: City of Larkspur**
- **Chapter 12: City of Mill Valley**
- **Chapter 13: City of Novato**
- **Chapter 14: Town of Ross**
- **Chapter 15: Town of San Anselmo**
- **Chapter 16: City of San Rafael**
- **Chapter 17: City of Sausalito**
- **Chapter 18: Unincorporated Marin County**

1 California Office of Traffic Safety Crash Ranking Results 2023

CHAPTER 2. VISION & GOALS

Marin County's vision for this LRSP was developed through feedback from the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in the following chapter. The vision statement reflects the county's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, working towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

2.1 VISION STATEMENT

Marin County and its incorporated cities and towns strive to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

2.2 GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Marin County residents.

3. SAFETY PARTNERS

3.1 TECHNICAL ADVISORY COMMITTEE

The LRSP development process was informed by a number of stakeholders who formed the project's TAC. The TAC provided guidance on the vision statement, goals, collision analysis, emphasis areas, and strategies, as well as implementation of the final plan. TAC members represented various agencies, organizations, and jurisdictions.

TAC Members

- **California Highway Patrol:** Erik Egide, Sergeant; Glen Newcomer, Officer
- **Central Marin Police:** Scott Niklewicz, Corporal
- **Marin County Department of Public Works:** Dan Dawson, Principal Transportation Planner; Farid Javandel, Principal Civil Engineer; Carey Lando, Senior Project Planner
- **Marin County Bicycle Coalition:** Warren Wells, Policy & Planning Director
- **MarinHealth:** Melanie Duarte, Project Manager; Charles Holloway, Director, Safety & Security Services
- **City of Novato:** Christopher Blunk, Public Works Director
- **Town of San Anselmo:** Scott Schneider, Assistant Public Works Director
- **City of San Rafael:** Nhat Phan, Traffic Engineer; Rafat Raie, Deputy Director of Public Works
- **City of Sausalito:** Kevin McGowan, Public Works Director
- **Transportation Authority of Marin:** Dan Cherrier, Director of Project Delivery; Bill Whitney, Principal Project Delivery Manager

3.2 JURISDICTIONS

In addition to the TAC, representatives from all the Marin County jurisdictions provided feedback at critical points during the LRSP development process. These representatives confirmed the LRSP goals, vision statement, high collision network, priority project locations, and emphasis areas for their respective jurisdictions.

Jurisdiction Representatives

- **City of Belvedere:** Antony Boyd, Public Works Director
- **Town of Corte Madera:** RJ Suokko, Director of Public Works
- **City of Fairfax:** Loren Umbertis, Public Works Director
- **City of Larkspur:** Richard Cho, Senior Engineer; Julian Skinner, Public Works Director
- **City of Mill Valley:** David DeLira, Associate Engineer
- **City of Novato:** Christopher Blunk, Public Works Director
- **Town of Ross:** Richard Simonitch, Public Works Director
- **Town of San Anselmo:** Scott Schneider, Assistant Public Works Director
- **City of San Rafael:** Nhat Phan, Traffic Engineer; Rafat Raie, Deputy Director of Public Works
- **City of Sausalito:** Andrew Davidson, Senior Civil Engineer; Kevin McGowan, Public Works Director
- **Town of Tiburon:** David Eshoo, Public Works Engineering Manager
- **Unincorporated Marin County:** Carey Lando, Senior Project Planner; John Neville, Civil Engineer

4. PROCESS

4.1 DATA ANALYSIS

To develop the LRSP, collision data for the five most recent finalized years (January 1, 2017 - December 31, 2021) were downloaded from SafeTREC's Transportation Injury Mapping System (TIMS) and analyzed in Microsoft Excel and ArcGIS Pro. Only collisions resulting in an injury or fatality and occurring on non-state route arterials and collectors were included in the analysis: local, residential roads were not considered as they typically have fewer collisions. Collisions were analyzed at the county level as well as at the level of each individual jurisdiction.

An initial descriptive analysis was performed to assess trends in road users involved, collision types, primary collision factors, and other collision characteristics over the five-year period. The results of this analysis were used to select the emphasis areas for the county and each jurisdiction, which will be discussed in more detail in Chapters 6 and 8–18.

Equity considerations were taken into account by assessing collision trends in Plan Bay Area Equity Priority Communities and Justice40 Initiative priority communities. Equity Priority Communities are census tracts designated by the Metropolitan Transportation Commission as having a significant concentration of underserved households based on American Community Survey data including households with low incomes and people of color. The Justice40 Initiative was created by the Biden-Harris Presidential Administration to address underinvestment in disadvantaged communities; as part of this effort, the United States Department of Transportation has identified census tracts that are burdened from an underinvestment in transportation. Trends based on race, age, and vulnerable user groups were also assessed.

A High Collision Network was also developed for the County, including intersections and road segments with high collision rates. The collision rate per 100 million entering vehicles was calculated at all non-state route arterial and collector intersections within the county. For roadway segments, collisions occurring along each segment, including at intersections, were analyzed to produce the collision rate per 100 million vehicle miles traveled. The intersections and segments with the highest rates were selected for a draft high collision network. Following jurisdiction feedback, adjustments were made to this draft list to result in a final High Collision Network for the county.

4.2 PRIORITY PROJECT IDENTIFICATION

Following the creation of the High Collision Network through the process described above, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. These countermeasures are engineering treatments that have the potential to reduce collisions in these locations based on the collision trends. See Appendix A for more detailed information on the countermeasures. In collaboration with the jurisdictions, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts.

4.3 OUTREACH

Outreach was performed to every jurisdiction in Marin County to guide the LRSP development process. Meetings with representatives from each jurisdiction were held to solicit feedback, verify analysis results, and build consensus ahead of the document's completion. Each jurisdiction was responsible for approving its chapter of the plan.

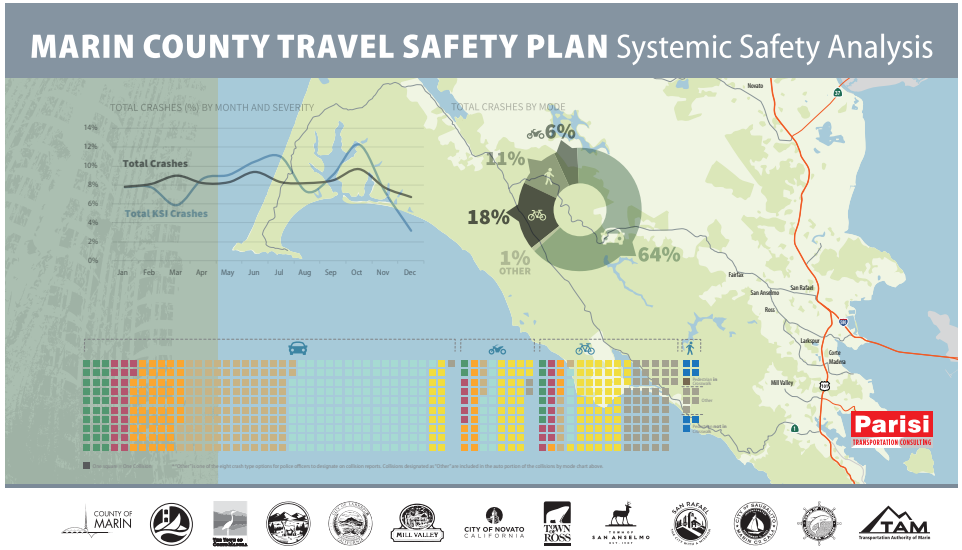
5. EXISTING EFFORTS

In recent years, Marin County's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Marin County.

5.1 PLANS & STUDIES

Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.



Bicycle & Pedestrian Plan Updates (2018)

TAM facilitated a coordinated update of bicycle and pedestrian master plans in all jurisdictions and unincorporated Marin County. The updates were completed in 2017 and were adopted by the local jurisdictions in 2018. Each jurisdiction managed the adoption of its plan. The plan updates were part of a countywide effort to create a more cohesive, accessible, and safer network for pedestrians and bicyclists.

5.2 PROGRAMS

Safe Routes to Schools

SAFE ROUTES TO SCHOOLS MARIN COUNTY

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

Marin County Complete Streets Policy

In 2016 Marin County adopted a formal Complete Streets policy in accordance with Metropolitan Transportation Commission (MTC) requirements for funding eligibility. The policy outlines the County's commitment to creating and maintaining Complete Streets in a context-sensitive way that incorporates inter-departmental cooperation and coordination, consultation with designated committees, and ongoing evaluation.

Community-Based Transportation Plans

TAM manages an effort by which local communities develop plans to improve mobility options for low-income and disadvantaged populations. Community-based transportation plans identify transportation challenges and develop strategies to overcome them using a collaborative process involving residents in minority and low-income communities; community and faith-based organizations that serve them; local jurisdictions; and transportation agencies. Identified solutions are then prioritized for Lifeline Program funds distributed by the TAM Board of Commissioners. To date community-based transportation plans have been developed for the Canal neighborhood, Marin City, and Novato. More information on these plans can be found in the respective jurisdiction chapters.

Safe Pathways to Schools Program

TAM's Safe Pathways to Schools program funds capital projects to enhance safety for students walking and cycling to school. Three cycles of projects were previously funded using Measure A funds; in 2019, a fourth project cycle was held using funds from Measure AA. As part of the Safe Pathways application process, TAM categorized projects as either "small" or "large." Small Safe Pathways projects are projects that require $50,000 or less to design and construct and that should be completed within one year from commencement. Large projects have a maximum requested amount of $400,000. To date over $14.6 million has been allocated to Safe Routes infrastructure improvements through Safe Pathways funding. A fifth cycle will occur in 2024.

TAM's crossing guard program is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school.

California Highway Patrol Ongoing Programs

The California Highway Patrol (CHP) routinely carries out enforcement and education programs in Marin County. Enforcement campaigns focus efforts on primary collision factor violations (speeding, unsafe turns, etc.); they are usually aligned with Office of Traffic Safety (OTS) grant funding and CHP's Maximum Enforcement Campaigns. OTS grant enforcement includes driving under the influence saturation patrols, speed enforcement, speed radar trailer deployments, sobriety checkpoints, pedestrian safety, and sideshow/street racing and aggressive driving activity. Marin CHP is also the lead for several traffic safety programs including programs focused on impaired driving (Designate a Sober Driver, Teen Impaired Driving Education, Every 15 Minutes); safe driving for seniors and the newly licensed (Age Well Drive Smart, Start Smart), bicycle and pedestrian safety (BESEEN); and child passenger safety (CARSEAT).

6. COUNTYWIDE ROAD SAFETY

6.1 DATA SUMMARY

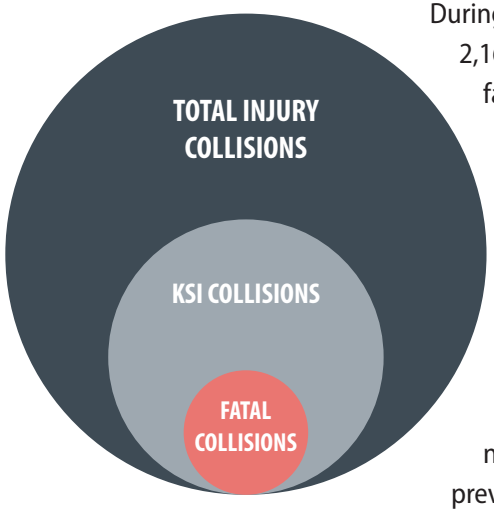


Figure 6.1: Relationship between injury, KSI, and fatal collisions

During the five-year period from 2017-2021, 2,164 collisions resulting in an injury or fatality were reported to occur on Marin County's non-state arterial and collector roadways.[1] This includes 28 fatality collisions (1.3%) and 199 severe injury collisions (9.2%), which are collectively classified as "KSI collisions," named for collisions in which a victim was Killed or Seriously Injured (Figure 6.1). This represents a decline in the total number of reported collisions from the previous five-year period (2012-2016) by over 21%. However, the percentage of all injury collisions that resulted in a severe injury or fatality increased by 1.3 percentage points and the number of fatal collisions increased by eight collisions during this time. Meanwhile, the total Marin County population increased by less than 2%.[2]

Collisions Over Time

As shown in Figure 6.2, the number of collisions had been declining over time prior to the onset of the COVID-19 pandemic in early 2020. The pandemic initially accelerated this decline as fewer people were on the roads. Severe injury and fatality collisions, meanwhile, have seen periodic peaks and troughs (Figure 6.3). A slight increase in KSI collisions is evident in 2020, perhaps reflecting a rise in walking and bicycling as forms of socially distant recreation. Injury collisions increased in 2021 as pandemic restrictions began to ease.

Over the five-year period, injury collisions tended to experience slight seasonal peaks in March (8.5%), May (8.9%), and October (9.6%); KSI collisions also peaked in October (10.6%). July was a low point for all collisions (7.4% occurred during this

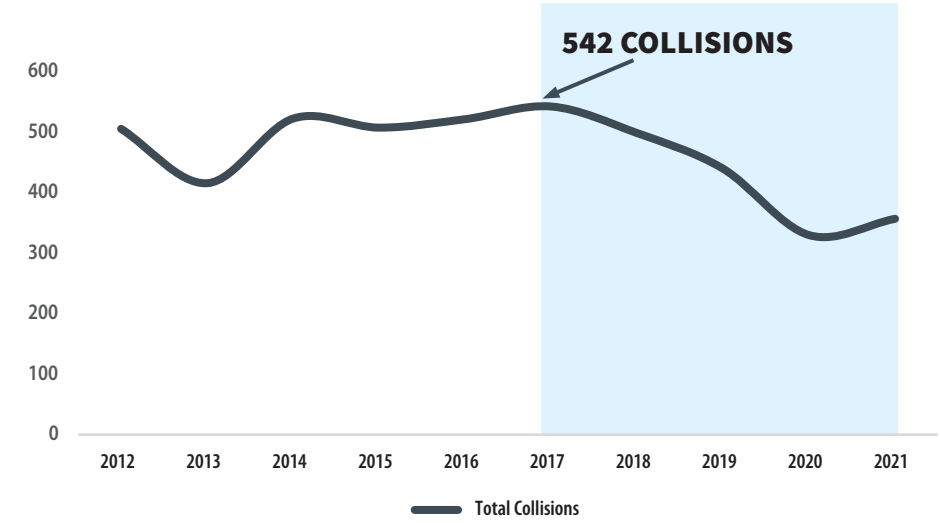


Figure 6.2: Countywide injury collisions by year

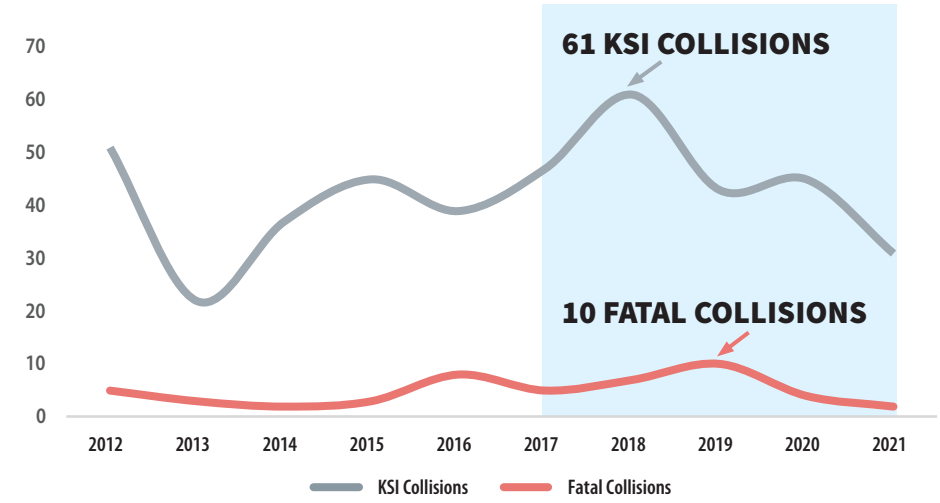


Figure 6.3: Countywide KSI and fatal collisions by year

1 For the purpose of this plan, any reference to "collisions" refers to reported collisions on non-state arterial and collector roads resulting in injury or fatality, unless specified otherwise. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials.

2 2021 vs. 2016 American Community Survey 5-year population estimates (Table DP05)

month), while March (5.3%) and July (5.8%) saw lower percentages of KSI collisions. Fatal collisions tended to peak in January and September, with approximately 18% of fatal collisions occurring during each of these months.

Primary Collision Factors

A primary collision factor is a behavior that best describes the main cause of a collision. While a collision may have several contributing factors, it will only have one primary collision factor. Among all collisions in Marin County, four primary collision factors were responsible for approximately 64% of collisions (Figure 6.4). Unsafe speeds caused 26% of total collisions and about 20% of KSI collisions. Improper turning caused 17% of total collisions, automobile right of way violations (collisions where drivers did not yield to another driver with the right-of-way) caused 13%, and driving or bicycling under the influence caused approximately 8%. While impaired driving caused a lower percentage of total collisions, this collision factor is more likely to result in severe injury or fatality collisions. Violations relating to pedestrians were also noteworthy when considering KSI collisions. Pedestrian right of way violations (collisions where a pedestrian's right of way was violated) caused 8% of all injury collisions, but 11% of KSI collisions. Similarly, pedestrian violations (collisions where pedestrians were deemed to be at fault) were responsible for only 3% of all injury collisions but 6% of KSI collisions and 11% of fatal collisions.

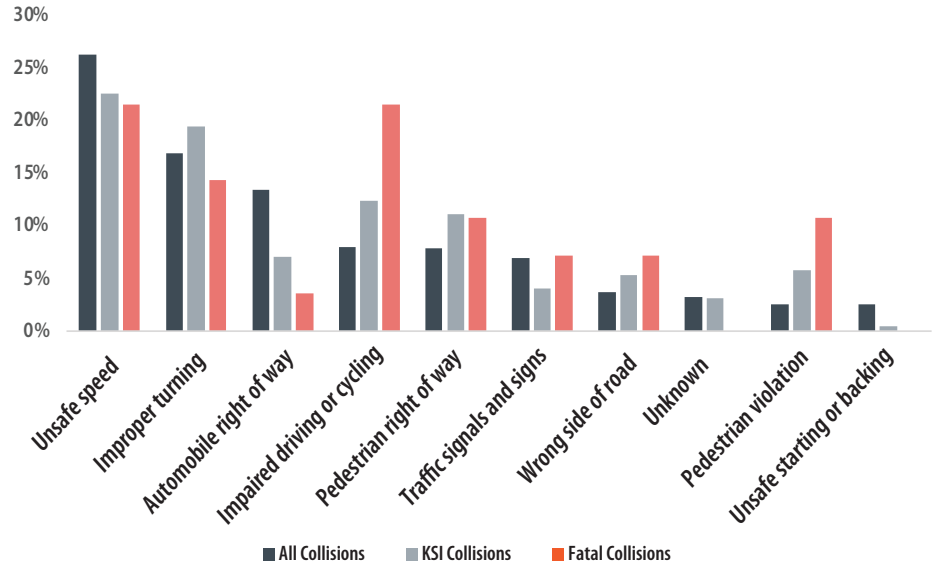


Figure 6.4: Top 10 primary collision factors

Road User Types

Figure 6.5 shows reported collisions by mode. Approximately 60% of collisions in Marin County involved motor vehicles only. Thirty-six percent (36%) of these were KSI collisions, while fewer than 1% resulted in a fatality. Bicyclists were involved in 19% of collisions. Almost 17% of collisions involving these vulnerable users resulted in a fatal or severe injury, while over 1% resulted in a fatality. Of the 14% of collisions involving pedestrians, 17% were KSI collisions and 3% resulted in a fatality. Lastly, motorcycle collisions made up 7% of overall collisions but 20% of these were KSI collisions and 2% resulted in a fatality. The fact that collisions involving bicyclists, pedestrians, and motorcyclists resulted in a higher percentage of severe outcomes speaks to the need to address safety issues for these vulnerable users.

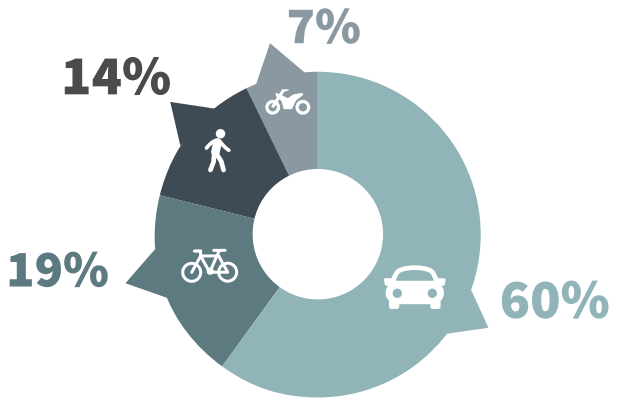


Figure 6.5: Countywide collisions by mode

Bicycle collisions occurred throughout the county, with concentrations, also referred to as "hotspots," in San Rafael, San Anselmo, Larkspur, and Corte Madera. Of the 420 reported collisions involving bicyclists in Marin County from 2017-2021, approximately 20% were solo bicycle collisions (not involving any other parties or motor vehicles); these were largely due to unsafe speed as well as improper turning and other causes. Bicycle collisions with motor vehicles were largely due to improper turning, automobile right of way violations, drivers on the wrong side of the road, and unsafe speed. Bicyclists under the age of 18 were involved in 14% of bicycle collisions and 15% involved bicyclists aged 65 and older.

Hotspots of pedestrian collisions were found in downtown San Rafael, downtown Novato, and Larkspur. The majority (69%) of these collisions occurred when a pedestrian was crossing in a crosswalk, although no details are available on whether pedestrians had the right-of-way at the time of their crossing. The most common primary collision factor for pedestrian collisions was pedestrian right of way violations (56%); this was followed by pedestrian violations (17%, which could occur both within or outside of a crosswalk) and unsafe speed (5%). Ten percent (10%) of pedestrian collisions in Marin County involved pedestrians under the age of 18, while 24% involved pedestrians over the age of 65.

Motorcycle collision hotspots were found in downtown San Rafael, downtown Novato, and along sections of Panoramic Highway. Unsafe speeds were the primary cause of 35% of collisions involving motorcycles, while 20% were caused by improper turning and another 20% were caused by automobile right of way violations. Collisions involving a solo motorcyclist, with no other parties or motor vehicles involved, accounted for 47% of motorcycle collisions. Half of these collisions were caused by unsafe speeds, 38% involved the motorcyclist hitting an object, and 38% involved an overturned motorcycle.

Equity Considerations

Plan Bay Area 2050 includes three equity priority communities (EPCs) in Marin County: one in Marin City, one encompassing San Rafael's Canal neighborhood, and the third in the Terra Linda district in San Rafael. The two San Rafael EPCs are also included as federal Justice40 designated disadvantaged communities (see Chapter 4 for an explanation of EPCs and Justice40). Marin City had 11 reported collisions from 2017-2021, including one bicycle collision and two pedestrian collisions. The Canal neighborhood had 125 collisions, including 29 involving bicyclists and 21 involving pedestrians. In Terra Linda, 66 collisions occurred during the study period. These included 6 involving bicyclists and 6 involving pedestrians. These areas are analyzed in greater detail in the jurisdiction-specific chapters.

Minority populations tended to account for a disproportionately larger percentage of collisions involving active transportation users (pedestrians and bicyclists). People of Hispanic background make up 17% of the Marin County population but were involved in 24% of all collisions involving pedestrians. Only 2.7% of the population identifies as African American, but this demographic accounted for 6% of all pedestrian collisions and 4% of all bicyclist collisions. Hotspot locations of collisions

Improving safety conditions at transit stops can reduce collisions involving vulnerable road users.

involving Hispanic or African American active transportation users are found in downtown San Rafael, San Rafael's Canal neighborhood, and downtown Novato.

A relatively high number of pedestrian collisions occurred in the vicinity of several Marin County transit stops, denoting these locations as potential sites to address and to advance equitable road user safety. In San Rafael, these include the transit stops at Mission Avenue and Lincoln Avenue, Grand Avenue and Third Street, and the San Rafael Transit Center. Transit stops at the intersection of Ward Street and Magnolia Avenue in Larkspur also experienced a relatively high number of pedestrian collisions, as well as the stops at Tamalpais Drive and Eastman Avenue in Corte Madera. While it is unclear whether these pedestrians were transit users, collisions near transit stops can be signs of inequity in road safety conditions that should be addressed.

Older adults aged 65 and over were involved in 433 (20%) collisions as drivers, bicyclists, or pedestrians and 25 of these collisions were KSI collisions (11% of all collisions involving older adults). Ross (33%), Larkspur (32%), and Mill Valley (28%) had the highest percentage of collisions resulting in injury or fatality involving older adults. Youth under the age of 18 were involved in 146 collisions (7% of all countywide injury collisions) and six KSI collisions (3% of all countywide KSI collisions) as drivers, bicyclists, or pedestrians. Corte Madera had the highest percentage of collisions involving youths (11%).

High Collison Network

A High Collision Network (HCN) was developed based on collision rates both at intersections and along road segments throughout Marin County. HCN locations were confirmed through coordination with representatives from each of the jurisdictions and unincorporated Marin County. Figure 6.6 shows the countywide HCN.

The HCN includes 70 road segments and 92 intersections. HCN network facilities are present in all Marin jurisdictions, except Tiburon and Belvedere, which had low numbers of collisions and therefore low collision rates.

In keeping with the overall geographic collision trends, San Rafael, Novato, and Unincorporated Marin County were the highest-represented jurisdictions in the HCN. More detail is presented on the HCN in each of the jurisdiction chapters.

Figure 6.6: Marin County High Collision Network

6.2 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Emphasis areas were identified based on the collision analysis results and were refined through stakeholder input. An overall list of emphasis areas for Marin County was developed, and three to seven 'primary' emphasis areas were selected from this list for each jurisdiction. While the primary emphasis areas represent key issues on which jurisdictions should focus to increase safety, jurisdictions are encouraged to address other emphasis areas as well.

Each emphasis area is accompanied by quantifiable goals to facilitate evaluation of the plan's effectiveness in reducing collision rates, particularly rates of collisions resulting in severe injuries or fatalities. Strategies are provided to reach each emphasis area's goal: these are grouped based on the Caltrans Strategic Highway Safety Plan Five E's: education, enforcement, engineering, emergency response, and emerging technology.

Strategies encompass both infrastructure and non-infrastructure elements. Infrastructure-based strategies are capital improvements that enhance the roadway environment and generally have an associated collision reduction factor identified through comparative studies (see Appendix A). Most infrastructure-based strategies identified in this Plan come from the Caltrans Local Roadway Safety Manual. Non-infrastructure strategies incorporate programs and policies that aim to improve awareness and safe behaviors through strategies that don't directly impact the built environment. These can include education, enforcement measures, emergency services, and emerging technology. Most non-infrastructure-based strategies identified in this Plan come from the National Highway Traffic Safety Administration (NHTSA) Countermeasures That Work: A Highway Safety Countermeasure Guide.

The 11 emphasis areas were divided into four categories: Vulnerable Users, Collision Factors, Collision Types, and External Conditions.

VULNERABLE ROAD USERS

Vulnerable road users are unprotected by an enclosure when they are traveling on the road. This term typically includes pedestrians, bicyclists, and motorcyclists, who face higher risk of injury from collisions. In Marin County, many pedestrians and bicyclists are youths, older adults, and people with lower socioeconomic status or those living in disadvantaged neighborhoods. The County is also a popular destination for recreational bicyclists, including both experienced riders and less experienced tourists. The County's scenic, curving, and more remote roads are popular with both recreational bicyclists and motorcyclists. Motorcyclists lack the protection of vehicles but typically operate at the same speeds, putting them at risk of severe injury from collisions. Table 6.1 through Table 6.3 summarize the countywide goals and strategies for vulnerable road user emphasis areas.

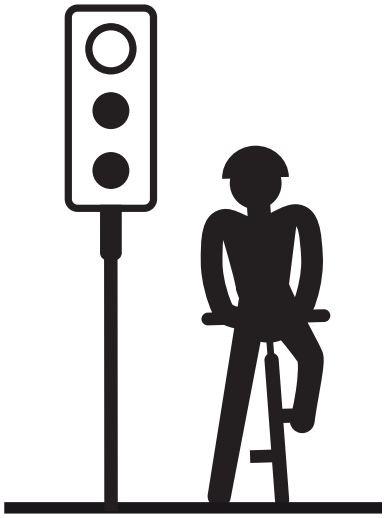
Table 6.1: Pedestrian emphasis area goals & strategies

EMPHASIS AREA: PEDESTRIANS

GOAL: Eliminate fatal & severe injury collisions involving pedestrians by 2050.

STRATEGIES	
Education	• Expand the Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to pedestrian collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant pedestrian injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 6.2: Bicyclist emphasis area goals & strategies

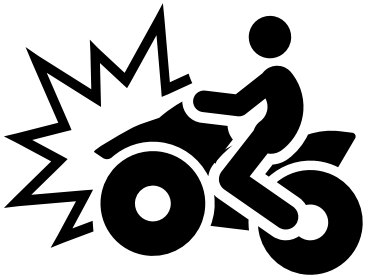


EMPHASIS AREA: BICYCLISTS

GOAL: Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming, including a focus on e-bicycles. • Expand Street Smarts safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of bicyclist collision trends at hot spot locations to inform strategy implementation.

Table 6.3: Motorcyclist emphasis area goals & strategies



EMPHASIS AREA: MOTORYCLISTS

GOAL: Eliminate fatal & severe injury collisions involving motorcyclists by 2050.

STRATEGIES	
Education	• Coordinate with motorcycle advocacy groups (e.g., ABATE) about ways to effectively promote safe behaviors. • Implement education and awareness campaigns focused on conspicuity, protective clothing, and driver awareness of motorcyclists.
Enforcement	• Prioritize equitable enforcement of motorcycle helmet laws in key high injury locations. • Equitably implement targeted enforcement for motorcyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving pavement friction at locations with curves and/or a high frequency of motorcycle collisions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to motorcycle collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant motorcyclistinjury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Collect and analyze data on multi-modal counts, including non-reported collisions.

COLLISION FACTORS

Collision factors are behaviors that directly result in a collision. Reductions in fatalities and severe injuries can be achieved by deterring these unsafe or risky behaviors made by drivers and other transportation users. In Marin County, almost 65% of collisions are caused by just four collision factors: automobile right of way violations, impaired driving and bicycling, improper turning, and unsafe speeds.

Table 6.4 through Table 6.7 list the goals and strategies for emphasis areas related to collision factors.

Table 6.4: Automobile right-of-way emphasis area goals & strategies

EMPHASIS AREA: AUTOMOBILE RIGHT-OF-WAY

GOAL: Eliminate fatal & severe injury collisions involving automobile right-of-way.

STRATEGIES	
Education	• Conduct public information and education campaigns for intersection safety laws regarding traffic lights, stop signs, turning left or right, distracted driving, and pedestrian right-of-way.
Enforcement	• Equitably implement targeted enforcement at high injury locations where automobile right-of-way violations are high. • Consider use of technology to support automated enforcement at key locations; consider supporting legislation to allow automated enforcement.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing behaviors resulting in automobile ROW violations such as signal head improvements, advanced dilemma zone technology, roundabouts, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

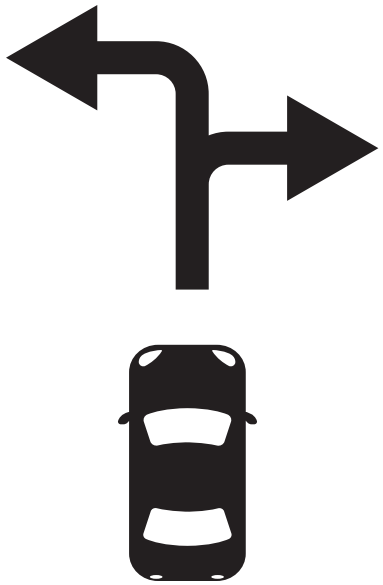
Table 6.5: Impaired driving & bicycling emphasis area goals & strategies

EMPHASIS AREA: IMPAIRED DRIVING & BICYCLING

GOAL: Eliminate fatal & severe injury collisions involving impaired driving & bicycling by 2050.

STRATEGIES	
Education	• Implement education and public awareness campaigns targeted at impaired driving. • Partner with local businesses and organizations along hot spot corridors on educational efforts and campaigns.
Enforcement	• Equitably implement high visibility enforcement campaigns. • Establish DUI checkpoints where appropriate.
Engineering	• In conjunction with other strategies, install countermeasures focused on mitigating or preventing hit objects, drivers mounting the curb, unsafe speeds, and improper turning. • Provide physical separation between fast-moving traffic and vulnerable road users.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement a Safe Ride Home partnership between the jurisdictions, police departments, CHP, taxi/ride-hail operators, and local businesses. • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 6.6: Improper turning emphasis area goals & strategies



EMPHASIS AREA: IMPROPER TURNING

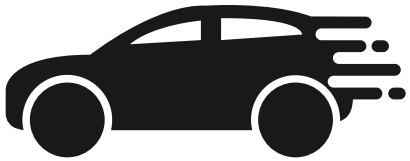
GOAL: Eliminate fatal & severe injury collisions improper turning by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program with an emphasis on avoiding improper turning.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from improper turning.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns such as curb radius. reduction, left turn hardening, protected intersections/corners, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 6.7: Unsafe speed emphasis area goals & strategies

EMPHASIS AREA: UNSAFE SPEED

GOAL: Eliminate fatal & severe injury collisions involving unsafe speed by 2050.



STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, AB 321) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer and/or permanent speed feedback signage at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

COLLISION TYPES

Collision types represent specific collision geometries; oftentimes they stem from certain user behaviors that can be addressed to increase road safety. Over half of all collision in Marin County had just three collision types: broadside, rear-end, and sideswipe. Table 6.8 through Table 6.10 show the goals and strategies for these emphasis areas.

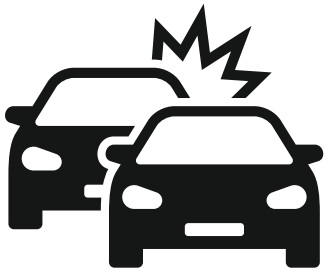
Table 6.8: Broadside collisions emphasis area goals & strategies

EMPHASIS AREA: BROADSIDE COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving broadside collisions by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program.
Enforcement	• Equitably implement targeted enforcement at high injury locations where violations that lead to broadside collisions are more common, such as automobile right of way and traffic signal/stop sign violations.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns (e.g., roundabouts and protected intersections/corners). • Consider modifying traffic signal timing with longer clearance intervals such as with advanced dilemma zone detection.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 6.9: Rear end collisions emphasis area goals & strategies



EMPHASIS AREA: REAR END COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving rear end collisions by 2050.

STRATEGIES	
Education	• Partner with local businesses and community organizations to educate the public about distracted driving. • Expand the Street Smarts program.
Enforcement	• Equitably implement targeted distracted driving enforcement at high injury locations where rearend collisions are more common.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

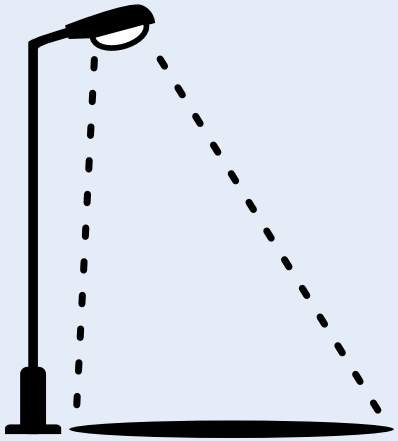
Table 6.10: Sideswipe collsions emphasis area goals & strategies

EMPHASIS AREA: SIDESWIPE COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving sideswipe collisions by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program.
Enforcement	• Equitably implement targeted enforcement at high injury locations where sideswipe collisions are more common.
Engineering	• In conjunction with other strategies, install countermeasures focused designing and improving roadways to prevent sideswipe collisions, such as installing signals and adding lane channelization and turn lanes where appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

EXTERNAL CONDITIONS



Sometimes conditions beyond the road user's control can contribute to collisions. In Marin County, a high percentage of collisions occurred during dark conditions, either in the presence of streetlights or in areas with no streetlights. Approximately 25% of injury collisions and one-third of collisions resulting in severe injury or fatality took place in dark conditions.

Table 6.11 displays the goal and strategies for this emphasis area.

Table 6.11: Dark Conditions emphasis area goals & strategies

EMPHASIS AREA: DARK CONDITIONS

GOAL: Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

7. IMPLEMENTATION & EVALUATION

This chapter identifies implementation and evaluation considerations that will be important to jurisdiction staff as they work towards achieving the LRSP goals.

7.1 IMPLEMENTATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

7.2 EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

8. BELVEDERE & TIBURON LOCAL ROAD SAFETY PLAN

8.1 INTRODUCTION

Tiburon and Belvedere are both located on a peninsula in southern Marin County. Tiburon Boulevard (California State Route 131) serves as the primary access road to both communities, which are bordered by the San Francisco Bay and, in the case of Tiburon, Corte Madera. Tiburon is the fourth largest incorporated city or town in the county by area (4.5 square miles) and the seventh largest by population, with just over 9,000 residents.[1] Belvedere, meanwhile, is the smallest Marin County jurisdiction by area (0.52 square miles) as well as the smallest by population (approximately 2,100 residents). Given that these jurisdictions have relatively similar geography, terrain, and low number of collisions, the two are analyzed together in this chapter.

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. It provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for Tiburon and Belvedere. For the purpose of this plan, only non-state roadways were considered; therefore any considerations around Tiburon Boulevard are not considered unless specified (see Section 8.4 for a collision analysis along Tiburon Boulevard).

1 United States Census Bureau 2021

8.2 VISION & GOALS

Tiburon and Belvedere's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the jurisdictions' commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

Tiburon and Belvedere strive to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

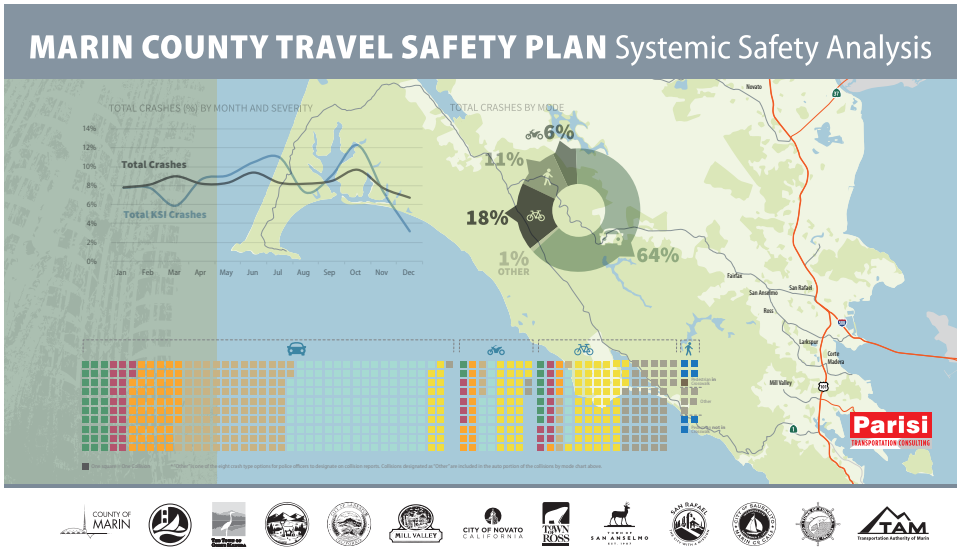
GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all residents.

8.3 EXISTING EFFORTS

In recent years, Tiburon and Belvedere's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Tiburon and Belvedere.

PLANS & STUDIES



Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Tiburon Bicycle & Pedestrian Master Plan Update (2016)

This plan is an update of the Town's bicycle and pedestrian master plan. It identifies existing and future needs as well as projects, policies, and programs to improve active transportation in Tiburon. The plan's goals are to increase bicycle and pedestrian access, improve bicycle transportation, and encourage pedestrian transportation.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

Crossing guards increase safety and comfort for students walking and rolling to school.

ENGINEERING IMPROVEMENTS

Tiburon Boulevard Pedestrian Crossing Improvements (Ongoing)

Caltrans has two projects planned to start construction in fall of 2022 to improve pedestrian safety along several locations along Tiburon Boulevard. The intersections of Stewart Drive and Tiburon Boulevard, Trestle Glen Boulevard and Tiburon Boulevard, as well as Ned's Way and Tiburon Boulevard will receive signal, signage, and striping improvements as part of this project.

Stewart Drive High Intensity Activated CrossWalK Signal (2023)

A High Intensity Activated CrossWalK (HAWK) signal was installed at the Tiburon Boulevard and Stewart Drive intersection to improve pedestrian safety at the intersection. This pedestrian-activated traffic control device gives drivers a red light, allowing pedestrians to safely cross Tiburon Boulevard.

Tiburon Boulevard/Blackfield Drive/Greenwood Cove Drive Reconstruction (2021)

A reconstruction project in Tiburon was completed in 2021. The project included removing pork-chop islands, tightening turning radii, shortening crosswalks, and improving traffic signal. Existing bicycle boxes were also retained as part of the project.

8.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified.

From 2017-2021, four reported injury collisions occurred in Tiburon and one injury collision occurred in Belvedere (Figure 8.1); there were no collisions resulting in severe injury or fatality in either jurisdiction. This represents a decrease in collisions for both jurisdictions compared to 2012-2016, down from five collisions in Tiburon and three in Belvedere during the previous period.

Figure 8.1: Belvedere & Tiburon collisions by severity

Primary Collision Factors

Four primary collision factors were responsible for 100% of collisions in Tiburon and Belvedere (Figure 8.2).

In Tiburon, half of collisions were caused by unsafe speed. One collision resulted from driving or bicycling under the influence of drugs or alcohol, and one was caused by improper turning.

Belvedere's one collision resulted from driving on the wrong side of the road.

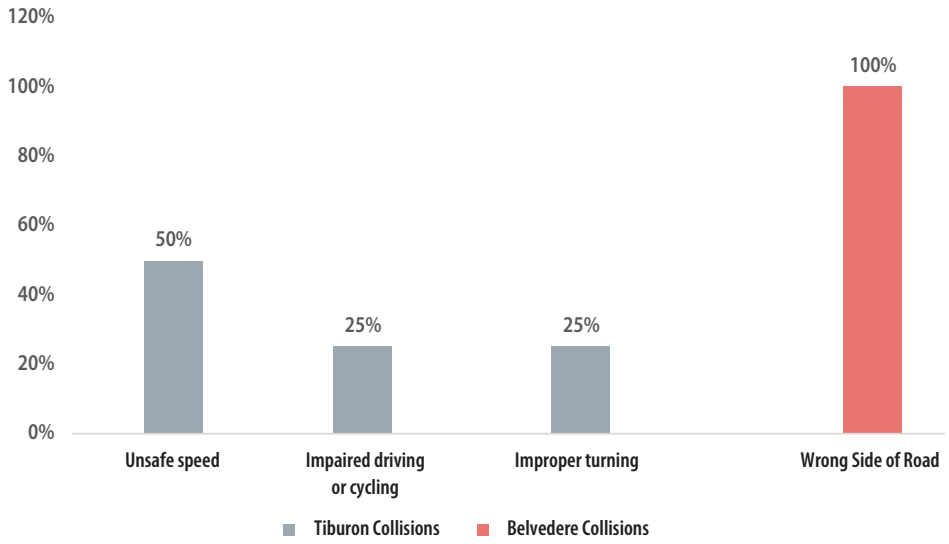


Figure 8.2: Top primary collision factors

Road User Types

Figure 8.3 shows collisions by mode for both Tiburon and Belvedere. Motor vehicle only collisions made up 50% of collisions in Tiburon and 100% of collisions in Belvedere. In Tiburon, both vehicle-only collisions involved solo vehicles, while the collision in Belvedere involved multiple vehicles. Two collisions in Tiburon (50%) involved bicyclists.

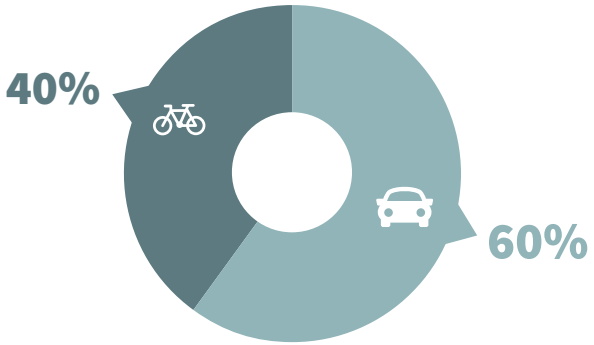


Figure 8.3: Tiburon & Belvedere collisions by mode

Equity Considerations

Owing to the low number of collisions, no trends regarding equity considerations could be determined.

External Conditions

Owing to the low number of collisions, no trends regarding external conditions could be determined.

Tiburon Boulevard

The focus of this analysis is non-state-owned roadways; however, when discussing collisions in Tiburon and Belvedere it would be remiss to ignore Tiburon Boulevard. Tiburon Boulevard is an important route for connecting Tiburon and Belvedere with the rest of Marin County. This section provides an analysis of Tiburon Boulevard from Highway 101 to Paradise Drive.

Fifty collisions occurred along Tiburon Boulevard from 2017-2021 (Figure 8.4). This included eight collisions resulting in a severe injury and zero fatalities. These collisions tended to be more closely spaced toward the western end of the segment. A hot spot of collisions was located between North Knoll Road and the Highway 101 ramps.

Tiburon Boulevard

Unsafe speed accounted for 54% of the collisions on this segment. This is drastically higher than the second most common primary collision factor, automobile right-of-way violations, which was responsible for 14% of collisions. Automobile right-of-way violations are when drivers did not yield to another driver with the right-of-way. Unsafe starting or backing caused 8% of collisions, while traffic signals and signs violations led to 6% of collisions. Together, these four primary collision factors were responsible for 82% of collisions on this roadway.

Of the 50 collisions, 86% involved motor vehicles only. Approximately 6% involved motorcyclists, while another 6% involved bicyclists and 2% involved pedestrians. The bicycle collisions occurred between North Knoll Road and Cecilia Way, while the motorcycle and pedestrian collisions were spread throughout the corridor. Caltrans is currently planning a State Highway Operation and Protection Program (SHOPP) project that will include the addition of Class IV bicycle lanes along Tiburon Boulevard.

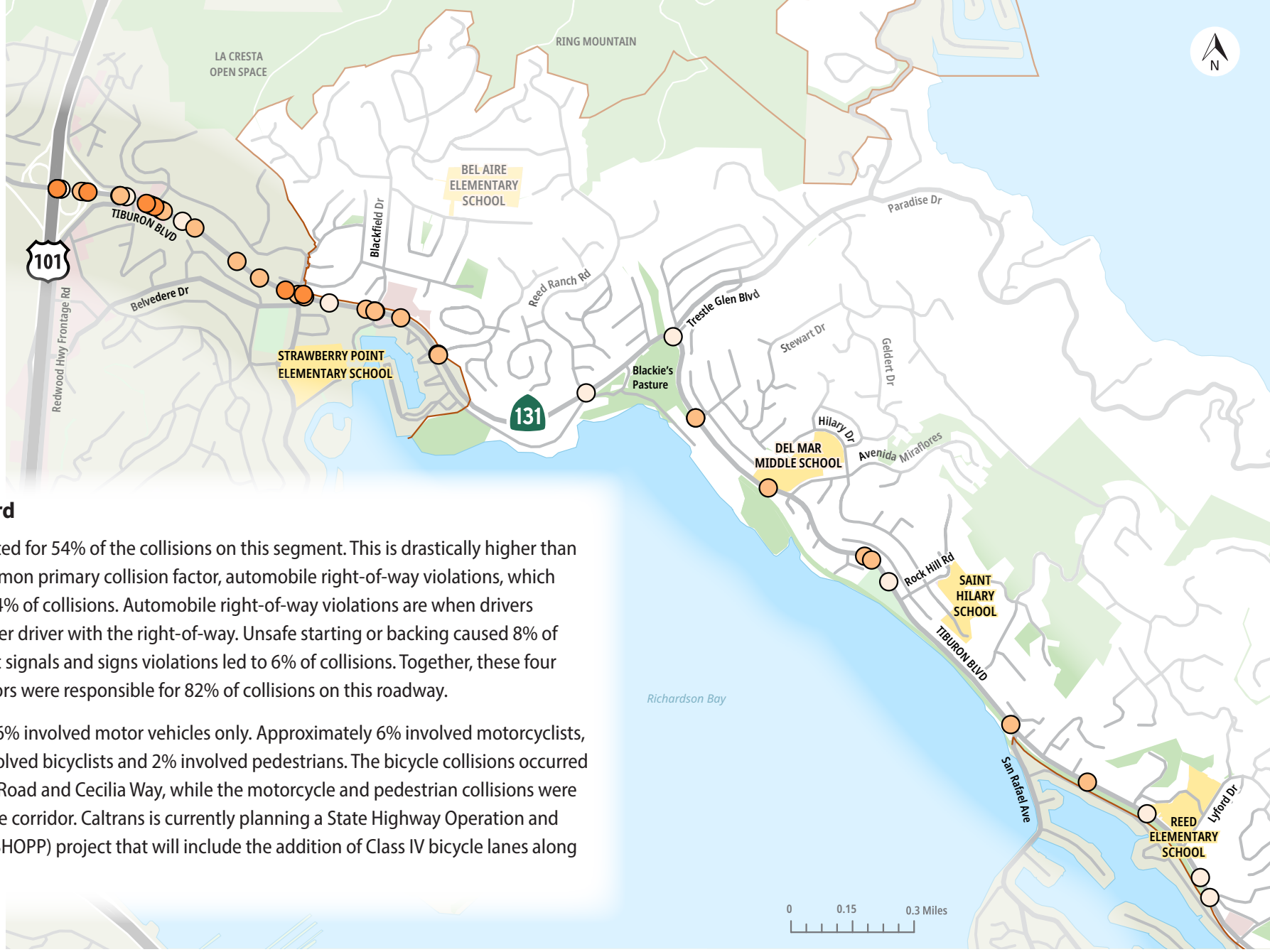


Figure 8.4: Tiburon Boulevard collisions by severity

High Collision Network

Owing to their low number of collisions, Tiburon and Belvedere did not feature any locations in the Marin County High Collision Network.

8.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for Tiburon and Belvedere in comparison to the County as a whole, which allowed for a larger sample size of collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Three primary emphasis areas were selected from this list for Tiburon based on the jurisdictions' collision trends, shown in Table 8.1. Owing to the low number of collisions in Belvedere (just three during 2012-2021), insufficient data existed to assess emphasis area trends for the City.

Approximately 11% of injury collisions in Tiburon from 2012-2021 involved a bicyclist; this is slightly higher than the County's rate of 9%. Given that Tiburon's roads are frequented by recreational bicyclists, this is an important emphasis area to address to improve road user safety.

Table 8.1: Tiburon primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	Bicyclists
Collision Factors	Unsafe Speed
Collision Types	Rear-End

Unsafe speed resulted in 58% of Tiburon's injury collisions, which is much higher than the countywide proportion of 28% for this collision factor. Paradise Drive was a hotspot of unsafe speed collisions. Approximately 58% of injury collisions were rear-end collisions, which is more than double the countywide proportion of 25%. Again, high numbers of rear-end collisions were located along Paradise Drive.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the County resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have further positive effects. Table 8.2 through Table 8.4 list the goals and strategies for Tiburon's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

Table 8.2: Tiburon bicyclist emphasis area goals & strategies

EMPHASIS AREA: BICYCLISTS

GOAL: Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts Marin safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of cyclist collision trends at hot spot locations to inform strategy implementation.

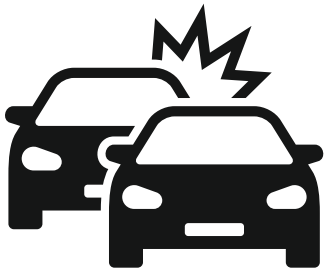
Table 8.3: Tiburon unsafe speed emphasis area goals & strategies

EMPHASIS AREA: UNSAFE SPEED

GOAL: Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, AB 321) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 8.4: Tiburon rear-end collision primary emphasis area goals & strategies



EMPHASIS AREA: REAR-END COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving rear end collisions by 2050.

STRATEGIES	
Education	• Partner with local businesses and community organizations to educate the public about distracted driving. • Expand the Street Smarts program.
Enforcement	• Equitably implement targeted distracted driving enforcement at high injury locations where rearend collisions are more common.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

8.6 PRIORITY PROJECTS

Owing to the low number and geographically dispersed nature of collisions in Tiburon and Belvedere, no priority projects have been identified at this time.

8.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

9. CORTE MADERA LOCAL ROAD SAFETY

9.1 INTRODUCTION

The Town of Corte Madera is located in central Marin County. The Town is bisected by Highway 101 and bordered by Larkspur and Mill Valley to the west, Tiburon to the south, San Rafael to the north, and the San Francisco Bay to the east. Corte Madera is the fifth largest incorporated city or town in Marin County by area, at 3.16 square miles. As of 2021 Corte Madera had a population of approximately 10,100 residents, which makes it the sixth most populous incorporated jurisdiction in Marin County.[1]

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the Town of Corte Madera.

9.2 VISION & GOALS

Corte Madera's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the town's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

1 United States Census Bureau 2021

VISION STATEMENT

The Town of Corte Madera strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Corte Madera residents.

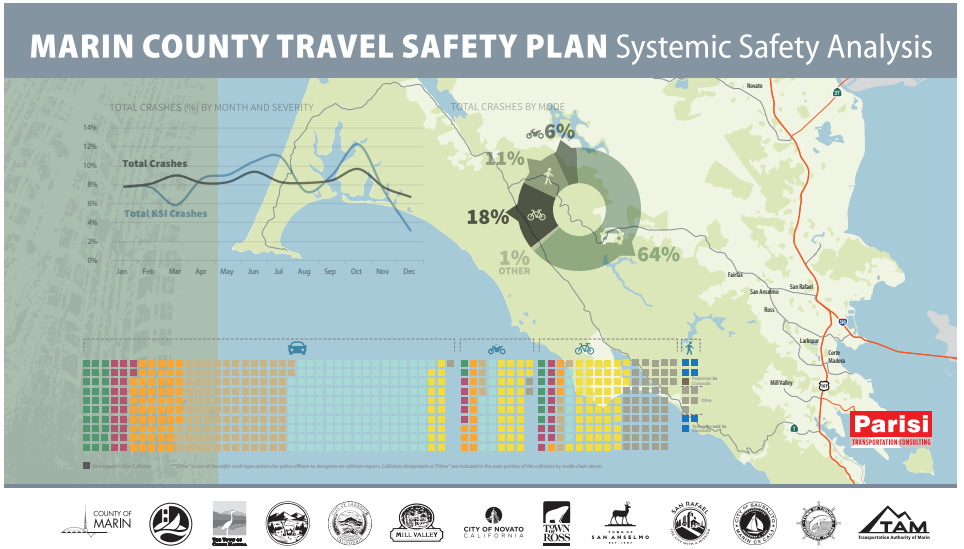
9.3 EXISTING EFFORTS

In recent years, Corte Madera's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Corte Madera.

PLANS & STUDIES

Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.



Bicycle and Pedestrian Plan (2016)

This plan was created to improve the Town's network for walking and bicycling by providing direction for future bicycle and pedestrian planning and meeting the guidelines of the California Active Transportation Program. Bikeway and pedestrian network information was gathered from meetings with the Corte Madera Bicycle Pedestrian Advisory Committee (BPAC) and Town staff and combined with information on proposed routes from the previously adopted Bicycle Transportation Plan (2008). Relevant bicycleway information was also gathered from the Marin County Unincorporated Area Bicycle and Pedestrian Master Plan (2008). Public input for the Plan was sought through public workshops, meetings, and social media.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

Crossing guards increase safety and comfort for students walking and rolling to school.

ENGINEERING IMPROVEMENTS

Central Marin Regional Pathway Gap Closure Project (Ongoing)

This project will close a gap in the active transportation network spanning five pathways and routes within a congested area that includes an interchange with Highway 101. The project will include widening an existing Class I pathway on Wornum Drive, installing a new class IV bicycle path on Nellen Avenue from Wornum Drive to Fifer Avenue, adding an enhanced crosswalk across Wornum Drive, and adding an enhanced crosswalk with a refuge island and Rectangular Rapid Flashing Beacons on Fifer Avenue. The project is currently in the design phase.

Paradise Drive Complete Street Project (Ongoing)

This project is currently in the design phase, which was initiated in 2021. It includes multimodal improvements along Paradise Drive from Westward Drive to the Town limit including a new multi-use path on the south side of the roadway and an enhanced crosswalk between Marin Montessori and Marin Country Day School.

Casa Buena Complete Streets Project (Ongoing)

This project, anticipated to be completed in summer 2024, includes sewer system repair and surface improvements along Casa Buena Boulevard. The surface improvements will fill a crucial gap in Marin County's primary North/South bicycle route, connecting the Horse Hill Class I Path (Mill Valley) to existing Class II bicycle lanes on Casa Buena Boulevard. The project will also fill sidewalk gaps along the corridor.

Tamal Vista Boulevard Complete Street Improvement Project (2020)

This project included roadway and sidewalk improvements on Tamal Vista Boulevard between Fifer Avenue and Madera Boulevard and all of Council Crest Drive. Improvements included adding Class II bicycle lanes, pedestrian refuge islands and rapid flashing beacons at crossings, new Americans with Disabilities Act (ADA) compliant ramps, and a bicycle left turn lane from the Wornum Drive intersection to the Sandra Marker trail. The project was completed in 2020.

Sidewalk Pilot Program

The Corte Madera Sidewalk Pilot Program contributes grant funds and resources to assist homeowners with their responsibility to maintain sidewalks and trees in a safe condition. Grant funds are awarded under several strategies: sidewalk grinding; Capital Improvement Program sidewalk replacement and repairs; individual sidewalk replacement; and sidewalk replacement projects (10-zone cycle).

9.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

From 2017-2021, 74 reported injury collisions occurred on non-state arterial and collector roadways in Corte Madera (Figure 9.1).

Figure 9.1: Corte Madera collisions by severity

Of these there were zero fatalities and eight collisions (11%) that resulted in a severe injury. This is nearly even with the number of collisions from 2012-2016, which included 76 injury collisions including five severe injury collisions. The percentage of collisions resulting in a severe injury increased by four percentage points in the more recent five-year study period.

Primary Collision Factors

Four primary collision factors were responsible for 71% of collisions in Corte Madera (Figure 9.2). Unsafe speeds resulted in 30% of collisions, compared to 26% of all countywide collisions. Automobile right of way violations led to 18% of collisions, while improper turning led to 14% of collisions in the Town. Pedestrian right-of-way violations resulted in 9% of collisions.

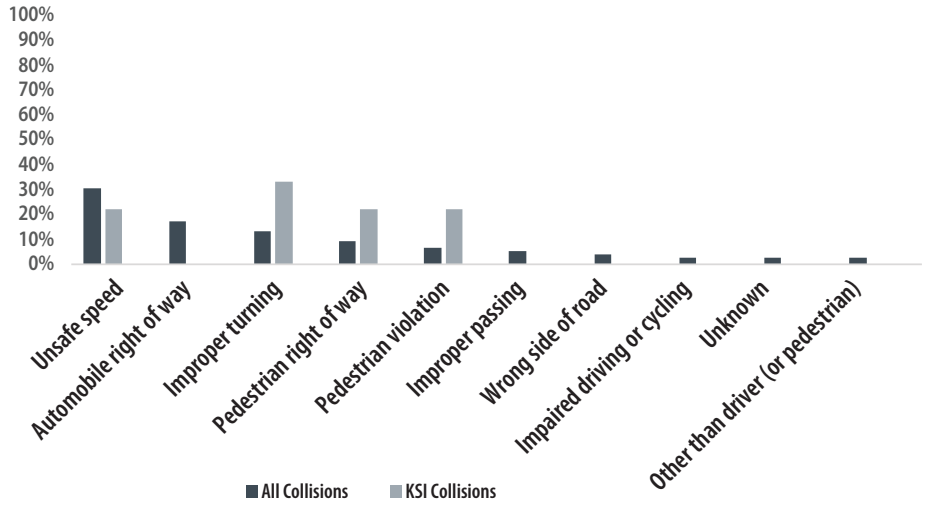


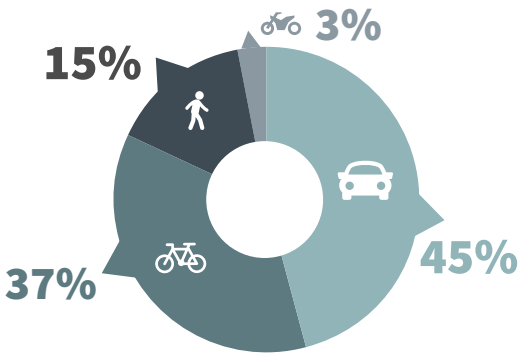
Figure 9.2: Top 10 primary collision factors

Road User Types

Figure 9.3 shows collisions by mode. Forty-five percent (45%) of collisions in Corte Madera involved vehicles only. A relatively high proportion (37%) involved bicyclists, compared to 19% of collisions countywide. Fifteen percent (15%) of collisions involved pedestrians and 3% involved motorcyclists. None of the vehicle-only collisions resulted in a severe injury. However, 14% of bicycle collisions and 36% of pedestrian collisions resulted in a severe injury.

Bicycle collisions tended to result from improper turning, unsafe speed, automobile right-of-way violations (where drivers did not yield to another driver with the right-of-way), and improper passing. Approximately 21% of collisions involving bicyclists were solo-bicycle collisions, which were primarily caused by unsafe speeds. Hotspots of bicycle collisions were located along Corte Madera Avenue and by the Park Madera Shopping Center on Tamalpais Drive.

Figure 9.3 Corte Madera collisions by mode



Among collisions involving pedestrians, 73% involved pedestrians who were crossing in a crosswalk at the time of the collision. Over half (55%) of collisions with pedestrians were caused by pedestrian right-of-way violations (where drivers did not yield to a pedestrian with the right-of-way), while the remaining 45% resulted from pedestrian violations, when pedestrian were deemed at fault. A pedestrian collision hotspot was located at the intersection of Tamalpais Drive and Eastman Avenue.

Equity Considerations

Bus stops located at the intersection of Tamalpais Drive and Eastman Avenue were near four pedestrian collisions during the study period. Two of these were pedestrian right-of-way violations, while the other two were pedestrian violations. These bus stops serve two transit routes: Golden Gate Transit Route 18, which connects the College of Marin to San Francisco; and Marin Transit Route 22, which operates between San Rafael and Marin City.

Youths under the age of 18 were involved in a higher percentage (11%) of collisions resulting in severe injury in the Town compared to the County as a whole (3%).

External Conditions

Seventeen percent (17%) of collisions occurred in low-visibility conditions. The majority of these – 12% of all collisions – occurred in the dark but in the presence of streetlights, while the remainder – 5% of all collisions - occurred at dusk or dawn when streetlights may not yet have been activated.

High Collision Network

Corte Madera's High Collision Network is shown in Figure 9.4, Table 9.1, and Table 9.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations and through discussions with jurisdictions.

Figure 9.4: Corte Madera High Collision Network

LEGEND

HCN Intersection | HCN Segment | Boundary

Table 9.1: Corte Madera High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Tamal Vista Boulevard/Fifer Avenue from Wornum Drive to Lucky Drive	2	2	1	5	**10**	**183.6**
2	Tamalpais Drive from Willow Avenue to Highway 101 Ramp	6	7	0	9	**22**	**77.6**

Table 9.2: Corte Madera High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Tamalpais Drive & Willow Avenue	0	2	0	0	**2**	**3.6**
B	Tamal Vista Boulevard & Fifer Avenue	0	0	0	1	**1**	**3.3**
C	Corte Madera Avenue & Redwood Avenue	0	0	0	1	**1**	**1.9**

The Town's High Collision Network includes two segments: Tamal Vista Boulevard/Fifer Avenue from Wornum Drive to Lucky Drive and Tamalpais Drive from Willow Avenue to the Highway 101 Ramp. The Tamal Vista Boulevard/Fifer Avenue segment has a collision rate of 183.6 collisions per 100 million vehicle miles travelled, the 25th highest rate among the 70 countywide High Collision Network segments. The Tamalpais Drive segment has a rate of 77.6 collisions per 100 million vehicle miles traveled, ranking 50th countywide. Approximately 60% of the Tamalpais Drive segment's 22 collisions involved a pedestrian or bicyclist.

Corte Madera's High Collision Network also includes three intersections: Tamalpais Drive and Willow Avenue, Tamal Vista Boulevard and Fifer Avenue, and Corte Madera Avenue and Redwood Avenue. These intersections have collision rates of 3.6, 3.3, and 1.9 collisions per 100 million entering vehicles, respectively, and are among the lowest of the County's 92 High Collision Network intersections.

9.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for Corte Madera in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Four primary emphasis areas were selected from this list for Corte Madera based on the Town's collision trends, shown in Table 8.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 9.3: Corte Madera primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Pedestrians** **Bicyclists**
Collision Factors	**Improper Turning**
External Conditions	**Dark Conditions**

Approximately 20% of injury collisions in Corte Madera involved a bicyclist; this includes 42% of KSI collisions. These rates are considerably higher than Marin County, where bicycle collisions made up 9% of injury collisions and 17% of KSI collisions.

Pedestrians were involved in 8% of injury collisions and 33% of KSI collisions. The latter rate is almost three times the rate of pedestrian-involved countywide KSI collisions.

Improper turning resulted in 13% of Corte Madera's injury collisions. This collision factor caused approximately one-third of the Town's KSI collisions, which is higher than the countywide proportion of 19%. Improper turning collisions were spread throughout the Town, with a hotspot located in front of the Park Madera Shopping Center on Tamalpais Drive.

A significant number of collisions in Corte Madera occurred under dark lighting conditions.

One-third of KSI collisions occurred during dark conditions. This includes 11% that occurred during dusk or dawn, compared to just 3% of countywide KSI collisions that occurred during these times of day. Collisions during dark conditions tended to be clustered along Tamalpais Drive between Willow Avenue and Lakeside Drive.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the Town resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 9.4 through Table 9.7 list the goals and strategies for Corte Madera's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

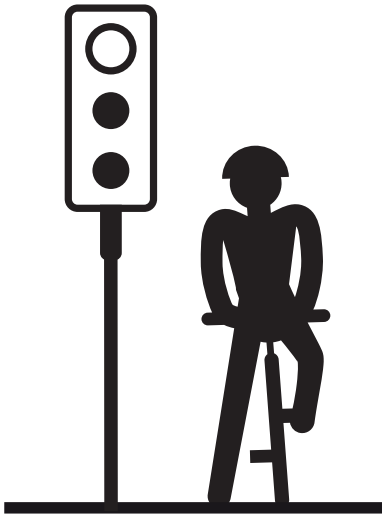
Table 9.4: Corte Madera pedestrian emphasis area goals & strategies

EMPHASIS AREA: PEDESTRIANS

GOAL: Eliminate fatal & severe injury collisions involving pedestrianss by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of pedestrian collision trends at hot spot locations to inform strategy implementation.

Table 9.5: Corte Madera bicyclist emphasis area goals & strategies

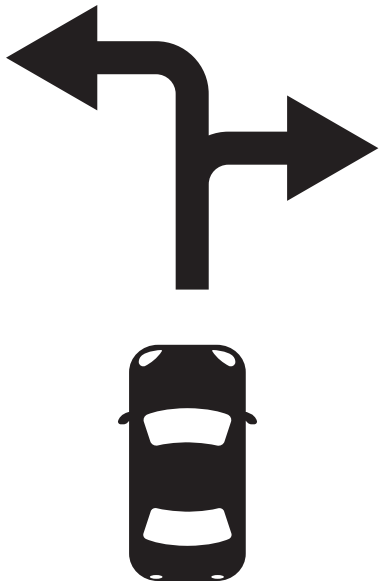


EMPHASIS AREA: BICYCLISTS

GOAL: Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of bicyclist collision trends at hot spot locations to inform strategy implementation.

Table 9.6: Corte Madera improper turning emphasis area goals & strategies

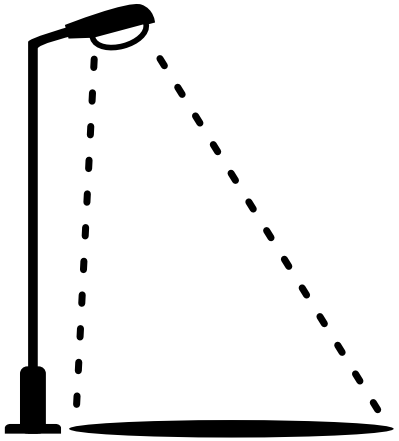


EMPHASIS AREA: IMPROPER TURNING

GOAL: Eliminate fatal & severe injury collisions improper turning by 2050.

STRATEGIES	
Education	• Expand Street Smarts program with an emphasis on avoiding distracted driving.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from improper turning.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns such as curb radius. reduction, left turn hardening, protected intersections/corners, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 9.7: Corte Madera dark conditions emphasis area goals & strategies



EMPHASIS AREA: DARK CONDITIONS

GOAL: Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

9.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the Town, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In Corte Madera, the priority location and projects are as follows:

Tamalpais Drive & Willow Avenue (Intersection)

- **Pedestrian Crossing Improvements**
  Pedestrian crossing improvements that could be considered at this intersection include bulb-outs and directional curb ramps. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Potential bicycle improvements could include installing continuous bicycle lanes on Tamalpais Drive. Adding dedicated bicycle facilities can lessen the chances of collisions involving motor vehicles overtaking bicyclists.

9.7 IMPLEMENTATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

10. FAIRFAX LOCAL ROAD SAFETY PLAN

10.1 INTRODUCTION

The Town of Fairfax is located in central Marin County. The Town is intersected by Sir Francis Drake Boulevard, which connects West Marin to the more populated eastern side of the County. It is bordered by San Anselmo to the east and Unincorporated Marin County on all other sides. Fairfax is the eighth largest incorporated Marin County city or town by area, at 2.2 square miles, and the eighth largest in terms of population with a population of approximately 7,500 residents[1].

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the Town of Fairfax.

1 United States Census Bureau 2021

10.2 VISION & GOALS

Fairfax's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the town's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

The Town of Fairfax strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

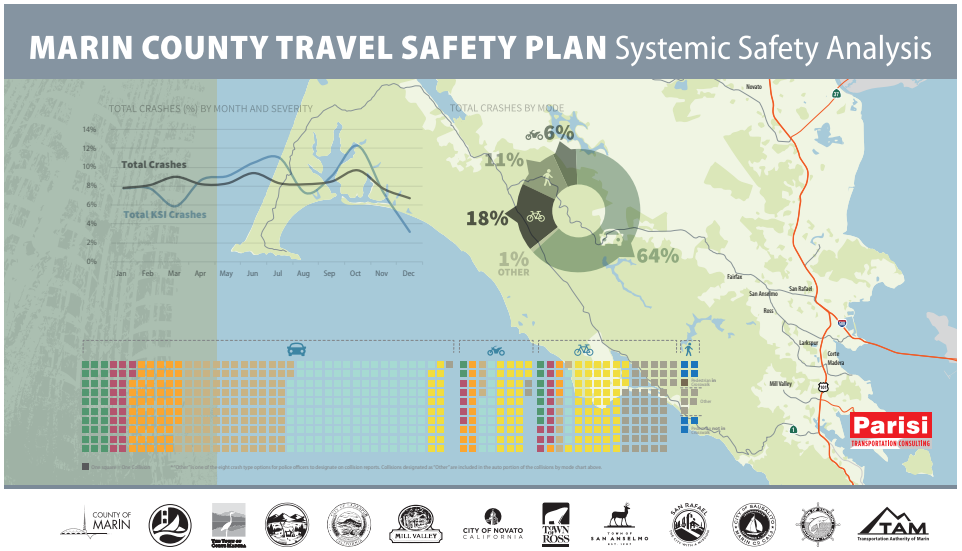
GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Fairfax residents.

10.3 EXISTING EFFORTS

In recent years, Fairfax's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Fairfax.

PLANS & STUDIES



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Bicycle and Pedestrian Plan Update (2016)

This plan provides for a Town-wide active transportation network of bicycle and pedestrian paths, lanes and routes, along with bicycle- and pedestrian-related programs and support facilities, intended to ensure bicycling and walking are viable transportation options for people who live, work, and recreate in Fairfax. The purpose of this Plan is to improve bicycle and pedestrian transportation in Fairfax by providing direction for future bicycle and pedestrian planning and meeting the guidelines of the California Active Transportation Program. The plan was created with input from the Fairfax Bicycle/Pedestrian Advisory Committee, Town staff, and the public, and builds on prior plans.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

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TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

10.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured).

From 2017-2021, 63 reported injury collisions occurred on non-state arterial and collector roadways in Fairfax (Figure 10.1). Of these, there were zero fatalities and four collisions (6%) that resulted in a severe injury. This marks a slight decrease from 2012-2016, which saw 67 collisions. It also marks a seven-percentage point decrease in the percentage of KSI collisions compared to the previous five-year period.

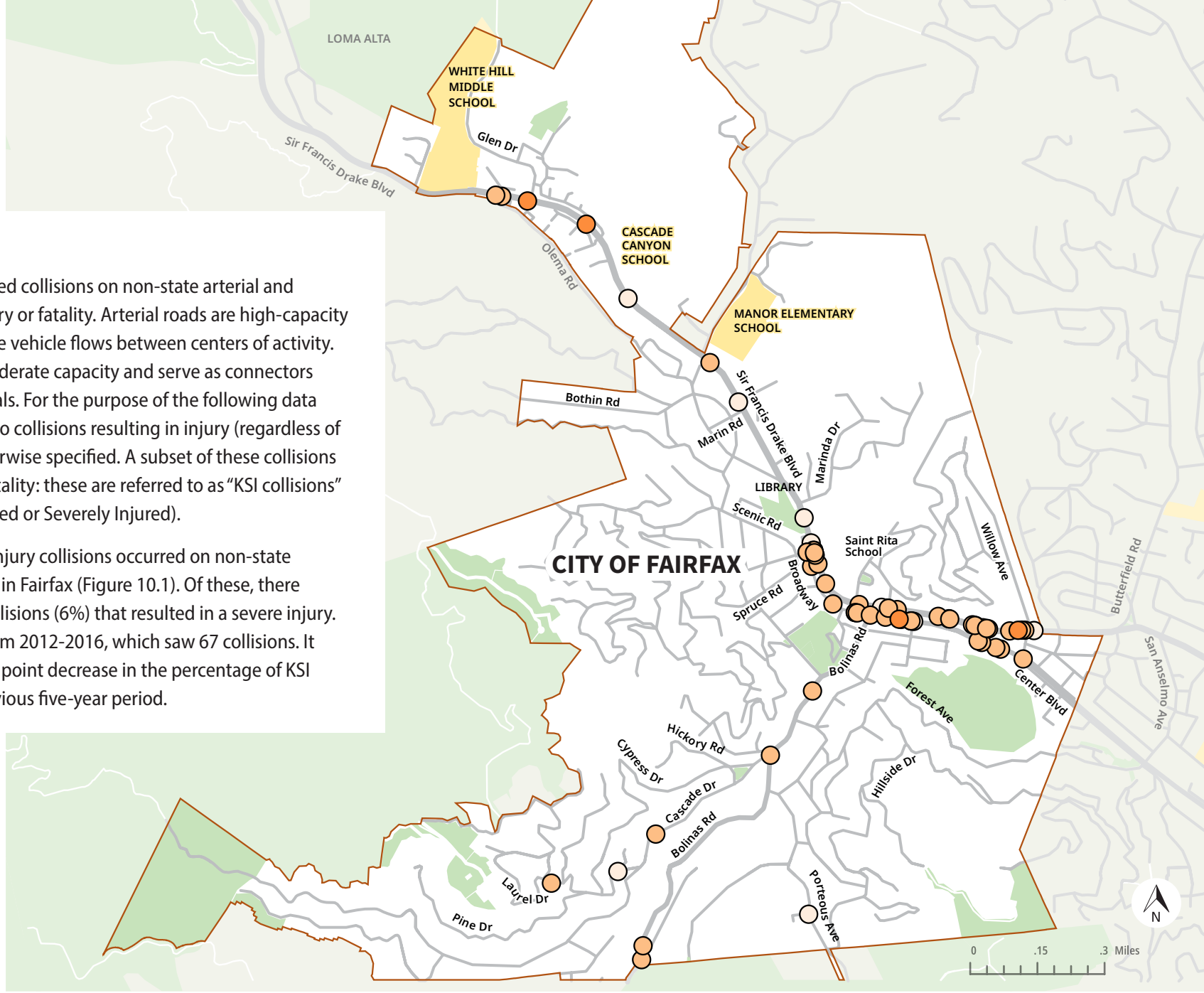


Figure 10.1: Fairfax collisions by severity

Primary Collision Factors

Four primary collision factors were responsible for approximately 65% of collisions in Fairfax (Figure 10.2). Unsafe speeds resulted in 27% of collisions, while improper turning resulted in 16%. Following too closely and pedestrian right-of-way violations each resulted in 11% of the Town's collisions, rates that are above the County's for these collision factors (2% and 8%, respectively). Half of collisions resulting in a severe injury resulted from a pedestrian right-of-way violation. Pedestrian right-of-way violations occurred when drivers did not yield to a pedestrian with the right-of-way.

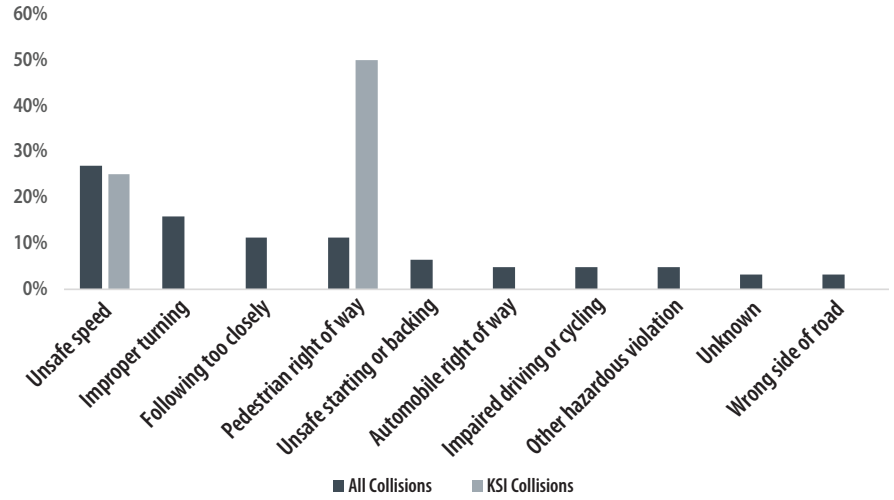


Figure 10.2: Top 10 primary collision factors

Road User Types

Figure 10.3 shows collisions by mode. 48% of collisions in Fairfax involved vehicles only. Almost one-third (32%) involved bicyclists: this is higher than the countywide rate of 19%. Sixteen percent (16%) of collisions involved pedestrians, while 5% involved motorcyclists. None of the vehicle-only collisions resulted in a severe injury or fatality. However, two collisions involving a pedestrian and one each involving a bicyclist and a motorcyclist resulted in a severe injury.

Of Fairfax's 21 collisions involving a bicyclist, 18 involved motor vehicles, two were solo bicyclist collisions, and one involved a bicyclist and a pedestrian. Almost 30% of bicycle collisions were caused by improper turning, while approximately 15% each resulted from unsafe starting or backing, unsafe speeds, and other hazardous violations.

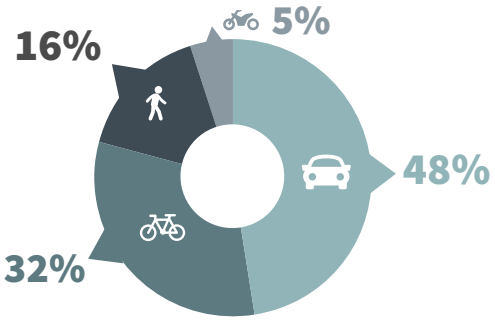


Figure 10.3:
Fairfax collisions by mode

Hot spots of bicycle collisions were located at the intersection of Sir Francis Drake Boulevard and Azalea Avenue as well as on Broadway between Mono Avenue and Bolinas Road.

Eighty percent (80%) of pedestrians involved in collisions were crossing in a crosswalk at the time of the collision. Seventy percent (70%) of collisions with pedestrians were caused by pedestrian right-of-way violations, while the remaining 30% was evenly split among unsafe speeds, unsafe starting or backing, and pedestrian violations (when pedestrian were deemed to be at fault). A pedestrian collision hot spot was located along Center Boulevard/Broadway between Merwin Avenue and Pacheco Avenue.

Equity Considerations

One pedestrian collision each occurred in proximity to three transit stops in the Town of Fairfax. Downtown, these stops were located at the Bolinas Road and Broadway intersection. To the north, the transit stop at Sir Francis Drake Boulevard and Glen Drive was also the site of a collision with a pedestrian. While it is unclear whether these collisions involved transit users, pedestrian collisions near transit stops can be seen as equity concerns.

Youths and older adults were involved in a higher percentage of KSI collisions compared to countywide rates. Seventeen percent (17%) of KSI collisions in Fairfax involved youths, compared to only 3% of KSI collisions at the countywide level. The proportion of KSI collisions that involved older adults was slightly higher than the County as a whole at 13% and 11%, respectively.

External Conditions

Approximately 27% of collisions occurred in low-visibility conditions. The majority of these, accounting for 20% of all collisions, occurred in the dark but in the presence of streetlights, while most of the remainder occurred at dusk or dawn when streetlights may not have been activated. One collision occurred along Cascade Drive in the dark where no streetlights were present.

High Collision Network

Fairfax's High Collision Network is show in Figure 10.4, Table 10.1, and Table 10.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations and refined following discussions with the jurisdictions.

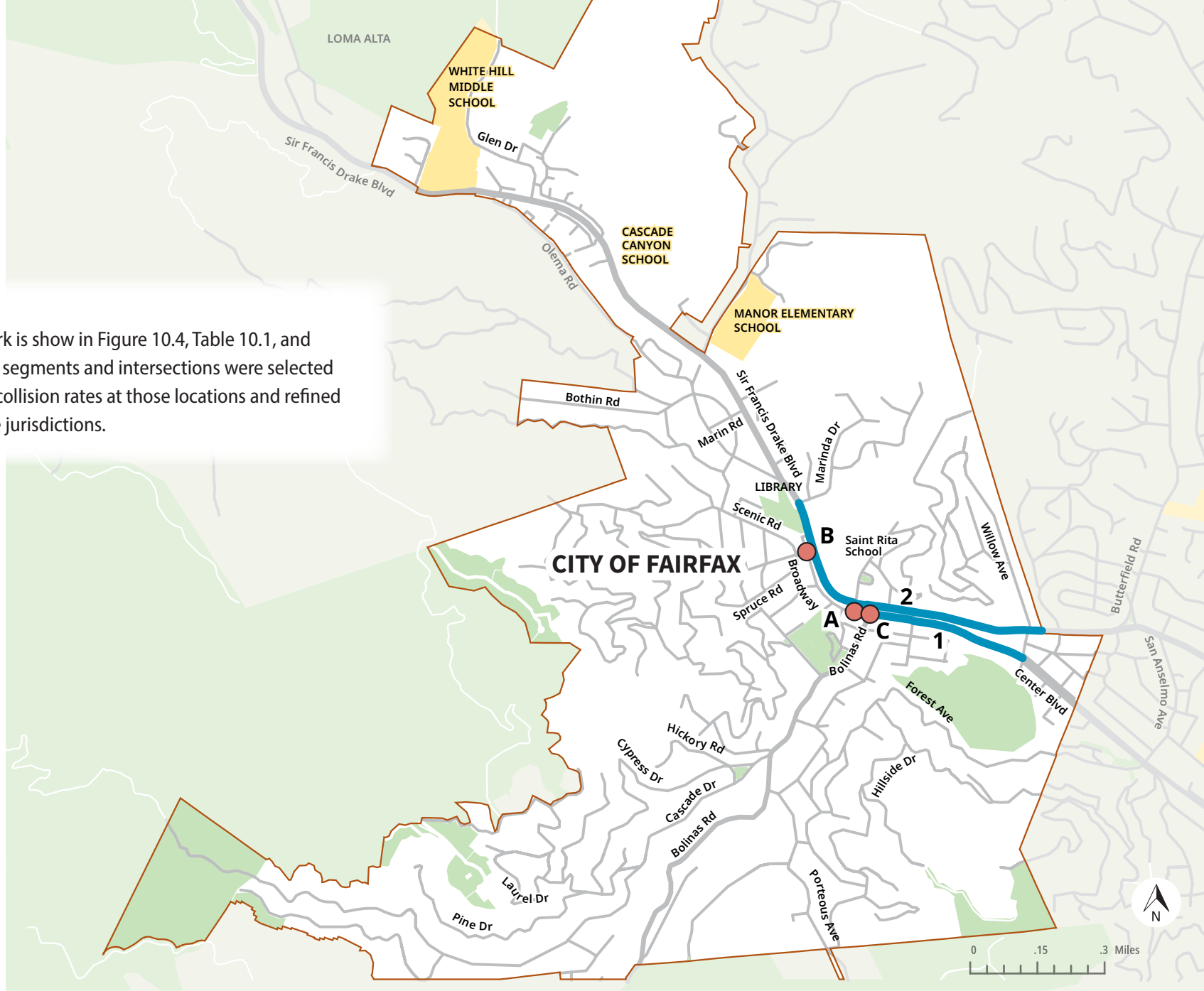


Figure 10.4: Fairfax's high collision network

Table 10.1: Fairfax High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Center Boulevard/ Broadway from Pastori Avenue to Claus Drive	5	7	1	3	**16**	**198.4**
2	Sir Francis Drake Boulevard from Marinda Drive to Town Border	2	9	1	17	**29**	**140.2**

Table 10.2: Fairfax High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Broadway & Claus Drive	0	2	0	0	**2**	**19.9**
B	Broadway & Azalea Avenue	0	1	0	1	**2**	**18.3**
C	Broadway & Bolinas Avenue	1	0	0	0	**1**	**4.2**

The Town's High Collision Network includes two segments: Center Boulevard/ Broadway from Pastori Avenue to Claus Drive and Sir Francis Drake Boulevard from Marinda Drive to the Town border. The Center Boulevard/Broadway segment has a collision rate of approximately 198 collisions per 100 million vehicle miles traveled (VMT), the twenty-second highest rate among the 70 countywide High Collision Network segments. The Sir Francis Drake Boulevard segment has a rate of 140 collisions per 100 million vehicle miles traveled, ranking 30th countywide. Both segments have a relatively high number of collisions involving active transportation users, with 12 in the former segment and 11 along the latter.

Fairfax's High Collision Network also includes three intersections: Broadway and Claus Drive, Broadway and Azalea Avenue, and Broadway and Bolinas Road. These intersections have collision rates of 19.9, 18.3, and 4.2 collisions per 100 million entering vehicles, respectively. The Claus Drive and Azalea Avenue intersections are in the top 30 of the county's 92 High Collision Network intersections and were sites of collisions involving bicyclists. All three intersections had a relatively low number of collisions compared to intersections elsewhere in the county.

10.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for Fairfax in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Four primary emphasis areas were selected from this list for Fairfax based on the Town's collision trends, shown in Table 10.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 10.3: Fairfax primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	Pedestrians
Collision Factors	Improper Turning Unsafe Speed
External Conditions	Dark Conditions

Almost 8% of injury collisions in Fairfax from 2012-2021 involved a pedestrian; this represents almost 14% of collisions resulting in a severe injury or fatality in the Town. These rates are higher than Marin County, where pedestrian collisions made up 12% of collisions resulting in KSI collisions.

Improper turning resulted in 18% of Fairfax's injury collisions and one-third of its KSI collisions. Countywide, meanwhile, this collision factor was only responsible for 19% of KSI collisions. Improper turning collisions were spread throughout the Town with a hotspot Downtown and several collisions along Bolinas Road.

Unsafe speed accounted for about one quarter of injury collisions and approximately 13% of KSI collisions. While these rates are not higher than countywide rates, speeding is a significant concern for the Town, particularly downtown along Sir Francis Drake Boulevard.

Approximately 27% of KSI collisions occurred during dark conditions. Twenty-five percent (25%) of these KSI collisions occurred in the presence of streetlights, compared to 22% of countywide KSI collisions. Collisions during dark conditions tended to be clustered downtown along Sir Francis Drake Boulevard and Broadway.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the Town resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 10.4 through Table 10.7 list the goals and strategies for Fairfax's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

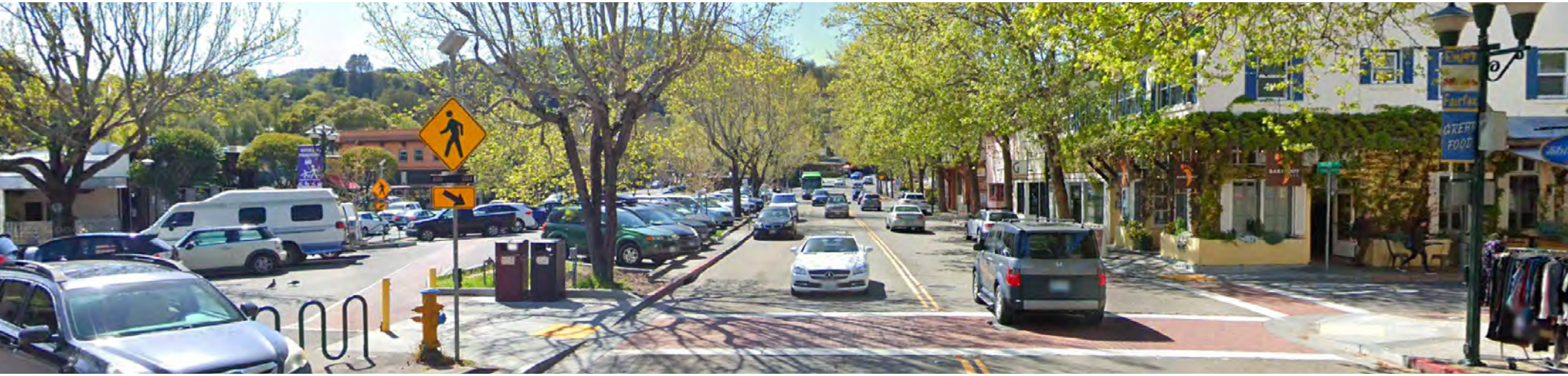


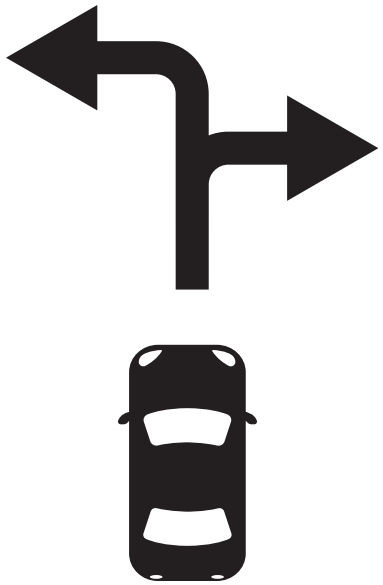
Table 10.4: Fairfax vulnerable primary emphasis area goals & strategies

EMPHASIS AREA: PEDESTRIANS

GOAL: Eliminate fatal & severe injury collisions involving pedestrianss by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of pedestrian collision trends at hot spot locations to inform strategy implementation.

Table 10.5: Fairfax improper turning emphasis area goals & strategies



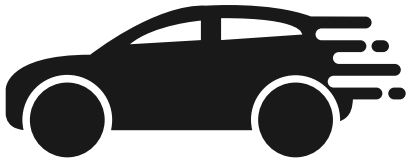
EMPHASIS AREA: IMPROPER TURNING

GOAL: Eliminate fatal & severe injury collisions improper turning by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program with an emphasis on avoiding distracted driving.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from improper turning.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns such as curb radius. reduction, left turn hardening, protected intersections/corners, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 10.6: Fairfax unsafe speed emphasis area goals & strategies

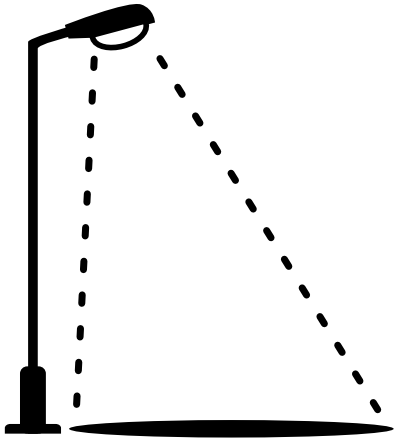
EMPHASIS AREA: UNSAFE SPEED



GOAL: Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, 2021) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 10.7: Fairfax dark conditions emphasis area goals & strategies



EMPHASIS AREA: DARK CONDITIONS

GOAL: Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• Implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

10.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the Town, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In Fairfax, the priority locations and projects are as follows:

Center Boulevard/Broadway from Pastori Avenue to Claus Drive (Segment)

- **Pedestrian Crossing Improvements**
  Several pedestrian crossing improvements could be considered along this corridor including advanced stop bars, improved signage, and rectangular rapid flashing beacons (RRFBs) where appropriate. These could improve pedestrian crossings by emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Consider extending the existing dedicated bicycle lane on Center Boulevard west past Pacheco Avenue on Broadway. Adding dedicated bicycle facilities, if feasible, can lessen the chance of conflicts and collisions involving motor vehicles overtaking bicyclists.

Sir Francis Drake Boulevard from Marinda Drive to the Town border (Segment)

- **Traffic Signals Improvements**
  Signalization improvements may include upgrading signals to 12" LED modules, lengthening clearance intervals, and installing adaptive traffic control.
- **Pedestrian Crossing Improvements**
  Several pedestrian crossing improvements could be considered along this corridor including advanced stop bars, directional curb ramps, median refuge islands, and reduced curb radii. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Consider adding bicycle facilities, if feasible. Adding dedicated bicycle facilities can lessen the chance of conflicts and collisions involving motor vehicles overtaking bicyclists.

10.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

11. LARKSPUR LOCAL ROAD SAFETY

11.1 INTRODUCTION

The City of Larkspur is located in central Marin County. The City's segment of Sir Francis Drake Boulevard serves as a key connector between Highway 101 and Interstate 580, while the city itself is intersected by Highway 101. It is bordered by San Rafael and unincorporated Marin County to the north, Corte Madera and Mill Valley to the south, and unincorporated Marin County to the west. Larkspur is the sixth largest Marin County incorporated city or town by area, at three square miles, and the fourth largest in terms of population with a population of approximately 13,000 residents.[1] Larkspur has the second highest population density of any incorporated Marin County city or town, with almost 4,300 residents per square mile.

A Local Road Safety Plan (LRSP) provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the City of Larkspur.

1 United States Census Bureau 2021

11.2 VISION & GOALS

Larkspur's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the city's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

The City of Larkspur strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

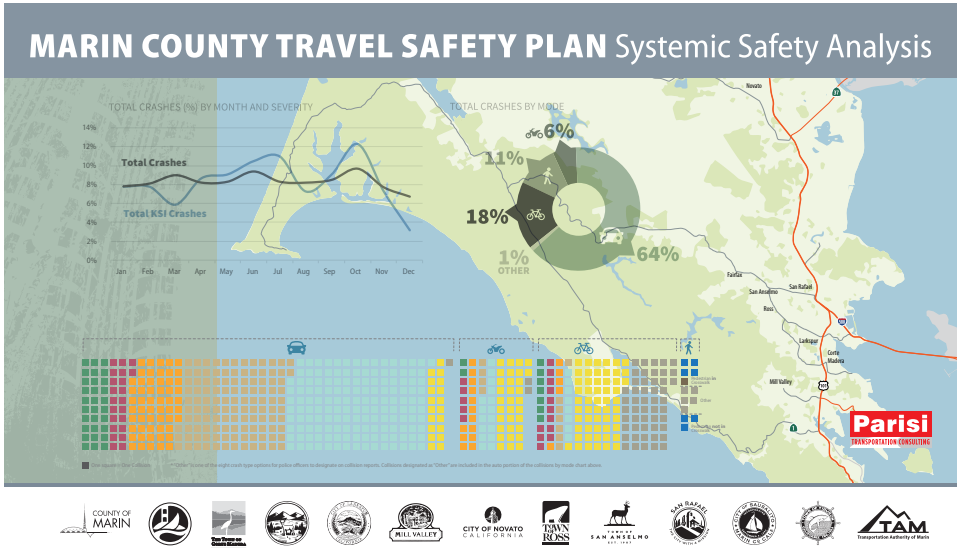
GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Larkspur residents.

11.3 EXISTING EFFORTS

In recent years, Larkspur's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Larkspur.

PLANS & STUDIES



Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Bicycle and Pedestrian Master Plan Update (2017)

This plan was developed to identify Larkspur's existing network of bicycle and pedestrian facilities and multi-use paths, lay the framework for future facilities, and develop policies that will work towards making bicycling and walking an integral part of transportation and daily life in Larkspur. The purpose of the plan is to coordinate and guide the provision of all bicycle and pedestrian related plans, programs, and projects in Larkspur. It is intended to assist the City in the implementation of its priorities but does not mandate any particular action on its part.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

Crossing guards provide safety and comfort for students walking and rolling to school.

ENGINEERING IMPROVEMENTS

Doherty Drive at Redwood High School Safe Pathways (Ongoing)
This project will provide crosswalk, sidewalk, pathway, and bicycle lane improvements to increase pedestrian and bicyclist safety in front of Redwood High School. The construction schedule has not yet been finalized.

Bon Air Road Bridge Replacement Project (2022)
After a multi-year process, Bon Air Road saw the completion of the new multimodal bridge in 2022. The bridge serves as a critical connection across Corte Madera Creek and fills a gap in the pedestrian and bicycle network. The bridge has new wide sidewalks and bicycle lanes that better connect pathways, trails, and bicycle lanes to schools, businesses, and the surrounding neighborhoods.

Magnolia Avenue Complete Streets Project (2022)
In 2022, Magnolia Boulevard in Larkspur received multimodal infrastructure upgrades, including pedestrian enhancements, bicycle lane improvements, and traffic calming. The complete streets opportunity was used to add more than a mile of new bicycle lanes and upgraded buffered bicycle lanes, enhanced pedestrian crossings, and improved vehicle travel lanes. Near Marin Primary & Middle School, several uncontrolled pedestrian crossings were also enhanced with traffic calming features including painted bulb-outs and reflective delineator posts. Connected to the new bridge, the intersection of Bon Air Road and Magnolia Boulevard also received a variety of multimodal safety enhancements. The new intersection design replaces the previous yield-controlled vehicle right-turn slip lanes with protective islands to remove this pedestrian-vehicle conflict zone, to provide a dedicated space for people on bicycles to maneuver through the intersection, and to make vehicle right turns safer.

Doherty Drive Complete Streets Projects (2022)
Doherty Drive benefited from several multimodal infrastructure upgrades in 2022, including pedestrian enhancements, bicycle lane improvements, and traffic calming. A 1,300-foot-long separated two-way bicycleway was completed in front of the Redwood High School; buffered bicycle lanes were installed throughout Doherty Drive; and other improvements were made to the corridor using the Transportation Authority of Marin's Measure A and AA Safe Pathways to Schools funding. This project closes a crucial gap in the bicycle network. Enhancements were also made to the uncontrolled pedestrian crossing at Rose Lane.

Sir Francis Drake Boulevard Corridor Rehabilitation (2021)
Completed in coordination with TAM, this regional project rehabilitated 2.2 miles of Sir Francis Drake Boulevard between Highway 101 and the Ross town limits. In addition to repaving, the project consisted of pedestrian safety improvements, striping, intersection and signal improvements, traffic operation improvements, utility infrastructure improvements, and new street lighting.

South Eliseo Drive Accessibility Improvement Project (2020)
This Capital Improvement Project calmed traffic and improved pedestrian safety through improvements including splitter islands, ADA-compliant curb ramps, and crosswalks. It was completed in 2020.

Magnolia/Madrone Intersection Improvements (2018)
This project aimed to improve intersection and crosswalk safety by installing crosswalk enhancements including rectangular rapid flashing beacons and other intersection modifications. Construction was completed in fall 2018.

Recent improvements at the intersection of Magnolia Avenue and Bon Air Road included a bicycle lane and traffic calming.

11.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

From 2017-2021, 93 injury collisions occurred on non-state arterial and collector roadways in Larkspur (Figure 11.1). Of these, there were zero fatalities and eight collisions (9%) that resulted in a severe injury. This marks an increase from 2012-2016, which saw 89 injury collisions. It also marks an increase in the percentage of collisions resulting in a severe injury compared to the previous five-year period, which had 4%.

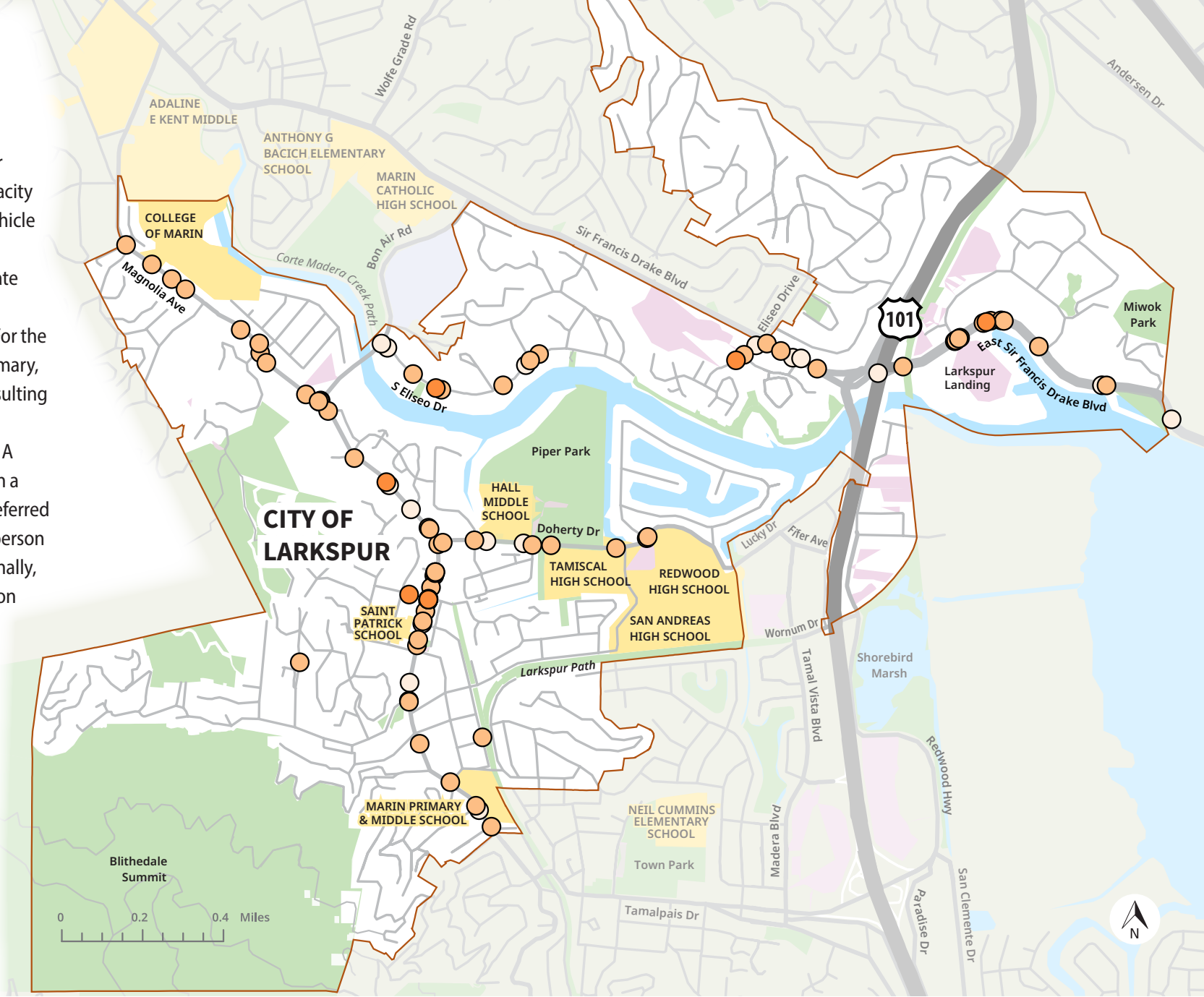


Figure 11.1: Larkspur collisions by severity

Primary Collision Factors

Four primary collision factors were responsible for approximately 63% of collisions in Larkspur (Figure 11.2). Unsafe speeds resulted in almost 38%, which is a far larger proportion than any of the other primary collision factors and surpassing the County's rate for collisions caused by unsafe speeds (26%). Surprisingly, this primary collision factor was not responsible for any severe injury collisions. Automobile right-of-way violations, pedestrian right-of-way violations (where drivers did not yield to a pedestrian with the right-of-way), and improper turning resulted in 10%, 9%, and 8% of collisions, respectively. Pedestrian right-of-way violations led to a high percentage (38%) of collisions resulting in a severe injury.

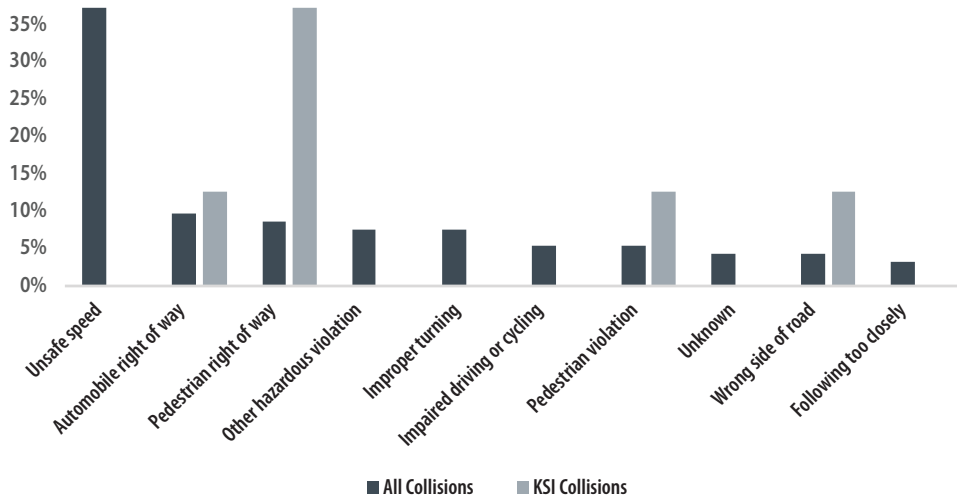


Figure 11.2: Top 10 primary collision factors

Road User Types

Figure 11.3 shows collisions by mode. Approximately 43% of collisions in Larkspur involved vehicles only, which is a lower proportion than the County as a whole. Conversely, 37% of collisions in Larkspur involved bicyclists, compared to only 19% countywide. The proportion of collisions involving pedestrians was also higher, at 17% compared to 14% countywide. One vehicle-only collision, two bicyclist collisions, and five pedestrian collisions resulted in a severe injury.

Of Larkspur's 34 collisions involving a bicyclist, 19 involved motor vehicles and 15 were solo bicyclist collisions. Bicycle collisions with motor vehicles tended to result equally from either unsafe speed, automobile right-of-way violations (where drivers did not yield to another driver with the right-of-way), and other hazardous violations. Almost half of solo bicyclist collisions were caused by unsafe speed. A hotspot of bicycle collisions was located along Magnolia Avenue between Doherty Drive and William Avenue.

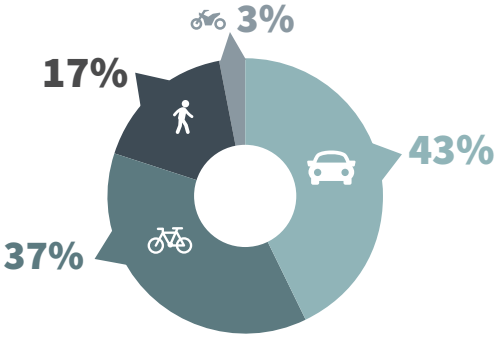


Figure 11.3:
Larkspur collisions by mode

Approximately 57% of pedestrians involved in collisions were crossing in a crosswalk at the time of the collision. Half of collisions with pedestrians were caused by pedestrian right-of-way violations, while 25% resulted from pedestrian violations, collisions for which pedestrians were deemed at fault. A pedestrian collision hotspot was located at the intersection of Magnolia Avenue and Ward Street.

Equity Considerations

A relatively high number of pedestrian collisions – five collisions resulting in seven injured people – occurred within 100 feet of the transit stops at the intersection of Magnolia Avenue and Ward Street. These stops are currently served by Marin Transit Route 22, which connects San Rafael to Marin City. One transit stop at Magnolia Avenue and Madrone Avenue was proximate to one pedestrian collision and another transit stop on South Eliseo Drive west of Via Belardo was also in proximity to one pedestrian collision. While it is unclear whether these collisions involved transit users, pedestrian collisions near transit stops can be considered equity concerns.

Youths and senior citizens were involved in a higher percentage of injury collisions compared to countywide rates. Ten percent (10%) of collisions in Larkspur involved youths and 32% involved older adults, compared to countywide rates of 7% and 20%, respectively.

External Conditions

Approximately 22% of collisions occurred in low-visibility conditions. The majority of these – 17% of all collisions – occurred in the dark but in the presence of streetlights, while most of the remainder occurred at dusk or dawn when streetlights may not have been activated. One collision occurred at the intersection of Magnolia Avenue and Wiltshire Avenue in the dark where no streetlights were present.

High Collision Network

Larkspur's High Collision Network is show in Figure 11.4, Table 11.1, and Table 11.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations and finalized through discussion with the jurisdictions.

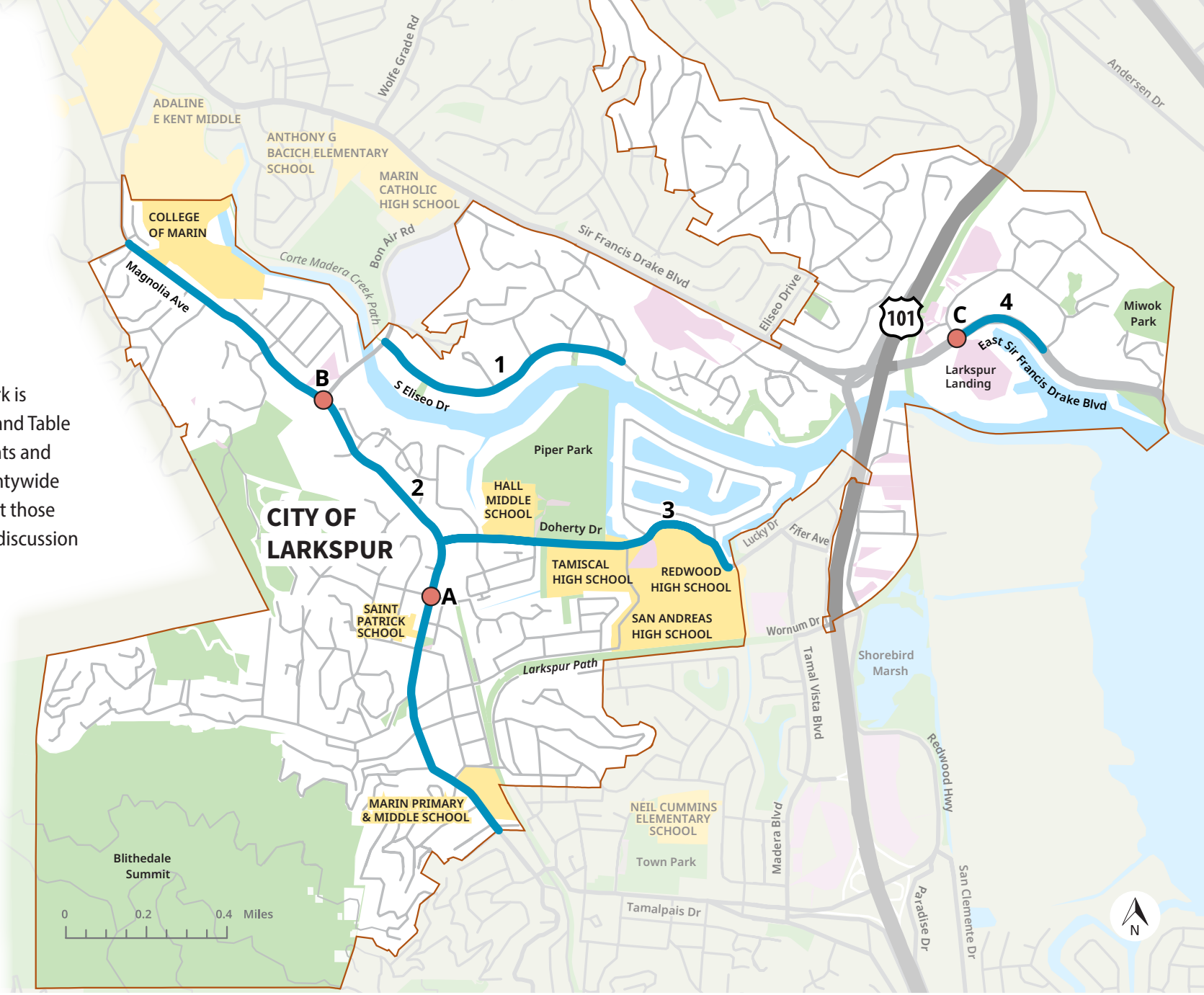


Figure 11.4: Larkspur High Collision Network

LEGEND

HCN Intersection | HCN Segment | Boundary

Table 11.1: Larkspur High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Eliseo Drive from Bon Air Road to Lower Via Casitas	2	3	0	3	**8**	**129.7**
2	Magnolia Avenue from Northern Border to Southern Border	10	23	1	14	**48**	**106.0**
3	Doherty Drive from Magnolia Avenue to Lucky Drive	1	5	0	3	**9**	**41.2**
4	Sir Francis Drake Boulevard from Larkspur Landing Circle West to Larkspur Landing Circle East	0	0	2	9	**11**	**23.9**

Table 11.2: Larkspur High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Magnolia and Ward	3	1	0	1	**5**	**17.7**
B	Magnolia and Bon Air	0	0	0	1	**1**	**2.5**
C	Sir Francis Drake and Larkspur Landing	0	0	1	1	**2**	**2.5**
D	Broadway & Bolinas Avenue	1	0	0	0	**1**	**4.2**

The City's High Collision Network includes four segments, all of which have collision rates that are in the lower half of the 70 countywide High Collision Network segments. South Eliseo Drive from Bon Air Road to Lower Via Casitas has the highest collision rate, with 129.7 collisions per 100 million vehicle miles traveled (VMT). Over half of collisions along this segment involved a pedestrian or bicyclist. Magnolia Avenue from the City's northern to southern border had the most collisions (48) with a rate of 106 collisions per 100 million vehicle miles traveled. Twenty-three of these involved a bicyclist while 10 involved a pedestrian. Doherty Drive from Magnolia Avenue to Lucky Drive and Sir Francis Drake Boulevard from Larkspur Landing Circle West to Larkspur Landing Circle East had relatively low rates among the countywide high collision network segments, with 41.2 and 23.9 collisions per 100 million vehicle miles traveled, respectively.

Larkspur's High Collision Network also includes three intersections: Magnolia Avenue and Ward Street, Magnolia Avenue and Bon Air Road, and Sir Francis Drake Boulevard and Larkspur Landing Circle West. These intersections have collision rates of 17.7, 2.5, and 2.5 collisions per 100 million entering vehicles, respectively. The Magnolia Avenue and Ward Street intersection had the thirty-second highest rate of the County's 92 High Collision Network intersections and was the site of five pedestrian collisions and two collisions involving bicyclists.

11.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for Larkspur in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Four primary emphasis areas were selected from this list for Larkspur based on the city's collision trends, shown in Table 11.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 11.3: Larkspur primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Pedestrians** **Bicyclists**
Collision Factors	**Automobile Right-of-Way** **Unsafe Speed**

Almost 20% of injury collisions and 18% of KSI collisions in Larkspur from 2012-2021 involved a bicyclist. These rates are higher than the County as a whole, where bicycle collisions made up 9% of all injury collisions and 17% of KSI collisions.

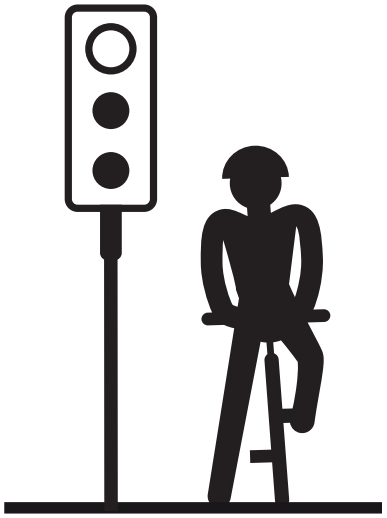
Meanwhile, over 9% of injury collisions and over 45% of KSI collisions in the city involved a pedestrian. This is slightly higher than the countywide rate for pedestrian injury collisions (6%) but almost four times the rate of pedestrian KSI collisions (12%).

Automobile right-of-way violations resulted in over 9% of Larkspur's KSI collisions. Countywide, this collision factor was responsible for 8% of KSI collisions. Automobile right-of-way collisions were spread throughout the city with half occurring on Magnolia Avenue between Doherty Drive and the City's southern border.

Unsafe speed accounted for almost 40% of injury collisions in the City, considerably higher than the county's rate of 28%. Unsafe speed collisions were most prevalent along Magnolia Avenue, Doherty Drive, and Sir Francis Drake Boulevard east of Highway 101.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the City resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 11.4 through Table 11.7 list the goals and strategies for Larkspur's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

Table 11.4: Larkspur bicyclists primary emphasis area goals & strategies



EMPHASIS AREA: BICYCLISTS

GOAL: Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• Install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy smart signal technology at intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of bicyclist collision trends at hot spot locations to inform strategy implementation.

Table 11.5: Larkspur pedestrians primary emphasis area goals & strategies

EMPHASIS AREA: PEDESTRIANS

GOAL: Eliminate fatal & severe injury collisions involving pedestrianss by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• Install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of pedestrian collision trends at hot spot locations to inform strategy implementation.

Table 11.6: Larkspur automobile right-of-way primary emphasis area goals & strategies

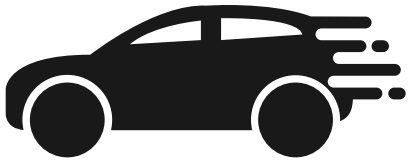
EMPHASIS AREA: AUTOMOBILE RIGHT-OF-WAY

GOAL: Eliminate fatal & severe injury collisions involving automobile right-of-way.

STRATEGIES	
Education	• Conduct public information and education campaigns for intersection safety laws regarding traffic lights, stop signs, turning left or right, distracted driving, and pedestrian right-of-way.
Enforcement	• Equitably implement targeted enforcement at high injury locations where automobile right-of-way violations are high. • Consider use of technology to support automated enforcement at key locations; consider supporting legislation to allow automated enforcement.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing behaviors resulting in automobile ROW violations such as signal head improvements, advanced dilemma zone technology, roundabouts, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 11.7: Larkspur unsafe speed primary emphasis area goals & strategies

EMPHASIS AREA: UNSAFE SPEED



GOAL: Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, 2021) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

11.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the city, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In Larkspur, the priority location and projects are as follows:

Magnolia Avenue from City's Northern to Southern Border (Segment)

- **Sight Distance Improvements**
  Removing parking would improve sight distances at driveways and intersections.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: mid-block crossings with RRFBs, advanced stop bars, bulb outs, tighten curb radius, and directional curb ramps. These could improve pedestrian crossings by shortening crossing distances and emphasize pedestrians' presence.
- **Bicycle Facility Improvements**
  Consider installing continuous bicycle lanes on segments along Magnolia Avenue, where feasible. Parking may need to be removed to accomplish this. Adding dedicated bicycle facilities can lessen the chances of collisions involving motor vehicles overtaking bicyclists.

11.7 IMPLEMENTATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

12. MILL VALLEY LOCAL ROAD SAFETY PLAN

12.1 INTRODUCTION

The City of Mill Valley is located in southern Marin County. The City is located west of Highway 101 and is bordered by Larkspur and Corte Madera to the north and unincorporated Marin County on the rest of its borders. Mill Valley is the third largest Marin County incorporated city or town by area, at 4.8 square miles, and the third largest in terms of population with a population of approximately 14,100 residents.[1] Because of this, Mill Valley has a relatively low overall population density: it ranks eighth of Marin County's 11 incorporated cities and towns, with a density of fewer than 3,000 residents per square mile. However, the City contains a significant portion of uninhabited land; inhabited areas are relatively densely populated compared to other Marin jurisdictions.

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the City of Mill Valley.

1 United States Census Bureau 2021

12.2 VISION & GOALS

Mill Valley's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the city's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

The City of Mill Valley strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

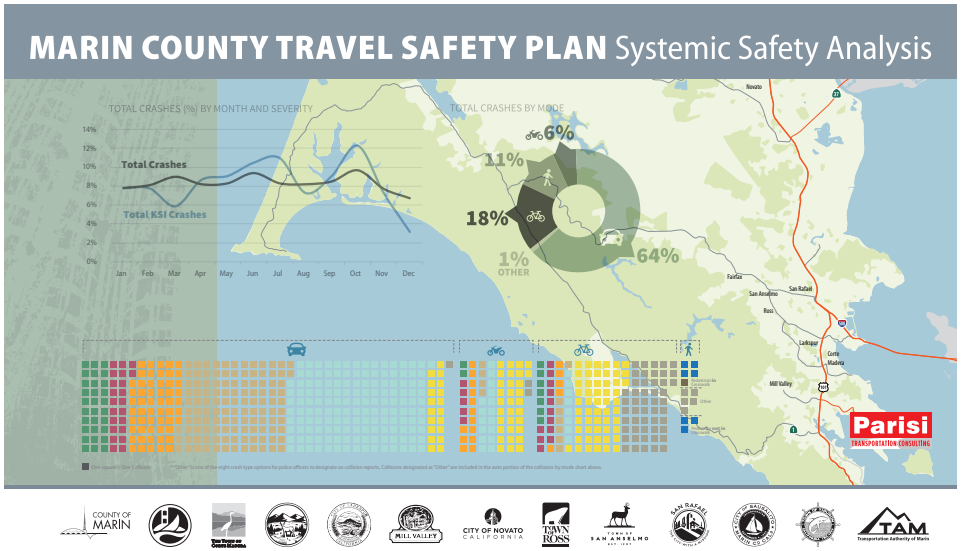
GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Mill Valley residents.

12.3 EXISTING EFFORTS

In recent years, Mill Valley's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Mill Valley.

PLANS & STUDIES



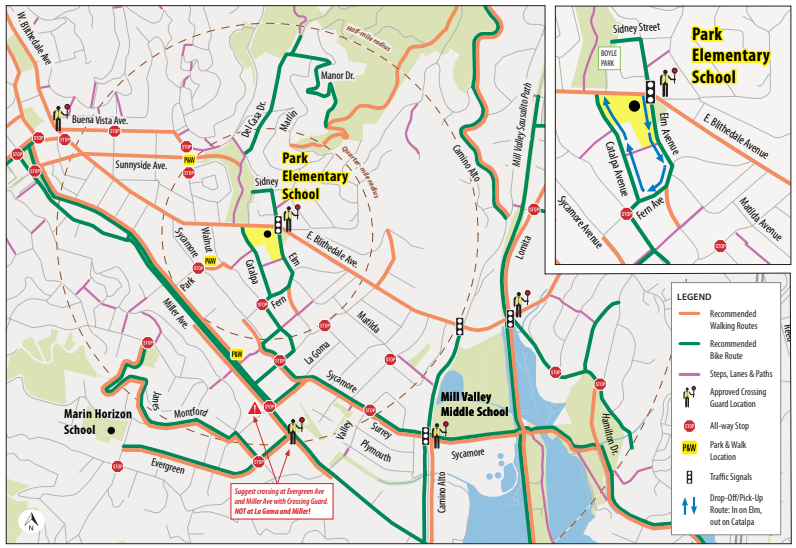
Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Bicycle and Pedestrian Transportation Plan (2017)

The Plan focuses on developing a network of bicycleways and walkways, identifying safety improvements, and documenting programs and policies that will support Mill Valley's goal of becoming a more bicycle- and pedestrian-friendly community. The plan is meant primarily as a coordinating and resource document to aid the City's efforts to pursue outside funding for bicycle and pedestrian safety projects.

PROGRAMS



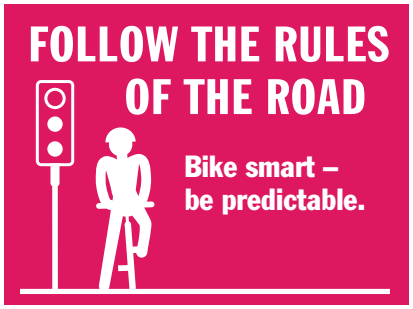
PARK SCHOOL Suggested Routes to School
Mill Valley School District

AUGUST, 2023

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin



Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

E-Bike Safety

In March 2023 Mill Valley was the first agency in California to adopt safety regulations governing e-bicycles and other electric mobility devices. The ordinance prohibits the use of electric mobility devices from certain locations within the City including the downtown plaza, skate park, public hiking and riding trails, sidewalks, and public facilities such as drainage facilities and athletic fields. It will also include speed regulations. The ordinance requires businesses that sell or rent electric mobility devices within the City to provide safety and legal educational materials to buyers and includes a diversion program for youths that would mandate a four-hour safety training program for youth offenders and an online training course for their parents.

ENGINEERING IMPROVEMENTS

Sycamore Avenue Bicycle Improvments (Scheduled for Construction in 2025)
This project located, between Camino Alto and the County multi-use path, was studied at a conceptual level to review opportunities to improve bicycle circulation along this short stretch of Sycamore Avenue. Improvements include adding conflict zone markings, improved ramps at driveway intersections, signage, and striping directing westbound bicyclists from the south side to the north side of Sycamore Avenue before arriving at the Camino Alto traffic signal. This would simplify the westbound bicycle crossing of that intersection to create a safer and more efficient route for bicyclists heading to and through the heart of Mill Valley.

East Blithedale Rehabilitation Project (2023)
The goal of this project was to rehabilitate pavement and drainage while making active transportation improvements along the corridor. Pedestrian improvements along the corridor included new high-visibility crosswalks, rectangular rapid flashing beacons, installation of pedestrian ramps, and improved sidewalks. The project had three phases. Phase 1, from Highway 101 to Camino Alto, included installation of Class IV bicycle lanes and were previously completed and closed the vehicle slip lane at Meadow Avenue to create a safer bicycle and pedestrian intersection. Phase 2 (Camino Alto to Elm Avenue) and Phase 3 (Elm Avenue to Sunnyside Avenue) were substantially completed in August 2023.

Downtown Project (2023)
This project focused on upgrading infrastructure and improving flow and safety for all road users. Phases one and two, completed in 2022, included upgrading accessible curb ramps and pavement repair along West Blithedale Avenue, Gardner Street, Corte Madera Avenue, Sunnyside Avenue, and Throckmorton Avenue. Phase three included upgrading existing curb ramps to meet accessibility standards and restriping along Throckmorton Avenue and Miller Avenue, and was completed in 2023.

Ashford Avenue (2022)
In conjunction with the first phase of the Blithedale Avenue project, a new crosswalk was installed to provide access between the residential area, the shopping center, and several schools. The project widened the sidewalk, installed a pedestrian railing, reconfigured the Blithedale/Meadow/Ashford intersection, and upgraded pavement markings to improve safety.

Camino Alto Improvements (2019)
A number of improvements to Camino Alto between Miller Avenue and East Blithedale Avenue were carried out in 2019. Improvements included new paving and narrowing traffic lanes to provide Class II bicycle lanes on both sides of the street. Signal upgrades and accessibility improvements were also made.

Recent projects have improved safety for cyclists and pedestrians throughout the City.

12.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

From 2017-2021, 93 reported injury collisions occurred on non-state arterial and collector roadways in Mill Valley (Figure 12.1). Of these, there were zero fatalities and one collision that resulted in a severe injury. This marks a 30% decrease from 2012-2016, which saw 133 injury collisions. It also marks a decrease in the number of collisions resulting in a severe injury compared to the previous five-year period, which had four.

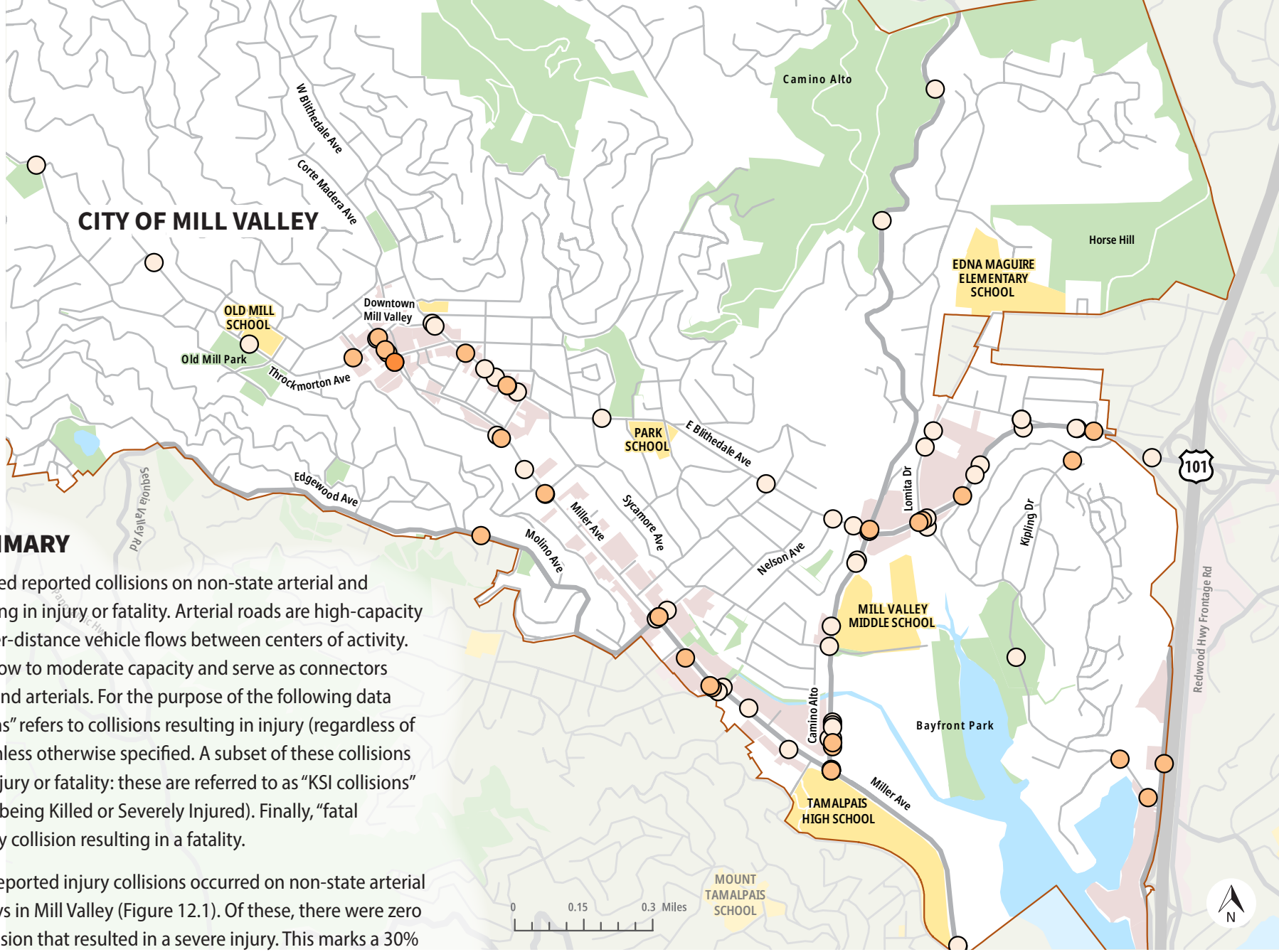


Figure 12.1: Mill Valley collisions by severity

Primary Collision Factors

Four primary collision factors were responsible for approximately 71% of collisions in Mill Valley (Figure 12.2). Unsafe speeds resulted in almost 38%, far outpacing the other primary collision factors and surpassing the County's rate for this collision factor (26%). Automobile right-of-way violations (where drivers did not yield to another driver with the right-of-way); pedestrian right-of-way violations (where drivers did not yield to a pedestrian with the right-of-way); and improper turning resulted in 15%, 10%, and 9% of collisions, respectively. The one severe injury collision resulted from a pedestrian right-of-way violation.

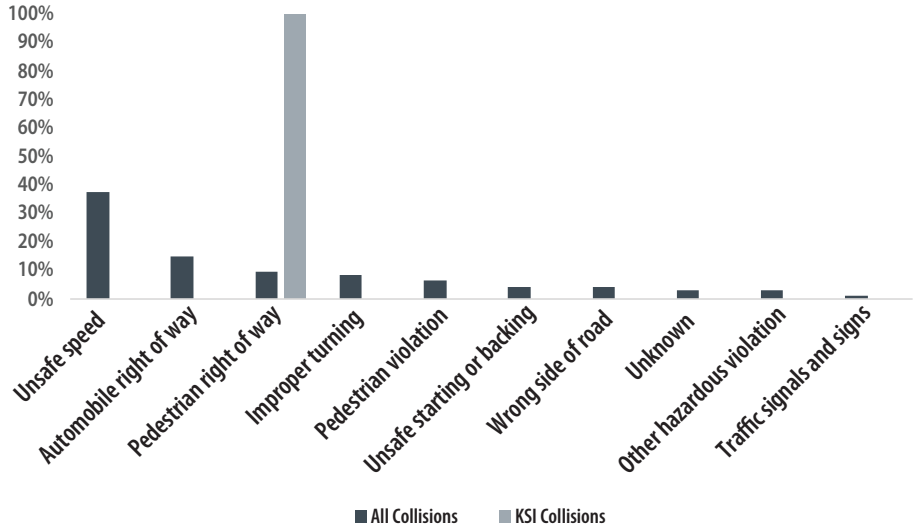


Figure 12.2: Top 10 primary collision factors

Road User Types

Figure 12.3 shows collisions by mode. Over half of collisions (52%) in Mill Valley involved vehicles only. Twenty-three percent (23%) involved bicyclists, compared to 19% of collisions countywide. Twenty percent (20%) of collisions involved pedestrians – compared to 14% countywide – and 5% involved motorcyclists. One collision with a pedestrian resulted in a severe injury, while the rest resulted in other injuries.

Of Mill Valley's 21 collisions involving a bicyclist, 18 involved motor vehicles, two were solo bicycle collisions, and one involved a motorcycle. Bicycle collisions with motor vehicles tended to result from unsafe speed (28%), users on the wrong side of the road (22%), improper turning (11%), and other hazardous violations (11%). Hotspots of bicycle collisions were located along Miller Avenue from Montford Avenue to Camino Alto and at the intersection of East Blithedale Avenue and Lomita Drive.

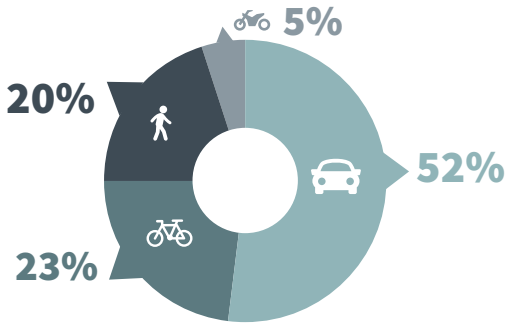


Figure 12.3: Mill Valley collisions by mode

Approximately 74% of the 19 pedestrians involved in collisions were crossing in a crosswalk at the time of the collision. Almost half (47%) of collisions with pedestrians were caused by pedestrian right-of-way violations, while 32% resulted from pedestrian violations (pedestrians were deemed at-fault) and 11% were caused by unsafe speeds. Pedestrian collision hot spots were located on Miller Avenue at the Mill Valley Depot Plaza and the intersection of Miller Avenue and Reed Street.

Equity Considerations

Approximately 5% of collisions involving pedestrians and 10% of collisions involving bicyclists involved a person of Hispanic background. Comparatively, approximately 3% of Mill Valley's population identifies as Hispanic.

Youths and older adults were involved in a higher percentage of injury collisions compared to countywide rates. 10% of these collisions involved youths, compared to 7% countywide; 28% involved older adults, compared to 20% for the County.

External Conditions

Approximately 31% of injury collisions in Mill Valley occurred in low-visibility conditions. Most of these low-visibility injury collisions – 12% of all injury collisions – occurred in the dark but in the presence of streetlights.

High Collision Network

Mill Valley's High Collision Network is shown in Figure 12.4, Table 12.1, and Table 12.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations and finalized through discussions with the jurisdictions.

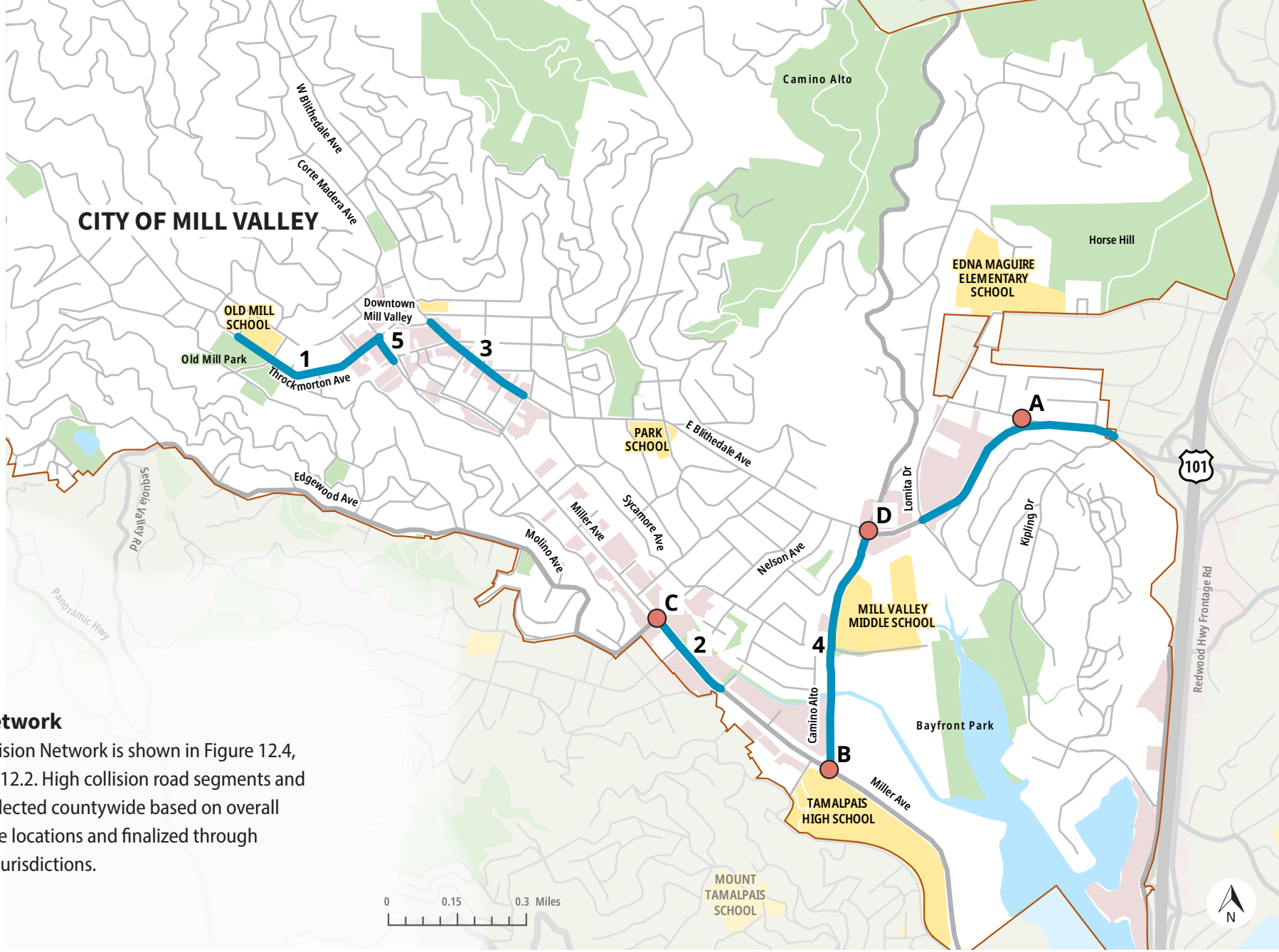


Figure 12.4: Mill Valley High Collision Network

Table 12.1: Mill Valley High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Throckmorton Avenue from Miller Avenue/Bernard Street to Elma Street	1	1	0	1	**3**	**153.4**
2	Miller Avenue from Reed Street to Montford Avenue	3	3	0	4	**10**	**128.7**
3	Blithedale Avenue from Throckmorton Avenue to Millwood Street	4	1	1	3	**9**	**113.4**
4	Camino Alto from Miller Avenue to East Blithedale Avenue	4	4	0	15	**23**	**102.9**
5	Miller Avenue from Throckmorton Avenue to Sunnyside Avenue	4	0	0	0	**4**	**78.8**
6	Blithedale Avenue from Roque Moraes Drive to Tower Drive	0	1	2	8	**11**	**36.8**

Table 12.2: Mill Valley High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Ashford Avenue & Meadow Drive	0	1	0	2	**3**	**18.3**
B	Miller Avenue & Camino Alto	2	1	0	3	**6**	**11.9**
C	Montford Avenue and Miller Avenue and La Goma Street	0	1	0	3	**4**	**8.2**
D	Camino Alto and East Blithedale Avenue	1	0	0	2	**3**	**3.1**

The City's High Collision Network includes six segments, as can be seen in the map. Throckmorton Avenue from Miller Avenue/Bernard Street to Elma Street had the highest collision rate for the City – 153.4 collisions per 100 million vehicle miles traveled – making it 28th of the 70 countywide High Collision Network segments by collision rate. Camino Alto from Miller Avenue to East Blithedale Avenue, while having one of the lower segment rates for the City, had the most collision (23). This included four involving bicyclists and four involving pedestrians. The one severe injury collision occurred on Miller Street from Throckmorton Avenue to Sunnyside Avenue; this was one of four pedestrian collisions that occurred along this segment.

Mill Valley's High Collision Network also includes four intersections. Of these, Ashford Avenue and Meadow Drive had the highest collision rate (18.3 collisions per 100 million entering vehicles) and ranked 30th of the County's 92 High Collision Network intersections. Miller Avenue and Camino Alto had the second highest rate and highest number of collisions (11.9 collisions per 100 million entering vehicles and six total collisions), including three involving vulnerable users.

11.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using KSI collision data from 2012-2021 for Mill Valley in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Four primary emphasis areas were selected from this list for Mill Valley based on the City's collision trends, shown in Table 12.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 12.3: Mill Valley primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Pedestrians**
Collision Factors	**Automobile Right-of-Way**
Collision Types	**Broadside** **Rear-End**

More than 8% of injury collisions and 25% of severe injury collisions in Mill Valley from 2012-2021 involved a bicyclist, which is significantly higher than the County's rates of 6% and 12%, respectively. The proportion of bicyclist collisions increased to over 20% in the five-year period from 2017-2021.

Automobile right-of-way violations resulted in almost 16% of Mill Valley's injury collisions, as well as 50% of collisions resulting in severe injury. Countywide, meanwhile, this collision factor was responsible for 8% of KSI collisions. Automobile right-of-way collisions were spread throughout the City with the most prominent locations along Miller Avenue and Camino Alto.

Miller Avenue and Camino Alto intersection.

Broadside collisions accounted for 27% of injury collisions and 50% of severe injury collisions. Countywide, this type of collision made up 20% of injury and 13% of severe injury collisions. Broadside collisions were most notable along Camino Alto, particularly adjacent to the Mill Valley Shopping Center.

Almost one-third (32%) of injury collisions in the City were rear-end collisions, compared to 25% countywide. These were most prominent at the Miller Avenue/ Camino Alto intersection as well as East Blithedale Avenue, particularly by the commercial center by Lomita Drive.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the City resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 12.4 through Table 12.7 list the goals and strategies for Mill Valley's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

Table 12.4: Mill Valley pedestrians primary emphasis area goals & strategies

EMPHASIS AREA: PEDESTRIANS

GOAL: Eliminate fatal & severe injury collisions involving pedestrianss by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of pedestrian collision trends at hot spot locations to inform strategy implementation.

Table 12.5: Mill Valley automobile right-of-way primary emphasis area goals & strategies

EMPHASIS AREA: AUTOMOBILE RIGHT-OF-WAY

GOAL: Eliminate fatal & severe injury collisions involving automobile right-of-way.

STRATEGIES	
Education	• Conduct public information and education campaigns for intersection safety laws regarding traffic lights, stop signs, turning left or right, distracted driving, and pedestrian right-of-way.
Enforcement	• Equitably implement targeted enforcement at high injury locations where automobile right-of-way violations are high. • Consider use of technology to support automated enforcement at key locations; consider supporting legislation to allow automated enforcement.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing behaviors resulting in automobile ROW violations such as signal head improvements, advanced dilemma zone technology, roundabouts, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

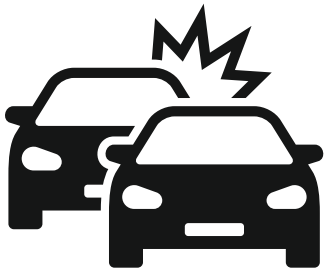
Table 12.6: Mill Valley broadside collisions primary emphasis area goals & strategies

EMPHASIS AREA: BROADSIDE COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving broadside collisions by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program.
Enforcement	• Equitably implement targeted enforcement at high injury locations where violations that lead to broadside collisions are more common, such as automobile right of way and traffic signal/stop sign violations.
Engineering	• Implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns (e.g., roundabouts and protected intersections/corners). • Consider modifying traffic signal timing with longer clearance intervals such as with advanced dilemma zone detection.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 12.7: Mill Valley rear end collisions primary emphasis area goals & strategies



EMPHASIS AREA: REAR END COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving rear end collisions by 2050.

STRATEGIES	
Education	• Partner with local businesses and community organizations to educate the public a bout distracted driving. • Expand the Street Smarts program.
Enforcement	• Equitably implement targeted distracted driving enforcement at high injury locations where rearend collisions are more common.
Engineering	• Install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

12.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the City, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In Mill Valley, the priority locations and projects are as follows:

Miller Avenue at Camino Alto, Montford Avenue/Locust Avenue, High School Parking Lot, & Almonte Boulevard (Intersections)

- **Study intersections, develop and implement recommended improvements** Various concepts that may be implemented include, but are not limited to, traffic circles, traffic signals, roadway geometry modification, pedestrian railings, bulb-outs, addition of crosswalks, etc. as necessary to improve safe access through the intersections.

Miller Avenue from Reed Street to Montford Avenue (Segment)

- **Study intersections, develop and implement recommended improvements** Analyze collision reports for this HCN arterial that accommodates buffered Class II bicycle lanes and is key access route for the community, looking for causes and patterns that can reduce or eliminate the number of collisions with best engineering practices. Develop and implement recommended mitigations.

Throckmorton Avenue from Miller Avenue/Bernard Street to Elma Street (Segment)

- **Study intersections, develop and implement recommended improvements** Analyze collision reports from this HCN segment that serves a community park, library, elementary school, and downtown business district and serves as a main evacuation route for multiple neighborhoods, looking for causes and patterns that can be mitigated with best engineering practices. Develop and implement recommended mitigations.

12.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. If feasible, metrics should be tracked every two years. If not tracked bi-annually, this data can be collected and summarized during the next LRSP update to help when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

13. NOVATO LOCAL ROAD SAFETY

13.1 INTRODUCTION

The City of Novato is located in northern Marin County. The City is split by Highway 101 and is bordered by unincorporated Marin County on all sides except for a short eastern segment bordering the San Pablo Bay. Novato is the largest Marin County incorporated city or town by area, at almost 27.5 square miles, and the second largest in terms of population with approximately 52,700 residents.[1] Due to its large area, Novato has a relatively low population density, ranking 10th of the county's 11 incorporated jurisdictions with a density of fewer than 1,920 residents per square mile.

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the City of Novato.

13.2 VISION & GOALS

Novato's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the city's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to

1 United States Census Bureau 2021

traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

The City of Novato strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Novato residents.

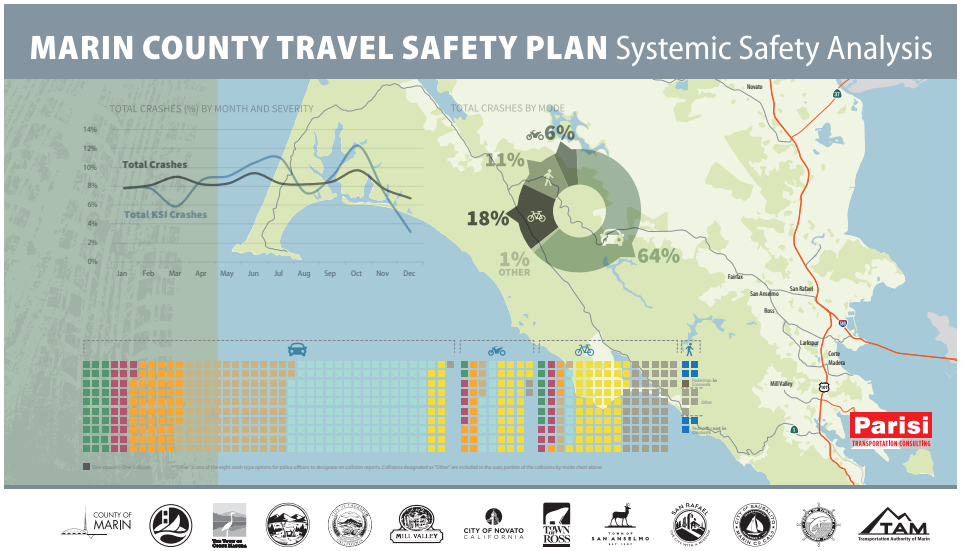
13.3 EXISTING EFFORTS

In recent years, Novato's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Novato.

PLANS & STUDIES

Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide



the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Bicycle/Pedestrian Plan (2015)

The Plan provides for a recommended citywide network of sidewalks, bicycle paths, lanes, and routes, along with pedestrian and bicycle related programs and support facilities, intended to ensure bicycling and walking become more viable transportation option for people who live, work, and recreate in Novato. The plan sought input from the Complete Streets and Pathways Oversight Committee, City staff, public workshops, and previous plans.

Community-Based Transportation Plan (2015)

The Novato Community-Based Transportation Plan was part of an effort by the Metropolitan Transportation Commission (MTC) and TAM to identify barriers to mobility and work to overcome them. The plan resulted from a collaborative planning process that involved residents in minority and low-income communities, the community and faith-based organizations that serve them, transit operators, county congestion management agencies, MTC, and TAM. It describes existing conditions, community input, recommended improvements, and considerations for implementation.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

ENGINEERING IMPROVEMENTS

Diablo Avenue-De Long Avenue Corridor Enhancements (2023)

The project proposed several traffic safety elements to be installed to calm arterial traffic and improve pedestrian access by shortening pedestrian crossing distances and increasing the visibility of traffic signals. De Long Avenue-Diablo Avenue is a multi-lane arterial that carries regional traffic through Novato and connects with Highway 101. The corridor is also an important east-west connection for bicyclists and pedestrians and is located one block from downtown Novato and Novato's transit center. Because of both the collision data and residents' concerns, project improvements along De Long Avenue-Diablo Avenue represent one of the City of Novato's top priorities for enhancing safety.

Novato Boulevard Improvements (2023)

The project included improvements to Novato Boulevard between Grant Avenue and Diablo Avenue to provide two through travel lanes (one in each direction) and a center, two-way left-turn lane between Diablo Avenue and 7th Street-Tamalpais Avenue, a second northbound through-travel lane between Boulevard Terrace and 7th Street-Tamalpais Avenue, and three through-travel lanes (two northbound and one southbound) and a center, two-way left-turn lane between 7th Street-Tamalpais Avenue and Grant Avenue. The project included other improvements such as new and reconstructed sidewalks, new bicycle lanes, reconstructed driveways, landscaping, and water quality enhancement areas.

Rowland Boulevard Improvement Project (2021)

This project included construction of a multi-use path, enhanced crosswalks, and traffic operations improvements along Rowland Boulevard from the southbound Highway 101 ramps to Vintage Way.

Pedestrian Access to Transit & Crosswalk Improvements (2018)

This project filled sidewalk gaps, upgraded accessible curb ramps and accessibility features, added a median pedestrian refuge and rectangular rapid flashing beacons, and updated striping, signs and pavement markings at several locations including DeLong Avenue, Diablo Avenue, and Redwood Boulevard.

13.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

From 2017-2021, 412 reported injury collisions occurred on non-state arterial and collector roadways in Novato (Figure 13.1). Of these, there were 18 (4%) collisions resulting in a severe injury and 6 (1.5%) resulting in a fatality. This marks a 24% decrease from 2012-2016, which saw 544 injury collisions. It also marks a one percentage point decrease in the percentage of collisions resulting in a severe injury compared to the previous five-year period. However, there were two additional fatal collisions during the more recent period.

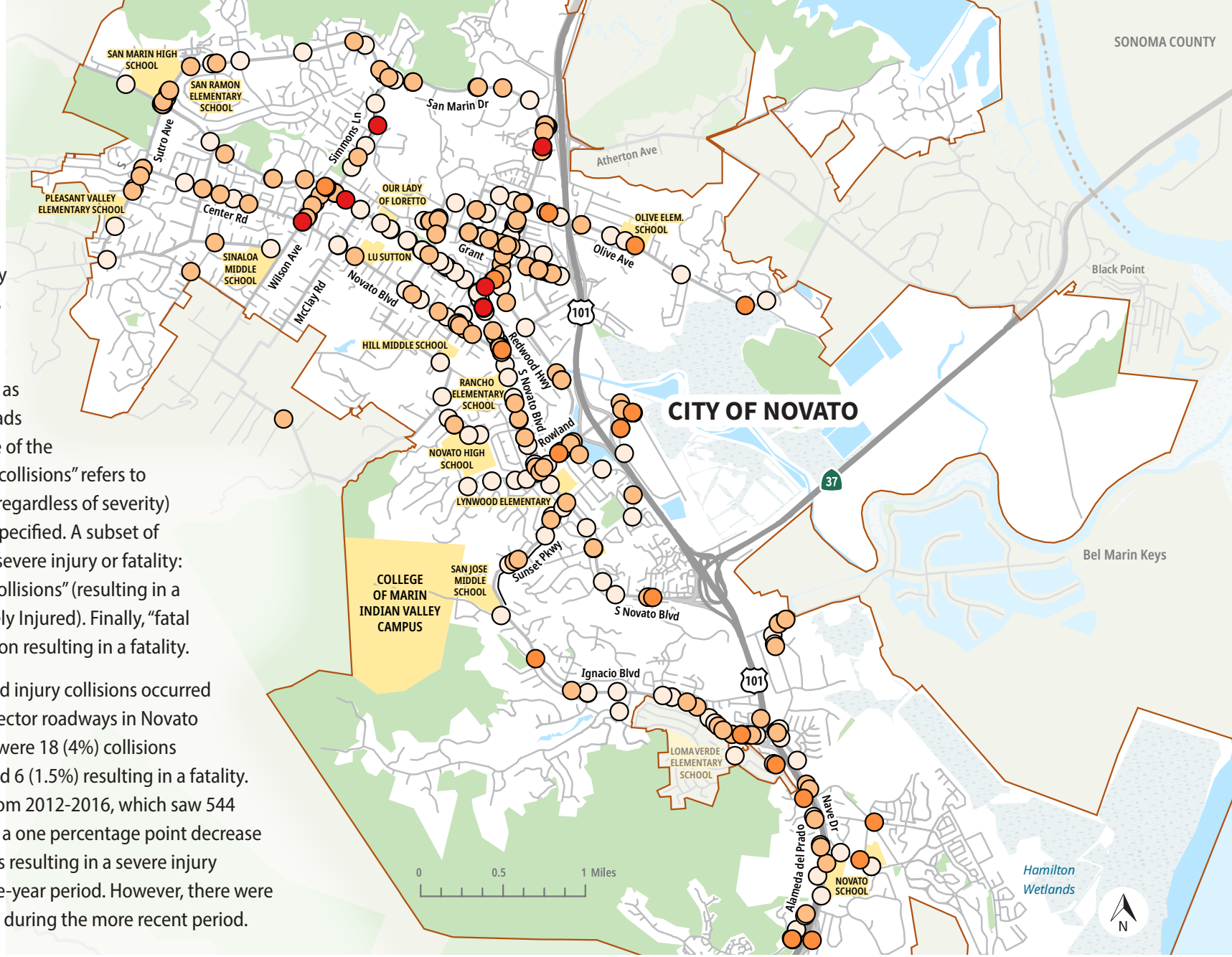


Figure 13.1: Novato collisions by severity

LEGEND

Fatality | Severe Injury | Other Visible Injury | Complaint of Pain | Boundary

Primary Collision Factors

Four primary collision factors were responsible for approximately 68% of collisions in Novato (Figure 13.2). Unsafe speeds resulted in approximately 27%. Automobile right-of-way violations (collisions where drivers did not yield to another driver with the right-of-way) and improper turning resulted in 18% and 1% of collisions, respectively. Driving under the influence of drugs or alcohol caused 11% of injury collisions in the City, compared to just 8% countywide. Half of the City's fatal collisions were caused by a pedestrian violation (pedestrians were deemed to be at fault); one-third resulted from driving under the influence, while the remaining were caused by unsafe speed.

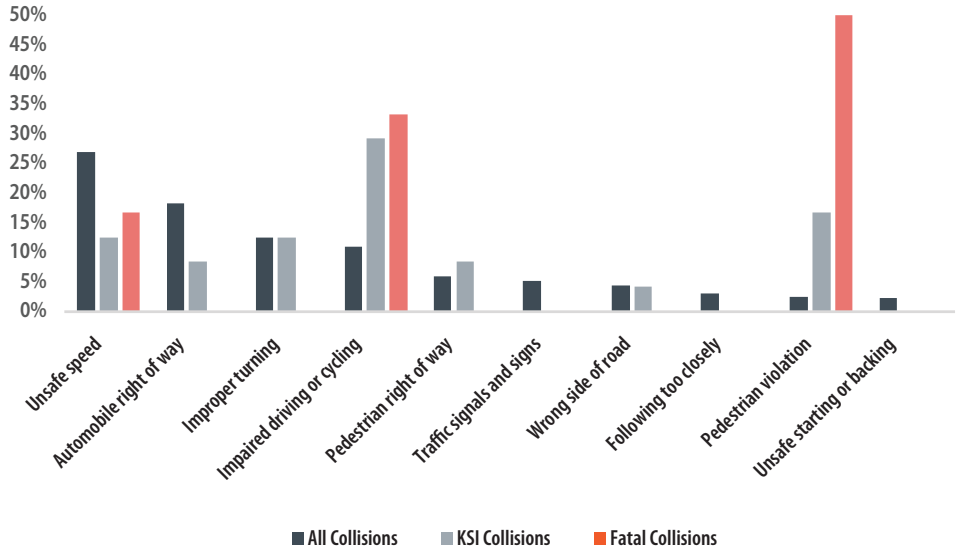


Figure 13.2: Top 10 primary collision factors

Road User Types

Figure 13.3 shows collisions by mode. Approximately 68% of collisions in Novato involved vehicles only, compared to 60% countywide. About twelve percent (12%) involved pedestrians (14% of which resulted in severe injury), 11% involved bicyclists, and 8% involved motorcyclists. Of the six fatal collisions during the study period, four involved a pedestrian, one involved a motorcycle, and one involved a solo motorist.

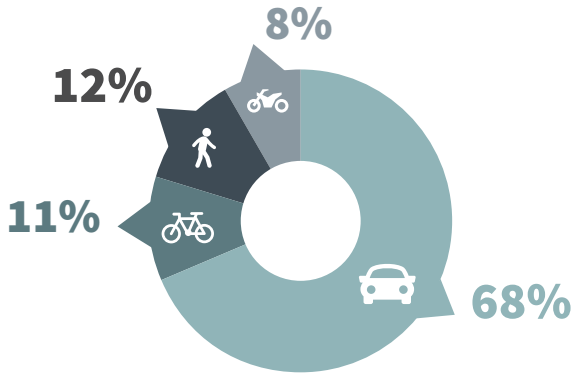


Figure 13.3: Novato collisions by mode

Of Novato's 47 collisions involving a bicyclist, 35 involved a motor vehicle, nine were solo bicycle collisions, and three involved a motorcycle. Bicyclist collisions with motor vehicles tended to result from improper turning (22%), automobile right-of-way violations (16%), driving on the wrong side of the road (13%), and unsafe speed (13%). Hot spots of bicycle collisions were located along Diablo Avenue in Downtown Novato and around the Novato Boulevard and Simmons Lane intersection.

Approximately 64% of the 49 pedestrians involved in collisions were crossing in a crosswalk at the time of the collision, while 19% were in the road and 10% were crossing without a crosswalk. Approximately 56% of collisions with pedestrians were caused by pedestrian right-of-way violations, when a driver did not properly yield to a pedestrian. Another 17% resulted from pedestrian violations (collisions where pedestrians were deemed to be at fault). Pedestrian collision hot spots were located along Diablo Avenue between Center Road and Redwood Boulevard and along Grant Avenue between Reichert Avenue and Fourth Street.

Approximately 69% of motorcycle collisions involved a motor vehicle, while 22% were solo motorcycle collisions. Motorcycle/vehicle collisions were mainly caused by automobile right-of-way violation (35%), unsafe speed (25%), and improper turning (14%). Half of solo motorcycle collisions resulted from unsafe speed, while another 28% were from improper turning. Motorcycle collisions were spread throughout the City, particularly along South Novato Boulevard and Redwood Boulevard in downtown Novato.

Equity Considerations

Novato has a relatively high proportion of active transportation users of Hispanic descent involved in collisions in the City compared to other jurisdictions. Approximately 20% of pedestrian collisions and 17% of bicycle collisions involved Hispanic people. Given that approximately 22% of the population is Hispanic or Latino, this elevated rate can be somewhat expected. While 4% of the population is African American, people with this background made up 8% of collisions involving bicyclists. Hot spots of Hispanic and African American active transportation user collisions were in downtown Novato around the Grant Avenue and Redwood Boulevard intersection; the intersections of Novato Boulevard with Wilson Avenue and Simmons Lane; and in the vicinity of the South Novato Boulevard and Rowland Boulevard intersection.

Bus stops at the intersections of Diablo Avenue and George Street and Novato Boulevard and Wilson Avenue were the sites of two pedestrian collisions each. The former location is adjacent to a supermarket and can therefore be expected to be used by shoppers who do not own or choose not to use vehicles. While it is unclear whether the victims of these collisions were using transit, active transportation user collisions near transit speak to a potential equity concern.

Youths and older adults were involved in a higher percentage of severe injury and fatality collisions compared to countywide rates. 17% of these collisions involved youths, compared to just 3% countywide; 13% involved older adults, compared to 11% for the County.

External Conditions

Approximately half of KSI collisions resulting in severe injury or fatality in Novato occurred in low-visibility conditions. Most of these collisions (38%) occurred in the dark but in the presence of streetlights. Approximately 4% occurred in the presence of streetlights that were not functioning: these were located on Redwood Boulevard between Atherton Avenue and Escallonia Drive.

High Collision Network

Novato's High Collision Network is shown in Figure 13.4, Table 13.1, and Table 13.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations and were finalized based on discussions with the jurisdictions.

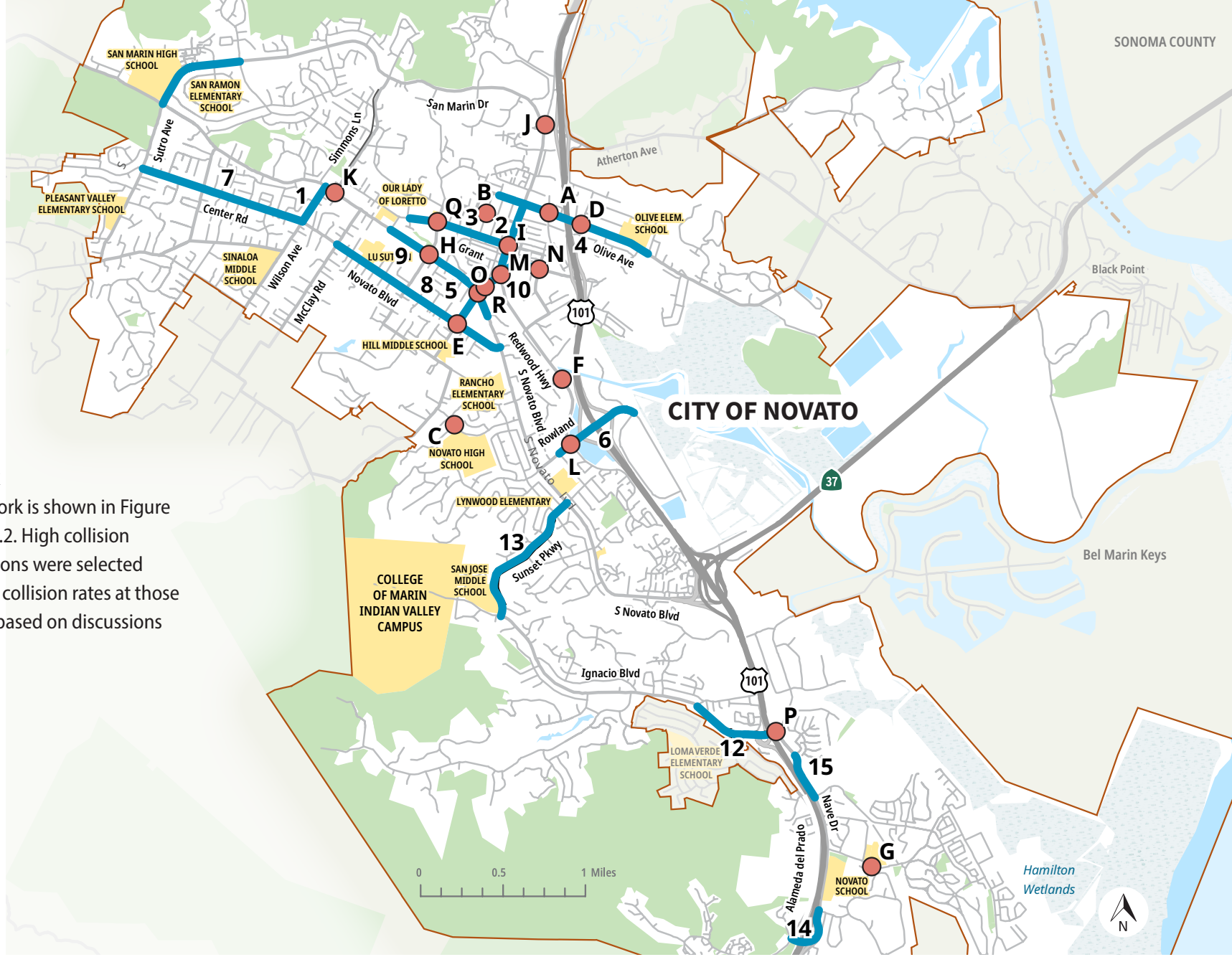


Figure 13.4: Novato High Collision Network

Table 13.1: Novato High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Wilson Avenue from Center Road to Novato Boulevard	1	2	1	4	**8**	**284.2**
2	Redwood Boulevard from Diablo Avenue/De Long Avenue to Olive Avenue	4	3	4	13	**24**	**239.8**
3	Grant Avenue from Monterey Court to Redwood Boulevard	6	2	3	9	**20**	**197.0**
4	Olive Avenue from Third Street to Summers Avenue	1	2	1	12	**16**	**187.7**
5	Novato Boulevard from Nave Court to Tamalpais Avenue	2	0	4	22	**28**	**161.0**
6	Rowland Boulevard from Leafwood Drive to Vintage Way	1	2	1	13	**17**	**152.5**
7	Center Road from Sutro Avenue to Wilson Avenue	1	3	1	5	**10**	**139.6**
8	Center Road from McClay Road to S. Novato Boulevard	4	2	2	8	**16**	**138.5**
9	Novato Boulevard from Tamalpais Avenue/Seventh Street to Grant Avenue	0	1	0	11	**12**	**136.3**
10	Diablo Avenue from Center Road to Reichert Avenue	6	1	3	22	**32**	**126.7**
11	San Marin Drive from Novato Boulevard/Sutro Avenue to San Carlos Way	1	4	3	8	**16**	**125.1**
12	Ignacio Boulevard from Nave Drive to Entrada Drive	4	2	0	11	**17**	**104.5**
13	Sunset Parkway from Monte Maria Avenue to Cambridge Street	0	4	1	5	**10**	**91.1**
14	Nave Drive from Bolling Drive to NB Alameda Del Prado	1	2	0	1	**4**	**54.6**
15	Nave Drive from Hamilton Parkway to Roblar Drive	0	1	0	2	**3**	**25.9**

Table 13.2: Novato High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Olive Avenue & Railroad Avenue	0	2	0	1	**3**	**27.9**
B	Vallejo Avenue & Third Street	0	0	0	2	**2**	**21.1**
C	Arthur Street & Washington Street	0	0	0	2	**2**	**18.8**
D	Olive Avenue & Chase Street	0	0	0	2	**2**	**18.4**
E	Center Road & Diablo Avenue	2	0	0	1	**3**	**15.2**
F	Redwood Boulevard & Hill Road	0	0	0	3	**3**	**14.7**
G	Main Gate Road & Randolph Drive	0	0	0	2	**2**	**13.6**
H	Novato Boulevard & Tamalpais Avenue & Seventh Street	0	0	0	5	**5**	**11.7**
I	Grant Avenue & Redwood Boulevard	2	0	0	2	**4**	**11.2**
J	San Marin Drive & Redwood Boulevard	0	1	1	3	**5**	**9.1**
K	Novato Boulevard & Simmons Lane	1	2	0	0	**3**	**8.6**
L	Rowland Boulevard & Redwood Boulevard	0	0	0	4	**4**	**8.1**
M	Diablo Avenue & Redwood Boulevard & De Long Avenue	1	0	0	4	**5**	**7.6**
N	De Long Avenue & Reichert Avenue	0	0	0	4	**4**	**7.1**
O	Novato Boulevard & Diablo Avenue	0	0	1	2	**3**	**5.7**
P	Ignacio Boulevard & Bel Marin Keys Boulevard and Nave Drive & Highway 101	0	0	0	2	**2**	**3.9**
Q	Grant Avenue & Seventh Street	0	0	0	1	**1**	**3.8**
R	Diablo Avenue & George Street	1	0	0	0	**1**	**3.4**

The City's High Collision Network includes 15 road segments. These account for over one-fifth (21%) of the 70 countywide high collision network segments. Of these segments, two have collision rates in the top 20 segments countywide. Wilson Avenue from Center Street to Novato Boulevard had eight collisions and a rate of 284.2 collisions per 100 million vehicle miles traveled. Half of these involved collisions with vulnerable road users, with two bicycle collisions, one pedestrian collision, and one motorcycle collision. Redwood Boulevard from Diablo Avenue/De Long Avenue to Olive Avenue had 24 collisions and a rate of 239.8 collisions per 100 million vehicle miles traveled. Approximately 40% of collisions on this segment involved vulnerable road users. Diablo Avenue from Center Road to Reichert Avenue had the highest number of collisions of any segment in Novato, with 32 total collisions, including six involving pedestrians.

Novato's High Collision Network also includes 18 intersections. Olive Avenue and Railroad Avenue ranked ninth of the County's 92 High Collision Network intersections with a rate of 27.9 collisions per 100 million entering vehicles. Two of the three collisions at this intersection involved a bicyclist. Vallejo Avenue and Third Street also ranked in the top 20 with a rate of 21.1 collisions per 100 million vehicles entering. Three intersections had the highest number of collisions in the City, with five each at Novato Boulevard/Tamalpais Avenue/Seventh Street, San Marin Drive/Redwood Boulevard, and Diablo Avenue/Redwood Boulevard/De Long Avenue. Most of these collisions involved motor vehicles only.

Diablo Avenue and Redwood Boulevard and De Long Avenue was the site of five collisions from 2017-2021.

Thirty-two collisions occurred on Diablo Avenue from Center Road to Reichert Avenue during the five-year study period.

13.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for Novato in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Six primary emphasis areas were selected from this list for Novato based on the City's collision trends, shown in Table 13.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 13.3: Novato primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Pedestrians**
Collision Factors	**Automobile Right-of-Way** **Impaired Driving or Bicycling** **Improper Turning**
Collision Types	**Broadside**
External Conditions	**Dark Conditions**

More than 7% of total injury collisions and 26% of KSI collisions in Novato from 2012-2021 involved a pedestrian; this is significantly higher than the County's rates of 6% and 12%, respectively, during this same time period. The pedestrian collision rate increased to over 12% of all injury collisions when considering only the most recent five years of data.

Automobile right-of-way violations resulted in almost 19% of Novato's injury collisions, as well as 14% of KSI collisions. Countywide, meanwhile, this collision factor was responsible for 8% of KSI collisions. Automobile right-of-way collisions were spread throughout the City with the most prominent locations along Novato Boulevard.

Driving or bicycling under the influence resulted in almost one quarter (24%) of KSI collisions in Novato, compared to just 10% countywide. Over the past five years this proportion has jumped to almost 30% while the County average has increased to 12%. Almost 40% of these collisions involved solo motor vehicles.

Improper turning caused almost 12% of KSI collisions in Novato. While this is below the countywide rate of 20%, the City felt that this was an important issue to address.

Broadside collisions accounted for 24% of injury collisions and 19% of severe injury and fatality collisions. Countywide, this type of collision made up 20% of injury and 13% of KSI collisions. Broadside collisions were most notable at the intersections of Redwood Boulevard and Grant Avenue; Redwood Boulevard and Diablo Avenue; and on Novato Boulevard between Diablo Avenue and Nave Court.

From 2012-2021, approximately 43% of KSI collisions occurred under dark conditions. This rate is significantly higher than the countywide rate of 30%.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the City resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 13.4 through Table 13.9 list the goals and strategies for Novato's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

Table 13.4: Novato pedestrian primary emphasis area goal, & strategies

EMPHASIS AREA: PEDESTRIANS

GOAL: Reduce fatal & severe injury collisions involving pedestrians 30% by 2030.
Reduce fatal & severe injury collisions involving pedestrians 50% by 2040.
Eliminate fatal & severe injury collisions involving pedestrians by 2050.

STRATEGIES	
Education	• Expand the Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• Install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of pedestrian collision trends at hot spot locations to inform strategy implementation.

Table 13.5: Novato automobile right-of-way primary emphasis area goals & strategies

EMPHASIS AREA: AUTOMOBILE RIGHT-OF-WAY

GOAL: Reduce fatal & severe injury collisions involving automobile right-of-way 30% by 2030.
Reduce fatal & severe injury collisions involving automobile right-of-way 50% by 2040.
Eliminate fatal & severe injury collisions involving automobile right-of-way by 2050.

STRATEGIES	
Education	• Conduct public information and education campaigns for intersection safety laws regarding traffic lights, stop signs, turning left or right, distracted driving, and pedestrian right-of-way.
Enforcement	• Equitably implement targeted enforcement at high injury locations where automobile right-of-way violations are high. • Consider use of technology to support automated enforcement at key locations; consider supporting legislation to allow automated enforcement.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing behaviors resulting in automobile ROW violations such as signal head improvements, advanced dilemma zone technology, roundabouts, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

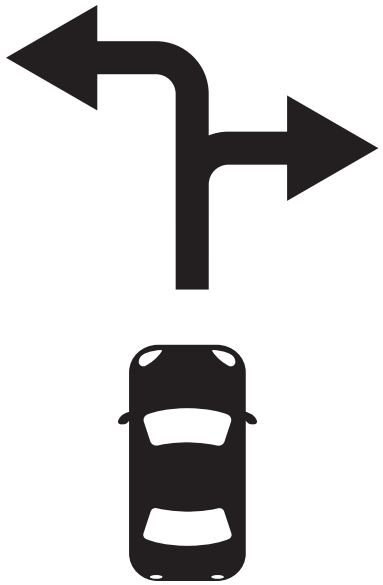
Table 13.6: Novato impaired driving & bicycling primary emphasis area goals & strategies

EMPHASIS AREA: IMPAIRED DRIVING & BICYCLING

GOAL: Reduce fatal & severe injury collisions involving impaired driving & bicycling 30% by 2030.
Reduce fatal & severe injury collisions involving impaired driving & bicycling 50% by 2040.
Eliminate fatal & severe injury collisions involving impaired driving & bicycling by 2050.

STRATEGIES	
Education	• Implement education and public awareness campaigns targeted at impaired driving. • Partner with local businesses and organizations along hot spot corridors on educational efforts and campaigns.
Enforcement	• Equitably implement high visibility enforcement campaigns. • Establish DUI checkpoints where appropriate.
Engineering	• In conjunction with other strategies, install countermeasures focused on mitigating or preventing hit objects, unsafe speeds, and improper turning. • Provide physical separation between fast-moving traffic and vulnerable road users.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement a Safe Ride Home partnership between the jurisdictions, police departments, CHP, taxi/ride-hail operators, and local businesses. • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 13.7: Novato improper turning primary emphasis area goals & strategies



EMPHASIS AREA: IMPROPER TURNING

GOAL: Reduce fatal & severe injury collisions involving improper turning 30% by 2030.

Reduce fatal & severe injury collisions involving improper turning 50% by 2040.

Eliminate fatal & severe injury collisions involving improper turning by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program with an emphasis on avoiding distracted driving.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from improper turning.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns such as curb radius. reduction, left turn hardening, protected intersections/corners, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 13.8: Novato broadside collisions primary emphasis area goals & strategies

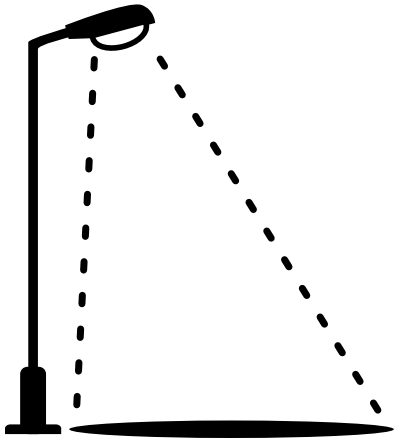
EMPHASIS AREA: BROADSIDE COLLISIONS

GOAL: Reduce fatal & severe injury broadside collisions 30% by 2030.

Reduce fatal & severe injury broadside collisions 50% by 2040.

Eliminate fatal & severe injury broadside collisions by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program.
Enforcement	• Equitably implement targeted enforcement at high injury locations where violations that lead to broadside collisions are more common, such as automobile right of way and traffic signal/stop sign violations.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns (e.g., roundabouts and protected intersections/corners). • Consider modifying traffic signal timing with longer clearance intervals such as with advanced dilemma zone detection.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.



EMPHASIS AREA: DARK CONDITIONS

GOAL: Reduce fatal & severe injury collisions involving dark conditions 30% by 2030.

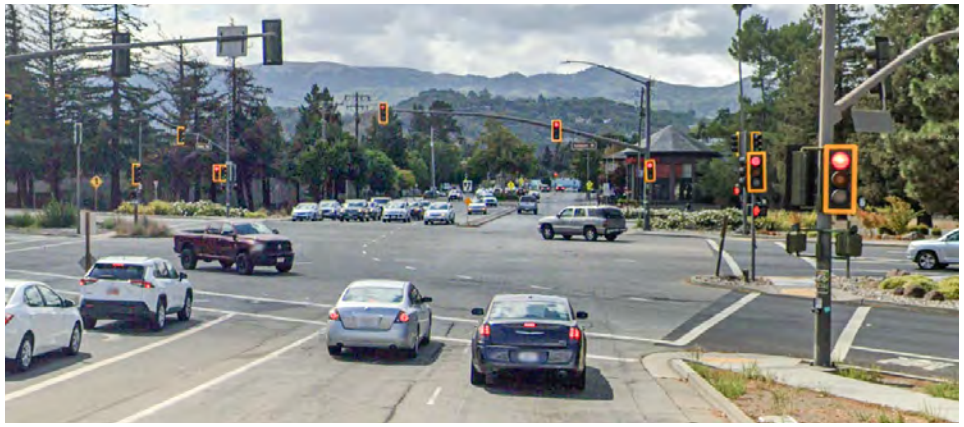
Reduce fatal & severe injury collisions involving dark conditions 50% by 2040.

Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

13.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the City, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In Novato, the priority locations and projects are as follows:



Diablo Avenue-De Long Avenue from Center Road to Reichert Avenue (Segment)

- **Signal Improvements**
  Signalization improvements may include adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, coordinating signals at multiple locations, and adding advanced dilemma detection zones.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: squared up intersections, high visibility crosswalks, curb extensions, advanced stop bars, yield limit lines at slip lanes, reduced lane widths at pork chop islands, tightened up radii, RRFB at mid-block crossings, and signal and ADA/APS pedestrian push button installation. These could improve pedestrian crossings by shorting crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Upgrading bicycle lanes to green bicycle lanes, installing green paint through conflict zones, and adding bicycle boxes could increase bicyclist visibility. Reducing vehicle lane widths to 11 feet may provide additional right-of-way to increase substandard bicycle lanes and add buffered bicycle lanes.

Ignacio Boulevard from Nave Drive to Entrada Drive (Segment)

- **Signal Timing Improvements**
  Signalization improvements may include adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: high visibility crosswalks, direction curb ramps, reduced curb radii, advanced stop bars, and pedestrian refuge islands.
- **Bicycle Facility Improvements**
  Upgrading bicycle lanes to green bicycle lanes, installing green paint through conflict zones, and adding bicycle boxes could increase bicyclist visibility. Reducing vehicle lane widths to 11 feet may provide additional right of way to increase substandard bicycle lanes and add buffered bicycle lanes.

Rowland Boulevard & Redwood Boulevard (Intersection)

- **Signal Timing Improvements**
  Broadside collisions may indicate that clearance intervals are too short; consider adding a longer yellow phase.

- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented at this intersection including some of the following: reduced curb radii, pedestrian ramps, pedestrian refuge islands, high visibility crosswalks, advanced stop bars, and pedestrian countdown signal heads. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.

- **Bicycle Facility Improvements**
  Installing green paint through conflict zones and mixing zones and installing sharrow symbols through mixing zones could increase the visibility of bicyclists, clarify where bicyclists are expected to ride, and reminds motorist to expect bicyclists on the road. Consider a protected intersection.

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Novato Boulevard & Diablo Avenue (Intersection)

- **Signal Improvements**
  Signalization improvements may include adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, coordinating signals at multiple locations, upgrading signal heads to 12" LED with backplates, and adding advanced dilemma detection zones.

- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented at this intersection including some of the following: squared up intersection, high visibility crosswalk, curb extensions, advanced stop bars, yield limit lines at slip lanes, pork chop island removal, radii tightening, and installation of ADA/APS pedestrian push buttons. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.

- **Bicycle Facility Improvements**
  Upgrading bicycle lanes to green bicycle lanes, installing green paint through conflict zones, and adding bicycle boxes could increase the visibility of bicyclists. Reducing vehicle lane widths to 11 feet may provide additional right-of-way to increase substandard bicycle lanes and add buffered bicycle lanes.

13.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

14. ROSS LOCAL ROAD SAFETY

14.1 INTRODUCTION

The Town of Ross is located in central Marin County. The Town is split by Sir Francis Drake Boulevard and is bordered by San Anselmo to the north, San Rafael to the east, and unincorporated Marin County on all other sides. Ross is the second smallest Marin County city or town by area, at approximately 1.6 square miles, as well as by population, with approximately 2,300 residents.[1] Additionally, it is the least dense of the county's incorporated cities and towns, with a population density of fewer than 1,500 residents per square mile.

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the Town of Ross.

14.2 VISION & GOALS

Ross's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the town's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

1 United States Census Bureau 2021

Vision Statement

The Town of Ross strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Ross residents.

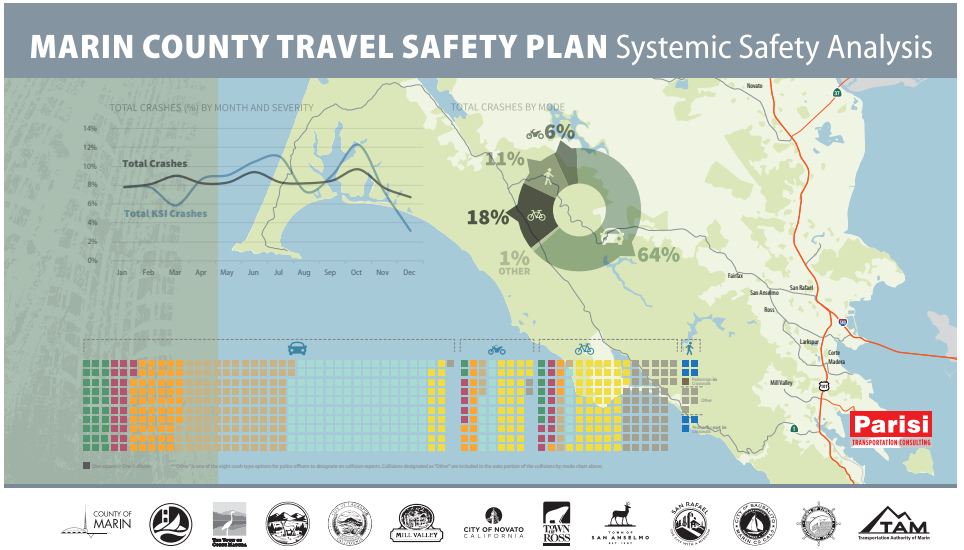
14.3 EXISTING EFFORTS

In recent years, Ross's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Ross.

PLANS & STUDIES

Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.



Bicycle and Pedestrian Plan (2018 Amendment)

This document serves as an appendix to the Town's 2010 bicycle and pedestrian plan. It provides an updated analysis of existing bicycling and walking conditions, discusses progress made towards the Town's goals, and re-evaluates the list of proposed projects to lend guidance for future bicycleway and walkway improvements. The Town's 2010 goals were to increase bicycle and pedestrian access, improve bicycle transportation, and encourage pedestrian transportation.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Bicycle safety education is an integral part of Safe Routes to Schools programming.

Crossing guards increase safety and comfort for students walking and rolling to school.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located. The primary locations of the TAM-funded crossing guards in Ross serve the K-8 students attending Ross School. The Town has partnered with Ross School to provide additional crossing guards on Sir Francis Drake Boulevard, including at the Bolinas Road intersection for students attending St. Anselm and Wade Thomas Elementary schools.

E-Bike Safety

The Town of Ross is partnering with Ross Police to encourage safe e-bicycle use, particularly among students. Ross School students worked with police to develop an e-bicycle safety video that will be shown to students. Additionally, police officers have been recognizing students who safely use their electric mobility devices and offering advice to those who do not follow safe riding laws.

ENGINEERING IMPROVEMENTS

Laurel Grove Pedestrian Pathway Project (2017 - Ongoing)

This project consists of installing 1,200 feet of new asphalt pathway and concrete barrier from the Marin Art and Garden Center up to the private driveway known as Monte Alegra. The work will involve complete reconstruction of the Laurel Grove pavement with new narrower lane striping and stamped asphalt pedestrian "havens" at Walters Road and Monte Alegre. Work on the first segment is scheduled to begin in summer 2023, while the next segment is scheduled for spring 2024 and will extend the pathway to the Canyon Road intersection. Preliminary design and right of way surveying has been completed under a grant from MTC to extend the pathway all the way to Makin Grade at the southerly Town Limit.

Bolinas Avenue Safe Pathways project (2012)

Sidewalk repair and widening between Sir Francis Drake and Kensington.

Sir Francis Drake Boulevard and Shady Lane pathway improvements (2008-2011)

Full length paved pathway repair and resurfacing projects.

14.4 DATA SUMMARY

From 2017-2021, nine reported injury collisions occurred on non-state arterial and collector roadways in Ross[2] (Figure 14.1). These included two collisions that resulted in a severe injury and zero fatal collisions. This marks a significant decrease from 2012-2016, which saw 14 injury collisions. However, there was an increase in severe injury collisions, up from zero in the previous period.

Figure 14.1: Ross collisions by severity

[2] For the purpose of this plan, any reference to "collisions" refers to reported collisions on non-state arterial and collector roads resulting in injury or fatality, unless specified otherwise. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials.

Primary Collision Factors

Four primary collision factors were responsible for all nine collisions in Ross (Figure 14.2). Unsafe speeds resulted in approximately 56%, compared to 36% countywide. Automobile right-of-way violations (collisions where drivers did not yield to another driver with the right-of-way) resulted in 22% of collisions, compared to 13% countywide. Improper turning and driving under the influence of drugs or alcohol each caused 11% of injury collisions in the Town. The severe injury collisions resulted from an automobile right-of-way violation and driving under the influence.

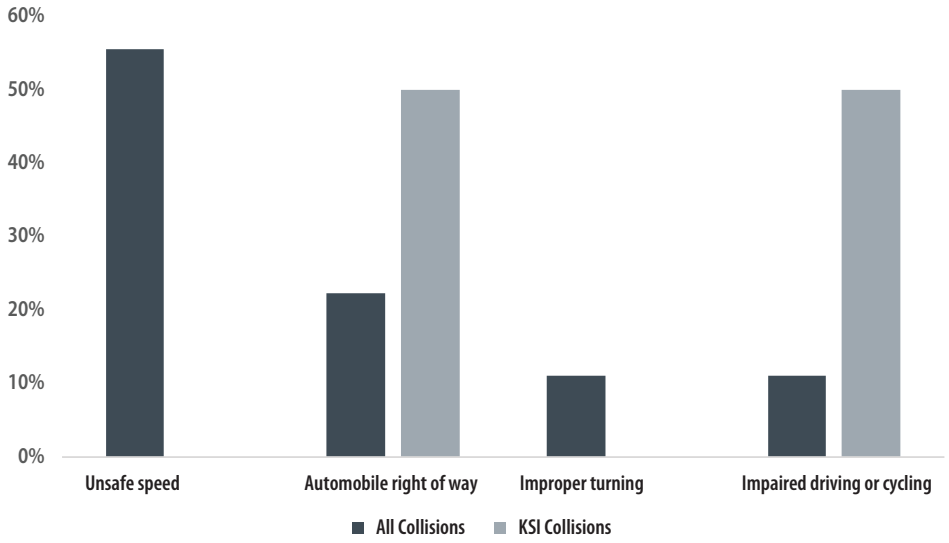


Figure 14.2: Top primary collision factors

Road User Types

Figure 14.3 shows collisions by mode. Approximately 78% of collisions in Ross involved vehicles only, compared to 60% countywide. Twenty-two percent (22%) involved bicyclists compared to 19% countywide. Of the two severe injury collisions, one involved a bicyclist and the other was a solo motor vehicle collision.

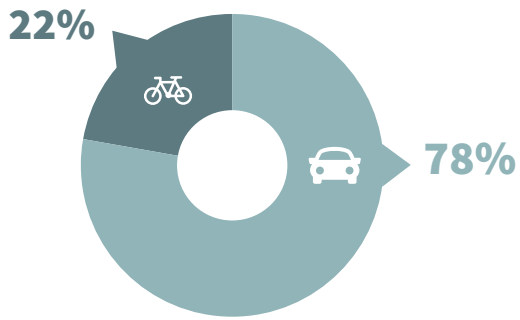


Figure 14.3: Ross collisions by mode

Of Ross's two collisions involving a bicyclist, one involved a motor vehicle and the other was a solo-bicycle collision. The former collision resulted from an automobile right-of-way violation, while the latter was caused by unsafe speeds. The bicycle/vehicle collision was located at the intersection of Bolinas Avenue and Upper Road, while the solo collision occurred at the intersection of Shady Lane and Upper Ames Avenue.

Equity Considerations

None of Ross's collisions involved minority populations using active transportation modes, nor did they occur in proximity to a transit stop.

Injury collisions involving older adults tended to occur at higher rates in Ross compared to the County. One-third (33%) of collisions in Ross involved older adults, while 20% of all County injury collisions involved this user group. The rate of severe injury collisions involving older adults was lower than the County rate.

External Conditions

Approximately one-third (33%) of injury collisions and half (50%) of severe injury collisions in Ross occurred in low-visibility conditions. These were all in locations where functioning streetlights were present.

High Collision Network

Ross's High Collision Network is shown in Figure 14.4, Table 14.1, and Table 14.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations.

Figure 14.4: Ross High Collision Network

Table 14.1: Ross High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Sir Francis Drake Boulevard from El Camino Bueno to Berry Lane	0	0	0	3	**3**	**19.1**

Table 14.2: Ross High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Sir Francis Drake Boulevard & Laurel Grove Avenue	0	0	0	1	**1**	**2.5**

The Town's High Collision Network includes one road segment: Sir Francis Drake Boulevard from El Camino Bueno to Berry Lane. This segment had three injury collisions from 2017-2021 and a collision rate of 19.1 collisions per 100 million vehicle miles traveled, placing it as the 58th highest collision rate of the 70 countywide High Collision Network segments. All three collisions at this location involved motor vehicles only, with no clear trends in terms of collision factors or collision types.

One intersection, Sir Francis Drake Boulevard and Laurel Grove Avenue, is also included in the Town's High Collision Network. This intersection had a collision rate of 2.5 collisions per 100 million entering vehicles, ranking 85th of the County's 90 High Collision Network intersections.

Sir Francis Drake Boulevard and Laurel Grove Avenue

14.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for Ross in comparison to the County as a whole, which allowed for a larger sample size of collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Four primary emphasis areas were selected from this list for Ross based on the Town's collision trends, shown in Table 14.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 14.3: Ross primary emphasis areas

Category	Primary Emphasis Area
Collision Factors	**Unsafe Speed** **Improper Turning**
Collision Types	**Rear-End**
External Conditions	**Dark Conditions**

Almost half (48%) of injury collisions in Ross from 2012-2021 resulted from unsafe speeds. Countywide, only 28% of injury collisions were caused by this collision factor.

The percentage of unsafe speed collisions in the Town increases when considering the latest five years of data, suggesting that this issue is becoming more prevalent in the Town.

Improper turning resulted in over 10% of injury collisions in the Town. While this is lower than the countywide average, it is the second leading collision factor in Ross and thus bears recognition.

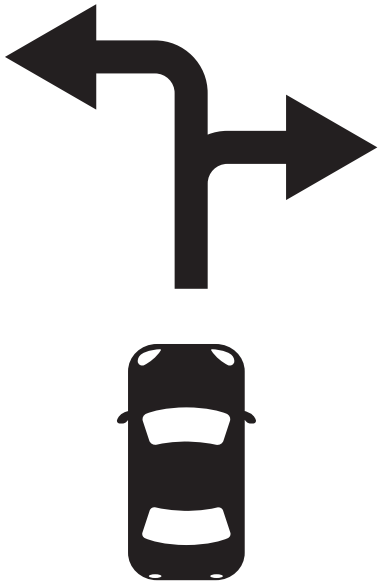
Approximately 45% of collisions in Ross were rear-end collisions. This compares to 25% countywide. Rear-end collisions were most notable along Sir Francis Drake Boulevard by the Town's northern border.

From 2012-2021, approximately one quarter (24%) of all injury collisions and half (50%) of severe injury collisions occurred under dark conditions. This rate is significantly higher than the countywide rates of 23% and 30%, respectively. These collisions were spread throughout the Town.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the Town resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 14.4 through Table 14.7 list the goals and strategies for Ross's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

Lagunitas and Sir Francis Drake Boulevard

Table 14.5: Ross Improper turning primary emphasis area goals & strategies



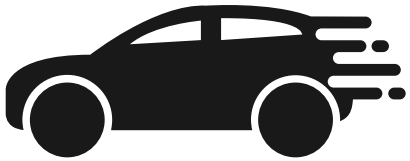
EMPHASIS AREA: IMPROPER TURNING

GOAL: Eliminate fatal & severe injury collisions improper turning by 2050.

STRATEGIES	
Education	• Expand Street Smarts program with an emphasis on avoiding distracted driving.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from improper turning.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns such as curb radius. reduction, left turn hardening, protected intersections/corners, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 14.4: Ross unsafe speed primary emphasis area goals & strategies

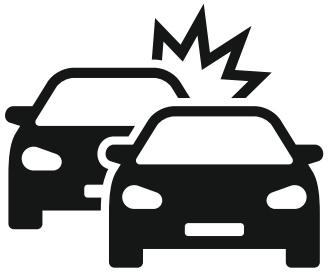
EMPHASIS AREA: UNSAFE SPEED



GOAL: Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, 321) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 14.6: Ross rear-end primary emphasis area goals & strategies

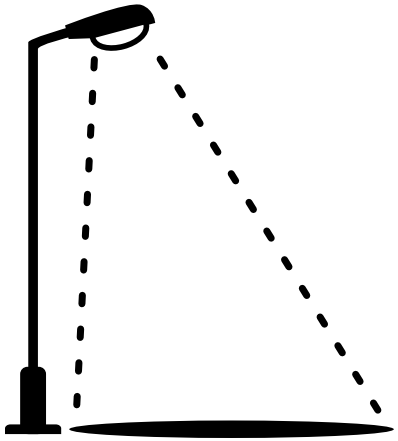


EMPHASIS AREA: REAR END COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving rear end collisions by 2050.

STRATEGIES	
Education	• Partner with local businesses and community organizations to educate the public about distracted driving. • Expand the Street Smarts program.
Enforcement	• Equitably implement targeted distracted driving enforcement at high injury locations where rearend collisions are more common.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 14.7: Ross dark conditions primary emphasis area goals & strategies



EMPHASIS AREA: DARK CONDITIONS

GOAL: Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

14.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the Town, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In Ross, the priority location and projects are as follows:

Sir Francis Drake Boulevard & Laurel Grove Avenue (Intersection)

- **Signal Improvements**
  Rear-end collisions may indicate that clearance intervals are too short: consider adding a longer yellow phase. Other signalization improvements may include adding phases, eliminating or restricting higher-risk movements, coordinating signals at multiple locations, and adding advanced dilemma detection zones.
- **Pedestrian Crossing Improvements**
  This intersection does not have a designated pedestrian crossing across Sir Francis Drake Boulevard. Consider adding a pedestrian crossing and implement some of the following: high visibility crosswalks, directional curb ramps, reduced curb radii, and pedestrian countdown heads. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.

14.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

15. SAN ANSELMO LOCAL ROAD SAFETY PLAN

15.1 INTRODUCTION

The Town of San Anselmo is located in central Marin County. The Town, and its Hub intersection in particular, are key connectors between Fairfax and unincorporated Marin County to the west, San Rafael to the east, and Ross to the south. San Anselmo is the seventh largest Marin County incorporated city or town by area, at approximately 2.7 square miles, and the fifth largest in terms of population with approximately 12,700 residents.[1] San Anselmo is the densest of Marin County's cities and towns, with a population density of over 4,700 residents per square mile.

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the Town of San Anselmo.

15.2 VISION & GOALS

San Anselmo's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the town's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to

1 United States Census Bureau 2021

traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

The Town of San Anselmo strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all San Anselmo residents.

15.3 EXISTING EFFORTS

In recent years, efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in San Anselmo.

PLANS & STUDIES

Hub Transportation Study (2023)

This study considered multimodal operational and safety issues at the Hub, San Anselmo's busiest intersection. The study evaluated short, medium, and long-term solutions and their impacts on traffic, safety, and right-of-way. The study was carried out using an iterative approach that reviewed baseline conditions, developed multi-modal improvement concepts based on project goals, and incorporated community and stakeholder input. The project culminated with a number of short- and long-term concept recommendations for multimodal improvements at the Hub.

Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Bicycle and Pedestrian Master Plan Update (2016)

The purpose of the plan update was to improve bicycle and pedestrian transportation in San Anselmo. The plan's goals are to improve bicycle and pedestrian connections, to encourage active transportation and active recreation, and to improve safety for people using active modes. The plan development process sought input from City staff, the Bicycle and Pedestrian Advisory Committee, the public, and previous plans.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

Crossing guards increase safety and comfort for students walking and rolling to school.

E-Bike Safety

The Town has created a policy regarding the use of e-bicycles and other electric mobility devices in Memorial Park and has scaled up enforcement at Memorial Park and throughout the Town to increase safe use of electric mobility devices.

Engineering Improvements

Sir Francis Drake Boulevard Rehabilitation Project (2022)

The project included design and construction of pavement rehabilitation on Sir Francis Drake Boulevard between the Hub and Bolinas Avenue, along with bicycle and pedestrian improvements in accordance with the Town's Complete Streets Policy.

Brookside Sidewalk Gap Closure Project (2022)

This project closed a gap in the Town's sidewalk network along Sir Francis Drake Boulevard between Butterfield Road and Suffield Avenue.

Bike Spine Project (2022)

The Bike Spine project consisted of school bicycle route signing, striping, and shared lane pavement markings to create a bicycle route along existing streets to connect schools. This project was included in the Town's Bicycle and Pedestrian Master Plan update.

15.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

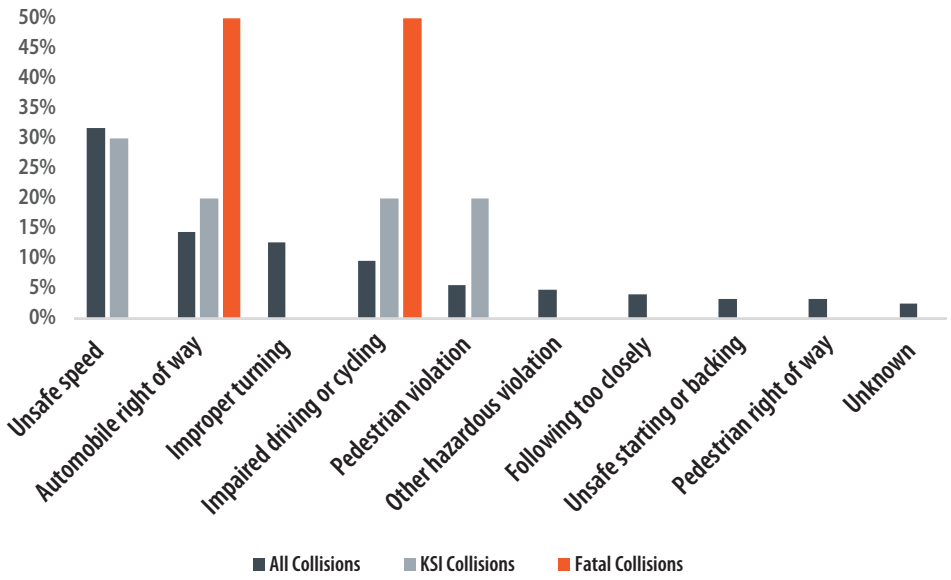
From 2017-2021, 126 reported injury collisions occurred on non-state arterial and collector roadways in San Anselmo (Figure 15.1). Of these, there were eight (6%) collisions resulting in a severe injury and two (2%) collisions resulting in a fatality. This marks an 11% decrease from 2012-2016, which saw 142 injury collisions. There was also a slight decrease in the number of severe injury collisions, down from nine during the previous period. However, the number of fatal collisions increased during these two periods from zero to two.

Figure 15.1: San Anselmo collisions by severity

Primary Collision Factors

Four primary collision factors were responsible for approximately 68% of collisions in San Anselmo (Figure 15.2). Unsafe speeds resulted in almost 32%, far outranking the other primary collision factors and surpassing the County's rate for this collision factor (26%). Automobile right-of-way violations (where drivers did not yield to another driver with the right-of-way), improper turning, and driving or bicycling under the influence of alcohol or drugs resulted in 14%, 13%, and 10% of collisions, respectively. The rate of collisions caused by driving under the influence was slightly higher than the countywide rate of 8% for this collision factor. While not responsible for a large percentage of injury collisions overall, pedestrian violations caused 25% of collisions resulting in a severe injury. These are collisions where the pedestrian was deemed to be at fault.

Figure 15.2: Top 10 primary collision factors



Road User Types

Figure 15.3 shows collisions by mode. Almost 60% of collisions in San Anselmo involved vehicles only. Approximately 25% involved bicyclists, compared to 19% of collisions countywide. Ten percent (10%) of collisions involved pedestrians and 7% involved motorcyclists. Of the two fatal collisions, one involved a pedestrian and the other involved motor vehicles only.

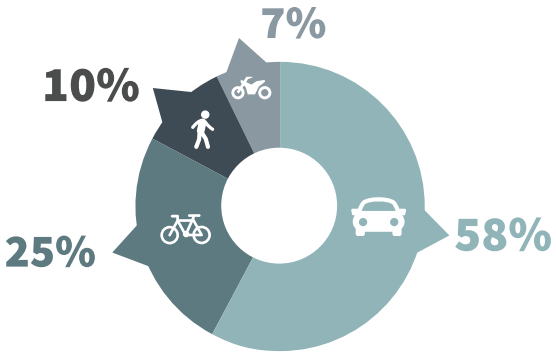


Figure 15.3: San Anselmo collisions by mode

Of San Anselmo's 32 collisions involving a bicyclist, 23 also involved motor vehicles, eight were solo bicycle collisions, and one involved a pedestrian. Bicycle collisions with motor vehicles tended to result from other hazardous violations (26%), automobile right-of-way violations (22%), improper turning (17%), and improper passing (9%). Solo bicycle collisions were largely due to unsafe speed (63%), while the bicycle/pedestrian collision resulted from a pedestrian violation. Bicycle collisions tended to occur in downtown San Anselmo, particularly on San Anselmo Avenue between San Rafael Avenue and Mariposa Avenue.

Approximately 46% of the 13 pedestrians involved in collisions were crossing in a crosswalk at the time of the collision. Almost half (46%) of pedestrian collisions were caused by pedestrian violations, while another 31% resulted from pedestrian right-of-way violations (where drivers did not yield to a pedestrian with the right-of-way). Hotspots of pedestrian collisions occurred near the Sir Francis Drake Boulevard and Sunny Hills Drive intersection as well as along San Anselmo Avenue between Woodland Avenue and Ross Avenue. Collisions during which pedestrians were either crossing outside a crosswalk or were walking in the road tended to occur along the southern portion of San Anselmo Avenue, as well as south of the intersection between San Anselmo Avenue and Bank Street.

Of the nine motorcycle collisions in San Anselmo, five involved motor vehicles and four were solo collisions. Motorcycle collisions, whether involving a motor vehicle or not, tended to result from unsafe speed. These collisions occurred along Sir Francis Drake Boulevard north of the Hub and along Red Hill Avenue.

Equity Considerations

Approximately 7% of collisions involving a pedestrian or bicyclist involved an active transportation user of Hispanic or African American descent. This is proportionate to the Town's overall population of these two demographic groups.

Several bus stops were located within 100 feet of at least one pedestrian collision. The stop at Sir Francis Drake Boulevard and Sunny Hills Drive, serving the Red Hill Shopping Center, was proximate to two such collisions. The transit stops at Sir Francis Drake Boulevard and Madrone Avenue; Sir Francis Drake Boulevard and Bank Street; and Sir Francis Drake Boulevard and Ross Street were each located near one pedestrian collision. While it is unclear whether these pedestrians were transit users, collisions near transit stops can be signs of inequity in road safety conditions that should be addressed.

Youths and older adults were involved in a higher percentage of injury collisions in San Anselmo compared to countywide rates. Ten percent (10%) of these collisions involved youths, compared to 7% countywide; 23% involved older adults, compared to 20% for the County. Approximately 20% of KSI collisions involved older adults, a rate that is almost double that of the County (11%).

External Conditions

Approximately 23% of injury collisions and 40% of KSI collisions in San Anselmo occurred in low-visibility conditions. The majority of these injury collisions – 19% of all collisions and 40% of KSI collisions – occurred in the dark but in the presence of streetlights.

Sir Francis Drake Boulevard and Sunny Hills Drive

High Collision Network

San Anselmo's High Collision Network is show in Figure 15.4, Table 15.2, and Table 15.3. High collision road segments and intersections were selected countywide based on overall collision rates at those locations.

Figure 15.4: San Anselmo High Collision Network

Table 15.2: San Anselmo High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	San Anselmo Avenue from Hazel Avenue to Bolinas Avenue	3	15	0	2	**20**	**337.4**
2	Sir Francis Drake Boulevard from San Francisco Boulevard to Cordone Drive	1	1	0	12	**14**	**137.0**
3	Sir Francis Drake Boulevard from Center Boulevard to Tunstead Avenue	1	2	0	1	**4**	**58.0**
4	Butterfield Road from Woodside Drive to Fairview Court	0	1	0	4	**5**	**27.8**
5	Red Hill Avenue from Sir Francis Drake Boulevard to Forbes Avenue	1	0	3	5	**9**	**10.9**

Table 15.3: Fairfax High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	San Anselmo and Madrone	0	1	0	0	**1**	**13.4**
B	Sir Francis Drake and Saunders	0	0	0	3	**3**	**5.5**
C	Sir Francis Drake and San Anselmo	0	0	0	1	**1**	**2.1**

The Town's High Collision Network includes five segments, as can be seen in the map. San Anselmo Avenue from Hazel Avenue to Bolinas Avenue had the highest collision rate of the Town's segments – 337.4 collisions per 100 million vehicle miles traveled – ranking twelfth of the 70 countywide High Collision Network segments by collision rate. This segment also had the highest number of collisions (20) for the Town, including 15 involving bicyclists and three involving pedestrians. Sir Francis Drake Boulevard from San Francisco Boulevard to Cordone Drive had the second highest rate for the Town, with 136.9 collisions per 100 million vehicle miles traveled. Twelve of this segment's 14 collisions involved motor vehicles only.

San Anselmo's High Collision Network also includes three intersections. Of these, San Anselmo Avenue and Madrone Avenue had the highest collision rate (13.4 collisions per 100 million entering vehicles) and ranked 49th of the County's 92 High Collision Network intersections. Sir Francis Drake Boulevard and Saunders Avenue had the second highest rate and highest number of collisions (5.5 collisions per 100 million entering vehicles and three total collisions), all of which involved motor vehicles only.

15.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for San Anselmo in comparison to the County as a whole, which allowed for a larger sample size of severe injury and fatality collisions (KSI collisions) to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Five primary emphasis areas were selected from this list for San Anselmo based on the Town's collision trends, shown in Table 15.4. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 15.4: San Anselmo primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Bicyclists** **Pedestrians**
Collision Factors	**Unsafe Speed**
Collision Types	**Rear-End**
External Conditions	**Dark Conditions**

Butterfield Road and Sir Francis Drake Boulevard

Almost 13% of injury collisions and 13% of KSI collisions in San Anselmo from 2012-2021 involved a bicyclist; this is significantly higher than the County's rates of 9% of all injury collisions. The bicycle collision rate increased when considering the latest five years of data, to almost 25% of all injury collisions in the Town. Two severe injury collisions involved bicyclists.

Collisions involving pedestrians in San Anselmo made up 19% of KSI collisions, compared to 12% of KSI collisions countywide. This rate also increased when considering the latest five years of data. One fatality and two severe injury collisions involved pedestrians.

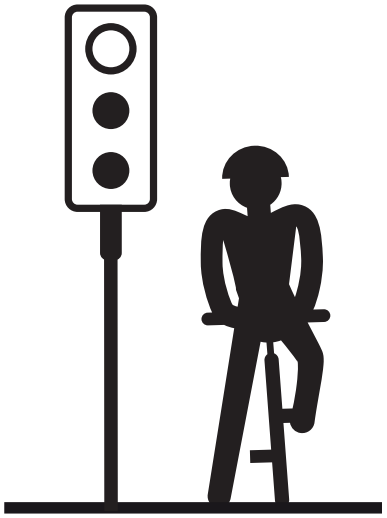
Unsafe speed resulted in 33% of San Anselmo's injury collisions, as well as 19% of KSI collisions. Countywide, meanwhile, this collision factor was responsible for 28% of injury collisions. Unsafe speed collisions were spread throughout the Town with the most prominent locations along Sir Francis Drake Boulevard from the San Anselmo Memorial Park to the Town's northern border.

Approximately one-third (33%) of injury collisions and 19% of KSI collisions in the Town were rear-end collisions, compared to 25% and 6% countywide, respectively. These were most prominent at the Hub intersection and Sir Francis Drake Boulevard near the Town's northern border.

One-fifth (20%) of injury collisions and 38% of KSI collisions occurred during dark conditions. Countywide, only 30% of KSI collisions occurred during dark conditions. Most of these collisions occurred in locations where working streetlights were present. The Hub was a hotspot of these collisions.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the Town resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 15.5 through Table 15.9 list the goals and strategies for San Anselmo's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

Table 15.5: San Anselmo bicyclists user primary emphasis area goals & strategies



EMPHASIS AREA: BICYCLISTS

GOAL: Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of bicyclist collision trends at hot spot locations to inform strategy implementation.

Table 15.6: San Anselmo pedestrian emphasis area goals & strategies

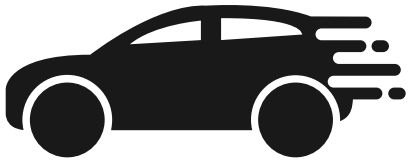
EMPHASIS AREA: PEDESTRIANS

GOAL: Eliminate fatal & severe injury collisions involving pedestrians by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of pedestrian collision trends at hot spot locations to inform strategy implementation.

Table 15.7: San Anselmo unsafe speed emphasis area goals & strategies

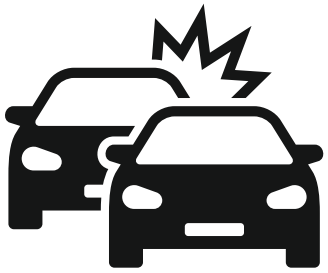
EMPHASIS AREA: UNSAFE SPEED



GOAL: Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, 321) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 15.8: San Anselmo rear end collisions emphasis area goals & strategies

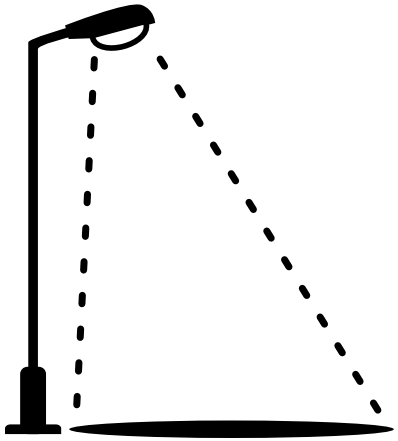


EMPHASIS AREA: REAR END COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving rear end collisions by 2050.

STRATEGIES	
Education	• Partner with local businesses and community organizations to educate the public about distracted driving. • Expand the Street Smarts program.
Enforcement	• Equitably implement targeted distracted driving enforcement at high injury locations where rearend collisions are more common.
Engineering	• Install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 15.9: San Anselmo dark conditions primary emphasis area goals & strategies



EMPHASIS AREA: DARK CONDITIONS

GOAL: Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• Implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

15.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the Town, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In San Anselmo, the priority locations and projects are as follows:

San Anselmo Avenue from Hazel Avenue to Bolinas Avenue (Segment)

- **Pedestrian Crossing Improvements**
  Pedestrian crossing improvements could be considered along this corridor, including some of the following: Rectangular rapid flashing beacons, high visibility crosswalks, curb extensions, advanced stop bars, and ADA/APS pedestrian push buttons. These would improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Consider adding bicycle lanes along this corridor, if feasible, which would require the removal of on-street parking in the downtown commercial core. Adding dedicated bicycle facilities can lessen the chances of conflicts and collisions involving motorists overtaking bicyclists.

Sir Francis Drake Boulevard from San Francisco Boulevard to Cordone Drive (Segment)

- **Intersection Improvements**
  Consider adding no right turn on red signage at San Francisco Boulevard and improving sight distances at intersections.

15.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

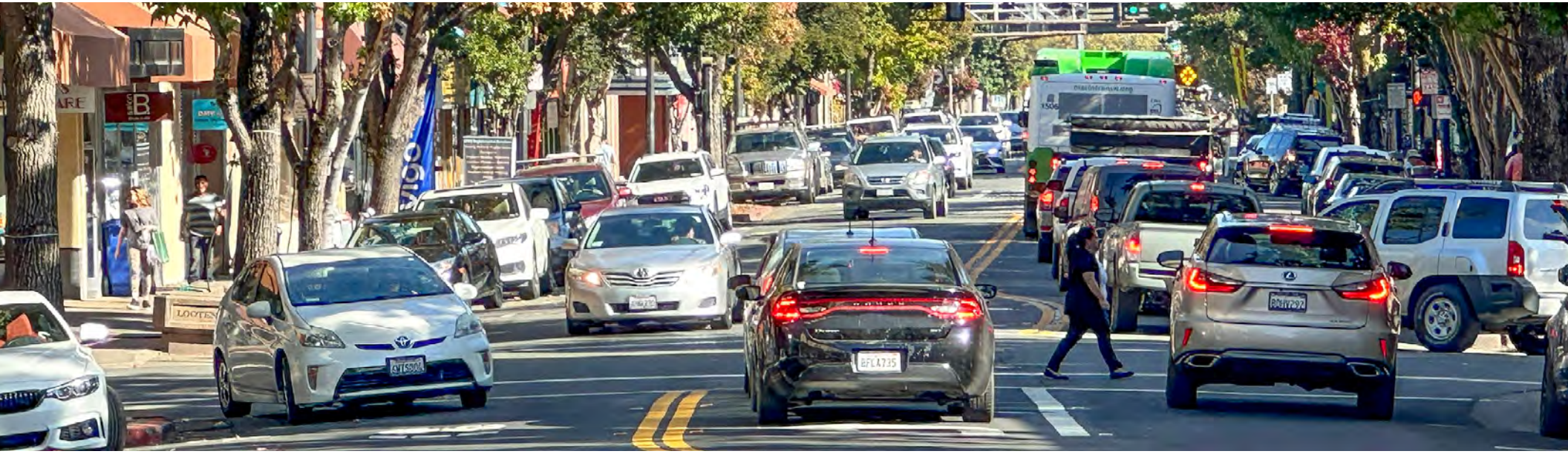
EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

16. SAN RAFAEL LOCAL ROAD SAFETY PLAN



16.1 INTRODUCTION

The City of San Rafael is located in central Marin County. Highways 101 and 580 divide the City, which serves as the entryway into Marin County for vehicles arriving from the East Bay. The City is bordered by Larkspur to the south, San Anselmo and Ross to the west, unincorporated Marin County to the north, and the San Pablo Bay to the east. San Rafael is the second largest Marin County incorporated city or town by area, at approximately 16.6 square miles, and the largest in terms of population with approximately 60,800 residents.[1] San Rafael is the fifth densest of Marin County's cities and towns, with a population density of almost 3,700 residents per square mile.

A Local Road Safety Plan (LRSP) provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the City of San Rafael.

16.2 VISION & GOALS

San Rafael's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the city's intention to initiate Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

1 United States Census Bureau 2021

Vision Statement

The City of San Rafael strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all San Rafael residents.

16.3 EXISTING EFFORTS

In recent years, San Rafael's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in San Rafael.

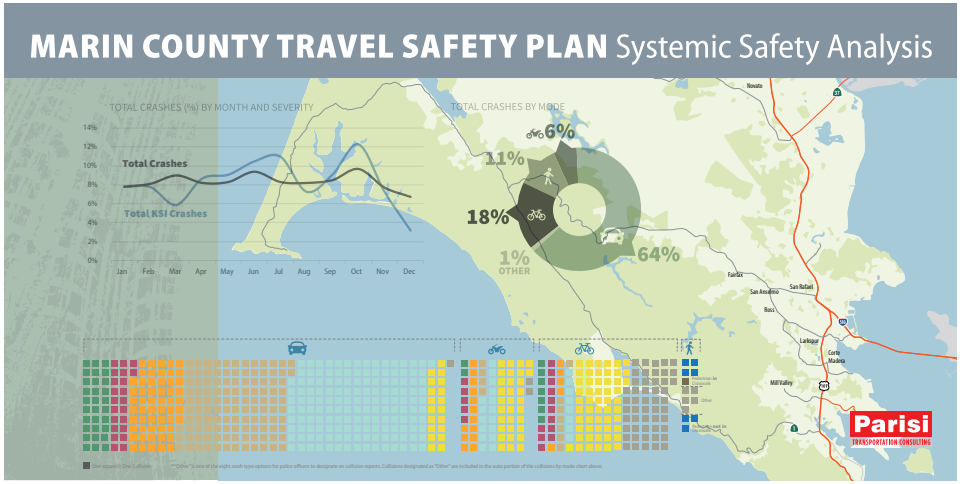
PLANS & STUDIES

Canal Community Based Transportation Plan (2022)

This plan aimed to understand residents' transportation challenges and gather community input to help identify and guide investments in active transportation modes for the next decade. It was developed in collaboration with a resident stakeholder committee and an agency technical advisory committee. It provided a number of transportation recommendations to address gaps identified by the community; these recommendations were prioritized based on level of community support and include active transportation infrastructure, traffic calming, and transit improvements.

Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future



improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Bicycle & Pedestrian Master Plan Update (2018)

This plan provides a framework to guide the City's bicycle and pedestrian investments over the next 5-10 years. The plan was adopted in July 2018 and includes a description of existing conditions as well as a list of prioritized projects. It outlines steps needed to improve safety, act on community needs, and improve the mobility options for San Rafael residents, workers, and visitors. Development of the plan included a robust community engagement effort.

Crosswalk Inventory and Improvement Prioritization System (2020)

The City collected a variety of data at all unsignalized crosswalks in the City and developed a system to prioritize the investment in traffic safety based on several factors. This guiding document is a dynamic tool to line up projects with the greatest need for local, regional, State and Federal funds.

A walk audit at Bahia Vista Elementary School brought parents, City, and school staff together to improve active transportation conditions.

Crossing guards increase safety and comfort for students walking and rolling to school.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program

TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

Operating Budget Set-Aside

Realizing the need for smaller level improvements, the Engineering operating budget sets aside funds for immediate improvements to critical items like signal visibility and signing and striping improvements.

Video Detection & Automated Traffic Signal Performance

The City is building out its network video detection and automated traffic signal performance measures by installing Miovision fisheye cameras and cabinet hardware at select locations, including two along Bellam Boulevard. This technology provides 24/7 turning movement counts, including pedestrians, bicyclists, and transit vehicles, which help the City with decision making. The collection of data paves the way for a trending industry of collision prevention software.

ENGINEERING IMPROVEMENTS

Manuel T. Freitas Parkway/Route 101 Interchange Project (Ongoing)
This Caltrans project is being undertaken to improve road user safety at the intersection of Freitas Parkway, Civic Center Drive, and Old Redwood Highway. The project will make ADA and pedestrian improvements at the intersection and will add a roundabout to improve vehicle flow while slowing traffic. Bicycle facilities will be provided within the roundabout for the north-south direction and may also be extended north to connect with the existing bicycle lanes on Redwood Highway.

Grand Avenue Cycle Track Project (Ongoing)
The City plans to construct a new protected two-way cycle track and widened sidewalk on the east side of Grand Avenue from Second Street to 4th Street. This would achieve the goal of getting bicyclists and pedestrians to and from Fourth Street, the main east-west multi-modal route through the City. The project is expected to be completed in 2024.

3rd Street Improvement Project (2023)
This project aimed to improve the core utility infrastructure as well as multimodal access. Its goals were to reduce traffic congestion throughout the downtown corridor; improve multimodal safety; rehabilitate pavement and add accessible curb ramps; and upgrade traffic signal infrastructure. The majority of the project was funded by TAM. The eastern section was funded by HSIP and consisted of smaller-scale improvements to signal indicators, ramps and signage. One feature of the project was the installation of a Class IV protected cycle track and sidewalk between Shaver Street and West Street. Construction was completed in fall 2023.

One-Way to Two-Way Street Conversions (2023)
The City of San Rafael converted several streets from one- to two-way traffic to increase multimodal user safety. This occurred on C Street and B Street with the completion of the Third Street improvements.

Francisco Boulevard East Sidewalk Improvements (2022)
The goals of this project were to provide a wider sidewalk along Francisco Boulevard East; provide connectivity between the Grand Avenue Bridge and the wider sidewalk south of Vivian Street; and replace the San Rafael Sanitation District's main line. The project installed an eight-foot-wide sidewalk/bicycle pathway between Vivian Street and Grand Avenue.

Francisco Boulevard West Multi-Use Path Project (2021)
This project constructed an approximately 4,500-foot multi-use pathway from Andersen Drive to Mahon Creek. Phase two of the project was completed in 2021. On the northern end, the project connects to the existing Mahon Creek Pathway to the west and to an existing pedestrian bridge/walkway to the north that extends to 2nd Street in downtown San Rafael.

Improvements along 2nd Street, part of the 3rd Street Improvement Project, aim to improve multimodal safety while reducing vehicular congestion.

Recent improvements on Francisco Boulevard West increase safety and comfort for cyclists.

16.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

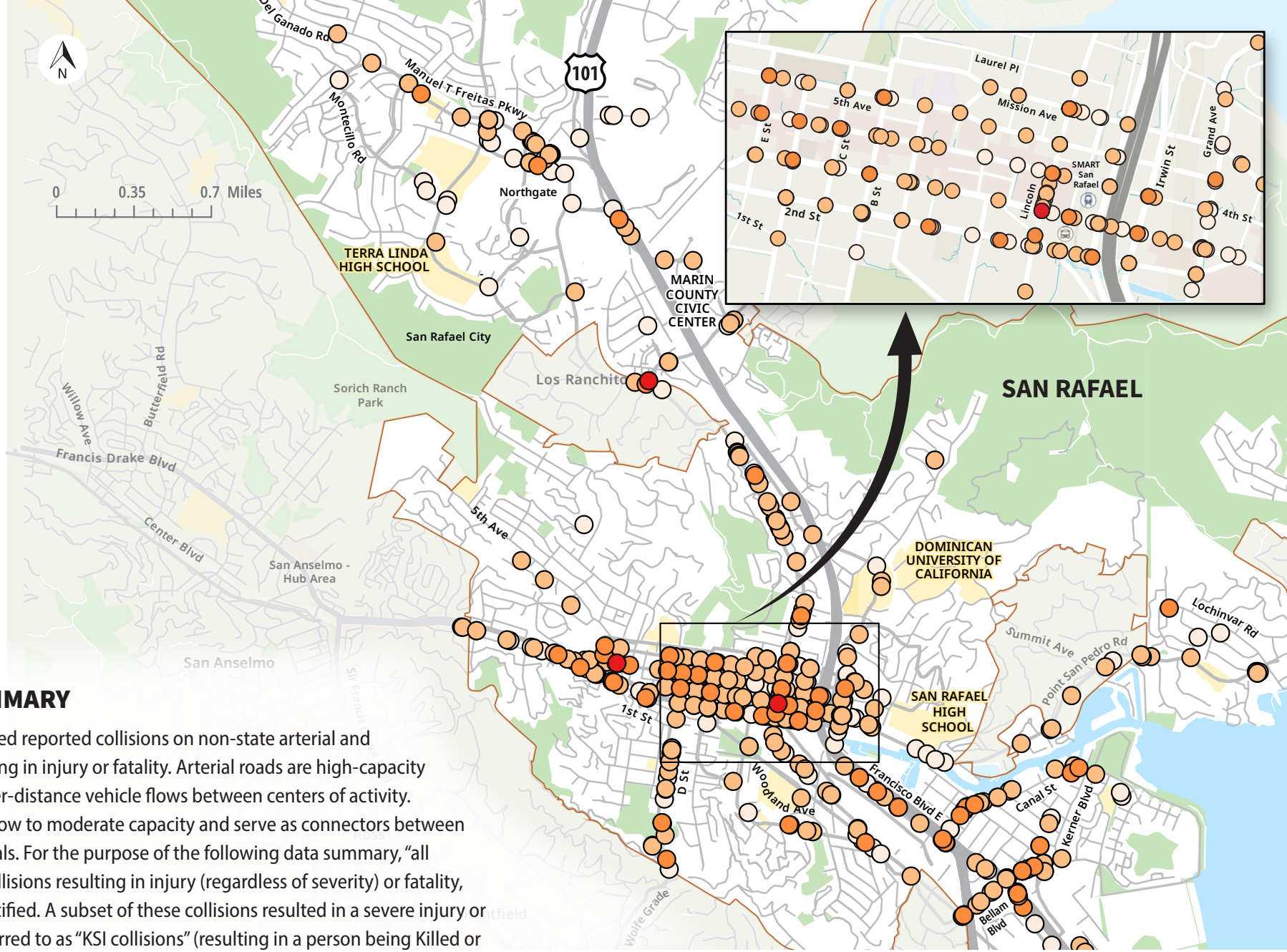


Figure 16.1: San Rafael collisions by severity

From 2017-2021, 737 reported injury collisions occurred on non-state arterial and collector roadways in San Rafael (Figure 16.1). Of these, there were 58 (8%) collisions resulting in a severe injury and three (<1%) collisions resulting in a fatality. This marks a 23% decrease from 2012-2016, which saw 953 injury collisions. Additionally, the number of fatal collisions in the City was down from 10 in the previous period. However, there was a three-percentage point increase in the proportion of collisions that resulted in severe injury, up from 5% during the previous period.

Primary Collision Factors

Four primary collision factors were responsible for approximately 65% of collisions in San Rafael (Figure 16.2). Unsafe speeds was the most common primary collision factor, causing almost 20% of collisions. Automobile right-of-way violations (drivers did not yield to another driver with the right-of-way), traffic signals and sign violations, and improper turning resulted in 16%, 15%, and 14% of collisions, respectively. The rate of traffic signal and sign-related collisions was over twice that of Marin County as a whole (7%). While only causing 13% of collisions, pedestrian right of way violations were responsible for 20% of KSI collisions and two of the City's three fatal collisions. The third fatal collision resulted from a traffic signal and sign violation.

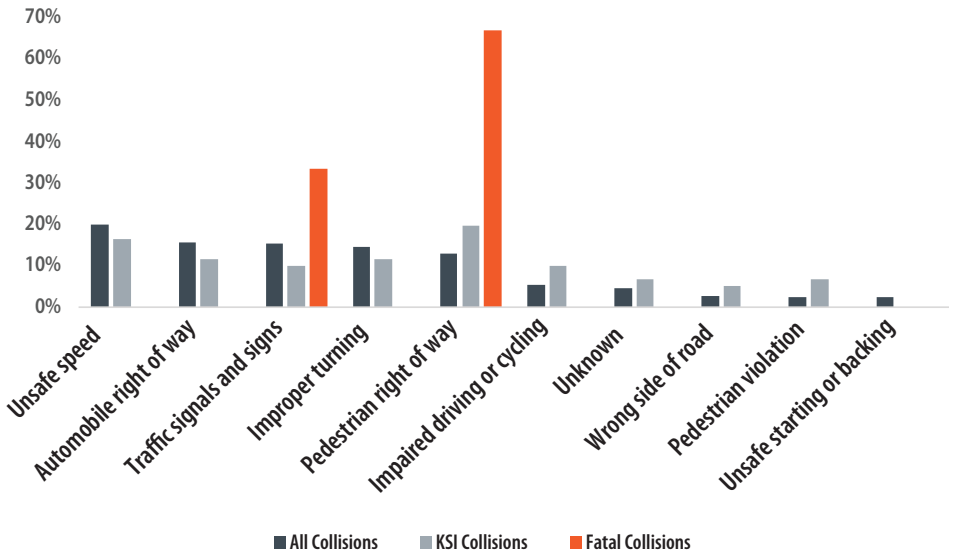


Figure 16.2: Top 10 Primary Collision Factors

Road User Types

Figure 16.3 shows collisions by mode. Approximately 60% of collisions in San Rafael involved vehicles only. Collisions in San Rafael were more likely to involve pedestrians than the County as a whole, at a rate of 19% in San Rafael, compared to 14% countywide. Sixteen percent (16%) of collisions involved bicyclists and 5% involved motorcyclists. Of the three fatal collisions, two involved a pedestrian and one involved a bicyclist.

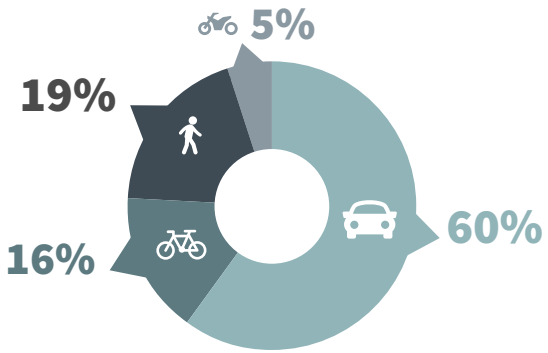


Figure 16.3: San Rafael collisions by mode

Of San Rafael's 116 collisions involving a bicyclist, 111 involved motor vehicles, five were solo bicycle collisions, and two involved a pedestrian. Bicycle collisions with motor vehicles tended to result from automobile right-of-way violations (21%), improper turning (20%), unsafe speed (14%), and operating on the wrong side of the road (13%). The solo bicycle collisions were mainly caused by improper turning and unsafe speed (40% each). No known cause was recorded for the two bicycle/pedestrian collisions. Bicycle collisions tended to occur in downtown San Rafael, particularly around the Lincoln Avenue and 3rd Street intersection, as well as in the Canal neighborhood along Bellam Boulevard.

Approximately 74% of the 143 pedestrian collisions occurred when the pedestrian was crossing in a crosswalk at the time of the collision and 11% occurred outside of a crosswalk. Almost 64% of pedestrian collisions were caused by pedestrian right-of-way violations (drivers did not yield to a pedestrian with the right-of-way), while another 10% resulted from pedestrian violations (the pedestrian was deemed to be at fault). Hotspots of pedestrian collisions occurred downtown, particularly adjacent to the SMART station and Transit Center and along B Street. Collisions involving pedestrians crossing outside of crosswalks were spread throughout the City. However,

one-third of these collisions occurred in the Canal neighborhood, one of the City's Equity Priority Communities (see the following section for more information).

Of the 35 motorcycle collisions in San Rafael, 30 involved a motor vehicle and five were solo collisions. Motorcycle/vehicle collisions largely resulted from automobile right-of-way violations (47%) and improper turning (30%). Solo motorcycle collisions were mainly caused by unsafe speed and improper turning. Motorcycle collisions occurred largely downtown, with a hotspot at the intersection between Hetherton Street and 2nd Street.

Equity Considerations

Almost 40% of pedestrian collisions and 23% of bicycle collisions in San Rafael involved people of Hispanic background. Citywide, this demographic group makes up 31% of the population. These collisions tend to cluster around the SMART station in downtown San Rafael as well as the Bellam Boulevard and Belvedere Street intersection in the Canal neighborhood.

Several bus stops were located within 100 feet of at least one pedestrian collision. The Marin Transit Route 35 stops at Lincoln Avenue and Mission Street, providing service to and from the Canal neighborhood via downtown San Rafael, were the site of five pedestrian collisions, including three that involved Hispanic pedestrians. The bus stop at Grant Street and 3rd Street (serving six transit routes) and the Transit Center (serving a number of bus routes as well as SMART rail) each had four pedestrian collisions in their vicinity. The transit stops, particularly the downtown Transit Center, provide important transportation options for people who cannot or do not drive. More than 7% of households in San Rafael do not have access to a vehicle. While it is unclear whether these pedestrians were transit users, collisions near transit stops can be signs of inequity in road safety conditions that should be addressed.

San Rafael's Canal neighborhood is designated as an equity priority community in Plan Bay Area 2050. This means that the neighborhood has a significant concentration of disadvantaged populations, such as households with low incomes and people of color. One hundred twenty-five collisions occurred in the Canal neighborhood from 2017-2021. Twenty-nine of these (23%) involved a bicyclist and 21 (17%) involved a pedestrian. The main causes of collisions in this area were unsafe speed (24%), automobile right-of-way violations (17%), and improper turning (13%).

A second equity priority community is located in San Rafael's Terra Linda district. Sixty-six collisions occurred in this district from 2017-2021. Approximately 79% of these collisions involved motor vehicles only, while 9% involved bicyclists, 9% involved pedestrians, and 3% involved motorcyclists. The main causes of these collisions were traffic signal and signs violations and unsafe speed, each of which accounted for 23% of collisions. The highest concentration of collisions occurred near the Northgate One Shopping Center along Las Gallinas Avenue and Manuel T. Freitas Parkway.

External Conditions

Over 21% of injury collisions and almost 30% of severe injury and fatality collisions in San Rafael occurred in the dark but in the presence of streetlights. This is higher than the countywide rates for these conditions (16% and 22%, respectively).

In San Rafael's Canal neighborhood, dark conditions contribute to collisions.

High Collision Network

San Rafael's High Collision Network is show in Figure 16.4, Table 16.1, and Table 16.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations.

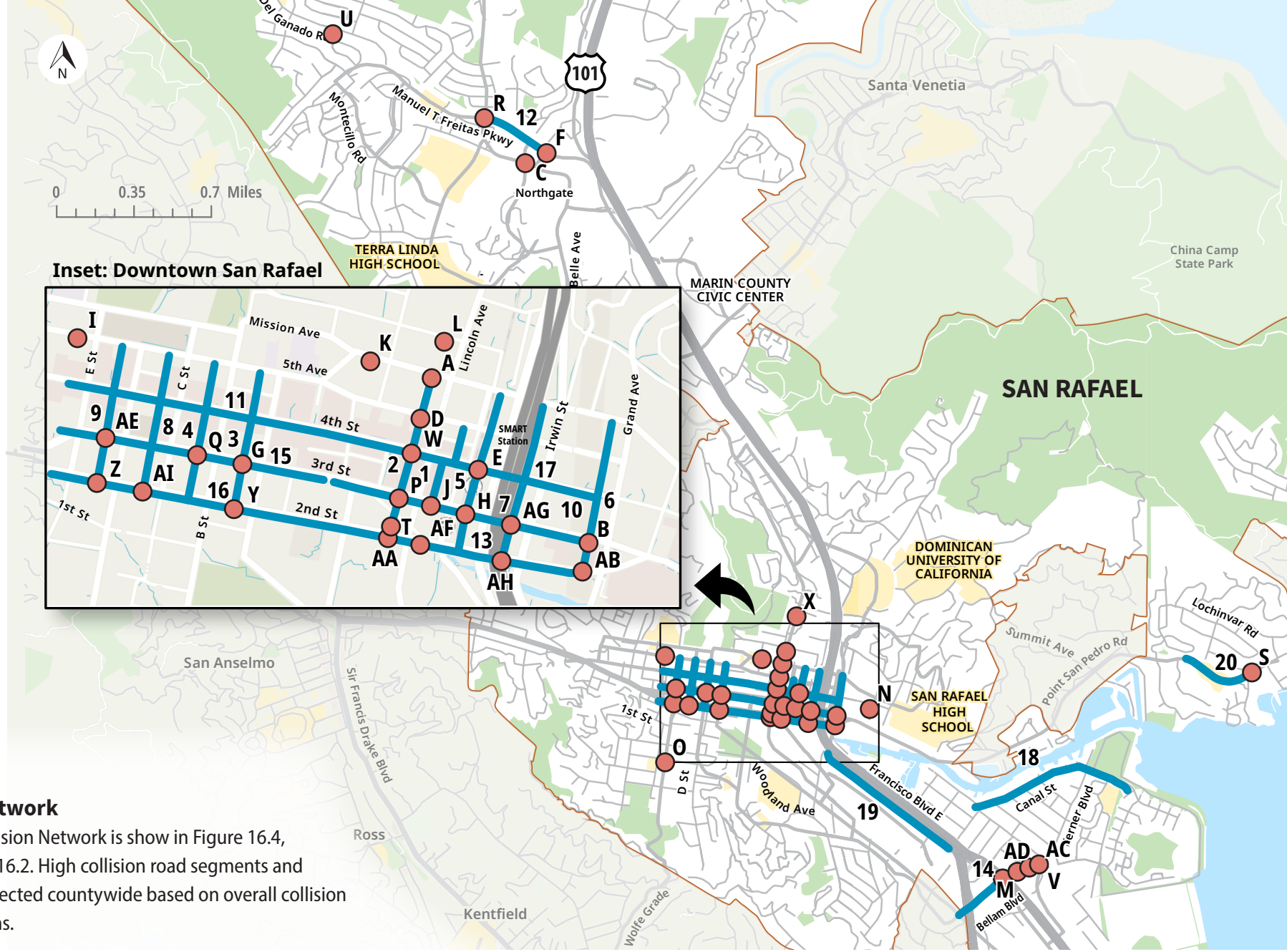


Figure 16.1: San Rafael high collision network

Table 16.1: San Rafael High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Tamalpais Avenue from 3rd Street to 5th Street	5	1	1	3	**10**	**1699.5**
2	Lincoln Avenue from 2nd Street to Mission Avenue	17	7	3	29	**56**	**1409.2**
3	A Street from 2nd Street to 5th Street	6	3	1	12	**22**	**1356.4**
4	B Street from 2nd Street to 5th Street	9	3	0	6	**18**	**1118.5**
5	Hetherton Street from 2nd Street to Mission Avenue	4	1	3	22	**30**	**937.7**
6	Grand Avenue from 2nd Street to Mission Avenue	5	4	0	25	**34**	**648.8**
7	3rd Street from Lincoln Avenue to Grand Avenue	17	8	1	35	**61**	**594.3**
8	C Street from 2nd Street to 5th Street	5	2	1	1	**9**	**585.0**
9	D Street from 2nd Street to 5th Street	2	2	0	11	**15**	**561.1**
10	4th Street from Grand Avenue to Lincoln Avenue	9	2	0	14	**25**	**486.9**
11	4th Street from E Street to Lincoln Avenue	8	7	2	10	**27**	**252.8**
12	Manuel T Freitas Parkway from Del Presidio to Las Gallinas Avenue	3	1	0	17	**31**	**235.7**
13	2nd Street from Lincoln Avenue to Grand Avenue	2	5	3	26	**36**	**234.8**
14	Bellam Boulevard from Kerner Boulevard to Andersen Drive	3	12	1	22	**38**	**233.6**
15	3rd Street from E Street to Lincoln Avenue	12	6	3	24	**45**	**231.0**
16	2nd Street from E Street to Lincoln Avenue	8	4	1	27	**40**	**166.9**
17	Irwin Street from 2nd Street to Mission Avenue	5	1	0	8	**14**	**138.4**
18	Canal Street from Medway Road to Portsmouth Cove	5	4	1	7	**17**	**88.5**
19	Francisco Boulevard East from Grand Avenue to Vivian Street	1	6	0	8	**15**	**85.9**
20	Point San Pedro Road from Manderly Road to Lochinvar Road	0	0	0	7	**7**	**71.8**

Table 16.2: San Rafael High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Lincoln Avenue & Mission Avenue	5	2	1	5	**13**	**31.7**
B	3rd Street & Grand Avenue	3	0	0	13	**16**	**31.6**
C	Las Gallinas Avenue & Northgate Drive	0	0	0	9	**9**	**29.9**
D	5th Street & Lincoln Avenue	1	0	0	7	**8**	**28.5**
E	4th Street & Hetherton Street	2	0	0	4	**6**	**27.0**
F	Manuel T Freitas Parkway & Del Presidio & Highway 101	0	0	0	15	**15**	**26.0**
G	3rd Street & A Street	5	1	0	6	**12**	**25.2**
H	3rd Street & Hetherton Street	2	0	0	10	**12**	**23.9**
I	5th Street & E Street	2	0	0	3	**5**	**23.1**
J	3rd Street & Tamalpais Avenue	4	1	1	3	**9**	**22.3**
K	Mission Avenue & Nye Street	3	0	0	2	**5**	**20.8**
L	Lincoln Avenue & Laurel Place	3	0	1	0	**4**	**20.5**
M	Bellam Boulevard & Lisbon Street	0	4	0	2	**6**	**20.4**
N	4th Street & Union Street	2	0	0	0	**2**	**19.4**
O	D Street & Bayview Street	3	0	0	1	**4**	**18.7**
P	Lincoln Avenue & 3rd Street	5	2	0	3	**10**	**18.0**
Q	3rd Street & B Street	2	2	0	4	**8**	**17.1**
R	Manuel T Freitas Parkway & Las Gallinas Avenue	2	0	0	6	**8**	**16.9**
S	Point San Pedro Road & Lochinvar Road & Loch Lomond Drive	0	0	0	6	**6**	**15.8**
T	Lincoln Avenue & Ritter Street	0	1	1	1	**3**	**15.7**
U	Del Ganado Road & Las Raposas Road	0	1	0	0	**1**	**14.8**

Table 16.2 continued: San Rafael High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
V	Bellam Boulevard & Belvedere Street	1	4	0	1	**6**	**14.5**
W	Lincoln Avenue & 4th Street	1	1	0	3	**5**	**14.0**
X	Lincoln Avenue & Maple Street	1	0	1	1	**3**	**13.9**
Y	2nd Street & A Street	1	0	1	5	**7**	**13.5**
Z	D Street & 2nd Street	1	1	0	7	**9**	**13.0**
AA	Lincoln Avenue & 2nd Street	0	1	0	7	**8**	**12.0**
AB	2nd Street & Grand Avenue	0	1	0	7	**8**	**11.4**
AC	Bellam Boulevard & Kerner Boulevard	0	2	0	5	**7**	**10.4**
AD	Bellam Boulevard & Francisco Boulevard	0	0	1	4	**5**	**9.8**
AE	3rd Street & D Street	0	0	0	4	**4**	**8.0**
AF	2nd Street & Francisco Boulevard West & Tamalpais Avenue	0	0	0	5	**5**	**8.0**
AG	3rd Street & Irwin Street	1	0	0	3	**4**	**4.6**
AH	2nd & Irwin Street	1	1	0	2	**4**	**3.9**
AI	2nd Street & C Street	1	0	0	1	**2**	**3.4**

The City's High Collision Network includes twenty segments, as can be seen on the map. This is the most of any jurisdiction in Marin County. San Rafael also includes nine of the top ten segments with the highest collision rates. Tamalpais Avenue from 3rd Street to 5th Street had the highest rate, with 1,700 collisions per 100 million vehicle miles traveled. This segment had 10 collisions from 2017-2021, with half of them involving pedestrians. Lincoln Avenue from 2nd Street to Mission Street had the second highest rate (1409.2 collisions per 100 million vehicle miles traveled) and a count of 29 collisions, 17 of which involved a pedestrian and seven that involved a bicyclist. Third Street from Lincoln Avenue to Grand Avenue had the highest number of collisions (61) of any High Collision Network segment in San Rafael. Seventeen collisions on this segment involved a pedestrian while eight involved a bicyclist. The high number of High Collision Network segments located in downtown San Rafael highlight the importance of addressing road user safety in this area.

San Rafael's High Collision Network also includes 35 intersections, again the most of any jurisdiction. This includes five of the top 10 Marin County intersections

with the highest collision rates. Of these the Lincoln Avenue and Mission Avenue intersection had the highest collision rate (31.7 collisions per 100 million entering vehicles) and ranked fourth of the county's 92 High Collision Network intersections. The intersection's 13 collisions included five involving pedestrians and two involving bicyclists. Third Street and Grand Avenue had the second highest rate and highest number of collisions (31.6 collisions per 100 million entering vehicles and 16 total collisions), three of which involved pedestrians.

It is worth noting that some High Collision Network locations have made improvements: C Street and D Street in downtown San Rafael were converted from one-way to two-way streets in summer 2020. While this study period does not contain enough data to determine changes in collision trends, they should be monitored for effectiveness going forward.

16.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for San Rafael in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Seven primary emphasis areas were selected from this list for San Rafael based on the City's collision trends, shown in Table 16.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 16.3: San Rafael primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Bicyclists** **Motorcyclists** **Pedestrians**
Collision Factors	**Unsafe Speed**
Collision Types	**Broadside** **Sideswipe**
External Conditions	**Dark Conditions**

Almost 15% of total injury collisions and 15% of KSI collisions in San Rafael from 2012-2021 involved a bicyclist. While this rate is slightly lower than the countywide rate (17%), the City recognizes bicyclists as an important user group whose safety must be improved to achieve its goals.

Collisions involving motorcyclists made up 8% of all KSI collisions in the City, compared to 7% countywide. This increases to 13% when considering the latest five years of data.

Collisions involving pedestrians made up 19% of KSI collisions, compared to 12% countywide. This rate increased to 30% when considering the latest five years of data. Two of the City's three fatalities were pedestrians.

Unsafe speed resulted in 22% of San Rafael's injury collisions, as well as 14% of KSI collisions. Unsafe speed collisions were spread throughout the City with the most prominent locations along 2nd Street, 3rd Street, Manuel T. Freitas Parkway, and Bellam Boulevard.

Approximately 26% of injury collisions and 15% of KSI collisions in the City were broadside collisions, compared to 20% and 13%, respectively, countywide. These were most prominent at the intersections between Grand Avenue and 3rd Street, Hetherton Street and 3rd Street, and Manuel T. Freitas Parkway and Las Gallinas Avenue; as well as along Bellam Boulevard.

Approximately 9% of all injury collisions and 8% of KSI collisions were sideswipe collisions. This is compared to 8% and 5% countywide, respectively. Hotspots of sideswipe collisions were located along Hetherton Street between 2nd and 3rd Streets and at the intersection of A Street and 2nd Street.

Over 24% of injury collisions and 36% of KSI collisions occurred under dark conditions. This is higher than the countywide rates of 23% and 30%, respectively. Most of these collisions occurred in locations where working streetlights were present. Downtown San Rafael between Lincoln Avenue, 2nd Street, Grand Avenue, and 4th Street was a hotspot for these collisions. A second hotspot was located along Bellam Boulevard between Francisco Boulevard East and Kerner Boulevard.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the City resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 16.4 through Table 16.10 list the goals and strategies for San Rafael's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

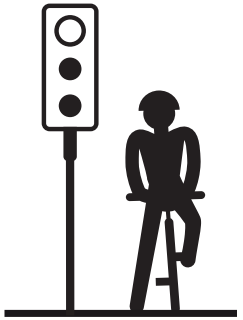
Table 16.6: San Rafael pedestrian primary emphasis area goals & strategies

EMPHASIS AREA: PEDESTRIANS

GOALS: Reduce fatal & severe injury collisions involving pedestrians 30% by 2030.
Reduce fatal & severe injury collisions involving pedestrians 50% by 2040.
Eliminate fatal & severe injury collisions involving pedestrians by 2050.

STRATEGIES	
Education	• Expand the Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider aligning with Pedestrian Safety Month. • Create education campaign for jurisdiction staff who operate vehicles about the importance of safe speeds.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury pedestrian collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and pedestrians and increasing driver awareness of pedestrians. • Provide low stress, all ages and abilities infrastructure connectivity for pedestrians, particularly within one mile of schools and along key active transportation routes. • Develop countywide street lighting standards. • Implement pedestrian safety countermeasures in all improvement and maintenance projects. • Develop and implement a Construction Accessibility Policy to maintain accessibility during construction and maintenance projects.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to pedestrian collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant pedestrian injury types at those locations.
Emerging Technology	• Implement new technologies to make pedestrian crossings safer and more comfortable (e.g., automated pedestrian detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of pedestrian collision trends at hot spot locations to inform strategy implementation.

Table 16.4: San Rafael bicyclist primary emphasis area goals & strategies

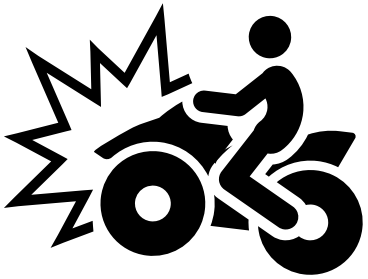


EMPHASIS AREA: BICYCLISTS

GOALS: Reduce fatal & severe injury collisions involving bicyclists 30% by 2030.
Reduce fatal & severe injury collisions involving bicyclists 50% 2040.
Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of bicyclist collision trends at hot spot locations to inform strategy implementation.

Table 16.5: San Rafael motorcyclist primary emphasis area goals & strategies



EMPHASIS AREA: MOTORYCLISTS

GOALS: Reduce fatal & severe injury collisions involving motorcyclists 30% by 2030.
Reduce fatal & severe injury collisions involving motorcyclists 50% by 2040.
Eliminate fatal & severe injury collisions involving motorcyclists by 2050.

STRATEGIES	
Education	• Coordinate with motorcycle advocacy groups (e.g., ABATE) about ways to effectively promote safe behaviors. • Implement education and awareness campaigns focused on conspicuity, protective clothing, and driver awareness of motorcyclists.
Enforcement	• Prioritize equitable enforcement of motorcycle helmet laws in key high injury locations. • Equitably implement targeted enforcement for motorcyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving pavement friction at locations with curves and/or a high frequency of motorcycle collisions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Collect and analyze data on multi-modal counts, including non-reported collisions.

Table 16.7: San Rafael unsafe speed primary emphasis area goals & strategies

EMPHASIS AREA: UNSAFE SPEED

GOALS: Reduce fatal & severe injury collisions involving unsafe speed 30% by 2030.
Reduce fatal & severe injury collisions involving unsafe speed 50% by 2040.
Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, AB 321) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 16.8: San Rafael broadside collisions primary emphasis area goals & strategies

EMPHASIS AREA: BROADSIDE COLLISIONS

GOALS: Reduce fatal & severe injury broadside collisions 30% by 2030.
Reduce fatal & severe injury broadside collisions 50% 2040.
Eliminate fatal & severe injury collisions involving broadside collisions by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program.
Enforcement	• Equitably implement targeted enforcement at high injury locations where violations that lead to broadside collisions are more common, such as automobile right of way and traffic signal/stop sign violations.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns (e.g., roundabouts and protected intersections/corners). • Consider modifying traffic signal timing with longer clearance intervals such as with advanced dilemma zone detection.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

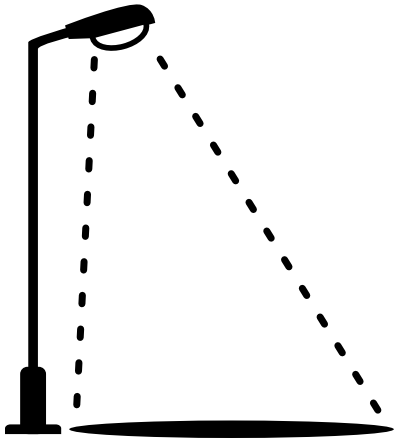
Table1 16.9: San Rafael sideswipe collsions primary emphasis area goals & strategies

EMPHASIS AREA: SIDESWIPE COLLISIONS

GOALS: Reduce fatal & severe injury sideswipe collisions 30% by 2030.
Reduce fatal & severe injury sideswipe collisions 50% by 2040.
Eliminate fatal & severe injury collisions involving sideswipe collisions by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program.
Enforcement	• Equitably implement targeted enforcement at high injury locations where sideswipe collisions are more common.
Engineering	• In conjunction with other strategies, install countermeasures focused designing and improving roadways to prevent sideswipe collisions, such as installing signals and adding lane channelization and turn lanes where appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 16.10: San Rafael dark conditions primary emphasis area goals & strategies



EMPHASIS AREA: DARK CONDITIONS

GOALS: Reduce fatal & severe injury collisions involving dark conditions 30% by 2030.
Reduce fatal & severe injury collisions involving dark conditions 50% by 2040.
Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

16.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the City, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In San Rafael, the priority locations and projects are as follows:

2nd Street from Lincoln Avenue to Grand Avenue (Segment)

- **Signal Improvements**
  Signalization improvements may include adding protected left turn phases, improving signal phasing, lengthening clearance intervals, coordinating signals at multiple locations, adding dedicated left turn lanes, and upgrading hardware to 12" signal heads with backplates.
- **Pedestrian Crossing Improvements**
  A numberof pedestrian crossing improvements could be implemented along this corridor including some of the following: high visibility crosswalks, advanced stop bars, bulb-outs, pedestrian countdown signal heads, directional curb ramps, and ADA/APS pedestrian push button. These would improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.

Manuel T. Freitas Parkway from Del Presidio to Las Gallinas (Segment)

- **Signal Improvements**
  Signalization improvements may include improving signal timing, providing a protected left turn phase, and providing advanced dilemma zone detection.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: high-visibility crosswalks, bulb-outs, leading pedestrian intervals, and removal of porkchop islands. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.

4th Street from E Street to Lincoln Avenue (Segment)

- **Signal Improvements**
  Signalization improvements may include improving signal phasing, coordinating signals at multiple locations, lengthening clearance intervals, upgrading signals to 12" heads, adding backplates, adding flashing left turn arrows, and adding a protected left turn phase.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: high visibility crosswalks, advanced stop bars, bulb-outs, directional curb ramps, wayfinding signs, pedestrian countdown signal heads, and ADA/APS pedestrian push button. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Installing bicycle boxes and green-backed sharrows could increase the visibility of bicyclists and clarify where bicyclists are expected to ride.
- **Speed Management**
  Consider lowering speed limits in compliance with AB 43.

4th Street from Lincoln Avenue to Grand Avenue (Segment)

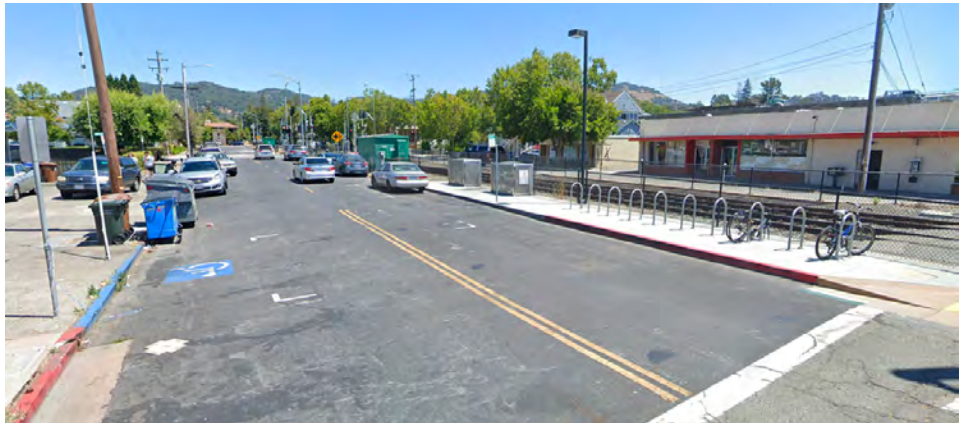
- **Signal Improvements**
  Signalization improvements may include improving signal phasing, coordinating signals at multiple locations, adding dedicated left turn lanes, and upgrading hardware to 12" signal heads with backplates.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: high visibility crosswalks, mid-block crossings, advanced stop bars, bulb-outs, directional curb ramps, wayfinding, pedestrian countdown signal heads, and ADA/APS pedestrian push button. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Installing bicycle lanes could improve bicycle connectivity through downtown as well as provide a key lower stress bicycle connection. Bicycle boxes and green-backed sharrows could also increase the visibility of bicyclists and clarify where they are expected to ride.

Bellam Boulevard from Kerner Boulevard to Andersen Drive (Segment)

- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented at this location including some of the following: installation of advanced stop bars, bulb-outs, high visibility crosswalks, pedestrian countdown signal heads, and ADA/APS pedestrian push button. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Installing bicycle lanes could improve bicycle connectivity.

Lincoln Avenue & Mission Avenue (Intersection)

- **Signal Improvements**
  Signalization improvements may include upgrading signal hardware, improving signal timing, and implementing a leading pedestrian interval.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented at this location including some of the following: installation of advanced stop bars, bulb-outs, high visibility crosswalks, pedestrian countdown signal heads, and ADA/APS pedestrian push button. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  The addition of bicycle boxes at the intersection would increase the visibility of bicyclists and clarify where they are expected to ride.



Tamalpais Avenue from 3rd Street to 5th Street (Segment)

- **Bicycle Facility Improvements**
  Installing bicycle lanes and improving bicycle crossings could improve bicycle connectivity through downtown as well as provide a key low stress bicycle connection..

Manuel T. Freitas Parkway and Del Presidio & Highway 101 (Intersection)

- **Signal Improvements**
  Signalization improvements may include upgrading signal hardware, lengthening clearance intervals, eliminating or restricting higher-risk movements, coordinating signals at multiple locations, and upgrading hardware to 12" signal heads with backplates.

- **Pedestrian Crossing Improvements**
  A numberof pedestrian crossing improvements could be implemented along this corridor including some of the following: high visibility crosswalks, directional curb ramps, reduced curb radii, pedestrian countdown signal heads, and removing pork chop islands. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.

16.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

17. SAUSALITO LOCAL ROAD SAFETY PLAN

17.1 INTRODUCTION

The City of Sausalito is located in southern Marin County. The City is a crucial connector between Marin County and San Francisco via the Golden Gate Bridge, and experiences high volumes of road users of all modes due to tourism. It is surrounded by the San Francisco Bay to the east and unincorporated Marin County on all other sides. Sausalito is both the ninth largest Marin County incorporated city or town by land area (approximately 1.8 square miles) and in terms of population (approximately 7,200 residents).[1] Sausalito is the third densest of Marin County's cities and towns, with a population density of over almost 4,100 residents per square mile.

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for the City of Sausalito.

17.2 VISION & GOALS

Sausalito's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the city's commitment to Vision Zero,

1 United States Census Bureau 2021

an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic-related fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

The City of Sausalito strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

GOALS

- Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.
- Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.
- Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.
- Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Sausalito residents.

17.3 EXISTING EFFORTS

In recent years, Sausalito's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in Sausalito.

PLANS & STUDIES

Bridgeway Safety Study (2023)

The City recently undertook a study to improve multimodal safety on Bridgeway from Napa Street to San Carlos Avenue. The study analyzed existing conditions, including collisions, and proposed a series of improvements that could build upon each other from short-term to a longer-term vision. Recommended improvements included filling the northbound bicycle lane gap, narrowing vehicle lanes, and implementing pedestrian crossing improvements.

Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Pedestrian/Bicycle Plan Check-In (2018)

The check-in of Sausalito's Pedestrian and Bicycle Plan documented the current state of walking and bicycling conditions around the city. The document's primary goal was to inform an ongoing update to the city's general plan. The check-in highlighted ongoing issues as well as next steps to improve safety and encourage walking and bicycling.

Students learn to safely ride bicycles as part of the Safe Routes to Schools educational programming.

PROGRAMS

Safe Routes to Schools

Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin

Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Engineering Improvements

Coloma Street Pedestrian Improvements (2023)

This project included installation of a sidewalk, mid-block crosswalk, and signage improvements on Coloma Street adjacent to Doctor Martin Luther King, Junior Park. Construction was completed in November 2023.

Nevada Street Striping Project (2022)

This project included striping improvements to calm traffic and add bicycle facilities along Nevada Street to improve conditions for students walking and bicycling to the Doctor Martin Luther King, Junior Academy Nevada Street campus.

Gate 6 Intersection Improvement Project (2021)

This project included the installation of new signals and ramps on the east side of the intersection to allow a dedicated bicycle phase to the signal.

17.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

From 2017-2021, 59 reported injury collisions occurred on non-state arterial and collector roadways in Sausalito (Figure 17.1). This marks a 35% decrease from 2012-2016, which saw 94 injury collisions. Of these collisions, there were eight (13%) resulting in a severe injury and one collision resulting in a fatality. While the number of severe injury collisions remained the same, the proportion of injury collisions that resulted in severe injury increased. Fatal collisions increased during these two time periods from zero to one.

Figure 17.1: Sausalito collisions by severity

Primary Collision Factors

Five primary collision factors were responsible for approximately 73% of collisions in Sausalito (Figure 17.2). Improper turning resulted in approximately 31% of collisions. Unsafe speed accounted for 20% of collisions and was the foremost cause of collisions in which people were killed or severely injured (resulted in one fatality). Pedestrian right-of-way violations (where drivers did not yield to a pedestrian with the right-of-way) accounted for 8% of collisions; this is when a driver fails to yield to a pedestrian crossing the street. Impaired driving and automobile right-of-way violations (where drivers did not yield to another driver with the right-of-way) each caused 7% of collisions.

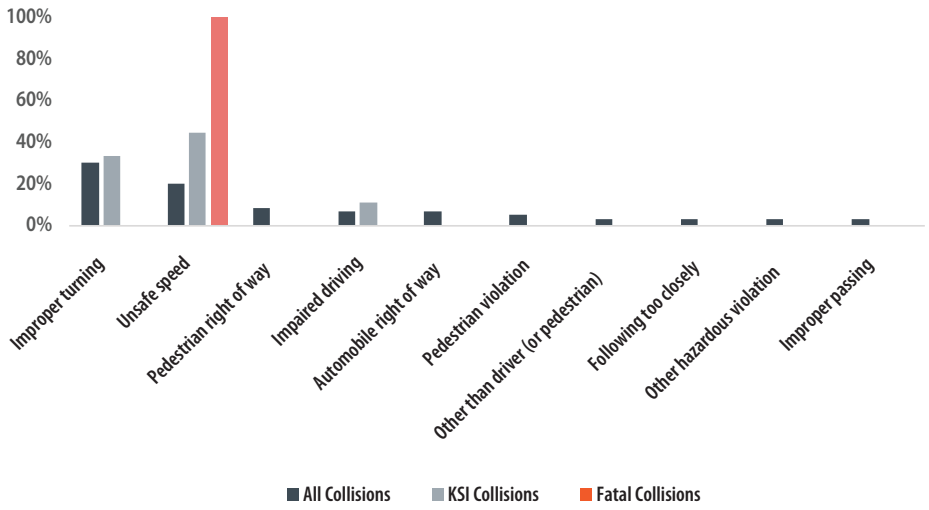


Figure 17.2: Top 10 primary collision factors

Road User Types

Figure 17.3 shows collisions by mode. Bicycle collisions made up almost half (49%) of all injury collisions in Sausalito. Approximately 24% of collisions involved motor vehicles only, 22% involved pedestrians (higher than the county's 14%), and 5% involved motorcycles. The City's one fatal collision involved a solo motor vehicle. The high rate of bicycle and pedestrian collisions speaks to the city's popularity among tourists and recreational bicyclists, as well as the challenging conditions for users of non-vehicular transportation modes.

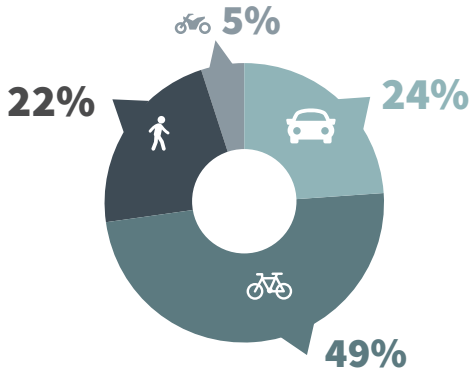


Figure 17.3: Sausalito collisions by mode

Of Sausalito's 32 collisions involving a bicyclist, 27 involved motor vehicles, three were solo bicycle collisions, and two involved a pedestrian. Bicycle collisions with motor vehicles tended to result from improper turning (48%) and unsafe speed (11%). Bridgeway from Napa Street to Turney Street was the main hotspot for collisions between bicyclists and motorists. Both collisions with pedestrians resulted from unsafe speeds.

Approximately 69% of the 13 pedestrians involved in collisions were crossing in a crosswalk at the time of the collision. Most pedestrian collisions resulted from three primary collision factors: pedestrian right-of-way violations (38%), unsafe speed (31%), and pedestrian violations (23%). A pedestrian violation is when a pedestrian crosses a street in an inappropriate place other than at an established crosswalk, or at a time when they are not permitted to cross at a signalized intersection. A hotspot of pedestrian collisions occurred on Bridgeway between Locust Street and Johnson Street.

Of the three motorcycle collisions in Sausalito, two involved a motor vehicle and one was a solo collision. There were no evident trends in the causes of motorcycle collisions. Two of these collisions occurred along Bridgeway between Gate 5 Road and Coloma Street.

Equity Considerations

None of Sausalito's pedestrian collisions involved minority populations. Approximately 9% of bicycle collisions involved a bicyclist of Hispanic or African American background, although this is below the percentage that these groups represent in the City's resident population (10%).

Several bus stops were located within 100 feet of at least one pedestrian collision. The stop at Bridgeway and Pine Street was proximate to two such collisions. Other stops along Bridgeway at Coloma Street, Easterby Street, and Bay Street were each located near one pedestrian collision. While it is unclear whether these pedestrians were transit users, collisions near transit stops can be signs of inequity in road safety conditions if people traveling to and from transit by foot are subject to unsafe or inadequate facilities. These inequities can be addressed by implementing infrastructure improvements, particularly safe crossings, in proximity to transit stops.

Older adults were involved in a higher percentage of injury and severe injury collisions compared to countywide rates. People over the age of 65 were involved in 23% of all injury collisions and 44% of severe injury collisions. This is compared to 20% and 11% countywide, respectively.

External Conditions

Approximately 17% of injury collisions and 22% of KSI collisions in Sausalito occurred in low-visibility conditions. Most of these – 10% of all collisions and 22% of KSI collisions – occurred in the dark but in the presence of streetlights.

High Collision Network

Sausalito's High Collision Network is show in Figure 17.4, Table 17.1, and Table 17.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations.

The city's High Collision Network includes three segments, as can be seen in the map; all were located along Bridgeway. Bridgeway from Napa Street to San Carlos Avenue had the highest collision rate of the city's segments (527.5 collisions per 100 million vehicle miles traveled) ranking 10th of the 70 countywide High Collision Network segments by collision rate. This segment also had the highest number of collisions (25) for the City, including 14 involving bicyclists and six involving pedestrians. Bridgeway from Bay Street to Second Street/Richardson Street had the second highest rate for the City, with 86.6 collisions per 100 million vehicle miles traveled. Two-thirds of the segment's six collisions involved a bicyclist or pedestrian.

Figure 17.4: Sausalito High Collision Network

Table 17.1: Sausalito High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Bridgeway from Napa Street to San Carlos Avenue	6	14	0	5	25	**527.5**
2	Bridgeway from Bay Street to 2nd Street/Richardson Street	2	2	1	2	6	**86.6**
3	Bridgeway from Gate 5 Road to Nevada Street	1	5	1	2	9	**70.5**

Table 17.2: Sausalito High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Bridgeway & Spring Street	1	3	0	2	**6**	**40.7**
B	Bridgeway & Napa Street	0	5	0	0	**5**	**37.1**
C	Bridgeway & Turney Street	0	3	0	1	**4**	**29.2**
D	Bridgeway & Locust Street	2	1	0	0	**3**	**22.0**
E	Bridgeway & Nevada Street	0	1	0	2	**3**	**20.7**
F	Bridgeway & Pine Street	2	0	0	0	**2**	**15.6**
G	Bridgeway & Johnson Street	2	0	0	0	**2**	**12.5**
H	Bridgeway & Harbor Drive	0	2	0	0	**2**	**7.0**
I	Bridgeway & Marinship Way & Easterby Street	1	0	0	0	**1**	**6.4**
J	Bridgeway & Gate 5 Road & Ebbtide Avenue	0	1	1	0	**2**	**5.5**

Sausalito's High Collision Network also includes ten intersections, again all located along Bridgeway. Of these, the collision rate at three intersections ranked in the top 10 of the County's 92 High Collision Network intersections: Bridgeway's intersections with Spring Street (40.7 collisions per 100 million entering vehicles), Napa Street (37.1), and Turney Street (29.2). Bridgeway and Spring Street also had the highest number of collisions of any intersection in Sausalito, with six collisions, four of which involved a pedestrian or bicyclist.

17.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for Sausalito in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Four primary emphasis areas were selected from this list for Sausalito based on the city's collision trends, shown in Table 17.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 17.3: Sausalito primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Bicyclists**
Collision Factors	**Improper Turning** **Unsafe Speed**
Collision Types	**Broadside**

Almost 20% of all injury collisions and 27% of KSI collisions in Sausalito from 2012-2021 involved a bicyclist; this is significantly higher than the County's rates of 9% and 16%, respectively. The bicycle collision rate increased when considering the latest five years of data, to almost 25% of all injury collisions in the City. Four severe injury collisions involved bicyclists.

Approximately 27% of both injury collisions and KSI collisions in the City were caused by improper turning, compared to 16% and 20%, respectively, countywide. These collisions were most prominent at Bridgeway's intersections with Spring Street, Napa Street, and Turney Street.

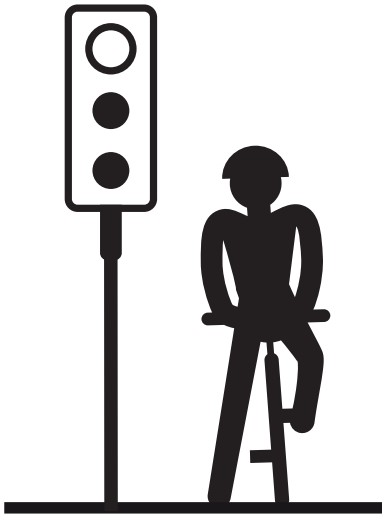
Unsafe speed resulted in 23% of Sausalito's injury collisions, as well as 40% of KSI collisions. Countywide, this collision factor was responsible for only 24% of KSI collisions. Unsafe speed collisions were spread throughout the City with the most prominent locations along Bridgeway between Locust Street and Pine Street.

One-fifth (20%) of KSI collisions were broadside collisions. Countywide, meanwhile, this type of collision made up only 13% of severe injury and fatality collisions. Broadside collisions were most prevalent at Bridgeway's intersections with Napa Street and Turney Street.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the City resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 17.4 through Table 17.7 list the recommended goals and strategies for Sausalito's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies.

Sausalito's Bridgeway is a challenging street to navigate by foot or bicycle.

Table 17.4: Sausalito bicyclists primary emphasis area recommended goals & strategies

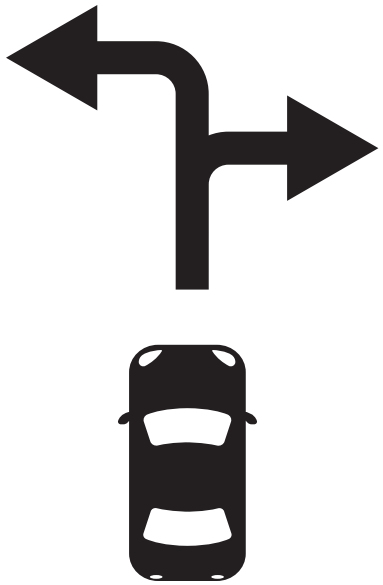


EMPHASIS AREA: BICYCLISTS

GOAL: Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming, including a focus on e-bicycles. • Expand Street Smarts safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of bicyclist collision trends at hot spot locations to inform strategy implementation.

Table 17.5: Sausalito improper turning primary emphasis area goals & strategies



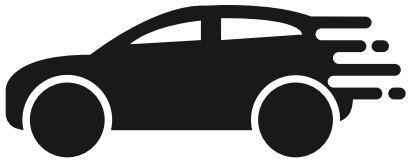
EMPHASIS AREA: IMPROPER TURNING

GOAL: Eliminate fatal & severe injury collisions improper turning by 2050.

STRATEGIES	
Education	• Expand Street Smarts program with an emphasis on avoiding distracted driving.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from improper turning.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns such as curb radius. reduction, left turn hardening, protected intersections/corners, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 17.6: Sausalito unsafe speed primary emphasis area goals & strategies

EMPHASIS AREA: UNSAFE SPEED



GOAL: Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, AB 321) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer and/or permanent speed feedback signage at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 17.7: Sausalito broadside collisions primary emphasis area goals & strategies

EMPHASIS AREA: BROADSIDE COLLISIONS

GOAL: Eliminate fatal & severe injury collisions involving broadside collisions by 2050.

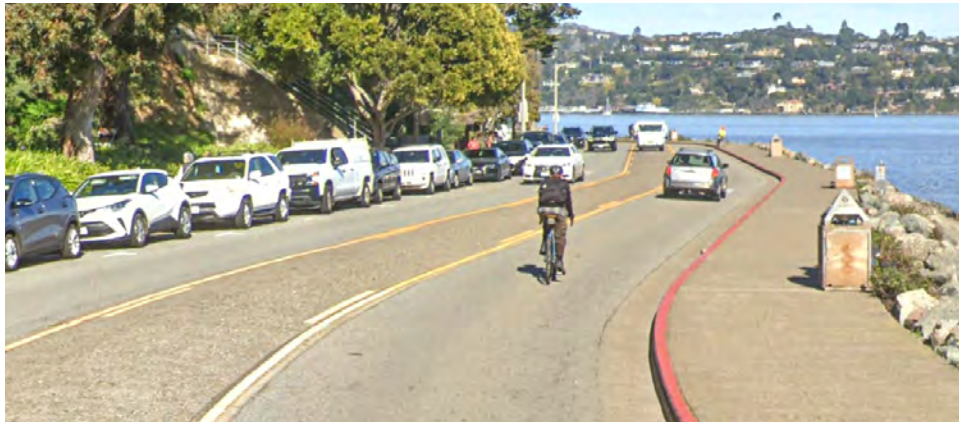
STRATEGIES	
Education	• Expand the Street Smarts program.
Enforcement	• Equitably implement targeted enforcement at high injury locations where violations that lead to broadside collisions are more common, such as automobile right of way and traffic signal/stop sign violations.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns (e.g., roundabouts and protected intersections/corners). • Consider modifying traffic signal timing with longer clearance intervals such as with advanced dilemma zone detection.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

17.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the city, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In Sausalito, the priority locations and projects are as follows:

Bridgeway from Napa Street to San Carlos Street (Segment)

- **Signal Improvements**
  Signalization improvements may include improving signal phasing, upgrading signals to 12" heads, prohibiting right turns on red, leading pedestrian intervals, and adding video detection.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: consolidating crosswalks, adding high visibility crosswalks, curb extensions, center pedestrian refuge island, advanced stop bars, yield lines, and pedestrian-orientated street lighting. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Consider upgrading bicycle lanes (e.g., by providing wider bicycle lanes and narrow traffic lanes, by creating green transition zones) and filling gaps in existing bicycle infrastructure. While the corridor is constrained for space along this segment, bicycle collisions may indicate that greater separation of bicycles and motor vehicles may be needed. Installing green paint through conflict zones and adding 'right turn yield to bicycles' signs can increase the visibility of bicyclists.



Bridgeway from Bay Street to Second Street/Richardson Street (Segment)

- **Traffic Calming Improvements**
  Consider traffic calming elements to discourage drivers using the median to pass slower vehicles and bicyclists and to slow vehicle speeds. This could reduce the number of sideswipe collisions along this segment.
- **Bicycle Facility Improvements**
  Consideradding bicycle lanes along this corridor. Adding dedicated bicycle facilities can lessen the chances of conflicts and collisions involving motorists overtaking bicyclists.

Bridgeway from Gate 5 Road to Nevada Street (Segment)

- **Signal Improvements**
  Signalization improvements may include improving signal phasing, coordinating signals at multiple locations, extending left turn pockets, upgrading signals to 12" heads, prohibiting right turns on red, and adding video detection. Replace controllers to allow operational and safety improvement.

- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: high visibility crosswalks, blank-out signs to reinforce a no right on red turn restriction, advanced stop bars, bulb outs, tighten curb radius, directional curb ramps and leading pedestrian intervals. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence. In addition, off-system pathway improvements should be considered.

- **Bicycle Facility Improvements**
  Installing green paint through conflict zones could increase the visibility of bicyclists. Bicycle signals at key locations should be considered, e.g., at Nevada Street. Provision of a wider bicycle lane by narrowing traffic lanes should be considered.

Bridgeway & Spring Street (Intersection)

- **Signal Improvements**
  Signalization improvements may include improving signal phasing, coordinating signals at multiple locations, extending left turn pockets, upgrading signals to 12" heads, prohibiting right turns on red, and adding video detection. Replace controllers to allow operational and safety improvement.

- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be implemented along this corridor including some of the following: high visibility crosswalks, blank-out signs to reinforce a no right on red turn restriction, advanced stop bars, bulb outs, tighten curb radius, directional curb ramps and leading pedestrian intervals. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence. In addition, off-system pathway improvements should be considered.

17.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

18. UNINCORPORATED MARIN COUNTY LOCAL ROAD SAFETY PLAN

18.1 INTRODUCTION

Unincorporated Marin County occupies an area of almost 460 square miles scattered throughout the County, with much of this area located in West Marin. A number of diverse communities are located on this land, ranging in size and characteristics from small rural communities to those that are denser and more urban. Unincorporated Marin includes key roadways such as Highway 1, Panoramic Highway, and Sir Francis Drake Boulevard. Approximately 66,000 residents live in unincorporated Marin County, comprising 30% of the County's total population.[1]

A Local Road Safety Plan (LRSP) is a plan that provides a framework to identify, analyze, and prioritize roadway safety improvements on local and rural roads to increase safety for all road users. The LRSP facilitates local agency partnerships and collaboration to systematically address road safety issues, ultimately resulting in a list of prioritized projects and actions that can be used to obtain federal funding. The LRSP provides a proactive approach to address safety needs and demonstrates agency responsiveness to safety challenges. A living document, the LRSP can be revised as needed to reflect evolving trends, community needs, and priorities.

This chapter presents the vision statement and goals, summarizes collision data, identifies emphasis areas, recommends high priority project locations, and outlines the implementation and evaluation strategies for Unincorporated Marin County.

1 United States Census Bureau 2021

18.2 VISION & GOALS

Unincorporated Marin's vision for this LRSP was developed through feedback with the Technical Advisory Committee (TAC) and Marin County jurisdictions, which are described in Chapter 3. The vision statement reflects the county's commitment to Vision Zero, an international strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. The vision statement recognizes that, while aspirational, to work towards anything less than an end to traffic fatalities and severe injuries would not be appropriate. The accompanying goals represent a path forward to achieving this vision.

Vision Statement

Unincorporated Marin strives to eliminate collision-related fatalities and severe injuries by proactively and equitably pursuing a safe systems approach prioritizing road safety for all users.

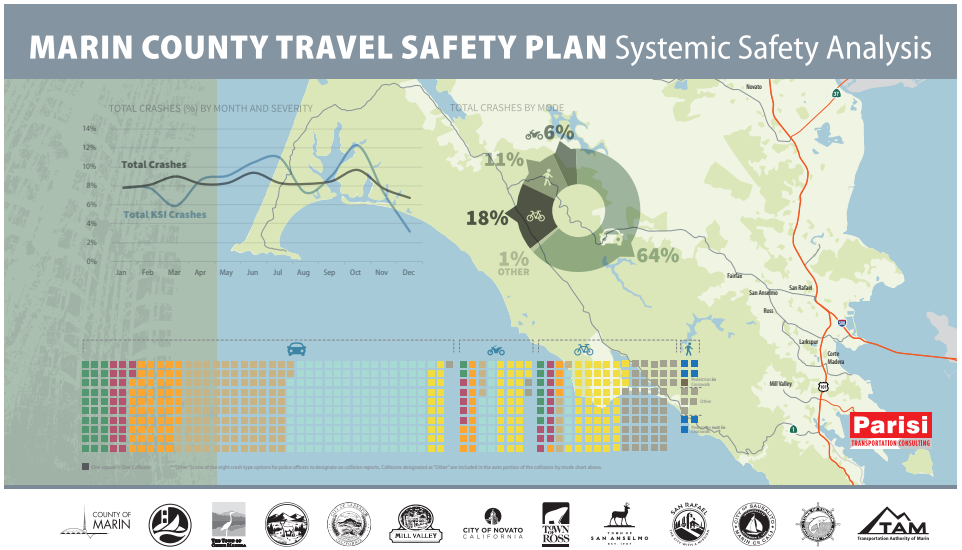
GOALS

- **Systematically implement proven safety solutions, initiatives, policies, and programs to eliminate preventable fatal & severe collisions by 2050.**
- **Utilize a multi-faceted approach that spans jurisdictions and encompasses diverse strategies including engineering, education, public health, and enforcement.**
- **Implement improvements that promote and support safe travel for vulnerable users including people walking and bicycling, children, older adults, and people with disabilities.**
- **Ensure that multimodal safety investments are made in a manner that is fair and equitable for all Marin residents.**

18.3 EXISTING EFFORTS

In recent years, unincorporated Marin's efforts to improve safety have been most visible through a range of plans and programs. This chapter describes plans, studies, and programs supporting safety in unincorporated Marin County.

PLANS & STUDIES



Systemic Safety Analysis Report (2018)

The 2018 Marin County Systemic Safety Analysis Report (SSAR) provided a large-scale systemic safety analysis of roadways across Marin County to help drive future improvement projects, grant applications, and traffic safety outreach programs for Marin County's 11 jurisdictions and unincorporated areas. The analysis was funded through the California Systemic Safety Analysis Report Program and produced by the Marin County Department of Public Works. The project also involved collaboration with various town and city police departments, the Marin County Sheriff, and the California Highway Patrol. A Technical Advisory Committee was formed to help guide the process and was comprised of representatives from the Marin Public Works Association, Transportation Authority of Marin, and Marin General Hospital. This LRSP serves as an update to portions of the SSAR.

Marin County Unincorporated Area Bicycle & Pedestrian Plan Update (2018)
This plan update serves as a coordinating and resource document to improve bicycle and pedestrian facilities in unincorporated areas of Marin County. It describes existing conditions, analyzes needs, proposes improvements, and provides an implementation strategy. The plan's goals are to increase bicyclist and pedestrian access, improve bicycle transportation, and encourage pedestrian transportation.

Marin City Community-Based Transportation Plan Update (2015)
The Marin City Community-Based Transportation Plan Update was part of an effort by the Metropolitan Transportation Commission to identify barriers to mobility and work to overcome them. The plan resulted from a collaborative effort of the Marin City Community Services District, Marin County, the Transportation Authority of Marin, Golden Gate Transit, Marin Transit, and other partner agencies and organizations. It describes existing conditions community input, recommended improvements, and considerations for implementation.

PROGRAMS

Safe Routes to Schools teaches students safe bicycling behaviors.

Safe Routes to Schools
Marin County's Safe Routes to Schools (SR2S) is a program of TAM. TAM has created a long-term, sustainable program that is institutionalized in schools with strong community involvement. SR2S began in 2000 as a pilot program in select towns. Today it operates in all Marin County jurisdictions and Unincorporated Marin in over 55 schools, serving a total population of over 29,000 students. Among its many activities, SR2S provides professional instructors to teach safe bicycling and pedestrian safety skills and oversees volunteers in promoting the program through contests, events, and regular submissions to school newsletters. SR2S also identifies potential infrastructure projects to address school travel safety issues.

Street Smarts Marin
Street Smarts is a traffic safety program run by TAM that educates drivers, pedestrians, and bicyclists about safety issues including distracted driving. The goal is to encourage people to adopt new attitudes and behaviors that will reduce the number of collisions and make the streets safer for everyone. The program incorporates physical banners and social media posts to spread its messages about key safety behaviors. The program began in 2009 and includes one to two rollouts per year.

Transportation Authority of Marin Crossing Guard Program
TAM's crossing guard program provides trained crossing guards at key intersections throughout Marin County. This is a key component of the Safe Routes to Schools program as crossing guards help reduce the reluctance that some parents may feel towards allowing their children to walk or bicycle to school. The program began in 2006 with 54 crossing guards and in the 2023/2024 school year 105 crossing guard locations will be active. TAM contracts with a professional company that specializes in crossing guard programs and uses a data-driven evaluation process to select the sites at which guards are located.

Crossing guards increase safety and comfort for students walking and biking to school.

ENGINEERING IMPROVEMENTS

Marin City Pedestrian Improvements (Ongoing)

This project includes pedestrian upgrades at various locations in Marin City: Flemings Drive and Terrace Drive, Terrace Drive and Terners Drive, Sherwood Drive and Donahue Street, Bay Vista Circle, and Donahue Street. Work is planned for summer 2023 and will include construction of ADA-compliant curb ramps, sidewalks, and pavement marking refresh.

Four Corners Intersection Improvements (Ongoing)

Marin County Public Works has been evaluating potential design improvements for the Panoramic Highway / Sequoia Valley Road / Muir Woods Road intersection, also known as Four Corners. The project will address the configuration of the intersection, including the skewed approaches of the roadways and lane alignments. The number of bicyclists and hikers either using or crossing the roadway further emphasizes the multimodal uses and the need to develop a solution that benefits all users. This project is currently in the study phase.

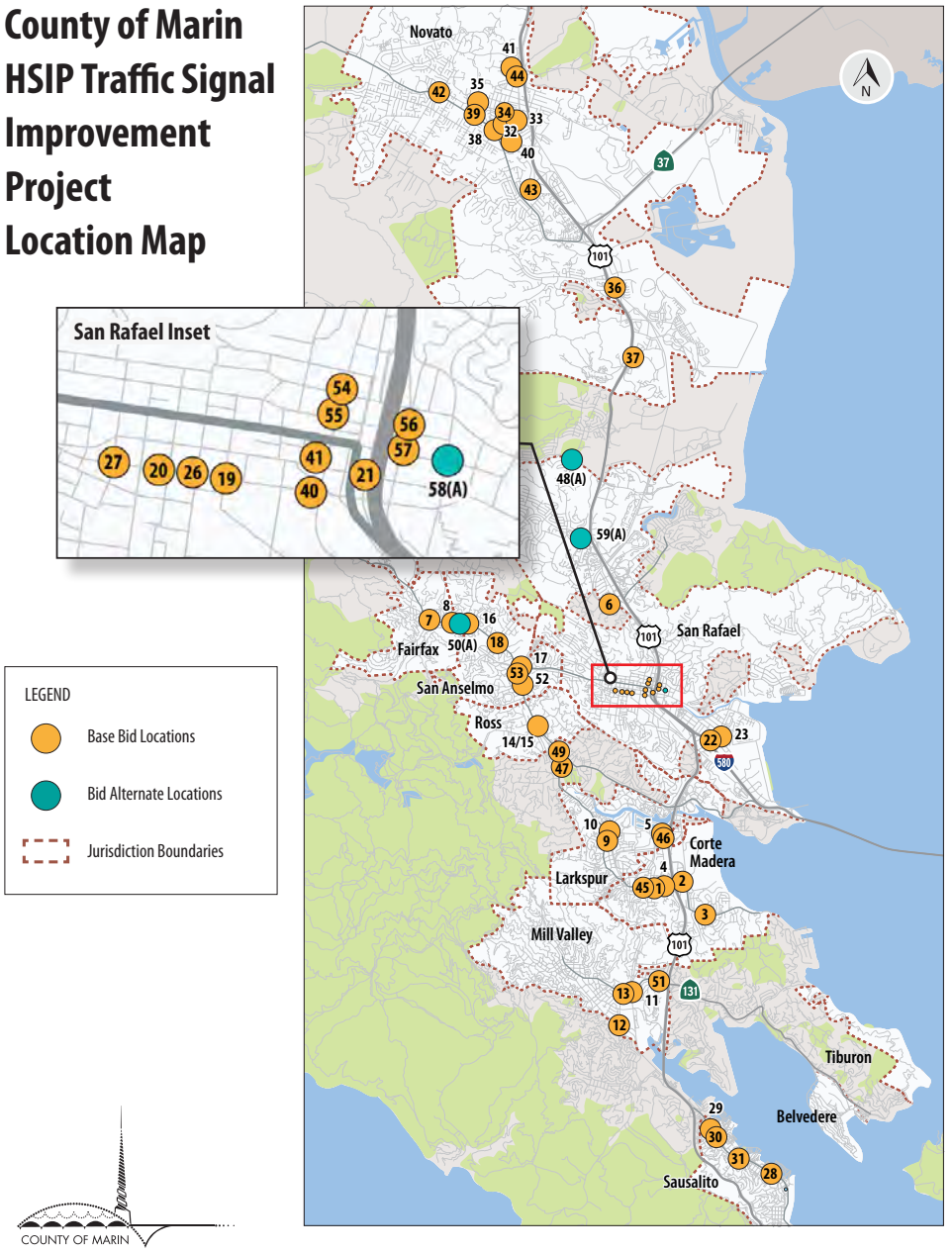
HSIP Signal Enhancements (2022)

This project enhanced 55 signalized intersections throughout unincorporated Marin as well as four in incorporated jurisdictions. Safety improvements included upgrading signal heads to 12" LED signal heads, adding signal head backplates, adding pedestrian countdown heads, adding audible pedestrian signals at pedestrian push buttons, updating signal hardware to incorporate Lead Pedestrian Intervals at crosswalks, and adding video or advanced detection loops for advanced dilemma zone detections.

Sir Francis Drake Boulevard Corridor Rehabilitation (2021)

Completed in coordination with TAM, this regional project rehabilitated 2.2 miles of Sir Francis Drake Boulevard between Highway 101 and the Ross town limits. In addition to repaving, the project consisted of pedestrian safety improvements, striping, intersection and signal improvements, traffic operation improvements, utility infrastructure improvements, and new street lighting.

County of Marin HSIP Traffic Signal Improvement Project Location Map



The HSIP Signal Enhancements project made improvements to 55 signals throughout the County.

18.4 DATA SUMMARY

This analysis considered reported collisions on non-state arterial and collector roads resulting in injury or fatality. Arterial roads are high-capacity roads that carry longer-distance vehicle flows between centers of activity. Collector roads have low to moderate capacity and serve as connectors between local roads and arterials. For the purpose of the following data summary, "all collisions" refers to collisions resulting in injury (regardless of severity) or fatality, unless otherwise specified. A subset of these collisions resulted in a severe injury or fatality: these are referred to as "KSI collisions" (resulting in a person being Killed or Severely Injured). Finally, "fatal collisions" refers to any collision resulting in a fatality.

From 2017-2021, 491 injury collisions occurred on non-state arterial and collector roadways in unincorporated Marin (Figure 18.1). Of these, there were 84 (17%) collisions that resulted in a severe injury and 15 (3%) collisions that resulted in a fatality. This marks a significant decrease of 41% from the previous five-year period from 2012-2016, which saw 624 total injury collisions. However, while the overall number of collisions decreased, the number of fatal collisions more than doubled between these two time periods, from seven.

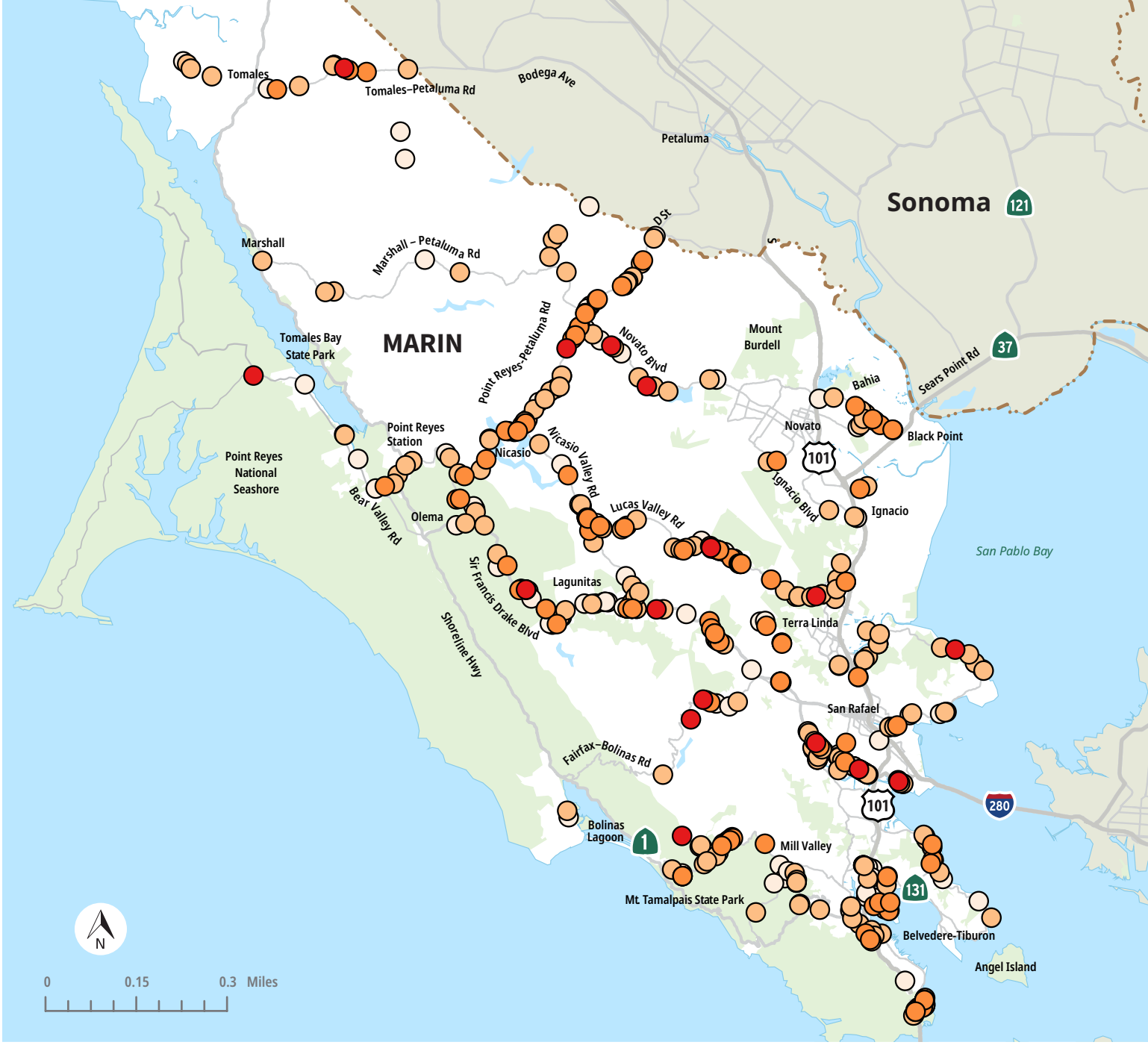


Figure 18.1: Unincorporated Marin collisions by severity

Primary Collision Factors

Four primary collision factors were responsible for approximately 76% of collisions in unincorporated Marin (Figure 18.2). Unsafe speeds resulted in approximately 29% of collisions, surpassing the countywide rate of 26% for this collision factor. Improper turning, responsible for 28% of collisions in unincorporated Marin, far outpaced the countywide rate of 17%. Driving or bicycling under the influence of drugs or alcohol and automobile right-of-way violations led to 12% and 7% of collisions, respectively. Unsafe speed and improper turning resulted in the majority of KSI collisions.

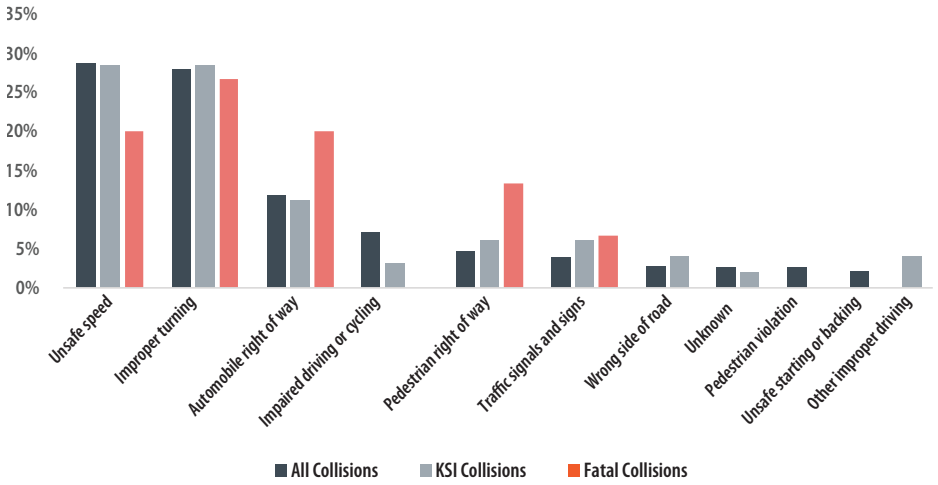


Figure 18.2: Top 10 primary collision factors

Road User Types

Figure 18.3 shows collisions by mode. Motor vehicle only collisions made up approximately 68% of all injury collisions in unincorporated Marin. Eighteen percent (18%) of collisions in unincorporated Marin involved a bicyclist, while 10% involved a motorcyclist and 4% involved a pedestrian. The rate of pedestrian collisions in unincorporated Marin is much lower than the overall County rate of 14%. Meanwhile, the rate of motorcycle collisions in unincorporated Marin is significantly higher than that for the entire county (7%). The high rate of motorcycle collisions speaks to the County's popularity among riders, as well as the challenging conditions for users of non-vehicular transportation modes.

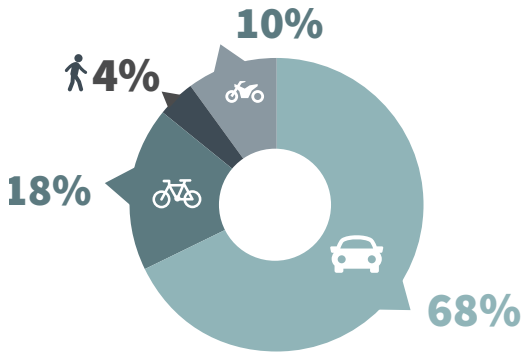


Figure 18.3: Unincorporated Marin collisions by mode

Of unincorporated Marin's 90 collisions involving a bicyclist, 52 involved motor vehicles, 35 were solo bicycle collisions, and three involved a motorcycle. Bicycle collisions with motor vehicles tended to result from improper passing (19%), improper turning (19%), automobile right-of-way violations (13%), and operating on the wrong side of the road (13%). Almost half (49%) of solo bicycle collisions were caused by unsafe speeds. Hotspots for bicycle collisions included Alexander Avenue, Strawberry Point, and College Avenue in Kentfield.

Approximately 58% of the 19 pedestrians involved in collisions were crossing in a crosswalk at the time of the collision. The majority of pedestrian collisions resulted from three primary collision factors: pedestrian right-of-way violations (53%, collisions where drivers did not yield to a pedestrian with the right-of-way); pedestrian violations (11%, collisions where pedestrians were deemed at fault); and unsafe starting or backing (11%). A hotspot of pedestrian collisions occurred on Sir Francis Drake Boulevard in Kentfield between Ross Terrace and College Avenue.

Of the 52 motorcycle collisions in unincorporated Marin, 40 were solo collisions, nine involved a motor vehicle, and three involved a bicycle. Solo motorcycle collisions tended to result from unsafe speed (55%) and improper turning (35%). Motorcycle collision hot spots were located along twisting rural roads including Panoramic Highway and Lucas Valley Road.

Equity priority communities such as Marin City can be targeted for safety improvements.

Equity Considerations

Several equity priority communities designated by Plan Bay Area 2050 are located in unincorporated Marin. These are census tracts that have a significant concentration of underserved populations, such as households with low incomes and people of color. Of these equity priority communities, Marin City had a relatively high number of collisions. Twelve collisions occurred here from 2017-2021, and nearly all occurred on Donahue Street or Drake Avenue, the main roadways through the community. These collisions included three involving a pedestrian and one involving a bicyclist.

Several bus stops were located within 100 feet of at least one pedestrian collision. The stop at Sir Francis Drake Boulevard and Elm Avenue, serving the College of Marin, was proximate to two such collisions. One pedestrian collision occurred at the College of Marin bus stop on College Avenue, which is also adjacent to a multi-use path. Two bus stops in Marin City – one at the Gateway Shopping Center on Donahue Street and the other at Donahue Street and Headlands Court – were each the site of a pedestrian collision. One pedestrian collision occurred near the Sir Francis Drake Boulevard and Bon Air Shopping Center stop, one at the North San Pedro Road and Roosevelt Avenue stop (serving several schools), and one at the stops at North San Pedro Road and Meadow Drive/Oxford Drive. While it is unclear whether these pedestrians were transit users, collisions near transit stops can be signs of inequity in road safety conditions that should be addressed.

External Conditions

Approximately 26% of injury collisions and 30% of severe injury and fatality collisions in unincorporated Marin occurred in low-visibility conditions. The majority of these collisions, accounting for 16% of all collisions and 17% of collisions resulting in severe injury or fatality, occurred in the dark where no streetlights were present.

Shoreline Highway

The focus of this analysis has been on non-state-owned roadways; however, when discussing collisions in unincorporated Marin it would be remiss to ignore Shoreline Highway. Shoreline Highway is an important route in the County for connecting travelers from Highway 101 to West Marin. This section provides an analysis of the segment that serves the more densely settled parts of unincorporated Marin, from Highway 101 to Panoramic Highway.

Fifty-one collisions occurred on this segment of Shoreline Highway from 2017-2021 (Figure 18.4). This included four collisions that resulted in a severe injury. These collisions tended to be more closely spaced towards the eastern end of the segment. A hot spot of collisions was located along Shoreline Highway between Tamalpais Valley Junction and Tennessee Valley Road, in an area with many commercial uses.

Four primary collision factors resulted in 82% of collisions on this segment. Unsafe speed was responsible for over one-third (35%) of collisions. Improper turning, automobile right-of-way violations (where drivers did not yield to another driver with the right-of-way), and improper passing caused 18%, 18%, and 12%, respectively.

Of the 51 collisions, over half (55%) involved motor vehicles only. One-third (33%) involved bicyclists, including four solo bicyclist collisions. Approximately 12% of the collisions involved motorcycles, including one solo motorcycle collision. None of the collisions along this segment involved pedestrians.

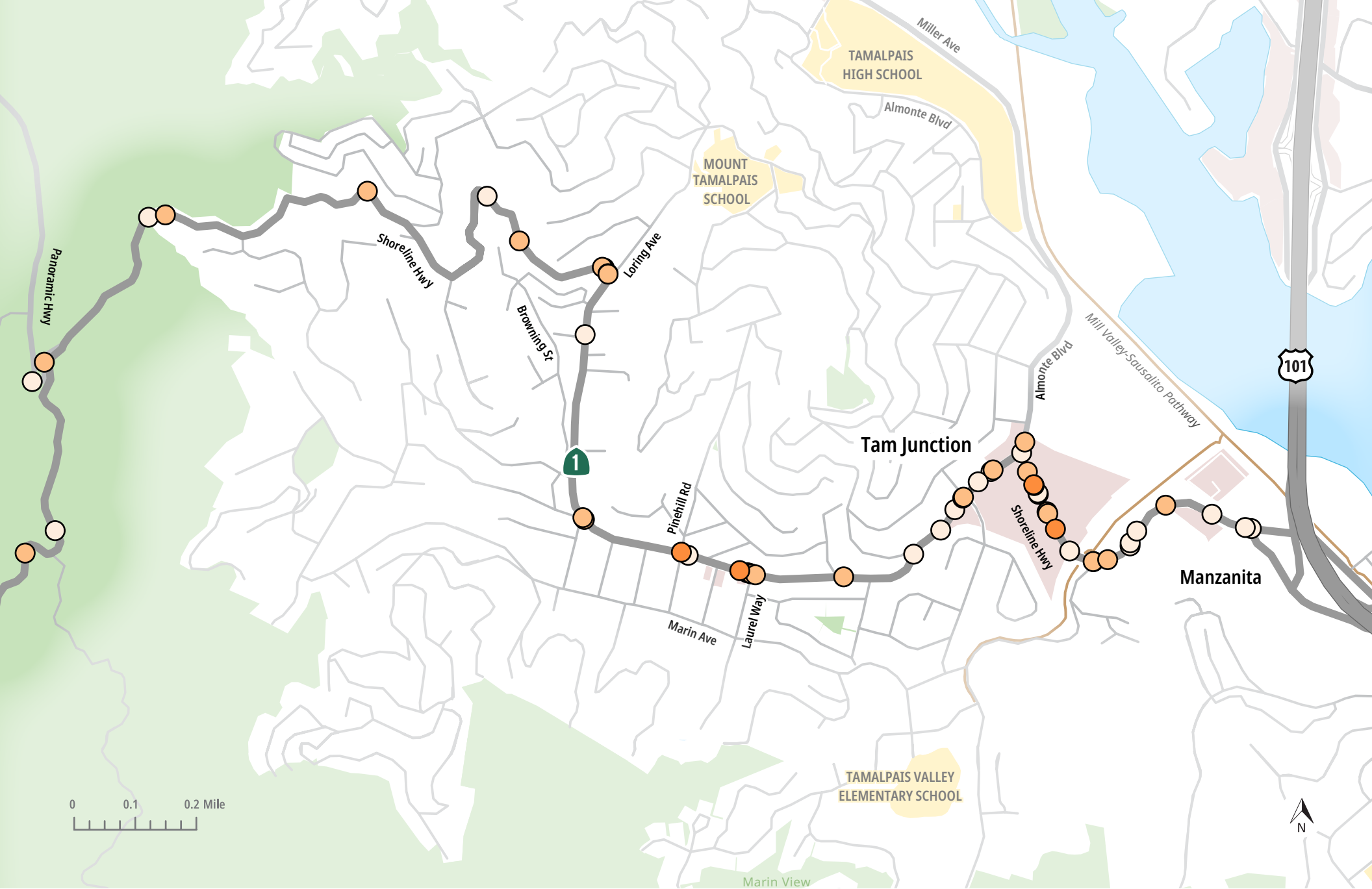


Figure 18.4: Unincorporated Marin Highway 1 collisions by severity

High Collision Network

Unincorporated Marin's High Collision Network is shown in Figure 18.5, Table 18.1, and Table 18.2. High collision road segments and intersections were selected countywide based on overall collision rates at those locations.

Unincorporated Marin's High Collision Network includes 12 segments, as can be seen in the map; this is the third highest number of segments among Marin County jurisdictions. Alexander Avenue from Highway 101 to Second Street had the highest rate of any Unincorporated segment – 295.4 collisions per 100 million vehicle miles traveled – ranking 13th of the 70 countywide High Collision Network segments by collision rate. Of this segment's 20 collisions, 17 involved bicyclists, including 12 solo bicycle collisions, largely resulting from unsafe speeds and occurring in areas with poor pavement condition. It is important to note that, while Alexander Avenue is located in Unincorporated Marin, it is owned by the Golden Gate Bridge District up to the Sausalito City limits. Marin City's Donahue Street and Drake Avenue were both included in the High Collision Network with collision rates of 222.6 and 76.9 collisions per 100 million vehicle miles traveled, respectively.

Figure 18.5: Unincorporated Marin High Collision Network

Table 18.1: Unincorporated Marin High Collision Network Segments

ID	Location	Number of Collisions					Collision Rate Per 100 Million VMT
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
1	Alexander Avenue from Highway 101 to 2nd Street	0	17	1	2	**20**	**295.4**
2	Donahue Street from Park Circle to Drake Avenue (East)	0	0	0	4	**4**	**222.6**
3	College Avenue from Sir Francis Drake Boulevard to Woodland Road	1	3	0	6	**10**	**90.1**
4	Drake Avenue from Donahue Street (West) to Donahue Street (East)	0	1	0	3	**4**	**76.9**
5	Lucas Valley Road from Bay Laurel Lane to Camino Margarita (Big Rock)	0	1	1	7	**9**	**68.5**
6	Point San Pedro Road from Summit Avenue to Sea Way	0	0	0	3	**3**	**66.8**
7	Point Reyes-Petaluma Road from Novato Boulevard to Nicasio Valley Road	0	1	4	17	**22**	**61.4**
8	North San Pedro Road from Golf Avenue to Meriam Drive	1	0	0	5	**6**	**43.2**
9	Panoramic Highway from Shoreline Highway to Gravity Car Road	1	6	10	4	**21**	**42.3**
10	Sir Francis Drake Boulevard from Bon Air Road to Del Monte	2	0	0	24	**26**	**36.1**
11	Sir Francis Drake Boulevard from Baywood Canyon Road to San Geronimo Valley Drive (White's Hill)	0	3	0	4	**7**	**24.0**
12	Sir Francis Drake Boulevard from Drakes Cove Road to Andersen Drive	0	0	1	8	**9**	**17.8**

Sir Francis Drake Boulevard from Bon Air Road to Del Monte had the highest number of collisions of any unincorporated segment, 26. These largely involved vehicles only but included two pedestrian collisions.

Unincorporated Marin's High Collision Network also includes 12 intersections, again the third highest number of any Marin County jurisdiction. This includes the intersection with the highest collision rate countywide: Nicasio Valley Road and Lucas Valley Road, with 57.9 collisions per 100 million entering vehicles. This was followed by the intersection of Point Reyes-Petaluma Road and Novato Road, with 23.8 collisions per 100 million entering vehicles. Collisions at unincorporated Marin High Collision Network intersections largely involved vehicles only.

Table 18.2: Unincorporated Marin High Collision Network Intersections

ID	Location	Number of Collisions					Collision Rate Per 100 Million Entering Vehicles
		Pedestrian	Bicycle	Motorcycle	Motor Vehicle Only	Total	
A	Nicasio Valley Road & Lucas Valley Road	0	1	1	2	**4**	**57.9**
B	Point Reyes-Petaluma Road & Novato Boulevard	0	1	1	1	**3**	**23.8**
C	Sir Francis Drake Boulevard & Nicasio Valley Road & San Geronimo Valley Road	0	1	0	3	**4**	**19.1**
D	Point Reyes-Petaluma Road & Nicasio Valley Road	0	0	0	2	**2**	**17.0**
E	Point Reyes-Petaluma Road & Hicks Valley Road	0	0	0	2	**2**	**14.5**
F	Miller Creek Road & Marinwood Avenue	1	0	0	1	**2**	**13.7**
G	Sequoia Valley Road & Panoramic Highway & Muir Woods Road	0	1	0	0	**1**	**5.4**
H	East Blithedale Avenue & Tower Drive & Kipling Drive[2]	0	1	0	2	**3**	**5.2**
I	Sir Francis Drake Boulevard & El Portal Drive	0	0	0	2	**2**	**2.6**
J	Sir Francis Drake Boulevard & Bon Air Road	0	0	0	2	**2**	**2.3**
K	Sir Francis Drake Boulevard & Bon Air Center & La Cuesta Drive	0	0	0	1	**1**	**1.3**
L	Sir Francis Drake Boulevard & Eliseo Drive & Barry Way	0	0	0	1	**1**	**1.2**

2 As of June 2023, this intersection is under the jurisdiction of the City of Mill Valley.

18.5 EMPHASIS AREAS

Emphasis areas provide a framework for developing and implementing strategies to increase road user safety across the County. Potential emphasis areas were initially identified using severe injury and fatality collision data from 2012-2021 for unincorporated Marin in comparison to the County as a whole, which allowed for a larger sample size of KSI collisions to be compared. Emphasis areas were then refined through stakeholder input. A full list of emphasis areas for the County can be found in Chapter 6. Seven primary emphasis areas were selected from this list for unincorporated Marin based on the city's collision trends, shown in Table 18.3. The following is a description of trends relating to these emphasis areas from 2012-2021.

Table 18.3: Unincorporated Marin primary emphasis areas

Category	Primary Emphasis Area
Vulnerable Road Users	**Bicyclists** **Motorcyclists**
Collision Factors	**Impaired Driving & Bicycling** **Improper Turning** **Unsafe Speed**
Collision Types	**Rear-End**
External Conditions	**Dark Conditions**

Approximately 18% of KSI collisions in unincorporated Marin from 2012-2021 involved a bicyclist; this is slightly higher than the County's rates of 17%. Given that unincorporated Marin's roads are frequented by recreational bicyclists, this is an important emphasis area for addressing road user safety.

Approximately 4% of injury collisions and almost 8% of KSI collisions involved a motorcycle, compared to 3% and 7% countywide, respectively. Similar to bicyclists, motorcyclists often seek out unincorporated Marin's scenic, winding roads for recreational riding.

Driving or bicycling under the influence of drugs or alcohol resulted in 11% of both injury collisions and KSI collisions. This is higher than the County's rates of 7% and 10%, respectively. Collisions caused by driving or bicycling under the influence were spread throughout unincorporated Marin. Hotspots included Lucas Valley Road, Paradise Drive, and Point Reyes-Petaluma Road.

Improper turning led to 26% of injury collisions and 28% of KSI collisions, significantly higher than the County's rates of 17% and 20%, respectively. These collisions were also widely distributed throughout the County but had hotspots along Lucas Valley Road, Point Reyes-Petaluma Road, and Sir Francis Drake Boulevard.

Unsafe speed resulted in 33% of unincorporated Marin's injury collisions, as well as 32% of KSI collisions. These rates are higher than the respective Countywide proportions for this collision factor of 28% and 24%. Unsafe speed collisions were spread throughout unincorporated Marin.

Approximately 7% of all injury collisions and 7% of KSI collisions were rear-end collisions. Countywide, meanwhile, this type of collision made up 6% of KSI collisions. High numbers of rear-end collisions were located along College Avenue and Sir Francis Drake Boulevard in Kentfield and Greenbrae.

Lastly, one quarter of KSI collisions in unincorporated Marin occurred under dark conditions. This includes 15% of all KSI collisions that occurred in locations without streetlights.

Focusing on these primary emphasis areas can significantly contribute to eliminating collisions in the County resulting in severe injury or fatality. However, a strategy that includes additional emphasis areas would have additional positive effects. Table 18.4 through Table 18.10 list the goals and strategies for unincorporated Marin's primary emphasis areas. See Appendix A for more detail on countermeasures recommended as emphasis area strategies..

Table 18.4: Bicyclists primary emphasis area goals & strategies

EMPHASIS AREA: BICYCLISTS

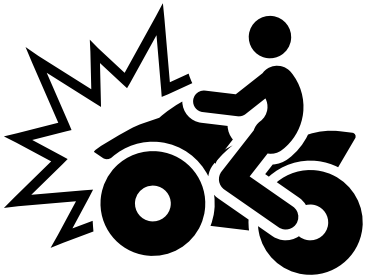
GOALS: Reduce fatal & severe injury collisions involving bicyclists 30% by 2030.

Reduce fatal & severe injury collisions involving bicyclists 50% by 2040.

Eliminate fatal & severe injury collisions involving bicyclists by 2050.

STRATEGIES	
Education	• Expand Safe Routes to Schools education programming. • Expand Street Smarts safety campaigns and consider alignment with Bicycle Safety Month.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injury bicycle collisions. • Prioritize enforcement of traffic laws based on likelihood of behavior causing an injury collision. • Equitably implement targeted enforcement for bicyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, install countermeasures focused on reducing the likelihood and severity of collisions between automobiles and bicyclists and increasing driver awareness of bicyclists. • Provide low stress, all ages and abilities infrastructure connectivity for bicyclists, particularly within one mile of schools and along key active transportation routes. • Refer to Caltrans and FHWA guidance on the preferred method of separation based on automobile speeds and roadway volumes. • Implement technology to improve bicyclist safety such as bicycle activated signal detection and bicycle signal heads as appropriate.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to bicycle collision sites. • Consider targeted training for responding to specific high incident locations and treatment of predominant bicyclist injury types at those locations. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement new technologies to make bicycle crossings safer and more comfortable (e.g., automated detection at signalized intersections, etc.). • Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Conduct in-depth analyses of bicyclist collision trends at hot spot locations to inform strategy implementation.

Table 18.5: Motorcyclists primary emphasis area goals & strategies



EMPHASIS AREA: MOTORYCLISTS

GOALS: Reduce fatal & severe injury collisions involving motorcyclists 30% by 2030.

Reduce fatal & severe injury collisions involving motorcyclists 50% by 2040.

Eliminate fatal & severe injury collisions involving motorcyclists by 2050.

STRATEGIES	
Education	• Coordinate with motorcycle advocacy groups (e.g., ABATE) about ways to effectively promote safe behaviors. • Implement education and awareness campaigns focused on conspicuity, protective clothing, and driver awareness of motorcyclists.
Enforcement	• Prioritize equitable enforcement of motorcycle helmet laws in key high injury locations. • Equitably implement targeted enforcement for motorcyclists driving under the influence of alcohol or drugs.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving pavement friction at locations with curves and/or a high frequency of motorcycle collisions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Collect and analyze data on multi-modal counts, including non-reported collisions.

Table 18.6: Impaired driving & bicycling primary emphasis area goals & strategies

EMPHASIS AREA: IMPAIRED DRIVING & BICYCLING

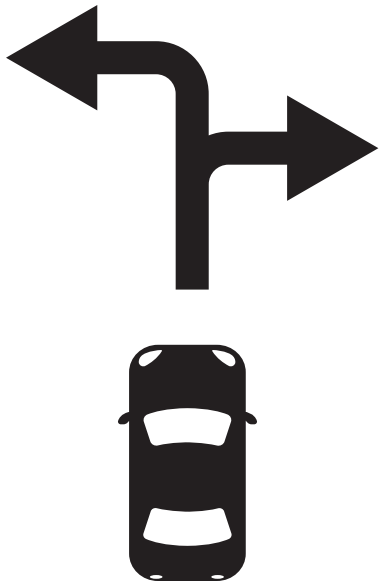
GOALS: Reduce fatal & severe injury collisions involving impaired driving and bicycling 30% by 2030.

Reduce fatal & severe injury collisions involving impaired driving and bicycling 50% by 2040.

Eliminate fatal & severe injury collisions involving impaired driving and bicycling by 2050.

STRATEGIES	
Education	• Implement education and public awareness campaigns targeted at impaired driving. • Partner with local businesses and organizations along hot spot corridors on educational efforts and campaigns.
Enforcement	• Equitably implement high visibility enforcement campaigns. • Establish DUI checkpoints where appropriate.
Engineering	• Install countermeasures focused on mitigating or preventing hit objects, unsafe speeds, and improper turning. • Provide physical separation between fast-moving traffic and vulnerable road users.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Implement a Safe Ride Home partnership between the jurisdictions, police departments, CHP, taxi/ride-hail operators, and local businesses. • Deploy collision-prevention technology at signalized intersections.Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 18.7: Improper turning primary emphasis area goals & strategies



EMPHASIS AREA: IMPROPER TURNING

GOALS: Reduce fatal & severe injury collisions involving improper turning 30% by 2030.

Reduce fatal & severe injury collisions involving improper turning 50% by 2040.

Eliminate fatal & severe injury collisions involving improper turning by 2050.

STRATEGIES	
Education	• Expand the Street Smarts program with an emphasis on avoiding distracted driving.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from improper turning.
Engineering	• In conjunction with other strategies, implement countermeasures focused on designing and improving intersections to encourage drivers to make safe turns such as curb radius. reduction, left turn hardening, protected intersections/corners, etc.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

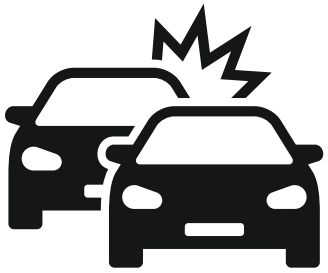
Table 18.8: Unsafe speed primary emphasis area goals & strategies

EMPHASIS AREA: UNSAFE SPEED

GOALS: Reduce fatal & severe injury collisions involving unsafe speed 30% by 2030.
Reduce fatal & severe injury collisions involving unsafe speed 50% by 2040.
Eliminate fatal & severe injury collisions involving unsafe speed by 2050.

STRATEGIES	
Education	• Partner with local businesses and organizations on educational efforts and campaigns along hot spot corridors. • Implement a safe speeds education campaign. • Expand the Street Smarts Marin program.
Enforcement	• Equitably implement targeted enforcement on key collision areas which resulted in injuries from unsafe speeds. • Use recent legislation (AB 43, AB 321) and national research to set context-appropriate speeds suitable for all road users particularly in business districts and near schools. • Consider use of technology to support automated enforcement at key locations. • Deploy a radar trailer and/or permanent speed feedback signage at locations where instances of unsafe speed are more prevalent.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses. • Coordinate with emergency services to develop design standards for traffic calming treatments, particularly on collector and neighborhood streets.
Emergency Response	• Install emergency vehicle preemption systems. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined.
Emerging Technology	• Implement technology such as spot cameras, variable message signs, and traffic control warning devices as appropriate. • Monitor speeds through critical intersections using smart signal technology. • Utilize technologies such as video data and crowdsourcing to track and address near misses. • Engage in legislative advocacy to seek state law change allowing automated speed cameras and allowing the resulting citations to be handled as local municipal code violations rather than vehicle code violations.

Table 18.9: Rear-end primary emphasis area goals & strategies



EMPHASIS AREA: REAR END COLLISIONS

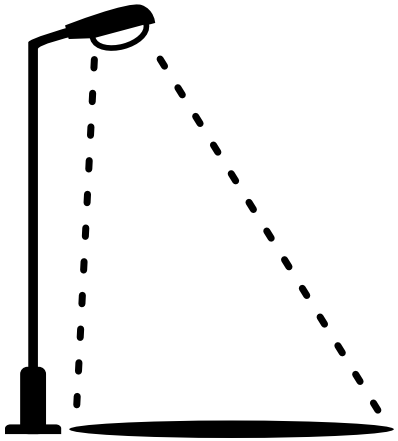
GOALS: Reduce fatal & severe injury rear-end collisions 30% by 2030.

Reduce fatal & severe injury rear-end collisions 50% by 2040.

Eliminate fatal & severe injury rear-end collisions by 2050.

STRATEGIES	
Education	• Partner with local businesses and community organizations to educate the public about distracted driving. • Expand the Street Smarts program.
Enforcement	• Equitably implement targeted distracted driving enforcement at high injury locations where rearend collisions are more common.
Engineering	• In conjunction with other strategies, install countermeasures focused on designing and improving roadways that lead to more appropriate speeds to the surrounding land uses.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

Table 18.10: Dark conditions primary emphasis area goals & strategies



EMPHASIS AREA: DARK CONDITIONS

GOALS: Reduce fatal & severe injury collisions involving dark conditions 30% by 2030.

Reduce fatal & severe injury collisions involving dark conditions 50% by 2040.

Eliminate fatal & severe injury collisions involving dark conditions by 2050.

STRATEGIES	
Education	• Implement education campaigns targeted at safely walking and bicycling in the dark. • Implement a safe speeds education campaign.
Enforcement	• Use recent legislation and national research to set context appropriate speeds suitable for all road users.
Engineering	• In conjunction with other strategies, implement countermeasures focused on improving nighttime infrastructure awareness and decision making. • Improve street lighting in areas with high numbers of collisions during dark conditions.
Emergency Response	• Install emergency vehicle preemption systems. • Improve resources for deploying emergency responses to collision sites. • Ensure that emergency routes are clear and well defined. • Consider targeted training for responding to specific high incident locations and treatment of predominant injury types at those locations.
Emerging Technology	• Deploy collision-prevention technology at signalized intersections. • Utilize technologies such as video data and crowdsourcing to track and address near misses.

18.6 PRIORITY PROJECTS

Following the identification of the High Collision Network, the collision patterns at these intersections and segments were analyzed to determine potential countermeasures. In collaboration with the County, a subset of priority project locations was selected to recommend specific improvements based on the collision rates, trends, and potential improvement impacts. These are locations where site-specific engineering improvements can have a substantial effect in achieving the LRSP's goals. In unincorporated Marin, the priority locations and projects are as follows:

Point Reyes-Petaluma Road from Novato Boulevard to Nicasio Valley Road (Segment)

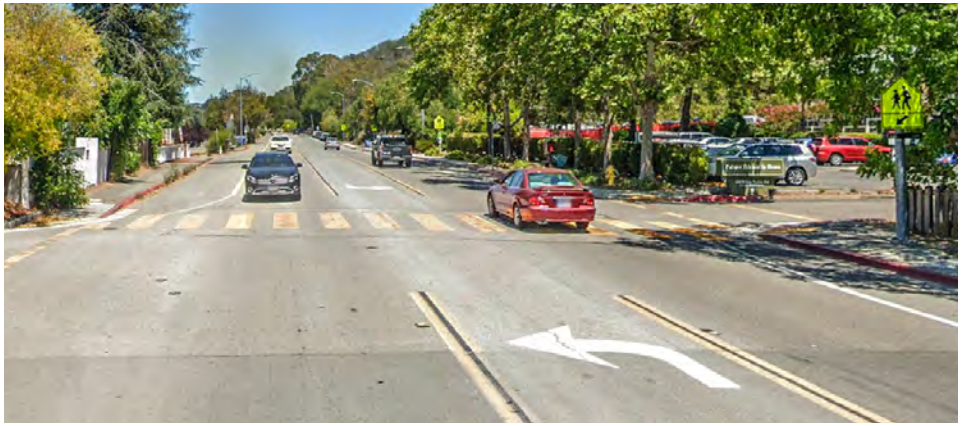
- **Road Improvements**
  Roadway improvements could include widening the shoulder and installing guard rails where applicable.
- **Bicycle Facility Improvements**
  Installing a wider shoulder, where feasible and with preference to the uphill direction, could give bicyclists and motorists more room to maneuver. Installing "Bikes May Use Full Lane" signs clarifies where bicyclists are expected to ride and reminds motorists to expect bicyclists on the road.

Panoramic Highway from Shoreline Highway to Gravity Car Road (Segment)

- **Road Improvements**
  Roadway improvements may include widening the shoulder and installing designated turn-outs where feasible; and installing curve advanced warning signs, guard rails, and dynamic variable speed warning signs at curves.
- **Bicycle Facility Improvements**
  Installing a wider shoulder, where feasible, could give bicyclists and motorists more room to maneuver. Installing "Bikes May Use Full Lane" signs clarify where bicyclists are expected to ride and reminds motorists to expect bicyclists on the road. Other signage to alert motorists to bicyclist presence could also be beneficial.

College Avenue from Sir Francis Drake Boulevard to Woodland Road (Segment)

- **Intersection Improvements**
  The intersection of Woodland Road and College Avenue may benefit from installation of a traffic signal or roundabout. Signalization would require a warrant study to determine if this countermeasure is appropriate.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be considered along this corridor including some of the following: high visibility crosswalks, rectangular rapid flashing beacons (RRFBs), pedestrian signals or High Intensity Activated CrossWalKs (HAWKs), advanced stop bars, bulb outs, tightening curb radii, directional curb ramps, and leading pedestrian intervals. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Upgrading bicycle lanes to green bicycle lanes, installing green paint through conflict zones, and adding bicycle boxes could increase the visibility of bicyclists.



North San Pedro Road from Golf Avenue to Meriam Drive (Segment)

- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be considered along this corridor including some of the following: high visibility crosswalks, advanced stop bars, bulb outs, tightening curb radii, and directional curb ramps. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Installing "Bikes May Use Full Lane" signs clarifies where bicyclists are expected to ride and reminds motorists to expect bicyclists on the road.

Donahue Street from Park Circle to Drake Avenue East (Segment)

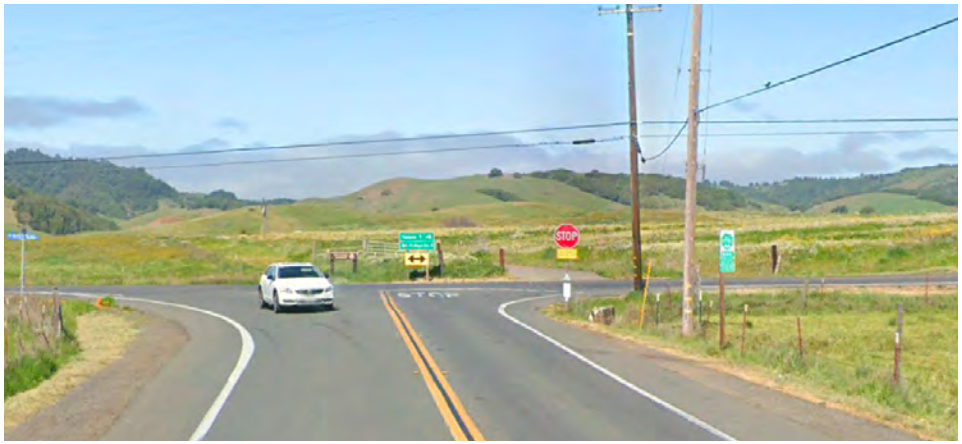
- **Intersection Improvements**
  The intersection of Donahue Street and Drake Avenue may benefit from installation of a traff ic signal or roundabout. Signalization would require a warrant study to determine if this countermeasure is appropriate.
- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be considered along this corridor including some of the following: high visibility crosswalks, RRFBs, advanced stop bars, bulb outs, and tightening curb radii. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.

Drake Avenue from Donahue Street West to Donahue Street East (Segment)

- **Road Improvements**
  Consider installing edgelines and narrowing travel lanes to encourage traffic calming.

Alexander Avenue from Highway 101 to Second Street (Segment, Owned by Golden Gate Bridge District)

- **Road Improvements**
  Repave road and flatten curves. Install dynamic/variable speed warning signs.
- **Bicycle Facility Improvements**
  Install wider shoulder or protected/separated bicycleways, where feasible.



Point Reyes-Petaluma Road & Novato Boulevard (Intersection)

- **Intersection Improvement**
  Intersection improvements may include installing a left turn lane where applicable and installing splitter islands on the minor road approaches. As an optional alternative, convert the intersection to a roundabout as these can be effective at reducing severe injuries at intersections.
- **Bicycle Facility Improvements**
  Installing a wider shoulder, where feasible, could give bicyclists and motorists more room to maneuver. Installing "Bikes May Use Full Lane" signs clarifies where bicyclists are expected to ride and reminds motorists to expect bicyclists on the road.

Point Reyes-Petaluma Road & Nicasio Valley Road (Intersection)

- **Intersection Improvements**
  Intersection improvements may include installing a left turn lane where applicable and installing splitter islands on the minor road approach.
- **Convert Intersection to Roundabout**
  This is an optional alternative countermeasure. Roundabouts can be effective at reducing severe injuries at intersections.

East Blithedale Avenue & Tower Drive & Kipling Drive (Intersection)[3]

Signal Improvements

Signalization improvements may include upgrading signal hardware, lengthening clearance intervals, eliminating or restricting higher-risk movements, coordinating signals at multiple locations, and upgrading hardware to 12" signal heads with backplates.

- **Pedestrian Crossing Improvements**
  A number of pedestrian crossing improvements could be considered at this intersection including some of the following: high visibility crosswalks, directional curb ramps, reduced curb radii, and removing pork chop islands. These could improve pedestrian crossings by shortening crossing distances and emphasizing pedestrians' presence.
- **Bicycle Facility Improvements**
  Installing "Bikes May Use Full Lane" signs clarifies where bicyclists are expected to ride and reminds motorists to expect bicyclists on the road.

3 As of June 2023, this intersection is under the jurisdiction of the City of Mill Valley.

18.7 IMPLEMENTATION & EVALUATION

A number of considerations must be proactively managed to successfully implement the strategies presented in the LRSP. Successful implementation requires adequate funding, coordination, and partnerships, and can be supported by policies at both the jurisdiction and county levels.

IMPLEMENTATION

Next Steps & Timeline for Implementation

The next steps for implementation should focus on developing specific programs and projects from the LRSP recommendations:

- Identify an "agency champion" to advance each LRSP priority recommendation. This agency generally would assume the primary role in program/project development
- Further define each priority recommendation (or if appropriate, bundle several recommendations together) into a discrete program or project with a specific scope of improvements
- Allocate initial funding to complete basic program/project development tasks, such as conceptual planning, feasibility assessments, cost estimation, and agency coordination

These initial development steps will allow lead agencies to define specific programs and projects and prepare them for inclusion in competitive funding applications, regional transportation plans, and local capital improvement plans (CIPs).

The strategies introduced in this document may be implemented in different phases. Short-term implementation would generally occur in less than five years from completion of the LRSP. These actions include low-cost engineering treatments that can be constructed relatively quickly, such as striping projects, signal optimizations, and quick-build infrastructure. Additional short-term strategies could include scaling up existing programs and implementing enforcement activities.

Medium-term implementation typically would occur between five and ten years after LRSP development. This may include progressive and scaled-up safety elements as well as larger projects that require more resources to design and construct. Policy changes also could be implemented in this timeframe.

In the long term (generally 10 years or more), implementation may focus on further emphasizing safety in future planning and design efforts.

Funding Sources & Strategies

Obtaining funding is critical for plan implementation. The County and its jurisdictions can pursue funding at various levels depending on their needs. Identification of funding sources and opportunities can be focused on the following:

- Federal and state grant opportunities, including the Highway Safety Improvement Program, Safe Streets & Roads for All, and the Active Transportation Program
- Regional funding opportunities, including funding opportunities resulting from Marin County's Measure AA sales tax and Measure B vehicle registration fees
- Local fund contributions from TAM, the County, and its jurisdictions to support countywide programs
- Capital improvement projects, such as repaving efforts into which safety upgrades could be bundled

The following strategies can help to increase the likelihood of success in competitive funding applications:

- Pursue the highest-priority, highest-benefit projects and programs. These tend to be the most competitive in grant programs, driven by strong results in the benefit-cost analyses that are often required. In addition, showing funding partners that the County and local jurisdictions have thought carefully about the highest-value ways to direct resources can inspire confidence from these federal and state entities
- Partner across jurisdictions to greatly strengthen applications for competitive funding. Some potential partners for local jurisdictions include the County, TAM, Marin Transit, or relevant community-based organizations. Beyond grant applications, these jurisdictional partnerships also could include more formalized memoranda of understanding to share the costs of planning, design, construction, or operations
- Leverage local funding for projects and aim to provide close to 50 percent of total project costs from these local funds. This type of commitment will increase competitiveness when applying for discretionary funds at the federal and state levels
- Pursue multiple funding sources. Infrastructure programs and projects often require agencies to leverage many sources to meet project budgets, especially given the uncertainty of competitive funding programs

Coordination & Partnership

Coordination and partnership among diverse stakeholders are essential for the success of the LRSP. Within jurisdictions, collaboration and partnership between public works, law enforcement, bicycle/pedestrian advisory committees, and others can ensure that road user safety is systematically addressed.

Additional countywide partnerships could also be considered to track funding and project implementation. These partnerships could take the following forms:

- Jurisdictional partnerships to prepare joint grant applications and potentially share program/project costs
- Countywide bicycle working committee including representatives from existing groups from various jurisdictions to further develop program/project concepts, track funding opportunities, and monitor overall progress toward LRSP goals
- Task force to audit countywide projects and programs related to bicycle safety, review collision trend data, and make recommendations on preventing future collisions

Policy Support

Whether at the county or jurisdiction levels, the LRSP strategy implementation can be facilitated by supportive policies. Policies to consider include establishing clear goals for regional connectivity through a countywide bicycle master planning process, parking policies, and traffic calming policies. Having clear policies can pave the way for related safety improvements.

EVALUATION

It will be important to evaluate progress towards meeting the LRSP's goals. Evaluation allows the County and its jurisdictions to monitor safety conditions over time and make strategy adjustments as necessary.

In order to understand progress and safety conditions, specific outcome metrics should be used when evaluating the LRSP's progress. Foremost among these should be the number of KSI collisions in each jurisdiction, as this corresponds directly to the LRSP goals. Additional metrics could be the number of non-KSI injury collisions and collisions related to each emphasis area. Metrics should be tracked every two years and summarized in a memo or scorecard. This data will also be helpful when applying for funding.

Regularly updating the LRSP will allow the plan and its strategies to be revised based on the evaluation results. The LRSP should be updated every four years or as needed.

PHOTO CREDITS

Adobe Stock: pages, 26, 98, 192

Google Earth: pages 32, 50, 59, 64, 67, 80, 90, 95, 103, 115, 116, 119, 125, 126, 131, 133, 138, 141, 147, 169, 170, 171, 172, 188, 189, 198, 211, 212, 213, 214, 215

Parametrix: inset cover photo and pages 38, 45, 70, 75, 82, 85, 107, 115, 152, 153, 156, 175, 180, 183

Transportation Authority of Marin: pages 3, 7, 10, 28, 40, 52, 54, 69, 121, 135, 152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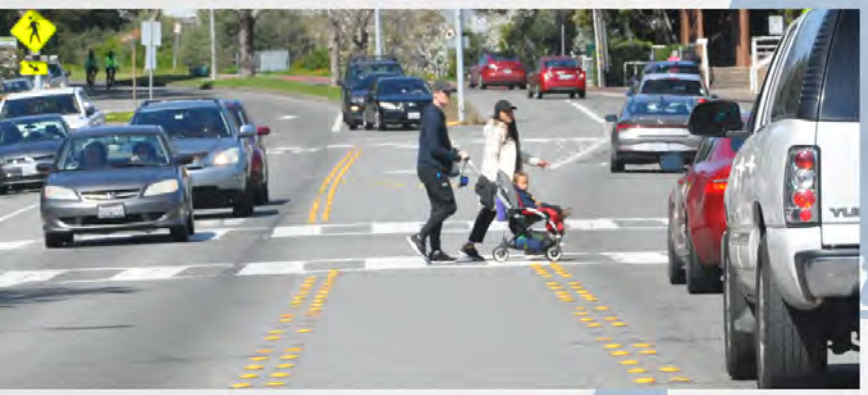
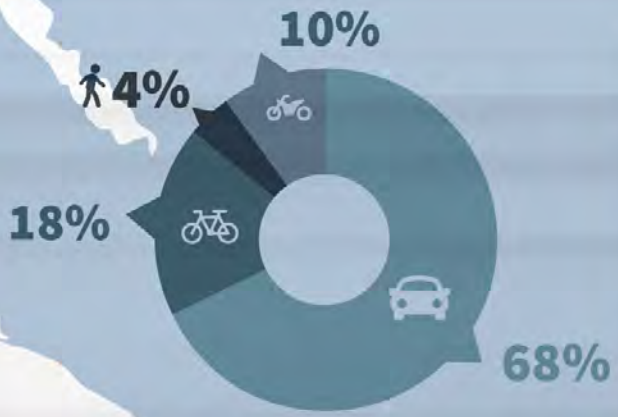
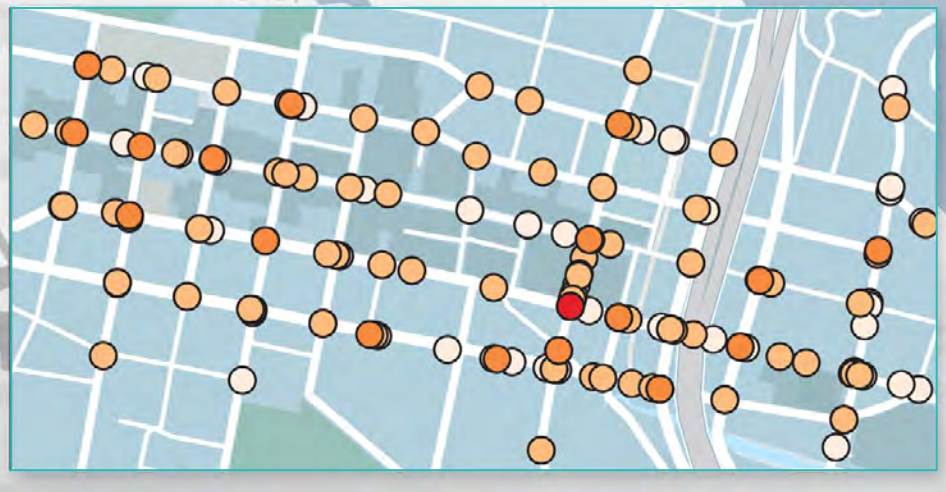
2024 MARIN COUNTY

Local Road Safety Plan **APPENDIX**







COUNTY OF MARIN

THE TOWN OF CORTE MADERA

MILL VALLEY

CITY OF NOVATO CALIFORNIA

TOWN OF ROSS

TOWN OF SAN ANSELMO

SAN RAFAEL THE CITY WITH A MISSION

CITY OF SAUSALITO MARIN CO CALIF

TAM Transportation Authority of Marin

JANUARY, 2024

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2024 MARIN COUNTY LOCAL ROAD SAFETY PLAN

Undertaken by the Transportation Authority of Marin and County of Marin
with Support from the 11 Cities and Towns in Marin County

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APPENDIX A. COUNTERMEASURE TOOLKIT

INTRODUCTION

The Countermeasure Toolkit provided within the following pages summarizes the measures found in the 2022 Caltrans Local Roadway Safety Manual (CA-LRSM). The CA-LRSM is a tool intended to provide focused roadway safety information in a single document. This data uses information from the Crash Modification Factor Clearinghouse and three other Federal Highway Administration (FHWA) published safety manuals — Roadway Departure Safety, Intersection Safety, and Roadways Safety Information Analysis — in conjunction with its own research with the Safe Transportation Research and Education Center (SafeTREC) to develop the CA-LRSM.

SUMMARY OF CONTENT

The toolkit lists Highway Safety Improvements Program (HSIP) countermeasures and non-HSIP countermeasures as well as crash type, crash reduction factors (CRF), federal funding eligibility for HSIP projects and the systemic opportunity. The countermeasures listed in this toolkit have been divided into four groups: signalized intersections, unsignalized intersection, roadway segments and countermeasure that do not currently apply for HSIP funding (not included in the CA-LRSM).

The information included in the countermeasure toolkit are:

- **CRASH TYPES – "All", "P & B" (Pedestrian and Bicycle), "Night", "Emergency Vehicle", or "Animal"**
- **CRF - Crash Reduction Factor used for HSIP calls-for-projects**
- **EXPECTED LIFE – 10 years or 20 years**
- **FEDERAL FUNDING ELIGIBILITY – The maximum federal reimbursement ratio**
- **SYSTEMIC APPROACH OPPORTUNITY – Opportunity to implement using a systemic approach: "Very High", "High", "Medium" or "Low"**

For countermeasures that are not eligible in Caltrans' local HSIP call for projects, "N/A" is placed in the above fields.

The toolkit refers to each countermeasure with an identification letter and number. The letters refer to the following:

- **'S' countermeasures apply to signalized intersections.**
- **'NS' countermeasures apply to unsignalized intersections.**
- **'R' countermeasures apply to roadway segments.**
- **'NH' countermeasures do not qualify for HSIP funding.**

The list of countermeasures in the following section is not all-inclusive and only consists of thoroughly researched countermeasures. The mix of countermeasure and CRFs included is intended to meet Caltrans' goal of a data-driven process for local agencies to follow. Where possible and appropriate, the CRF value listed in this toolkit is based on research studies that specifically established the CRF to be used for 'all' project areas, roadway types and traffic volumes. Where not all applicability factors have already been established by prior research, Caltrans worked closely with FHWA to approximate CRFs for countermeasures often utilized by local agencies.

SIGNALIZED INTERSECTIONS COUNTERMEASURES

S1. Add intersection lighting

Applicable at signalized intersections that have a disproportionate number of nighttime crashes and do not currently provide lighting at the intersection or at its approaches. 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.

Crash Type	Night
CRF	40%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

S2. Improve signal hardware: lenses, back-plates, mounting, size, and number

Install at signalized intersections with a high frequency of right-angle and rear-end crashes occurring because drivers may be unable to see traffic signals sufficiently in advance of the intersection. Signalized 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.

Crash Type	All
CRF	15%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

S3. Improve signal timing (coordination, phases, red, yellow, or operation)

Install at locations that have a crash history at multiple signalized intersections along a corridor. Signalization improvements may include adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations.

Crash Type	All
CRF	15%
Expected Life (Years)	10
Federal Funding Eligibility	50%
Systemic Approach Opportunity	Very High

S5. Install emergency vehicle pre-emption systems

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.

Crash Type	Emergency Vehicle
CRF	70%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

S6. Install left-turn lane & add turn phase (signal has no left-turn lane or phase before)

Many intersection safety problems can be traced to difficulties 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, rearend, sideswipe) is to provide exclusive left-turn lanes and the appropriate signal phasing, particularly on high-volume and high-speed major-road approaches.

Crash Type	All
CRF	55%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Low

S7. Provide protected left turn phase (left turn lane already exists)

Applicable at signalized intersections with existing left turn pockets that currently have a permissive left-turn or no left-turn protection and 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.

Crash Type	All
CRF	30%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

S8. Convert signal to mast arm (from pedestal-mounted)

Install at intersections that are currently controlled by pedestal-mounted traffic signals (in medians and/or on outside shoulder) and that have a high frequency of right-angle and rear-end crashes occurring because drivers may be unable to see traffic signal 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.

Crash Type	All
CRF	30%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

S9. Install raised pavement markers and striping (through intersection)

Applicable at intersections where the lane designations are not clearly visible to approaching motorists and/or at intersections noted as being complex and experiencing crashes that could be attributed to a driver's unsuccessful attempt to navigate the intersection.

Crash Type	All
CRF	10%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

S10. Install flashing beacons as advance warning

Applicable in advance of signalized intersections with crashes that are a result of drivers being unaware of the intersection or being unable to see the traffic control device in time to comply.

Crash Type	All
CRF	30%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

Click here for an image example

https://roadtripchick.files.wordpress.com/2012/07/p1030110.jpg

S11. Improve pavement friction (High Friction Surface Treatments)

Install at 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 are determined to be problems in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.

Crash Type	All
CRF	40%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

S12. Install raised median on approaches

Effective at intersections noted as having turning movement crashes near the intersection as a result of insufficient access control. Raised medians must comply with Americans with Disabilities Act guidelines.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

S13PB. Install pedestrian median fencing on approaches

Applicable at signalized Intersections with high pedestrian-generators nearby (e.g., transit stops) that may experience high volumes of pedestrians jaywalking 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 and a midblock crossing isn't viable, installing a continuous pedestrian barrier in the median may be a solution.

Crash Type	P&B
CRF	35%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	High

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

Install at locations where crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) 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.

Crash Type	All
CRF	50%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

S15. Reduced left-turn conflict intersections

Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur 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 and the median U-turn.

Crash Type	All
CRF	50%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

Click here for an image example

https://safety.fhwa.dot.gov/provencountermeasures/reduced_left.cfm

S16. Convert intersection to roundabout (from signal)

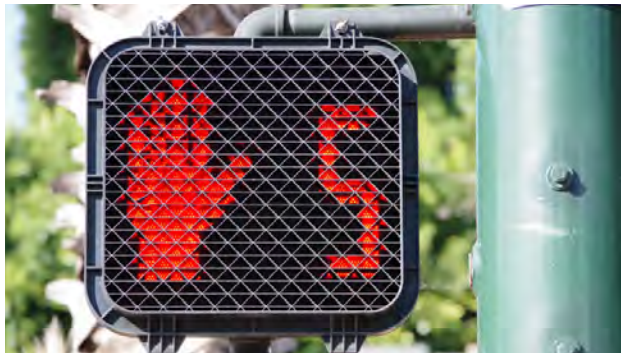
Install at signalized intersections that have a significant crash problem and the only alternative is to change the nature of the intersection itself. Roundabouts can also be very effective at intersections with complex geometries and intersections with frequent left-turn movements.

Crash Type	All
CRF	Varies
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Low

S17PB. Install pedestrian countdown signal heads

Install at signals that have signalized pedestrian crossings with walk/don't walk indicators and where there have been pedestrian/vehicle crashes. 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.

Crash Type	P & B
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High



S18PB. Install pedestrian crossing

Install at signalized Intersections with no marked crossings and pedestrian signal heads, where pedestrians are known to be crossing intersections that involve significant turning movements. Pedestrian crossings are especially important at intersections with multiphase traffic signals, school crossings, and double-right or double-left turns.

Crash Type	P & B
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

S19PB. Pedestrian Scramble

A pedestrian scramble is a form of pedestrian "walk" phase at a signalized intersection in which all vehicular traffic is required to stop, allowing pedestrians and bicyclists to safely cross through the intersection in any direction, including diagonally. A pedestrian scramble may be considered at signalized intersections with very high pedestrian/bicycle volumes, e.g. in an urban business district.

Crash Type	P & B
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

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

Install at signalized Intersections with a marked crossing and where significant bicycle and/or pedestrians volumes are known to occur. Adding an 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.

Crash Type	P & B
CRF	15%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

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

Install at signalized intersection locations noted as having high turning vehicle volumes and that have had pedestrian/vehicle crashes. An LPI gives pedestrians the opportunity to enter an intersection about 3–7 seconds before vehicles are given a green indication.

Crash Type	P & B
CRF	60%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

UNSIGNALIZED INTERSECTIONS COUNTERMEASURES

NS1. Add intersection lighting

Install at non-signalized intersections that have a disproportionate number of nighttime 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.

Crash Type	Night
CRF	40%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

NS2. Convert to all-way STOP control (from two-way or Yield control)

Applicable at unsignalized intersection locations that have a crash history and have no controls on the major roadway approaches. However, all-way stop sign 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. CA MUTCD warrants should always be followed.

Crash Type	All
CRF	50%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

NS3. Install signals

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.

Crash Type	All
CRF	Varies
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Low

NS4. Convert intersection to roundabout (from all way stop)

Applicable at 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 suburban and urban settings where right-of-way is limited.

Crash Type	All
CRF	Varies
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Low

NS5. Convert intersection to roundabout (from 2-way stop or yield control)

Applicable at 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, or retrofitting existing moderate volume signalized intersections. Roundabouts may not be a viable alternative in suburban and urban settings where right-of- way is limited.

Crash Type	All
CRF	Varies
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Low

NS5mr. Convert intersection to mini roundabout

Mini roundabouts generally have a diameter of 45-90 feet with traversable islands. They provide the benefits of a roundabout with a smaller footprint, ideal for areas that already have low speeds but also a constrained right-of-way.

Crash Type	All
CRF	30%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	

NS6. Install/upgrade larger or additional stop signs or other intersection warning/ regulatory signs

The target for this strategy should be approaches to unsignalized intersections with paerns of rear-end, right-angle, or turning collisions related to lack of driver awareness of the presence of the intersection.

Crash Type	All
CRF	15%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

NS7. Upgrade intersection pavement markings

Install at unsignalized intersections that are not clearly visible to approaching motorists, particularly approaching motorists on the major road. The strategy is 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.

Crash Type	All
CRF	25%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

NS8. 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.

Crash Type	All
CRF	15%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

NS9. Install flashing beacons as advance warning

Install in advance of non-signalized intersections with patterns of crashes that could be related to lack of a driver's awareness of the approaching intersection or controls at a downstream intersection.

Crash Type	All
CRF	30%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

Click here for an image example

https://carmanah.com/tag/school-zone-safety/page/11/

NS10. Install transverse rumble strips on approaches

Transverse rumble strips are installed in the travel lane to provide 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.

Crash Type	All
CRF	N/A
Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Approach Opportunity	N/A

NS11. Improve sight distance to intersection (clear sight triangles)

Install at 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.

Crash Type	All
CRF	20%
Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Approach Opportunity	High

NS12. Improve pavement friction (high friction surface treatments)

Install at 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 are determined to be a problem in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.

Crash Type	All
CRF	40%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

NS13. Install splitter-islands on the minor road approaches

Applicable at 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. Creation of a splitter island allows for an additional stop sign to be placed in the median for the minor approach.

Crash Type	All
CRF	40%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

NS14. Install raised median on approaches

Install at locations where turning movements affect the safety of an intersection. This countermeasure only applies to crashes occurring on the approaches or in the influence area of the new raised median. All new raised medians funded with federal HSIP funding must not include the removal of the existing roadway structural section and must be doweled into the existing roadway surface.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

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

Install at locations with crashes related to turning maneuvers including angle, rear-end, pedestrian, and sideswipe (involving opposing left turns). 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.

Crash Type	All
CRF	50%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

NS16. Reduced left-turn conflict intersections

Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur 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 and the median U-turn.

Crash Type	All
CRF	50%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	

NS17. Install right-turn lane

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.

Crash Type	All
CRF	20%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Low

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

Many collisions at unsignalized intersections are related to left-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive left-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new left-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriates.

Crash Type	All
CRF	35%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Low

NS19PB. Install raised medians / refuge islands

Applicable at intersections that have a long pedestrian crossing distance, a high 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.

Crash Type	P & B
CRF	45%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

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

Install at 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.

Crash Type	P & B
CRF	20%
Expected Life (Years)	10
Federal Funding Eligibilitty	100%
Systemic Approach Opportunity	High

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

Install at non-signalized intersections with or without a marked crossing, where pedestrians are known to be crossing intersections with significant vehicular traffic. Rectangular rapid flashing beacons, overhead flashing beacons, curb extensions, advanced "stop" or "yield" markings, and other safety features can be added to complement standard crossing elements.

Crash Type	P & B
CRF	35%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

NS22PB. Install rectangular rapid flashing beacon (RRFB)

A 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.

Crash Type	P & B
CRF	35%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	

NS23PB. Install pedestrian signal (including Pedestrian Hybrid Beacon (HAWK)

Intersections noted as having a history of pedestrian/vehicle crashes and in areas where the likelihood of a pedestrian is significant. Corridors should also be assessed to determine if there are adequate safe opportunities for non-motorists to cross and if a pedestrian signal, high-intensity activated crosswalk, or hybrid beacons are needed to provide an active warning to motorists when a pedestrian is in the crosswalk.

Crash Type	P & B
CRF	55%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Low

ROADWAY SEGMENTS COUNTERMEASURES

R1. Add segment lighting

Install at locations with a 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.

Crash Type	Night
CRF	35%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

R2. Remove or relocate fixed objects outside of clear recovery zone

Applicable at 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.

Crash Type	All
CRF	35%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	High

R3. Install median barrier

Applicable in areas where crash history indicates that drivers are unintentionally crossing the median and these cross-overs are resulting in high severity crashes. The installation of median barriers can increase the number of property damage only collisions and non-severe injuries. The net result in safety from this countermeasure is connected more to reducing the severity of crashes as opposed to the number of crashes.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

R4. Install guardrail

A guardrail is installed to reduce the severity of lane departure crashes. However, guardrails 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. Guardrails 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 injury crashes.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

R5. Install impact attenuators

Impact attenuators are typically used to shield rigid roadside objects such as concrete barrier ends, steel guardrail ends and bridge pillars from oncoming automobiles. Attenuators should only be installed where it is impractical for the objects to be removed.

Crash Type	All
CRF	25%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

R6. Flatten side slopes

Applicable at 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. This countermeasure is appropriate 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.

Crash Type	All
CRF	30%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R7. Flatten side slopes and remove guardrail

Install at 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.

Crash Type	All
CRF	40%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R8. Install raised median

Install at locations 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.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R9. Install median (flush)

Applicable at locations 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.

Crash Type	All
CRF	15%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R10PB. Install pedestrian median fencing on approaches

Roadway segments with high pedestrian generators and destinations nearby (e.g. transit stops) may experience a high volume of pedestrians jaywalking 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.

Crash Type	All
CRF	15%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R11. Install acceleration/ deceleration lanes

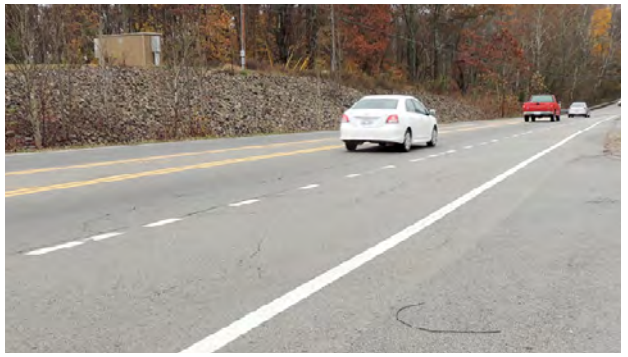
Install at locations proven to have crashes that are the result of drivers not being able to turn onto a high speed roadway to accelerate until the desired roadway speed is reached and areas that do not provide the opportunity to safety decelerate to negotiate a turning movement. This countermeasure can also be used to improve the safety of merging vehicles at a lane-drop location.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Low

R12. Widen lane (initially less than 10 feet)

Install at 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 lane width less than 10 feet.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium



R13. Add two-way left-turn lane (without reducing travel lanes)

Applicable at 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 inadvertently crossing the centerline of an undivided multilane roadway.

Crash Type	All
CRF	30%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R14. Road Diet (reduce travel lanes from four to three and add a two-way left-turn and bicycle lanes)

Install at areas noted as having a high frequency of head-on, left-turn, and rear-end crashes with traffic volumes that can be handled by only two free flowing lanes. Using this strategy in locations with traffic volumes that are too high could result in diversion of traffic to routes that are less safe than the original four-lane design. It may also result in congestion levels that contribute to other crashes.

Crash Type	All
CRF	30%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R15. Widen shoulder

Applicable at 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.

Crash Type	All
CRF	30%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R16. Curve shoulder widening (outside only)

Install at roadway curves noted as having frequent lane departure crashes due to inadequate or no shoulders, resulting in an unsuccessful attempt to reenter the roadway. Curve shoulder widening creates a recovery area in which a driver can regain control of a vehicle, as well as lateral clearance to roadside objects.

Crash Type	All
CRF	45%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	

R17. Improve horizontal alignment (flatten curves)

Applicable at 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.

Crash Type	All
CRF	50%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Low

R18. Flatten crest vertical curve

The target for this strategy is usually unsignalized intersections with restricted approach 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.

Crash Type	All
CRF	25%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Low

R19. Improve curve superelevation

Applicable for 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.

Crash Type	All
CRF	45%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

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

One-way streets can offer improved signal timing and accommodate irregular-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 that can create new problems.

Crash Type	All
CRF	35%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R21. Improve pavement friction (high friction surface treatments)

Applicable at locations with a noted amount of crashes on wet pavement or under dry conditions when pavement friction is significantly less than actual roadway speeds; including but not limited to curves, intersections, and areas with short stopping or weaving distances. This treatment is intended to target locations where skidding is a problem and the target vehicle is one that runs (skids) off the road or is unable to stop due to insufficient skid resistance.

Crash Type	All
CRF	40%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Medium

R22. Install/upgrade signs with new fluorescent sheeting (regulatory or warning)

This countermeasure only applies to crashes occurring within the influence area of the new/upgraded signs. This countermeasure is not eligible unless 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.

Crash Type	All
CRF	15%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

R23. Install chevron signs on horizontal curves

Install at roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness. Ideally this type of safety countermeasure would be combined with other sign evaluations and upgrades.

Crash Type	All
CRF	40%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

R24. Install curve advance warning signs

Applicable at 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 countermeasure would be combined with other sign evaluations and upgrades.

Crash Type	All
CRF	25%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

R25. Install curve advance warning signs (flashing beacon)

Install at 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.

Crash Type	All
CRF	30%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

R26. Install dynamic/variable speed warning signs

Dynamic speed feedback signs can reduce vehicle speeds by alerting motorists that they are operating above the speed limit. The signs include a speed measuring device and a message sign that displays feedback to drivers who exceed a predetermined speed threshold. The feedback can include displaying the driver's actual speed, showing a message such as SLOW DOWN, or activating some warning device, such as beacons or a curve warning sign.

Crash Type	All
CRF	30%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

https://www.pexco.com/traffic/products/roadside-delineator-posts/fg-400-500-posts/

R27. Install delineators, reflectors and/or object markers

Applicable at roadways that have an unacceptable level of crashes on curves (relatively flat to sharp) during periods of light and darkness. Many roadways with a history of fixed object crashes can be candidates for this treatment, as can roadways with similar fixed objects along the roadside that have yet to experience crashes.

Crash Type	All
CRF	15%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

Click here for an image example

https://www.pexco.com/traffic/products/roadside-delineator-posts/fg-400-500-posts/

R28. Install edge-lines and centerlines

Install on roadways with a history of run-off-road right, head-on, opposite-direction-sideswipe, or run-off-road left crashes. Install where the existing lane delineation is not sufficient to assist the motorist in understanding the existing limits of the roadway.

Crash Type	All
CRF	25%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

R29. Install no-passing line

Applicable at 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.

Crash Type	All
CRF	45%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

R30. Install centerline rumble strips/stripes

Centerline rumble strips/stripes can be used on many roadways – 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.

Crash Type	All
CRF	20%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	Very High

R31. Install edgeline rumble strips/stripes

Shoulder and edgeline 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.

Crash Type	All
CRF	15%
Expected Life (Years)	10
Federal Funding Eligibility	100%
Systemic Approach Opportunity	High

R32PB. Install bicycle lanes

Applicable along 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 bicycle lanes can be incorporated into a roadway when it is desirable to delineate which available road space is for exclusive or preferential use by bicyclists.

Crash Type	P & B
CRF	35%
Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Approach Opportunity	High

R33PB. Install separated bicycle lanes

Separated bicycleways are most appropriate on streets with high volumes of bicycle traffic and/or high bicycle-vehicle collisions. 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.

Crash Type	P & B
CRF	45%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	

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

Install at 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.

Crash Type	P & B
CRF	80%
Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R35PB. Install pedestrian crossing (with enhanced safety features)

Install on roadway segments with no controlled crossing for a significant distance in high-use midblock crossing areas and/or multilane roads locations. Rectangular rapid flashing beacons, overhead flashing beacons, curb extensions and other safety features can be added to complement standard crossing elements. For multi-lane roadways, advance "yield" markings can be effective in reducing the 'multiple-threat' danger to pedestrians.

Crash Type	P & B
CRF	30%
Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

R36PB. Install raised pedestrian crossing

Applicable on lower-speed roadways where pedestrians are known to be crossing roadways that involve significant vehicular traffic. 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.

Crash Type	P & B
CRF	35%
Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Approach Opportunity	High

R37PB. Install rectangular rapid flashing beacon (RRFB)

A 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.

Crash Type	P & B
CRF	350%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	

R38. Install animal fencing

Install 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).

Crash Type	Animal
CRF	80%
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Approach Opportunity	Medium

Click here for an image example

https://www.flickr.com/photos/tranbc/50020523007

COUNTERMEASURES THAT DO NOT QUALIFY FOR HSIP FUNDING

NH1. Implement traffic safety education programs

Education programs such as Street Smarts Marin can raise awareness and improve driver, pedestrian, and bicyclist behaviors. Aimed as "hot spot" locations, education programs can be successful in encouraging safe traffic behavior.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH2. Implement targeted enforcement programs

Enforcement programs can be effective at reducing common violation types such as speeding, failure to yield, red light running, aggressive driving, failure to wear safety belts, distracted driving, and driving while impaired. They can be especially effective when combined with education programs.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH3. Install cameras to detect red-light running

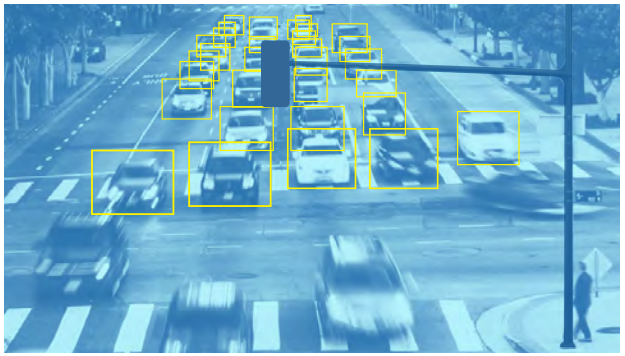
Install at signalized intersections with a high frequency of crashes attributed to drivers who intentionally disobey red signal indications. This type of automated enforcement refers to the use of photo and video camera systems connected to the signal controller. Such systems record vehicles proceeding through the intersection after the signal displays red.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH4. Provide advanced dilemma zone detection for high speed approaches

Effective in 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.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A



NH5. Fill sidewalk and pathway gaps

Filling gaps in existing sidewalk and pathway networks increases safety and comfort for active transportation users. Gaps should be filled in a way that meets specifications for best practices in terms of width, accessibility, and other attributes.

Crash Type	P & B
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH6. Add pedestrian scale lighting

Pedestrian scale lighting increases the visibility of pedestrians at night, especially at intersections and when crossing the street. Lighting should be implemented in a way so as to illuminate pedestrians and reduce glare to motorists.

Crash Type	P & B
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH7. Wayfinding

This treatment can reduce pedestrian and bicycle collisions. Wayfinding can be deployed to route bicycles and pedestrians to safer facilities and avoid hazardous routes.

Crash Type	P & B
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH8. Install sharrows

Sharrow markings increase the visibility of bicyclists, clarifies where bicyclists are expected to ride and reminds motorists to expect bicyclists on the road.

Crash Type	P & B
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH9. Install 'Bikes May Use Full Lane' sign

Regulatory 'Bikes May Use Full Lane' sign increases the visibility of bicyclists, clarifies where bicyclists are expected to ride, and reminds motorists to expect bicyclists on the road.

Crash Type	P & B
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH10. Deploy smart signal technology

Smart traffic signals are equipped with sensing, video capture, and connectivity technologies to collect real-time data from the environment. They can improve the flow of traffic as well as detect pedestrians and bicyclists at intersections.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH11. Install protected intersection

Protected intersections separate bicyclists from vehicles at intersections, increasing safety for all users. The bicycleway is set back from vehicle traffic and bicyclists are given a dedicated path through the intersection and have right-of-way over turning vehicles.

Crash Type	P & B
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH12. No right turn on red restrictions

No right turn on red (RTOR) restrictions can benefit pedestrians with minimal impacts on traffic. They should be done in locations with substantial pedestrian volume and places where children cross. Part-time RTOR prohibitions during the busiest times of day may be sufficient to address the problem. Blank out signs can be used to reinforce turn restrictions and encourage motorist compliance.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH13. Refresh signage/ striping

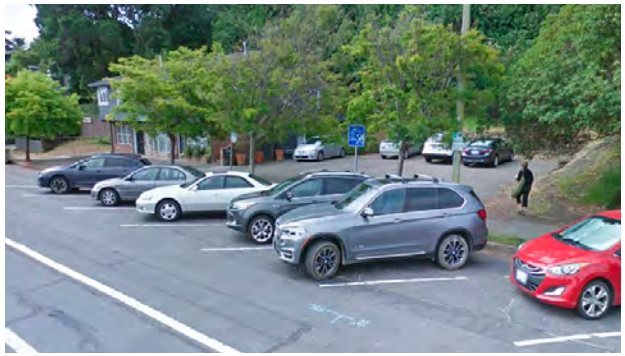
Refresh signage and striping that has faded with age. Faded striping and signs can lead to confusion and poor nighttime visibility.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH14. Back-in angle parking

Back-in angle parking provides motorists with better visibility of bicyclists, pedestrians, cars, and trucks as they exit a parking space and enter moving traffic. Back-in angle parking also removes the difficulty that drivers, particularly older drivers, have when backing into moving traffic.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A



NH15. Reduced lane widths

Reduced lane width encourages slower speeds and frees up additional right of way for bicycle and pedestrian facilities. Residential streets may be reduced to 10-foot lanes, arterial streets may be reduced to 11 foot lanes, and turn lanes may be reduced to 10 feet, as determined by individual jurisdictions.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH16. Square up intersection

Irregular angled intersections present safety hazards for all road users. Intersections less than 90 degrees reduce visibility for motorists, while intersections greater than 90 degrees allow for high-speed turns. These intersections also create unnecessarily long pedestrian crossings. Redesign intersections as close to 90 degrees as possible.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH17. Relocate parking

Parked vehicles can block sight distances. Relocate parking, or remove parking at the approaches to intersections and driveways to improve visibility.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH18. Mumble strip

Mumble strips are modified rumble strips. They use noise and vibrations to alert drivers who are leaving their lanes. Mumble strips generate less outside noise than rumble strips, which are less disruptive to nearby residents, through a sinusoidal wave pattern. Mumble strips should be installed on facilities where roadway departures collisions have occurred.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

Click here for an image example

https://micountyroads.org/news/mumble-strips-are-the-new-rumble-strips-in-macomb-county/

NH19. Provide tapered edge for pavement edge drop-off

This treatment is designed to be a standard policy for any overlay project. Instead of an overlay project ending with a 90-degree asphalt or concrete face at the edge of pavement, the tapered edge provides an approximate 30-degree angle at the edge.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH20. Pave existing shoulder

Install at roadways with an unpaved existing shoulder and exhibiting a high incidence of vehicles leaving the travel lane resulting in an unsuccessful attempt to reenter the roadway. Paving the existing shoulder provides a wider recovery area with a smooth surface that has a higher friction factor.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH21. Widen shoulder (unpaved)

Consider for roadways with a high 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 area in which to initiate such a recovery. Unpaved shoulders usually have flatter cross sections and some structural integrity as compared to areas of "flatten side slopes".

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH22. Remove slip lane

This treatment addresses pedestrian and sideswipe collisions. Slip lanes should be avoided as they allow vehicles to travel through intersections at larger speeds and allow less visibility of pedestrians waiting to cross. Removing one will result in a shorter crossing distance for pedestrians and slower speeds at the intersection.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

NH23. Upgrade bridge railing

Open-faced railings can present a snagging hazard, which may produce high deceleration forces leading to occupant injuries. Curbs or walkways between the driving lane and the bridge railing are another common hazard of older railing systems. Impacted vehicles may go over the railing or roll over.

Crash Type	All
CRF	N/A
Expected Life (Years)	N/A
Federal Funding Eligibility	N/A
Systemic Approach Opportunity	N/A

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