YUBA-SUTTER

Regional Safety Action Plan

Final Draft

January 2026

Made possible by a Safe Streets 4 All Planning Grant

Acknowledgments

Yuba County

City of Marysville

City of Wheatland

Sutter County

City of Yuba City

City of Live Oak

This study applies a systemic safety approach that identifies certain features on particular roadways that are correlated with specific crash types and frequencies. This broad approach is necessitated by the inherent nature of covering an entire region's facilities in one study and the limited scope/budget available to prepare roadway safety plans. Limited time is available to perform field observations throughout the study area to contextualize the data, and therefore, it is beyond the scope of work to perform in-depth "hot spot" evaluations at all locations.

The analysis and recommendations in this report are conceptual in nature based upon limited information, and before implementing any changes, or using any of its information for design or construction, more detailed analysis should be conducted to make sure that the design or construction documents reflect specific, detailed, local, and field conditions.

Adrian Engel, P.E.
Registered Professional Engineer

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CHAPTER 1

Introduction

This Plan and Our Region

Yuba and Sutter Counties and four incorporated cities, Marysville, Wheatland, Yuba City, and Live Oak, are committed to prioritizing transportation safety and eliminating traffic-related deaths and serious injuries on their roadways.

The development of this Regional Safety Action Plan (RSAP) was led by a joint effort of County, City, and partner agencies in the Yuba-Sutter region. By combining efforts, the Yuba-Sutter region can provide leadership in roadway safety and more effectively spearhead the implementation of roadway safety policy, projects, and programs. This RSAP covers the two counties and four incorporated cities in them: Yuba County, Marysville, Wheatland, Sutter County, Yuba City, and Live Oak.

Yuba County and Sutter County are situated in the Sacramento Valley. The counties have a combined total population of over 180,000, with people concentrated in Yuba City and Marysville. Roadway safety is a pressing issue facing the region today. In 2021, the Office of Traffic Safety ranked Yuba County eighth of 58 counties statewide based on the total number of crashes resulting in injury and fatality, third for crashes involving pedestrians, and fifth for crashes involving motorcycles. Sutter County ranked sixth for total number of crashes resulting in injury and fatality, third for crashes involving bicyclists under the age of 15, and seventh for crashes where a party involved had been drinking.

The beginning chapters of the document cover the regional aspects of the plan, including project vision and goals, potential countermeasures, and a Safety Action Plan that will act as a roadmap for Yuba-Sutter and its member agencies to implement this RSAP. The second portion of the plan contains six jurisdiction-specific chapters, each of which includes crash analysis, focus areas, priority projects, and project lists.

Project team conducting walk audits

Safe System Approach

The Safe System Approach acknowledges that mistakes are inevitable while also asserting that severe injuries and fatalities are avoidable on our roadways. According to the World Health Organization, the goal of a Safe System is to ensure that if crashes occur, they "do not result in serious human injury."[1] The Safe System Approach to road safety started internationally as part of the Vision Zero proclamation that death and serious injury on the roadway system is unacceptable.[2] [3]

As shown in **Figure 1.1**, the Safe System Approach is founded on several principles, including acknowledging that humans make mistakes and humans are vulnerable. As a result, a proactive, redundant system is needed to prevent death and serious injuries.[4] Countries that have adopted the Safe System Approach have had success reducing highway fatalities, with reductions in fatalities between 50% and 70%.[5] The Safe System Approach is the foundation for the National Safety Strategy released by the United States Department of Transportation (USDOT) in 2022. In 2022, Caltrans also adopted both a Safe System Approach and a Vision Zero goal as part of their Strategic Highway Safety Plan to eliminate all traffic fatalities and serious injuries by 2050.

Figure 1.1: Safety System Elements and Principles

To anticipate human mistakes, a Safe System seeks to[6]:

- Separate users in a physical space (e.g., sidewalks, dedicated bicycle facilities)
- Separate users in time (e.g., pedestrian scramble, dedicated signal turn phases)
- Alert users to potential hazards
- Accommodate human injury tolerance through interventions that reduce speed and/or impact force

Creating a Safe System means shifting a major share of the responsibility for preventing crashes from road users to those who design the road transport system. "Individual road users have the responsibility to abide by laws and regulations"[7] and do so by exhibiting due care and proper behavior on the transportation system. While road users are responsible for their own behavior, this is a shared responsibility with those who design, operate, and maintain the transportation network including the automotive industry, law enforcement, elected officials, and government bodies.[8] In a Safe System, roadway system designers and operators take on the highest level of ethical responsibility.

WHAT

A Safe System aims to eliminate fatal and serious injuries for all road users.

WHY

A Safe System acknowledges the vulnerability of the human body.

WHO

A Safe System requires a partnership between cities, counties, Caltrans, police, and road users.

References

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7. World Health Organization (2011). Decade of Action for Road Safety 2011-2020. Retrieved from https:// www.who.int/ roadsafety/decade_of_action/plan/ plan_en.pdf.
8. Federal Highway Administration (2020). Integrating the Safe System Approach with the Highway Safety Improvement Program. Report No. FHWA-SA-20-018. Retrieved from https://safety.fhwa.dot.gov/hsip/docs/fhwasa2018.pdf.

Commitment & Vision

Our Commitment

The Yuba-Sutter Region will **work collaboratively** to **eliminate** traffic fatalities and serious injuries by 2050.

Our Vision

The Yuba-Sutter Region will have a **multimodal** and **sustainable** transportation system where users of **all ages** and **abilities** can travel **conveniently**, **reliably**, and **free from harm**.

Guiding Principles: Safety Is Our Highest Priority.

1. Traffic deaths and serious injuries are a preventable public health issue that must be addressed.

2. Safety is a shared responsibility.

3. Actions towards Vision Zero will be data-driven based on available crash data and risk factors (e.g., exposure, likelihood, and severity).

4. Evaluation will be ongoing. Regular data collection and analysis will help measure performance against Regional Safety Action Plan objectives.

Existing Policy Landscape

In recent years, leaders at the federal and state levels have taken bold and consistent steps to acknowledge the persistent and unacceptable level of severe injuries and fatalities on our roadways, commit to eliminating these occurrences, and follow international best practices and public health fundamentals to form a new safety paradigm in the US. This has specifically involved embracing the Vision Zero goal of safe mobility for all and adopting the Safe System Approach as the way to get there. The Safe System Approach is a significant evolution in how roadway safety is conceptualized.

This Safety Action Plan has been developed to align with the pivot to the Safe System Approach. This chapter summarizes the primary reference documents and policy considerations that influenced the direction, decisions, and priorities in this RSAP.
This Plan focuses on addressing crash risk through an assessment of vehicle speed, mass, and exposure that is inherently proactive and systemic. This Plan presents a holistic assessment of the needs and opportunities for enhancing safety consistent with a systemic risk factors, from systematically addressing socioeconomic and land use, features of the built environment, and passive and active safety tools. Finally, this Plan aspires to make safety the default choice: the easy choice for people as they move about and the easy choice for roadway design decisions. This Plan identifies the opportunities to streamline decision making to prioritize safety and improve internal alignment in programs, practices, and policies consistent with the Safe System Approach.

Federal Policy Considerations

National Roadway Safety Strategy

The United States Department of Transportation (USDOT) incorporated the Safe System Approach as part of its most recent National Roadway Safety Strategy (NRSS), adopted in January 2022. This NRSS is the first national commitment to the goal of zero fatalities on America's roadways, and names the Safe System Approach as the way to accomplish that goal. Federal transportation officials have since unveiled a number of policies and programs geared towards the application and implementation of the Safe System Approach at the state and local levels.

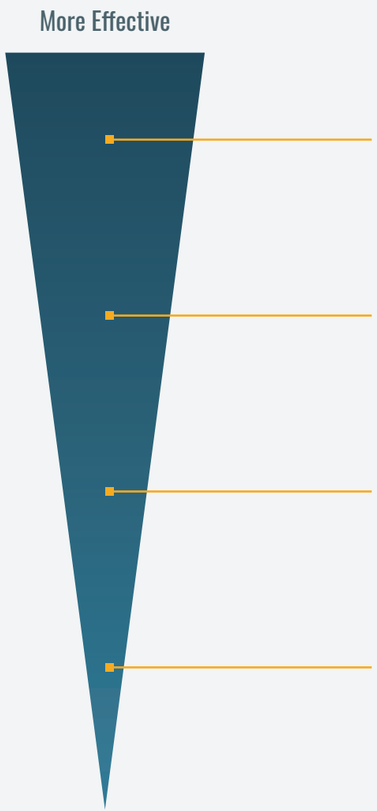
Safe Streets and Roads for All (SS4A)

The Safe Streets and Roads for All (SS4A) grant program was established by the Bipartisan Infrastructure Law in 2022, centered around USDOT's National Roadway Safety Strategy and its goal of zero deaths and serious injuries on America's roadways. It provides $5 billion in grant funding over its five-year duration (2022 - 2026) to develop and implement safety plans and projects. The SS4A grant program provides funding for local agencies to create Comprehensive Safety Action Plans (CSAPs). It also provides funding to implement safety projects, but only to those agencies that have an adopted CSAP or equivalent.

Safe System Roadway Design Hierarchy

The Safe System Roadway Design Hierarchy, created by the Federal Highway Administration (FHWA) in 2024, provides guidance in contextualizing and assessing infrastructure-based countermeasures and strategies on their alignment with the principles of the Safe System Approach.

The Hierarchy classifies countermeasures into four tiers, from most to least aligned with Safe System principles. Crucially, the Hierarchy prioritizes improvements and countermeasures that make physical changes to the system for the whole population as more effective than measures that rely on roadway users and individual decisions.



1. Remove Severe Conflicts

Removing severe conflicts, by separating users with different speeds or directions, such as using separated bike lanes.

2. Manage Vehicle Speeds

Reducing vehicle speeds and thereby reduces the severity of crashes that do occur. Countermeasures that reduce prevailing speeds can include lane narrowing and median islands.

3. Manage Conflicts In Time

Managing conflicts in time, which would separate users in time at shared spaces, like giving pedestrians a head start at intersections.

4. Increase Attentiveness and Awareness

Increasing attentiveness and awareness, which involves alerting users to conflicts and potential risks, can involve such countermeasures as intersection daylighting and warning signage.

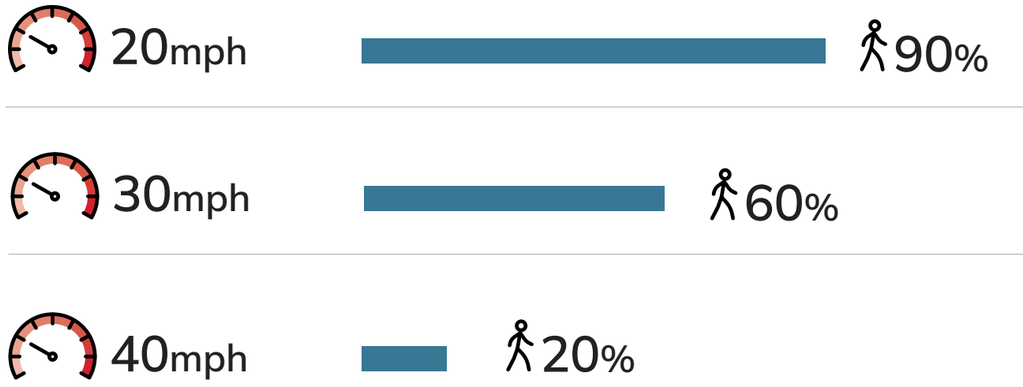
Safe System Approach for Speed Management

The FHWA's 2023 report on the Safe System Approach for Speed Management provides targeted recommendations around speed management. The report notes the need for agencies to place safety and the prevention of injury crashes (as opposed to throughput or travel times) as the highest priority when it comes to speed setting on roadways, and highlights the need to change the physical design and context of the roadway beyond merely changing regulatory speed limits in order to achieve target speeds. The report outlines a five-stage framework to speed management consistent with the Safe System Approach.

Primer on Safe System Approach for Pedestrians and Bicyclists

The Primer, released by the FHWA in 2021, emphasizes the importance of protecting pedestrians and bicyclists, as vulnerable users, under the Safe System Approach. The Primer details the considerations surrounding pedestrians and bicyclists under each of the five elements of the Safe System Approach and provides strategies and actions that can be taken at the federal, state, and local levels towards implementing the Safe System Approach. Also included is an appendix on benchmarking policies, programs, and practices for Safe System consistency.

Speed Management and Roadway Safety



Regional and Local Policy Considerations

Fully committing to Vision Zero and following the Safe System approach requires a fundamental pivot that involves infusing safety into all programs, policies, and practices within the agency as well as reconsidering existing agency approaches, budgets, and priorities where they conflict with Safe System principles. The Project Team developed a benchmarking tool for Federal Highway Administration as part of the Primer on the Safe System Approach for Pedestrians and Bicyclists where agencies can assess their standing on current safety policy and work against industry best practices. A combination of General Plans, Local Road Safety Plans, Standard Plans & Specifications, and Active Transportation Plans/Bicycle Master Plans were reviewed for the six jurisdictions to identify opportunities to improve how processes prioritize safety.

The General Plans include policies to prioritize safety in roadway projects or enhance safety while making other transportation system improvements. General Plans also bolster a Safe System by addressing the socioeconomic factors that have an impact on roadway safety. Older Improvement Standards and Specifications for some jurisdictions should be updated to focus on reducing the likelihood and severity of crashes (e.g., speed management). Over half of the jurisdictions have Active Transportation Plans/Bicycle Master Plans that identify recommendations for facilities with physical separation between vehicles and bicyclists/pedestrians. Yuba City, Marysville, and Yuba County already have Local Road Safety Plans. Many safety planning benchmarks are current efforts with this RSAP, but others will require additional work beyond the plan. For a detailed listing of relevant local policies, see **Appendix A**.

Pedestrians in Live Oak City

Safety as A Public Health Concern

This RSAP draws from emerging best practices which identifies and prioritizes strategies focused on addressing the potential for injury from the force generated by moving vehicles or individuals in a crash. The Safe Systems Pyramid, shown below, draws from public health principles to emphasize that interventions with the broadest reach and lowest individual effort are the most effective. This framework serves as a guide for prioritizing roadway design and operational strategies that maximize safety impacts while fostering collaboration beyond traditional safety-focused efforts. It highlights the role of agency partners and community stakeholders in the RSAP and addresses upstream, systemic issues to tackle root causes more holistically. The Safe System Pyramid guided the selection and prioritization of implementation strategies in **Chapter 4**.

Safe System Pyramid

CHAPTER 2

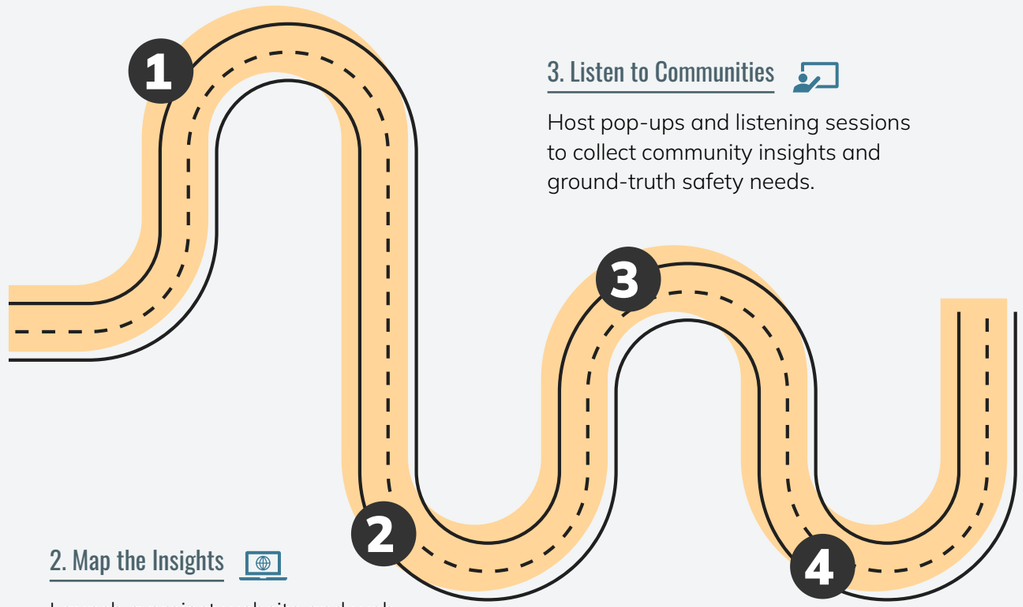
Community Engagement

The project team engaged with organizational partners around the region and the community at large, seeking insight to ensure that the resulting Regional Safety Action Plan (RSAP) creates a vision for improving the region's roadways that aligns with the community's values.

Our Community Engagement Journey Towards Vision Zero

1. United for Vision Zero

Establish a multi-agency task force to align strategies, share data, and guide Vision Zero efforts.



3. Listen to Communities

Host pop-ups and listening sessions to collect community insights and ground-truth safety needs.

2. Map the Insights

Launch a project website and web map to gather location-based public input.

4. From Talk to Action

Translate data and public feedback into targeted strategies and implementation priorities.

United for Vision Zero

Vision Zero Task Force

A Task Force was convened for the development of this Regional Safety Action Plan (RSAP) which comprised staff representatives from the partner jurisdictions' agencies as well as community organizations such as Blue Zones and the Yuba Area Bike Advocates. The Task Force is responsible for the Action Plan's development, implementation, and monitoring phases.

Over the course of the development of this RSAP, the Task Force met three times. The first meeting included an introduction on the Safe System Approach and Vision Zero and preliminary discussions on funding, regional coordination, and how best to address the needs of the public. During the second meeting, the Task Force discussed results of the crash data analysis along with the locations with disproportionately high injuries and fatalities and suggested other locations to consider based on their local knowledge. They also shared information about ongoing safety related projects or policies taking place within their jurisdiction or by their organization. During the third meeting, the groups discussed the results of the public facing community engagement along with focus areas...and choosing solutions to fit the contexts of the Yuba-Sutter region.

The Task Force included staff or members from the following agencies and organizations:

- Yuba County Public Works
- City of Wheatland Engineering Department
- Sutter County Public Works
- Yuba City Public Works
- City of Yuba City Public Works
- Marysville Joint Unified School District
- Yuba County Sheriff
- Sutter County Police Department
- Yuba City Police Department
- Sacramento Area Council of Governments
- Yuba Area Bike Advocates
- Blue Zones Yuba-Sutter

Task Force meeting

Map the Insights

Project Website & Interactive Web Map

A website was developed for the Plan to collect public feedback, consisting of project information, an interactive web map, and a project calendar. In the web map, visitors could identify specific locations within the region where they had roadway safety concerns by leaving comments and tag them by mode of travel (i.e. walking, biking, driving, etc.). The web map was open for public response from November 2024 to June 2025, and made available in English, Spanish, and 10 other languages. The web map received a total of 49 comments. A map and log of all comments are included in **Appendix B**.

49 Total Comments

14 Walking Safety Comments

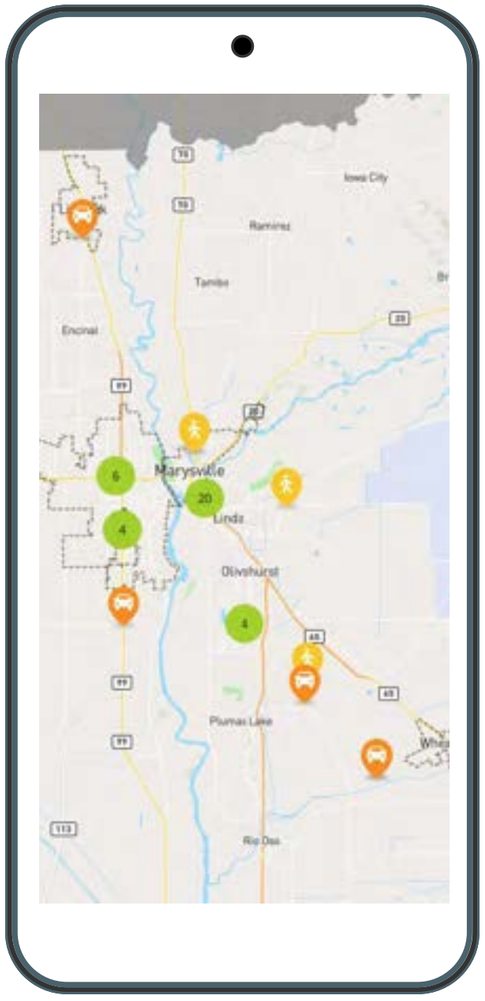
Unsafe crossings, poor lighting, and no ADA access.

15 Biking Safety Comments

Unsafe crossings, poor lighting, and no ADA access.

20 Driving Safety Comments

Unsafe crossings, poor lighting, and no ADA access.



United for Vision Zero

In-Person Outreach

Task Force and online engagement were supplemented with in-person events around the region to raise awareness and gather public input. At each pop-up event and listening session, project staff was available to inform the public about this Plan and its purpose. Residents were encouraged to share their safety concerns through interactive activities, direct conversations with the project team, and add comments on the web map. Lawn signs and posters that directed community members to project resources were strategically posted in high-traffic areas throughout the community.

Pop-Ups

To meet people where they are and optimize engagement, project staff participated at three community events. These events provided the opportunity for the engagement of a broader cross-section of the public than that which would attend a typical project-specific public meeting. At the first pop-up event in January 2025, the team distributed informational takeaway cards and engaged attendees in conversations about the project while they were in line for food at a Yuba-Sutter Food Bank distribution site. The outreach team later joined a Group Walking event with Blue Zones, a community-based organization, where they discussed the project and safety concerns with other attendees. During the third event, the team shared project information and gathered input at the Family Skate Night, which took place at the Tri-Counties Community Center.

Food bank pop up

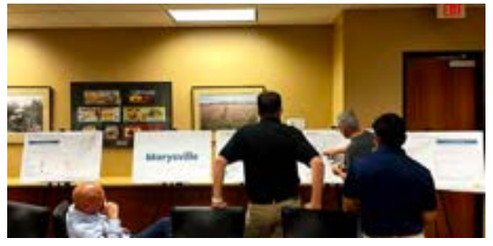
Project team distributing flyers

Project team collecting feedback

Listening Session

In May, the team hosted four listening sessions, one in each of the four partner cities during evenings. These meetings were conducted in an open-house style, with informational and interactive boards set up around the room for attendees to interact with. For each jurisdiction, one board displayed crash trends and crash hotspot maps and a second board listed the safety corridors identified by the project team for potential improvements and again solicited feedback on the community's agreement on those corridors being given higher priority, as well as provide an opportunity for them to propose other locations. All boards were translated into Spanish. Boards utilized are in **Appendix B.**

Marysville listening session



Wheatland listening session

From Talk to Action

Key Takeaways

Speeding is a primary concern.
Residents consistently identified vehicle speeding as a top safety issue across neighborhoods.

Pedestrian crossing safety is a major theme.
Many comments focused on the need for safer crossings, particularly near schools.

Infrastructure improvements are widely requested.
Community members called for enhanced sidewalks, traffic calming measures, and improved lighting—especially in residential and downtown areas.

CHAPTER 3

Regional Safety Analysis

This chapter summarizes key findings from the region's crash data, including the identification of high-injury safety corridors and region-wide focus areas. Together, these components highlight crash trends across the Yuba-Sutter region and inform the systemic safety strategies presented in Chapter 4.

About the Data

Crash analysis for 2018 to 2023 for Yuba-Sutter Region was carried out using crash data obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database. The analysis includes all crashes that led to injury and excludes property-damage-only crashes. Data collected includes the type of crash, primary cause, and at-fault party, etc.

While crash databases such as the SWITRS, accessed through the Transportation Injury Mapping System (TIMS), remain the best source of crash data, they have been found to have certain reporting biases, including:

- Crashes involving people walking, on bicycles, or on motorcycles are less likely to be reported than crashes with people driving.
- Younger victims are less likely to report crashes.
- Alcohol-involved crashes may be underreported.

Bicyclist using crosswalk at signalized intersection

About KSI Crashes

Severe injuries resulting from a traffic crash can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the crash scene

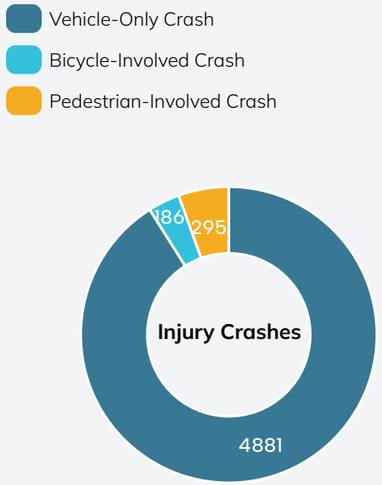
Throughout this analysis, the acronym KSI is used to denote crashes where someone was killed or severely injured.

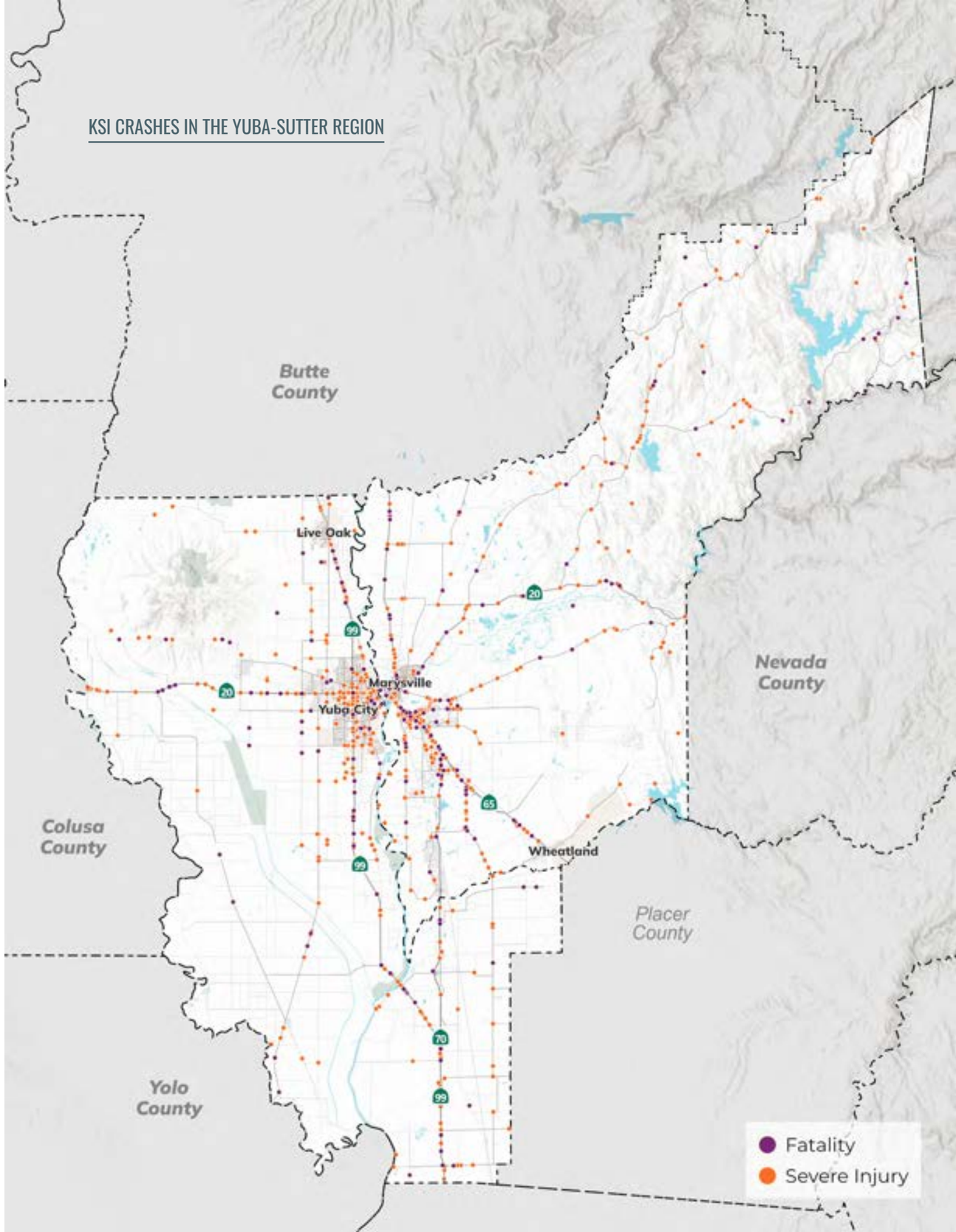
Summary of KSI Crashes

886 of the region's 5,362 crashes resulted in a victim being Killed or Severely Injured (KSI). There was a disproportionately greater share of KSI crashes that involved pedestrians when compared to all crashes. 101 (11 percent of KSI crashes compared to 6 percent) involved pedestrians, and 48 KSI crashes (5 percent) involved bicyclists.

Distracted Driving: The Safe System Approach addresses human mistakes such as loss of attention, distracted driving, and aggressive driving by designing road infrastructure and traffic systems that anticipate these errors. The goal is to minimize their consequences by creating multiple layers of protection that prevent severe crashes even when mistakes occur. These protections include improved visibility, in-vehicle technology, traffic calming measures, lane departure warnings, and physical barriers that separate traffic flows.

Figure 3.3
Crash Mode Share by Severity





Crash Data Fact Sheet

The region's crash history includes several categories, as explained below.

What are the different crash types?

Broadside: also known as a T-bone crash, occurs when the front of one vehicle strikes the side of another. These crashes can be severe due to limited protection on vehicle sides. It is the most common type of crash in the Yuba-Sutter region.

Rear End: happens when one vehicle hits the back of another, typically due to sudden stops or following too closely at an unsafe speed. It is the second most common type of crash in the region.

Vehicle/Pedestrian: involves a vehicle striking a pedestrian. In the Yuba-Sutter region, this crash type had the highest rate of KSI outcomes, due to the vulnerability of pedestrians.

Hit Object: occurs when a vehicle collides with a fixed object like a tree, pole, or barrier. These crashes often involve just one party. Hit object crashes make up the largest share of KSI crashes in the region.

Head-On: occurs when two vehicles collide front-to-front, usually on undivided roads. These are among the most dangerous crash types and represent the second highest share of KSI crashes in the region.

Overturned: occurs when a vehicle flips onto its side or roof, often due to sharp turns or high speeds. Overturned crashes can be especially hazardous for occupants.

Sideswipe: occurs when two vehicles traveling in the same or opposite directions brush against each other, often during lane changes or merging.

Primary Crash Factor

Determining the cause of a crash is not always straightforward, as multiple contributing factors may be involved. The primary crash factor (PCF), is the element identified by the reporting officer as most responsible for the incident. Below are some of the most common crash factors observed in the Yuba- Sutter region:

- **Unsafe Speed:** refers to motorists operating a vehicle at a speed that exceeds what is considered safe given roadway conditions, including weather, traffic volume, and road characteristics. Even when it is not cited as the primary cause of a crash, speed contributes to the resulting severity of crashes.
- **Improper Turning:** refers to any turn made that violates traffic regulations or safety guidelines. This includes executing an illegal turn, failing to use a turn signal, or making a turn that interrupts traffic flow.
- **Vehicle Right-of-Way Violation:** occurs when a driver fails to properly yield to another vehicle who has the legal right to proceed.
- **Driving or Bicycling Under the Influence:** involves operating a motor vehicle or bicycle while impaired by alcohol or drugs. Impaired driving significantly increases collision risk by reducing reaction time, impairing judgment, and affecting motor coordination.
- **Traffic Signals and Signs:** indicates failure to comply with traffic control devices, including stop signs and traffic signals. Typical violations include running red lights and failing to stop at limit lines.
- **Wrong Side of Road:** involves a vehicle driving on the incorrect side of the road.
- **Following Too Closely:** indicates tailgating or not maintaining a safe distance from the vehicle ahead.
- **Pedestrian Violation:** refers to when pedestrians fail to follow traffic laws, such as crossing outside of designated pedestrian crosswalks or against signals. Pedestrian violations sometimes indicate inadequate pedestrian infrastructure surrounding the crash area.

Who's at fault?

The "at-fault" party refers to the individual determined to be primarily responsible for the crash. In most instances, it is the operator of a motor vehicle making the driving error. In vehicle/pedestrian crashes, it could be a pedestrian who violated rules of the road by walking in areas not designated for pedestrian use. However, pedestrian violations may be overrepresented due to a lack of clear information related to crash circumstance, such as a lack of crosswalks and the increased likelihood that the pedestrian party may be unable to provide their side of the incident at the time of the crash.

Time of Day and Lighting Conditions

Crashes are divided into four categories based on lighting conditions:

- Daylight
- Dusk and dawn
- Dark/nighttime, working streetlights present
- Dark/nighttime, streetlights not present or working.

Knowing the lighting condition of crashes helps reveal where improvements such as increased lighting can help with reducing crash risks.

Driving Under the Influence

This category summarizes the share of crashes that involved a driver or bicyclist impaired by alcohol and/or drugs.

Regional Crash Analysis

Crash Summary

Between 2018 and 2023, the Yuba-Sutter region (encompassing Yuba County and Sutter County) saw 5,362 crashes that led to some degree of injury. 186 crashes (3 percent) involved bicyclists and 295 (5 percent) involved pedestrians.

886 of the region's 5,362 crashes resulted in a victim being Killed or Severely Injured (KSI). A disproportionately greater share of KSI crashes involved pedestrians when compared to all crashes. 101 (11 percent of KSI crashes compared to 6 percent of all crashes) involved pedestrians, and 48 KSI crashes (5 percent) involved bicyclists. Broadside crashes emerged as the most common type of crash, with speeding as the top primary cause of crashes.

INJURY CRASH TOTAL

5,362

KSI CRASH TOTAL

886

Figure 3.1 Injury Crashes by Year

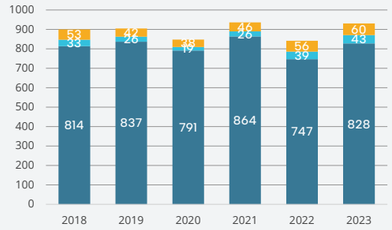
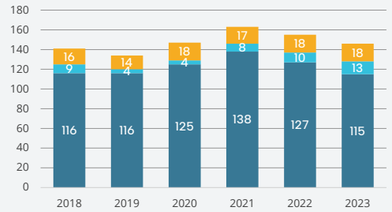


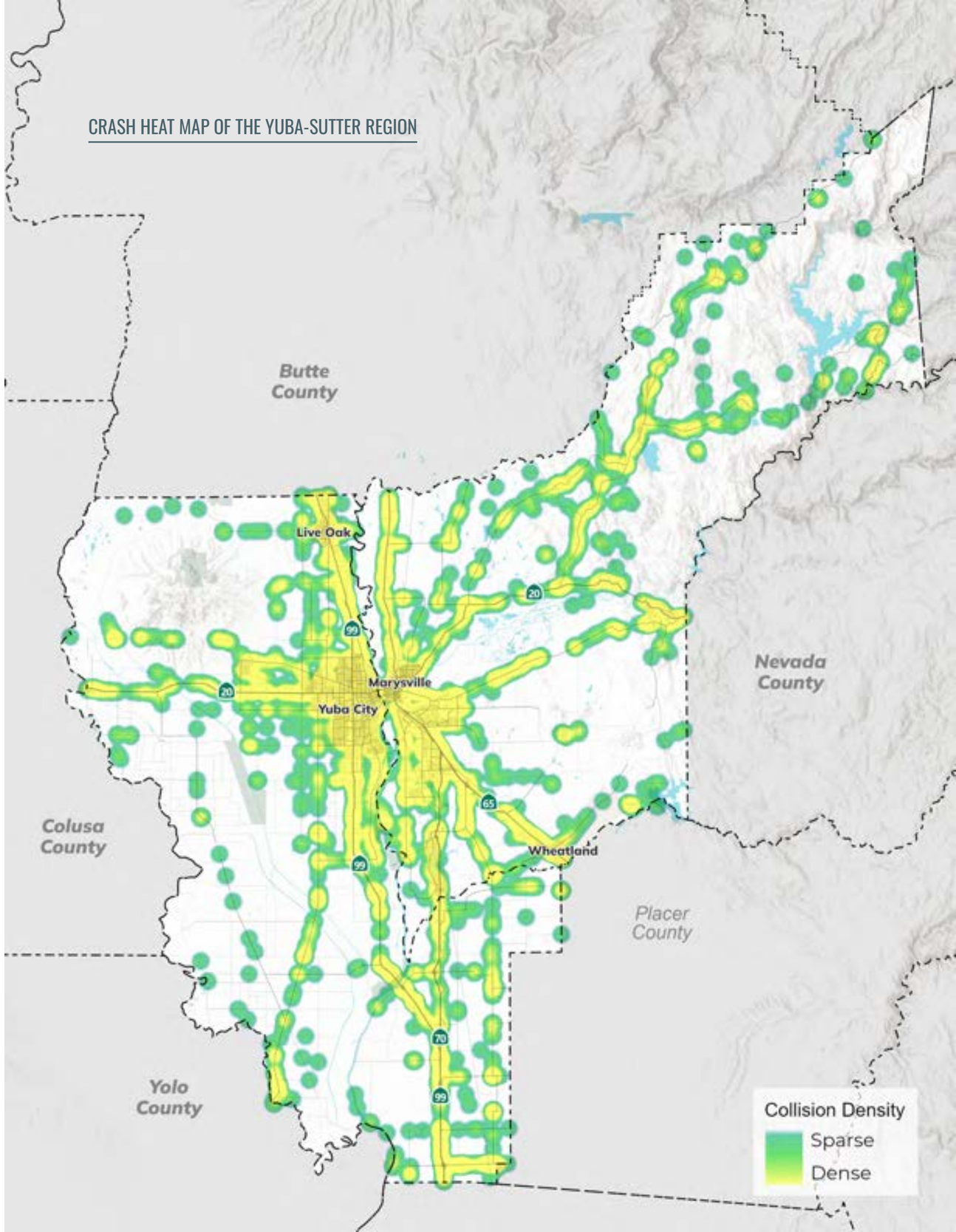
Figure 3.2 KSI Crashes by Year



Vehicle-Only Crashes

Bicycle-Involved Crashes

Pedestrian-Involved Crashes



Crashes by Crash Type

Broadside (27 percent), rear end (24 percent), and hit object (19 percent) emerged as the most common types of crashes throughout the region, accounting for 70 percent of crashes.

Crashes by Primary Crash Factor (PCF)

Unsafe speed (25 percent), improper turning (22 percent), vehicle right of way violation (16 percent), and driving or bicycling under the influence (12 percent) were the most common reported primary causes of crashes, accounting for 75 percent of crashes.

Figure 3.4
Share of Injury Crashes by Crash Type, 2018 - 2023

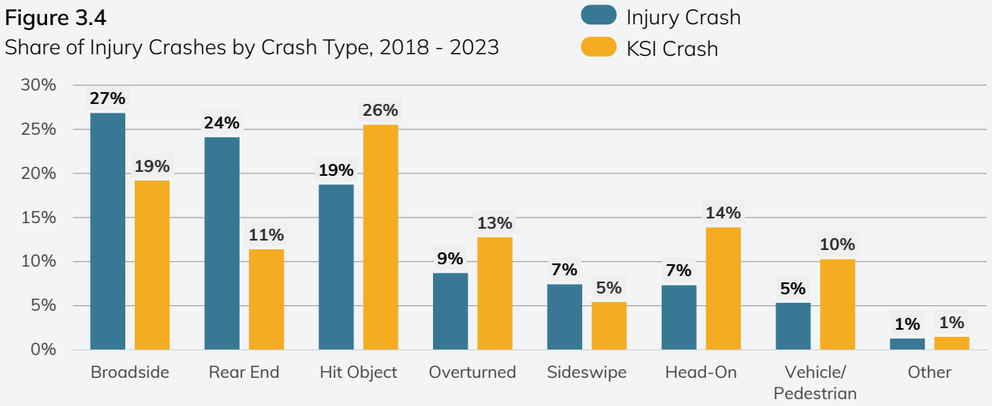
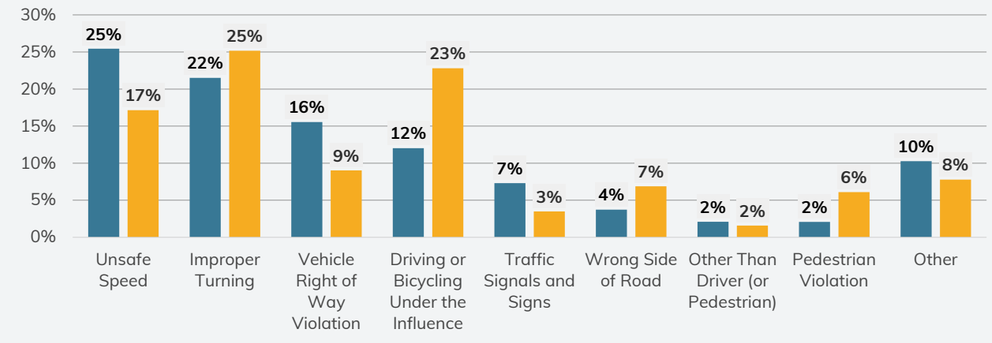


Figure 3.5
Share of Injury Crashes by Primary Crash Factor (PCF), 2018 - 2023



Crashes by Time of Day and Lighting Condition

Overall, most crashes occurred in the daylight (67 percent), 4 percent occurred during dusk and dawn, 14 percent occurred in the dark where streetlight was present, and 15 percent in the dark with no lighting. 54 percent of KSI crashes happened in the daytime, 4 percent occurred during dusk and dawn, and 16 percent occurred in the dark with streetlight present. A disproportionately greater share of KSI crashes occurred during nighttime in areas that lacked lighting, at 26 percent compared to 15 percent of all injury crashes.

Driving Under the Influence (DUI)

13 percent of all crashes involved a DUI charge. Notably, this share was larger for KSI crashes, at 25 percent.

Figure 3.6
Crashes by Time of Day & Lighting, 2018 - 2023

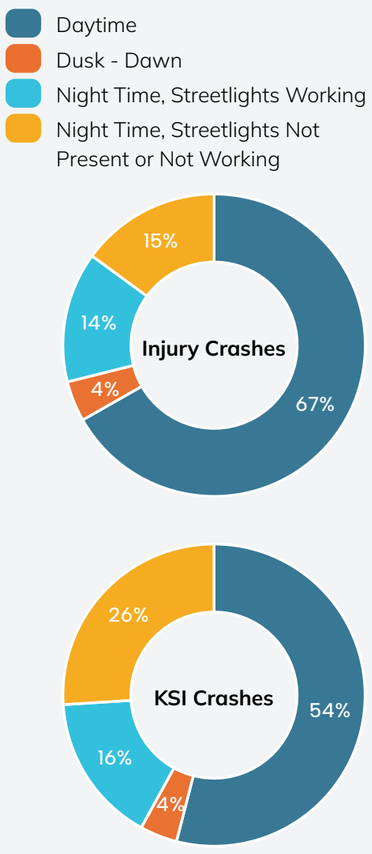
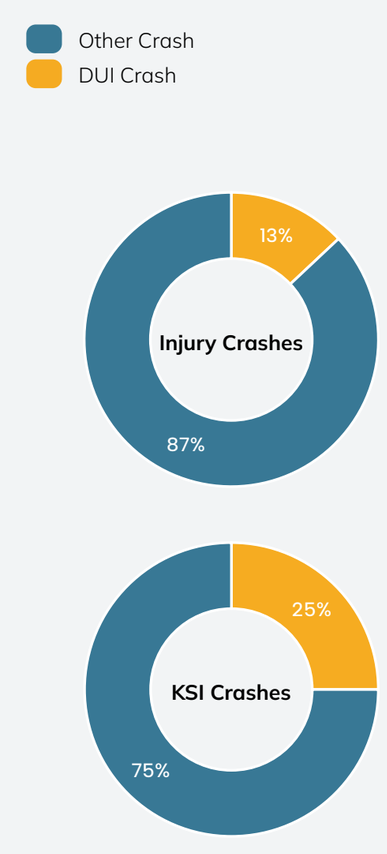


Figure 3.7
DUI Crashes, 2018 - 2023



Railroad Crash Summary

The railroad crash data analyzed covers the same time span as the roadway crash data: 2018 through 2023. There were eight railroad crashes that occurred in the same time period. Six crashes were within unincorporated Yuba County, five of them being on private roads and one being on Virginia Road southeast of Ostrom. There were two crashes within unincorporated Sutter County, one on Paseo Road and the other one on Clark Road south of Live Oak.

Of the crashes reported, two resulted in fatalities, two involved serious injuries, and two involved no injuries. Each crash report includes a narrative field that provides additional context. In six of the eight cases, the narrative stated: “Stopped on Crossing.” The remaining two crashes also attributed fault to the road user, though with different wording.

About the Data

Railroad crash data was sourced from the U.S. Department of Transportation’s Federal Railroad Administration (FRA), from the Highway-Rail Grade Crossing Incident Data.

According to the USDOT, a highway-rail grade crossing crash is defined as any impact between on-track railroad equipment and a highway user (e.g., automobile, pedestrian, etc.) occurring at a designated highway-rail grade crossing. These incidents are documented by FRA personnel when such crashes occur.

Incident information captured includes:

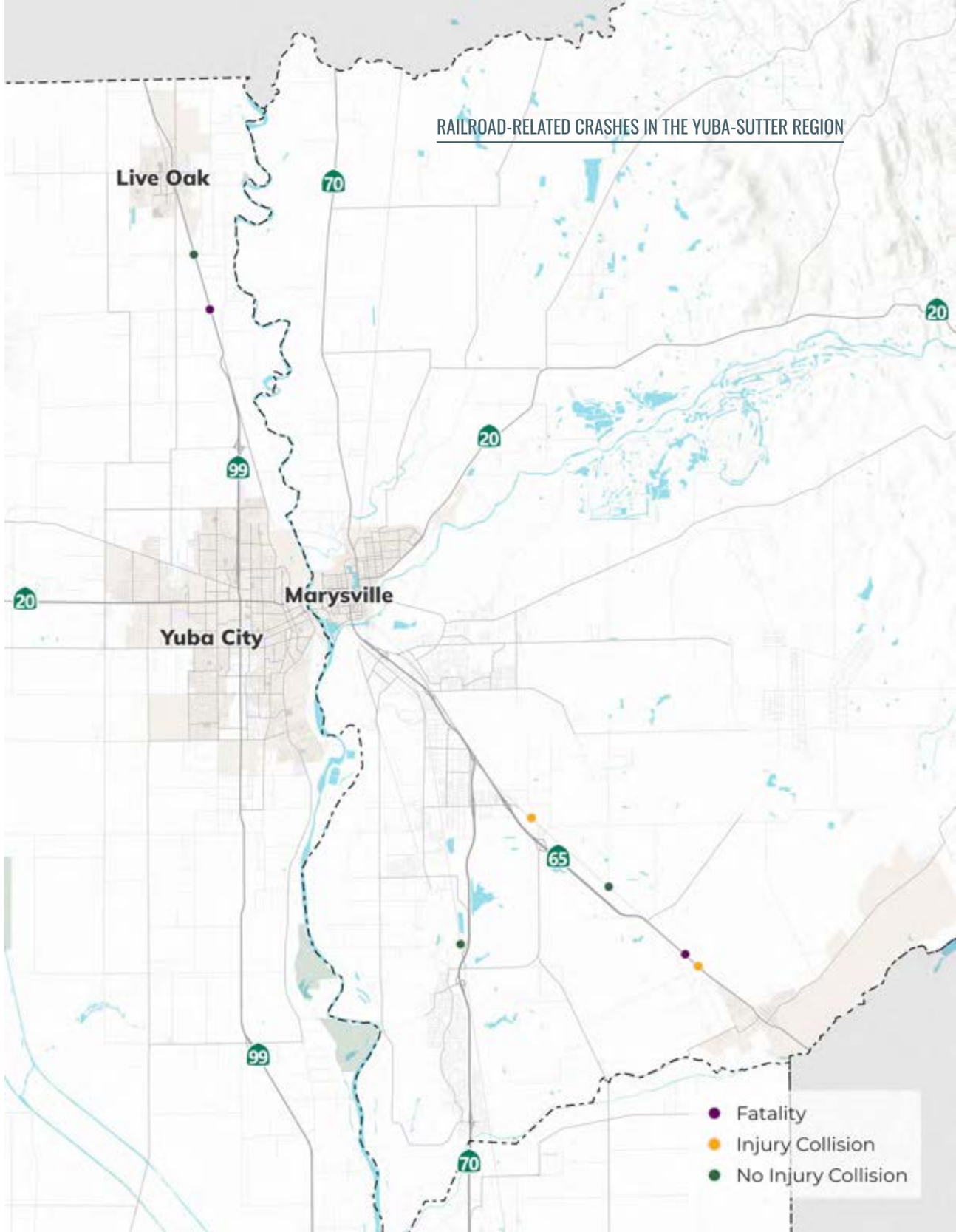
- Crash cause category (e.g., human factors, track issues, signal failures, mechanical problems)
- Casualty data (total killed and injured)
- Damage estimates
- Crash type (e.g., derailment)
- Track type (e.g., main line, yard)
- Track characteristics including signalization and method of operation (e.g., direct train control, yard/restricted limits)

Rail Crossing Rules and Regulations

The California Manual on Uniform Traffic Control Devices provides standards and specifications for all official traffic control devices in California (California MUTCD Part 8, Traffic Control for Rail and Light Rail Transit Crossings, https://dot.ca.gov/programs/safety-programs/camutcd).

The California Public Utilities Commission, which oversees the design, construction, and maintenance of rail crossings, hosts a webpage with the rules, guidance, and references for these high-risk areas: https://www.cpuc.ca.gov/crossings/

The CPUC also recently updated their Guidance on Pedestrian Treatments for Rail Crossings, which includesgeometric design considerations and design elements such as markings, signage, channelization, and warning devices.



Safety Corridors

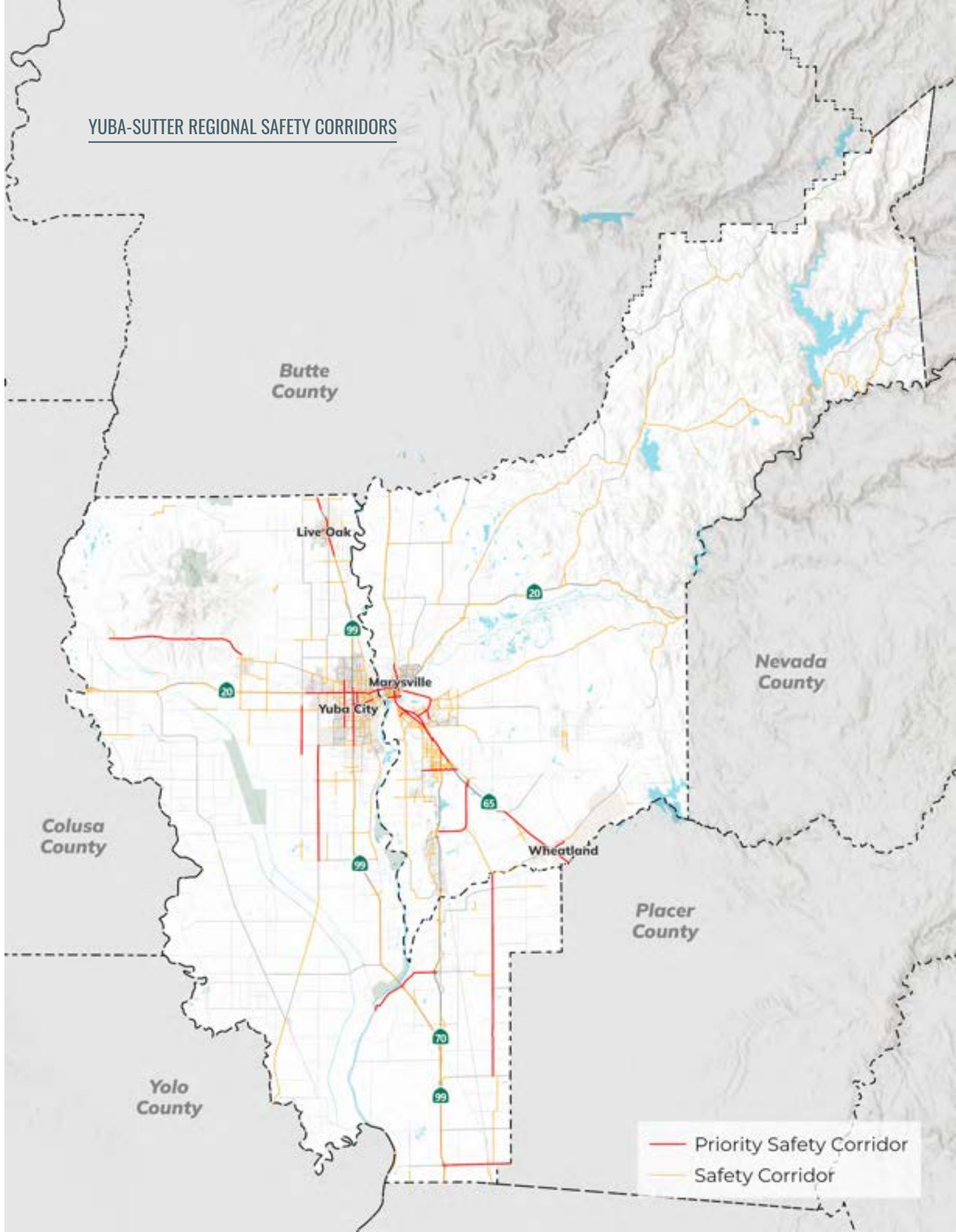
Safety corridors are defined as the roadways with the highest number and risk of crashes resulting in severe injury or death. This section discusses the methodology used to identify them.

Policy Background: Assembly Bill 43

Assembly Bill (AB) 43 is state traffic safety legislation aimed at reducing road fatalities by giving local governments more flexibility in setting speed limits. AB 43 enables jurisdictions to consider pedestrian and cyclist safety, school zones, and crash history when setting speed limits. If a jurisdiction, after completing an engineering and traffic survey, finds that the speed limit on a roadway segment is higher than reasonable or safe, they may declare a default speed limit that has been reduced an additional five miles per hour if that segment is designated as a *safety corridor*. A safety corridor is a roadway segment within an overall roadway network where the highest number of serious injury and fatality crashes occur; AB 43 stipulates that a jurisdiction's set of safety corridors must account for at least 25 percent of all killed or seriously injured (KSI) crashes and must comprise 20 percent of its streets or less. More information on AB 43 can be found in **Appendix A**.

Methodology

The methodology developed for this safety corridor identification is based on best practices identified from a review of Safe System-focused Vision Zero programs, as well as the recent *California Manual on Uniform Traffic Control Devices* definition of Safety Corridors. Safety corridors were designated based on crash frequency and contextual risk factors such as crash severity and mode, proximity to schools, the presence of vulnerable populations, etc. This methodology adopts a proactive, systemic safety analysis rather than relying solely on historical crash data. It incorporates known risk factors from national and state-level research. A network of safety corridors was developed using the 5-year crash dataset for 2018-2023 from the Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center database. Other data sources such as the USDOT Equitable Transportation Community (ETC) and Wejo speed data were used to incorporate contextual data into the network. For a full description of the technical methodology, see **Appendix B**.



Focus Areas

Focus areas were identified to represent the most significant patterns behind injury crashes—especially KSI crashes—in the region. Six such focus areas, denoted 'A' through 'F', were identified across the region, with each one applicable to several or all of the jurisdictions covered by this RSAP.

The following pages contain cutsheets that present each focus area, along with the following information:

- Description and associated information about each focus area
- Number of crashes associated, including number of KSI crashes among those (note that focus areas are not mutually exclusive; crashes can fall under multiple, and totals will exceed 100%)
- A map identifying locations of crashes within the focus area

Engineering countermeasures that can potentially address these crashes are also presented in each jurisdictions' chapter.

Yuba-Sutter Region Focus Areas:

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

FOCUS AREA B

Right-of-Way Issues at Intersections

FOCUS AREA C

Driving Under the Influence

FOCUS AREA D

Crashes Involving People Walking and Biking

FOCUS AREA E

Improper Turning Away from Intersections

FOCUS AREA F

Hit Object

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

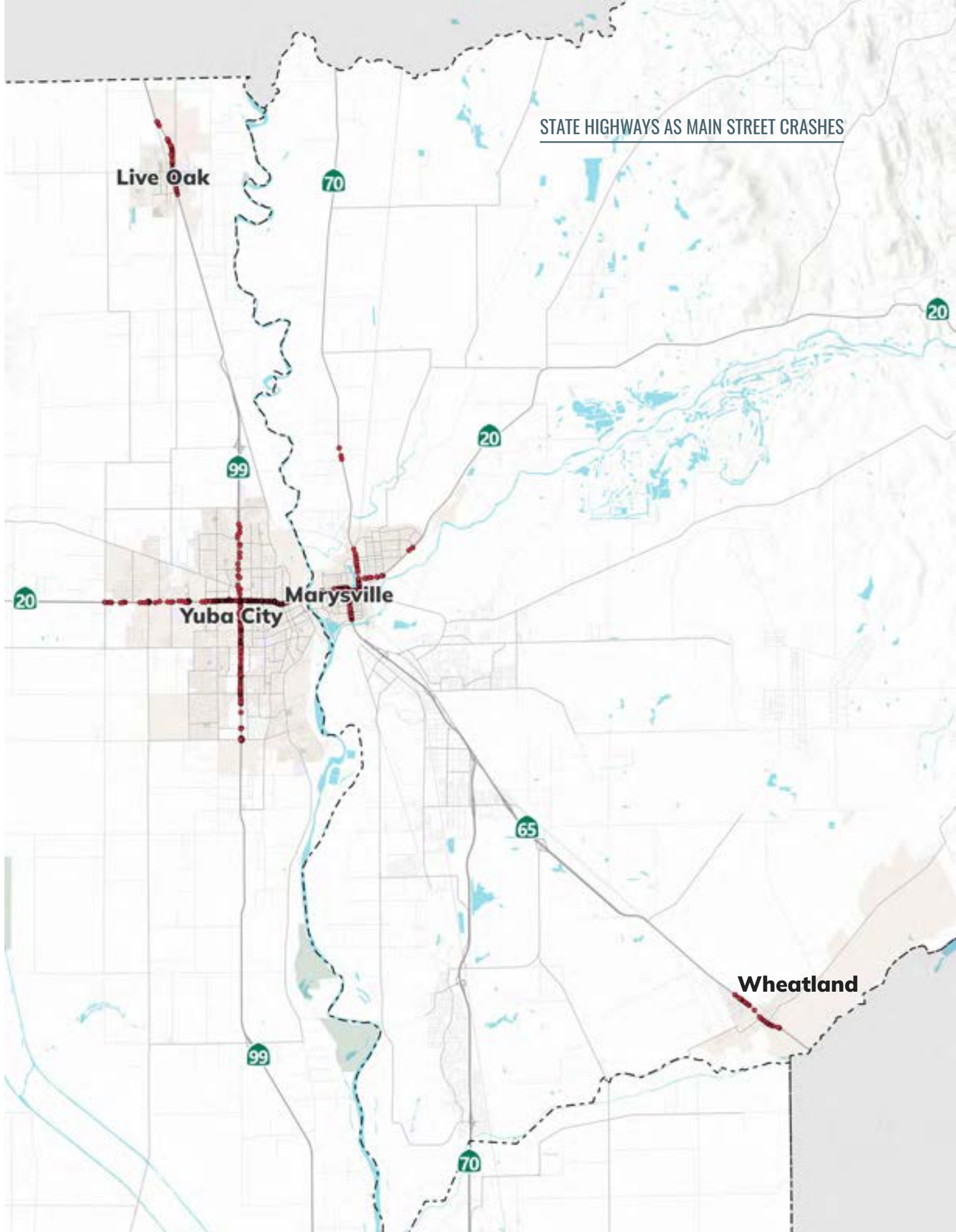
INJURY CRASH STATISTICS

829 (15%) **Total Crashes**

80 (9%) **KSI Crashes**

State Routes 20, 49, 65, 70, 99, and 113 traverse through the region and serve as key corridors within Yuba and Sutter County jurisdictions. Due to their high volumes and travel speeds, these highways present elevated safety risks and are frequently the sites of crashes. 39 percent of all crashes and 42 percent of KSI crashes in the Yuba-Sutter region occurred on state highways. Sections of highways that function as Main Streets in more populous areas often see conflicts between different modes of transportation—40 percent of all highway crashes (16% overall) occurred in such areas throughout the region. Speeds exceeding 60 mph were a factor in 40 percent of "main street" highway crashes, and in 10 percent of bicycle- and pedestrian-related incidents on these highways.

Countermeasures that can improve safety along highway main streets focus on slowing vehicle speeds, organizing traffic flow, and reducing conflict points between drivers, pedestrians, and bicyclists.



Complete Streets on the State Highway System

Caltrans Complete Street Contextual Design Guidance (DIB94)

The Yuba-Sutter region includes a mix of rural communities, suburban neighborhoods, and semi-urban downtown centers, many of which are bisected by state highways. These state routes frequently serve as community main streets in areas with growing residential development, schools, transit use, and walkable town centers. However, these corridors often lack adequate facilities for people walking, biking, or accessing transit, leading to serious safety risks, particularly for vulnerable road users.

Through the published Complete Streets Contextual Design Guidance (Design Bulletin 94), Caltrans has provided new flexibility in the design of complete streets projects on the State Highway system. The guidance includes considerations for changing speed limits, constructing appropriate bike facilities, and increasing shoulder widths – all context-sensitive solutions appropriate to better serving travelers of all ages and abilities.

Project Criteria

A project must meet the following criteria to follow this new guidance:

- Located in an urban area, suburban area, or rural main street
- Posted speed limit does not exceed 45 MPH
- Includes a bike, pedestrian, or transit facility.

Suggested Guidance

Some of the guidance suggested by DIB 94 is as follows:

- **Design Contexts:** Reallocate roadway space to enhance safe and efficient connectivity for communities, regardless of travel mode. To accommodate bicycle and pedestrian facilities, use strategies such as narrowing or removing travel lanes, adjusting median or turn lane widths, and reducing or eliminating on-street parking.
- **Vehicle Speeds:** Traffic calming and speed management strategies are tools to achieve safe and predictable speed transitions. Proposed speed limits should be based on place type, helping avoid sharp accelerations or decelerations along transitions such as from a rural area into a commercial district where pedestrians are more likely to be present.
- **Roadway Cross-sections:** Cross-sectional design should consider factors such as place type, operating speed, and current and potential users when establishing or modifying lane widths and preferred sidewalk and bikeway widths. Considering the community context and place type is key to aligning the class and location of treatments such as bicycle facilities for optimal safety and connectivity.
- **Crosswalks:** The placement and frequency of crosswalks should support pedestrian safety and visibility, particularly near schools, transit stops, and community destinations.

Where does this apply in Yuba-Sutter?

Several corridors in the region not only meet the DIB 94 eligibility criteria but also reflect ongoing safety concerns and latent demand for safer multimodal travel, particularly for non-motorized users. Examples include:

SR 20 through Marysville and Yuba City

This route traverses central business districts and neighborhoods with significant pedestrian activity. Speed limits are typically 35–45 MPH, and these corridors serve local bus routes but lack safe crossing opportunities and continuous bike facilities.

SR 70 through Linda and Olivehurst

This route serves as a main spine for residential communities and local schools. SR 70 has multiple driveways, cross streets, and transit stops—features typically found in a rural main street context. Current roadway geometry and traffic volumes, however, present safety challenges especially for pedestrians and cyclists, especially at uncontrolled crossing points.

SR 99 in Yuba City

This route is a key corridor with significant pedestrian activity, transit stops, and adjacent commercial and residential areas. It lacks consistent or protected bicycle facilities, often depending on narrow shoulders or intermittent bike lanes. This route also experiences land use transitions that would benefit from more predictable speed profiles.

SR 99 in Live Oak

This state highway cuts through small-town centers where pedestrian activity is high, but facilities are lacking or outdated and are candidates for safety enhancements, including sidewalk improvements, safer crossings, and improved visibility for vulnerable road users.

In each of these locations, existing land use, speed profiles, and community access needs, make the roadway a good candidate for design treatments as outlined in DIB 94. Several sites identified in this plan's crash analysis have shown repeated collisions on these highway segments, underscoring the need for safety improvements catered towards low-speed, multimodal infrastructure.

The design flexibilities provided under DIB 94 offer local agencies and Caltrans a valuable opportunity to modernize transportation infrastructure in a way that is both efficient and responsive to local context. Designing with this guidance in mind allows for rural and suburban settings like Yuba and Sutter Counties to design solutions that better match the context of the communities they serve.

FOCUS AREA B

Right of Way Issues at Intersections

INJURY CRASH STATISTICS

1,005 (20%) **Total Crashes**

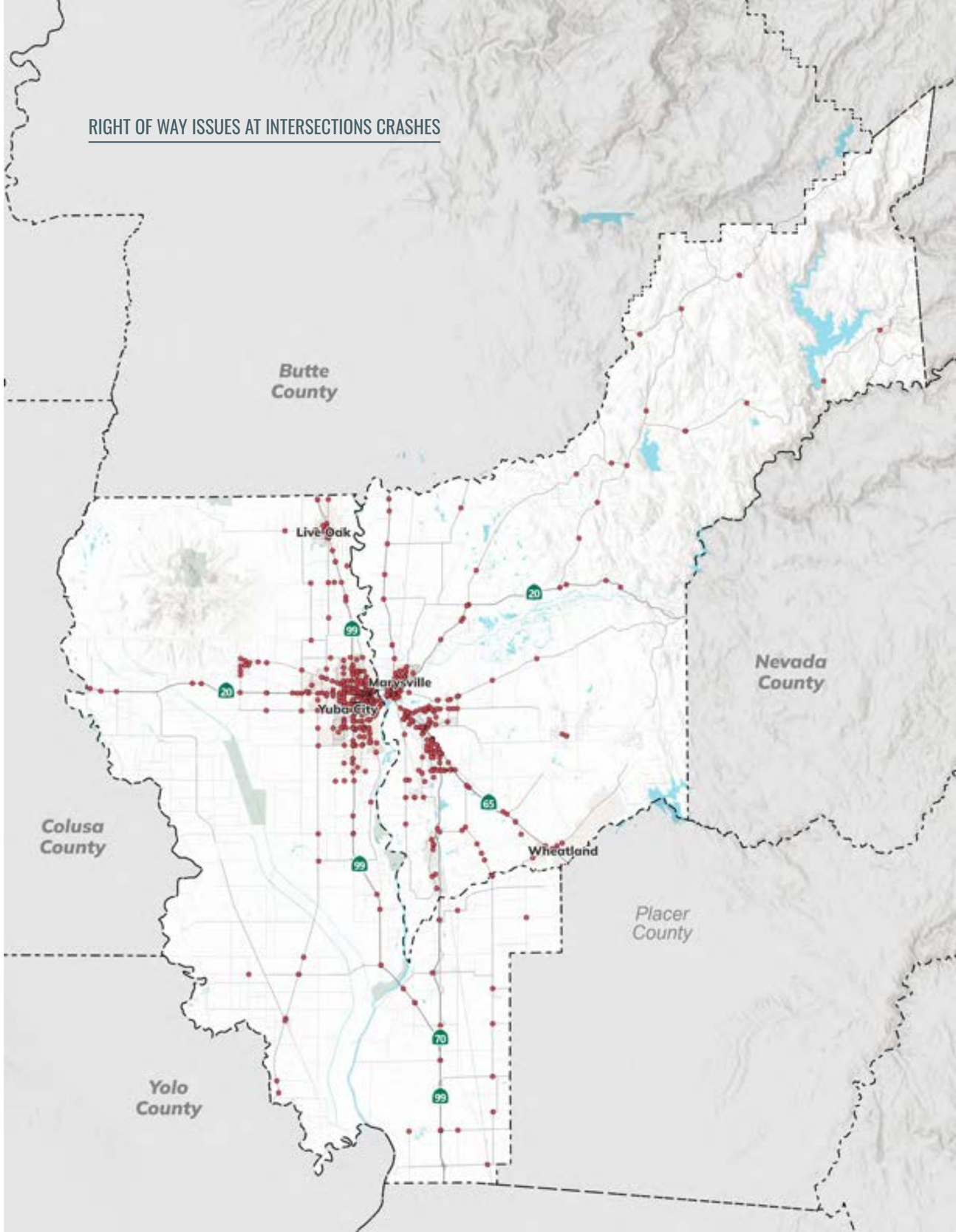
94 (11%) **KSI Crashes**

Improper turning is one of the primary causes of crashes and accounts for 1,153 crashes (nearly 22 percent) of all and 223 (25 percent) of KSI crashes in the Yuba-Sutter region. Of those 1,153 crashes,

740 occurred away from the intersection of two roadways, accounting for 14 percent of the region's crashes. Crashes with a primary collision factor of improper turning that aren't occurring at intersections of roadways include a wide range of actions, such as mis-attributing a turn into a driveway. In the moments leading up to these collisions, 43 percent of at-fault parties made an unsafe turning action (e.g. making abrupt lane changes) and 25 percent ran off the road. This crash type is strongly related to roadway departure on highways and county roads where speeds exceed 55 MPH.

32 percent of this crash category led to an object being hit and 17 percent to the vehicle overturning, the majority of which occur outside of city limits in more rural parts of the region. Countermeasures for this focus area include a combination of signage, roadway enhancements, and visibility improvements such as rumble strips, curve warning signs, guardrails, and additional shoulder space, which can help prevent dangerous turning maneuvers and roadway departures by guiding drivers and providing recovery space.

RIGHT OF WAY ISSUES AT INTERSECTIONS CRASHES



FOCUS AREA C

Driving Under the Influence

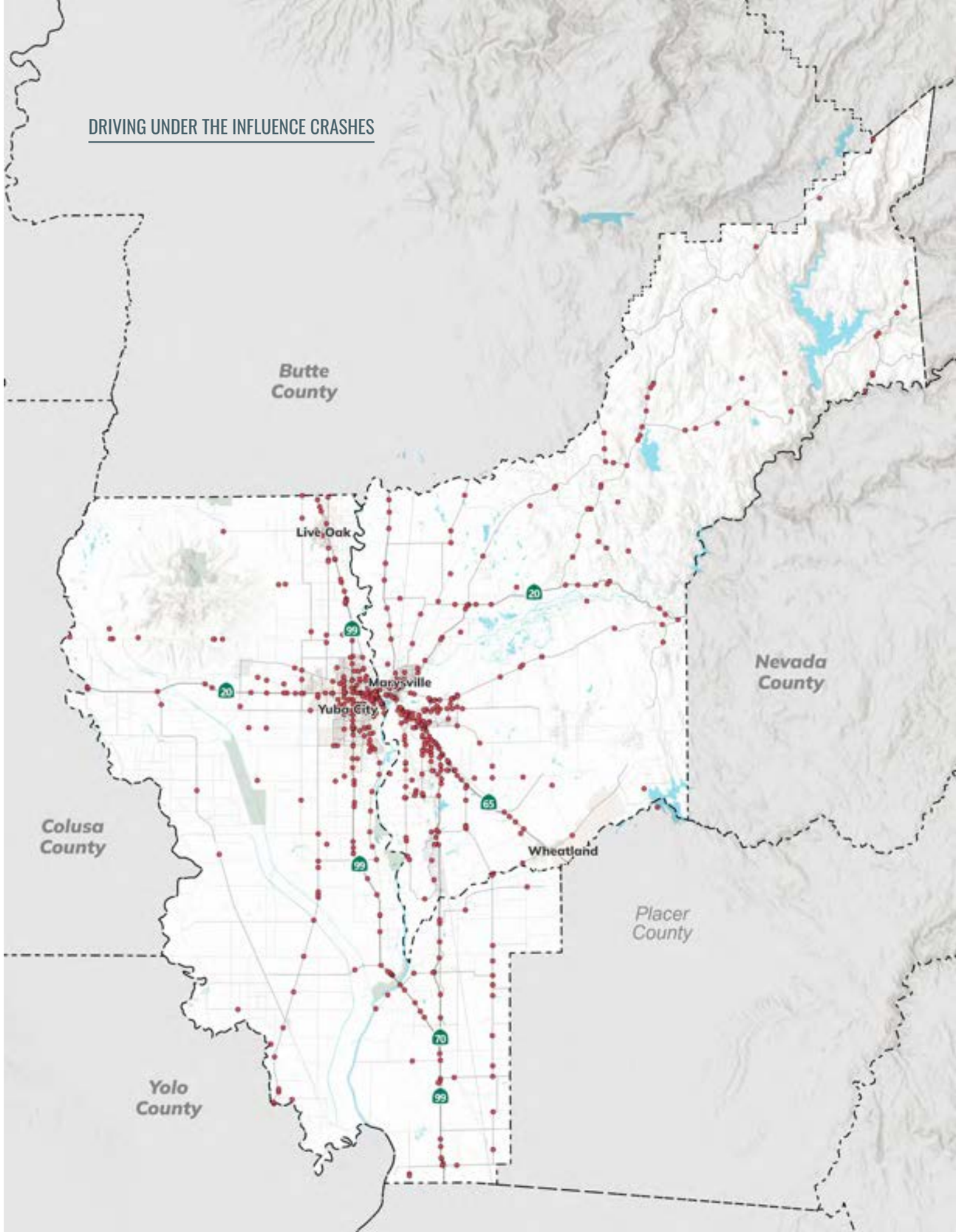
INJURY CRASH STATISTICS

707 (13%) **Total Crashes**

227 (26%) **KSI Crashes**

Driving under the influence (DUI) is a significant contributor to injury crashes, especially and disproportionately to KSI crashes. 26 percent of KSI crashes involves alcohol impairment. Friday, Saturday, and Sunday see higher crash frequency from 6pm to 3am, compared to other times of day and days of the week.

Within cities, there are higher concentrations of DUI crashes on arterial and collector roads along commercial areas, where there is also a higher share of DUI crashes involving bicyclists and pedestrians—even with crosswalks present. In the unincorporated areas, 63 percent of DUI crashes occurred on rural roads, and 44 percent resulted in a hit object crash. Narrow two-lane corridors such as SR-113, and curved road segments also host sites of DUI crashes. Countermeasures for DUIs are typically programs that target education and enforcement rather than engineering or infrastructure changes.



FOCUS AREA D

Crashes Involving People Walking and Biking

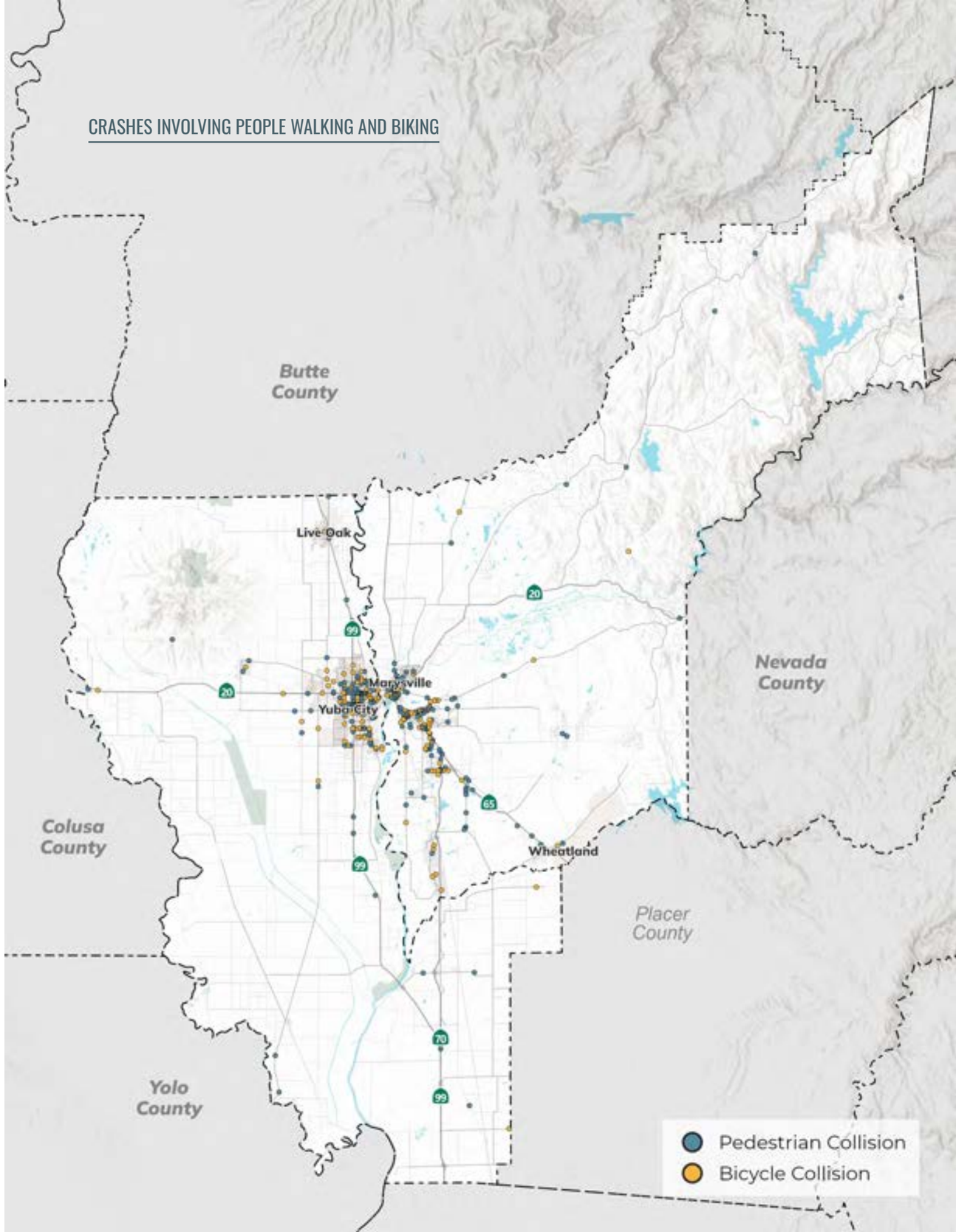
INJURY CRASH STATISTICS

480 (9%) **Total Crashes**

149 (17%) **KSI Crashes**

People walking and riding bicycles are considered vulnerable roadway users. Although crashes involving bicyclists and pedestrians make up less than nine percent of all crashes, they account for nearly seventeen percent of all KSI crashes in the region.

Sutter County's KSI crashes are concentrated within Yuba City, while Yuba County's crashes are dispersed throughout Marysville and the unincorporated communities of Linda and Olivehurst. There are higher rates of KSI crashes involving bicylists and pedestrians on wide four-lane arterials along commercial areas, sometimes with two-way left turn medians or median islands. Mid-block crashes occurred more often in areas where pedestrian crossings are sparse, mainly in unincorporated areas. Additionally, 24 percent of KSI crashes involving bicyclists and pedestrians occurred within a quarter-mile of a school and 25 percent ran off the road. Countermeasures for crashes involving bicyclists and pedestrians that occurred within a quarter-mile of a school typically offer vulnerable road users with dedicated, protected space and increased visibility, like bikeways and lighting.



FOCUS AREA E

Improper Turning Away from Intersections

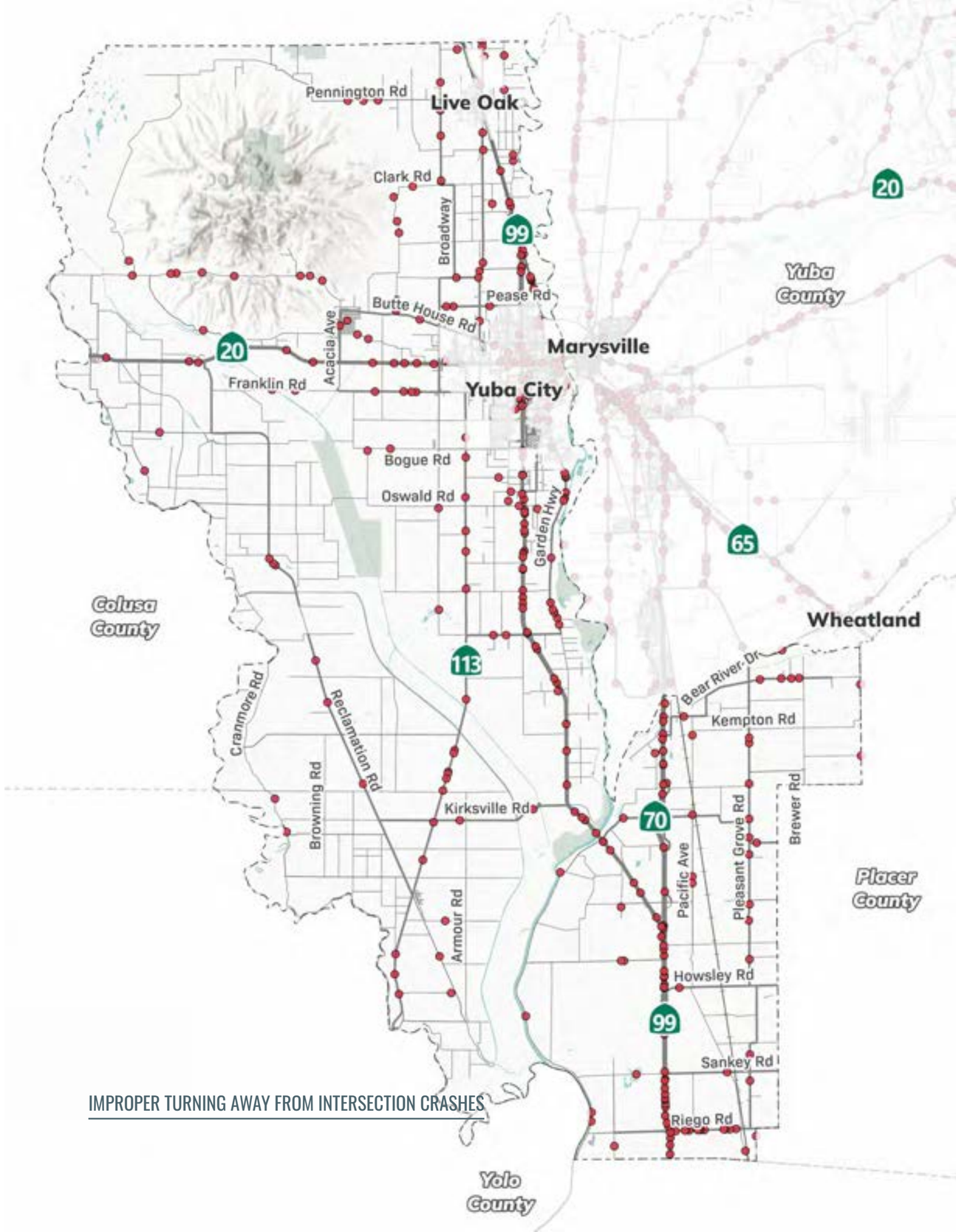
INJURY CRASH STATISTICS

740 (14%) **Total Crashes**

172 (19%) **KSI Crashes**

Improper turning is one of the primary causes of crashes and accounts for 1,153 crashes (nearly 22 percent) of all and 223 (25 percent) of KSI crashes in the region. Of those 1,153 crashes, 740 occurred away from an intersection, accounting for 14 percent of the region's crashes. In addition, 32 percent of crashes with improper turning as the primary factor and occurring away from intersections led to hit object and 17 percent to overturned, both crash types happening almost exclusively outside of city limits. This indicates roadway departure on highways and county roads where speeds exceed 55MPH. In the moments leading up to this focus area, 43 percent of at-fault parties made an unsafe turning action (e.g. making abrupt lane changes) and 25 percent ran off the road.

A combination of signage, roadway enhancements, and visibility improvements, such as rumble strips, curve warning signs, guardrails, and delineators, can help prevent unsafe turning and mitigate roadway departures by guiding drivers and providing recovery space. Pairing these countermeasures with speed limit reductions can reduce crash severity by lowering the kinetic energy transferred during high-speed impacts, helping prevent serious injuries.



IMPROPER TURNING AWAY FROM INTERSECTION CRASHES

FOCUS AREA F

Hit Object

INJURY CRASH STATISTICS

1,004 (19%) **Total Crashes**

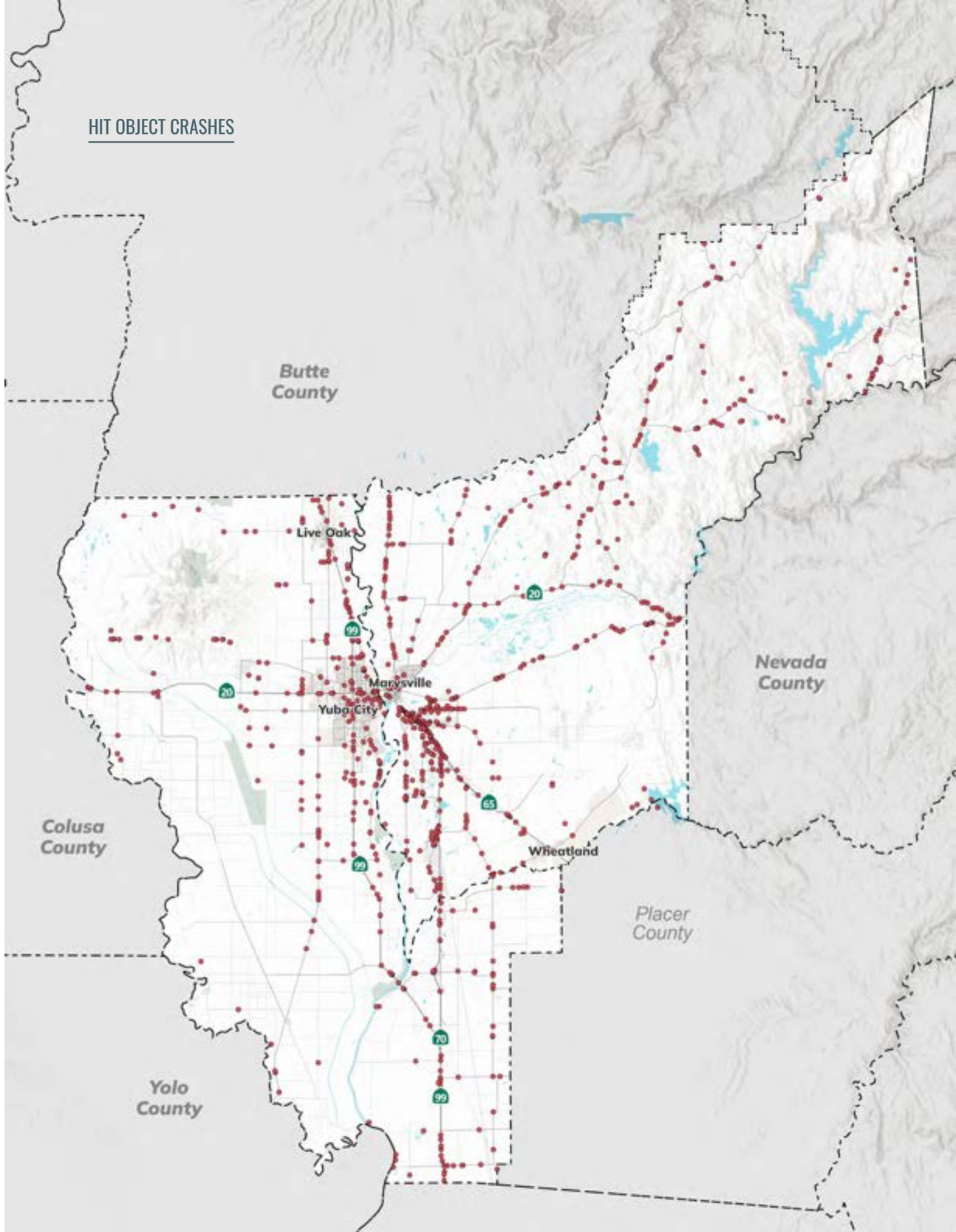
229 (26%) **KSI Crashes**

Overall, 1,004 of crashes resulted in hit object, making up 19 percent of the region's crashes. However, this type of crash accounted for 26 percent of KSI crashes. 95 percent of all hit object crashes involved only one party.

896 crashes, or 89 percent, of hit object crashes occurred outside of city limits. Out of those, 68 percent occurred on non-state facilities. In unincorporated Sutter County, many of these hit object crashes occurred on two-lane rural county roads—typically narrow lanes without shoulders, most of which have posted speed limits of 55MPH and up. In unincorporated Yuba County, many non-state-highway hit object crashes occurred in and near residential areas, mainly Linda and Olivehurst, where some roads range from two- to four-lanes and often have on-street parking.

Most of the objects hit were fixed objects (83 percent), such as trees and utility poles, nine percent were other objects such as items dropped from a vehicle, and two percent were animals.

Countermeasures like clear zone improvements and widened shoulders help prevent crashes with objects and provide recovery space, while rumble strips and reflectors enhance driver awareness and guidance, especially in low-visibility conditions. Speed limit reductions are especially critical, as lower speeds directly reduce the kinetic energy transferred during a crash, which in turn lowers the risk of severe injury or fatality.



CHAPTER 4

Regional Implementation Plan

Engineering & Programmatic Countermeasures

This section presents a toolbox of safety countermeasures that can be deployed to address crash trends and the systemic factors behind them. Systemic improvements, both engineering and programmatic/non-engineering related, were identified for implementation.

What Are Engineering Countermeasures?

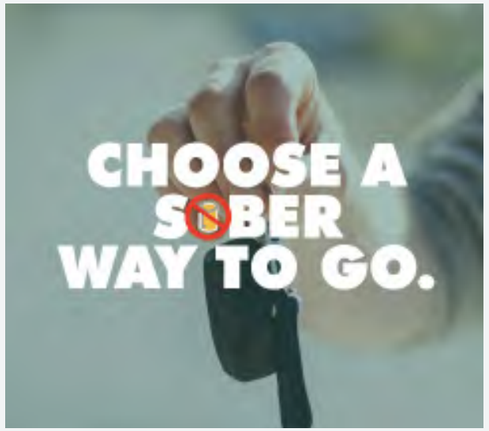
Engineering countermeasures are physical, infrastructure-based improvements that can be made to roadways to reduce likelihood of crashes.

What Are Programmatic/Non-engineering Countermeasures?

Programmatic/Non-engineering countermeasures introduce education, enforcement, and other policy instruments as means of encouraging safer roadways through user behavior, and they can be used to tackle traffic safety problems such as alcohol and drug impaired driving, distracted driving, speeding, and pedestrian and bicyclist safety.

Example: Rectangular Rapid Flashing Beacon

Example: OTS Go Safely California campaign resources



Engineering Countermeasures

Engineering countermeasures are presented in a toolbox in **Appendix D**, which includes descriptions of the countermeasures, its applicable tier(s) in the Safe System Roadway Design Hierarchy, estimated high-level cost, and opportunities for quick-build versions. Countermeasures that are part of FHWA's list of Proven Safety Countermeasures and/or in the 2020 Caltrans Local Roadway Safety Manual (LRSM) are also noted. Both distinctions can be advantageous for use in Caltrans Highway Safety Improvement Program (HSIP) grant funding applications.

As practitioners select countermeasures for specific projects, they should consider crash history, contextual factors, design features, costs, and a range of other issues. In each jurisdictions' chapter in subsequent sections of this Plan, countermeasures from this toolbox are paired with focus areas to provide a systemic approach to addressing crash trends.

Example Countermeasure - Roundabout

Roundabouts represent a proactive approach to improving intersection safety and efficiency within the Yuba-Sutter region. Their design aligns with the goals of the Regional Safety Action Plan by reducing severe crashes, enhancing traffic flow, and accommodating diverse users. Implementing roundabouts in strategic rural and urban locations can serve as a cost-effective and sustainable measure to advance both safety and mobility outcomes identified in the plan.

Example Engineering Countermeasure

Roundabout

INTERSECTIONS & ROADWAYS

FHWA PROVEN COUNTERMEASURE

Context	**Urban/Rural**
LRSM ID	**S16/NS04**
Cost	**$$$**

Low-Cost / Quick-Build Alternative Available

Description

A roundabout is a circular intersection where traffic flows in one direction around a central island, and vehicles must yield at entrance lanes. Unlike conventional intersections, roundabouts eliminate severe conflicts from crossing and left-turn movements. The design of a roundabout forces drivers to slow down, which narrows the range of vehicle speeds and reduces the severity of crashes. Additionally, pedestrians only need to cross one direction of traffic at a time, minimizing their exposure to vehicles.

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Programmatic Countermeasures

Programmatic countermeasures can also be effective in reducing the likelihood and severity of crashes. Programmatic countermeasures include education, enforcement, and other strategies. *Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices, 11th Edition*, published by the National Highway Traffic Safety Administration (NHTSA) in 2023, provides a range of information on example traffic safety programs, including examples and effectiveness rankings.

What's Included?

- Speed limit decrease opportunities, especially near schools or in downtowns
- Enforcement based on crash history
- High-visibility DUI enforcement
- DUI prevention through partnerships with public health agencies
- Education and public awareness campaigns targeted at speeding, DUIs, and increasing awareness of people walking and biking
- Automated enforcement with red-light cameras or speed cameras

More information on these and other programs can be found in **Appendix D**.

Local Efforts

Locally, several safety programs have already been implemented. CHP has previously been awarded grants from the California Office of Traffic Safety to perform targeted enforcement in high-frequency crash areas. Marysville has recently performed a round of DUI enforcement. Live Oak is in the process of performing engineering and traffic studies to implement lower speed limits in key areas.

There have been several other efforts through Blue Zones and First Five Sutter County as well as other local groups that have conducted education and outreach related to active transportation. Additionally, several of the jurisdiction's Health Departments have funding for bike helmet give-aways.

Example Programmatic Countermeasure

Speed Limit Modification

Description

California Assembly Bill (AB) 43 was passed in 2021 to provide a means to lower speed limits on corridors that meet certain criteria. AB 43 focused on giving local jurisdictions more flexibility in setting speed limits, especially regarding vulnerable road users:

- Speed Limit Reduction: Reduction of additional 5 mph based on several factors, including designation of Safety Corridors, as described in Chapter 3
- Prima Facie Speed Limits: Options for 15 and 25 mph in certain areas such as school zones depending on context
- Business Activity Districts: Option for 20 or 25 mph speed limits

Effectiveness and Cost

★★★★★

Cost: $

Implementation Plan

This section presents the Action Plan for the Yuba-Sutter Region partner agencies. Yuba-Sutter is committed to providing regional leadership to improve roadway safety and working to eliminate fatalities and severe injuries on the roadway network. The Action Plan is comprised of strategies to facilitate successful implementation and evaluate and communicate progress.

Infrastructure

A priority corridor list was prepared for each jurisdiction based on the locations of the safety corridor network that had the highest number of severe and fatal crashes, community input, location of sensitive land uses, as well as review of the jurisdiction's other infrastructure needs and priorities. See identified projects in each jurisdiction's section.

Prioritization

The FHWA Safe System Roadway Design Hierarchy provides guidance on how to prioritize projects when reviewing development applications and making land use and transportation planning decisions. Projects identified in the project list, as well as any future projects, should prioritize higher tiers with the goal of first removing severe conflicts. Project priorities should include those with the greatest potential of reducing crash risk (exposure, likelihood, and severity).

Policies and Practices

In addition to infrastructure projects, the success of this RSAP is dependent on changes to the policies and practices that institutionalize the Safe System Approach for the region's partner agencies in. As a result of the benchmarking assessment described in **Appendix A** and recommendations from the Task Force, the Action Plan contains strategies, institutional improvements, and new standard practices that center safety in the day-to-day operations of the Yuba-Sutter counties and local agencies. For example, rolling safety projects into existing capital improvement projects by consolidating safety improvements with maintenance efforts such as roadway resurfacing can be cost efficient and expedite project implementation and delivery. Yuba-Sutter's commitment to the goals of this RSAP emphasize that safety considerations are prioritized in projects over other competing factors.

Oversight, Coordination, and Partnership

The Action Plan also provides for oversight and accountability towards the commitment to safety. Yuba-Sutter will continue the momentum from the Task Force that convened during the creation of this plan. Having the leadership and oversight of this group will help maintain buy-in and support from elected officials and the community as Yuba-Sutter encourages Caltrans to implement countermeasures on state-owned facilities identified in the RSAP.

Continued communication and transparency with community members can allow for greater trust and support of the RSAP's goals. The Action Plan also contains policies that promote community education to develop collective awareness around safety, target educational campaigns towards identified emphasis areas, and create a culture that supports both policy and infrastructure changes.

Partner agencies must work together to carry out the projects and policies listed in each jurisdiction chapter and assume a shared responsibility for the implementation of the Plan.

Yuba-Sutter's city councils and county boards of supervisors should receive regular updates on if their jurisdictions are on track to meet the Vision Zero goal. The future success of this plan will require a comprehensive effort across government and the community, including partnerships with neighborhoods and community based organizations to encourage engagement and support.

Implementation Phasing & Sequencing

Implementing countermeasures, policies, and projects identified in the Plan typically requires an ongoing, long-term commitment. To facilitate the evaluation and prioritization of funding, it is desirable to consider the implementation of safety projects through different time horizons.

Jurisdictions should seek overlapping opportunities where safety improvements will be implemented as part of an upcoming effort such as the repaving program or CIP. Implementation should also happen proactively as part of any development impact review process to ensure that new developments align with the Safe System Approach and meet safety requirements. All transportation construction projects should be reviewed to ensure they align with the Safe System Approach and follow recommendations in this Plan.

Consistency with the Safe System

This Plan builds on existing safety practices to ensure consistency with the Safe System Approach. The Plan establishes a framework for the Region to guide transportation-related implementation moving forward to be aligned with the Safe System Approach. This includes rethinking how the jurisdictions in the Yuba-Sutter Region prioritize projects and allocate funding to address safety concerns systematically and proactively. The Plan also includes guidance for developing projects by reviewing them through a safety-first lens. All transportation projects should be reviewed to ensure severe crash risks are minimized for vulnerable road users.

Caltrans Project Implementation

Caltrans Project Delivery

Once the Regional Safety Action Plan (RSAP) is adopted, projects taking place on the California State Highway System (SHS), such as Highways 20, 70, and 99, will involve Caltrans. Project delivery with Caltrans is a structured, multi-phase approach designed to ensure projects are safe, efficient, and aligned with statewide mobility goals.

Following project identification from the planning process, Caltrans or one of the cities or counties involved with the RSAP will prepare a Project Initiation Document (PID). This document outlines the project's purpose, scope, schedule, and estimated cost, and serves as the foundation for securing funding. The PID includes analysis of key issues such as traffic operations, environmental impacts, multimodal considerations, and community involvement. It is essential for programming the project into the State Transportation Improvement Program (STIP) or Regional Transportation Improvement Program (RTIP), which commits funding from sources like the State Highway Account.

Projects may be developed directly by Caltrans as part of the State Highway Operation and Protection Program (SHOPP) which focuses on maintenance of existing facilities but will incorporate feasibility, safety, and multimodal elements as identified by various planning processes. Alternatively, the local agencies may implement projects on the SHS through the encroachment permit process for smaller, less complex projects or through the formal Project Study Report approval process for larger projects.

Following programming, the project enters the development phase, which includes environmental studies, securing necessary approvals and permits, acquiring rights of way, and completing detailed design plans. Caltrans then prepares and advertises the construction contract. Once a contractor is selected, the project moves into construction and contract administration, where Caltrans oversees the execution of the work to ensure compliance with specifications, timelines, and safety standards. The final step is project close-out, which includes documentation, final inspections, and transitioning the project into operational status.

Throughout this process, Caltrans coordinates closely with local agencies, especially when projects are locally sponsored or require regional input. This collaboration ensures that projects reflect community needs and are delivered efficiently and equitably.

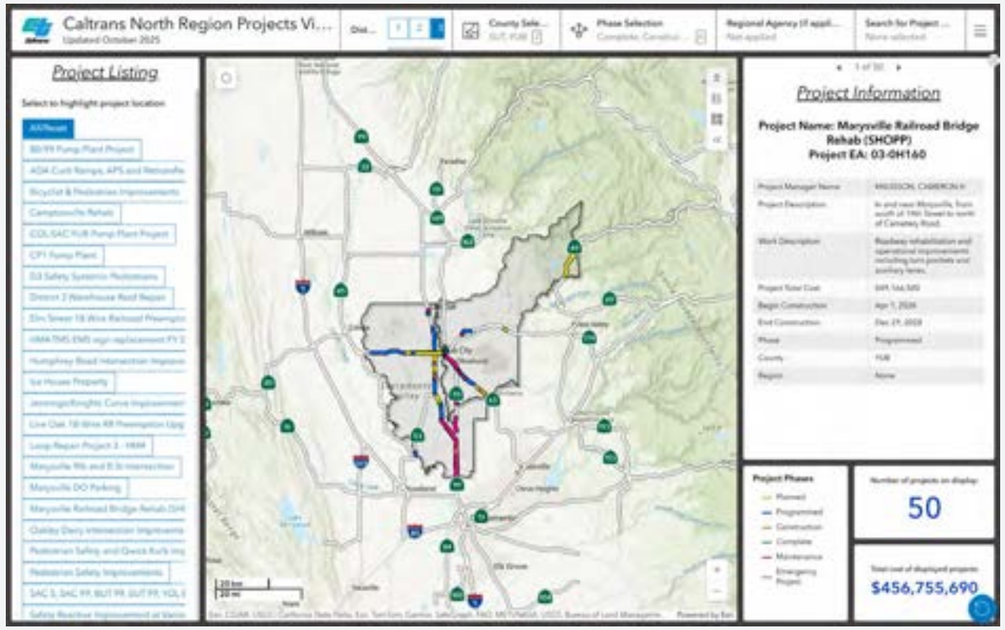
More information on project delivery can be found from the link here: https://dot.ca.gov/programs/project-delivery

Caltrans Project Delivery can be reached at:

- ProjectDeliveryWeb@dot.ca.gov
- (916) 653-2451

North Region Projects Viewer

The North Region Projects Viewer is a publicly available map-based web application that displays Caltrans projects occurring within the Caltrans North Region, consisting of Caltrans Districts 1, 2, and 3, under six project phase categories: Complete, Construction, Maintenance, Planned, Programmed and Emergency. Members of the public may use this tool to view projects and track their progress. The application can be accessed from the link here: https://www.arcgis.com/apps/dashboards/239772ff383d416483addc029ae9c6fa



Performance Measures

This Plan is a policy document and requires regular updates and monitoring to evaluate its efficacy and to ensure the Region is on track to achieve zero KSI crashes by 2050. Each jurisdiction in the Yuba-Sutter Region will monitor the following performance measures on an annual basis and make additional adjustments to the Plan as needed to meet the zero goal. The goal of monitoring is to understand if the measures are effective at reducing crashes as the region works toward zero fatalities and serious injuries. Additionally, ongoing monitoring will help to identify locations with high propensity for KSIs based on exposure, likelihood, and severity. Historic crash patterns can inform these considerations, but design decisions will be proactive and based on reducing safety risk. Every five years, the Yuba-Sutter Region will update their Safety Action Plan to reevaluate the crash data and performance measures. Performance measures will be added or removed to meet the goal of reducing fatal and severe injury crashes to zero.

Plan Implementation Metrics
The number of roadway miles and intersections improved
The percentage of streets where the operating speed matches the target speed
The number of projects implemented with the systemic deployment of countermeasures
Policy and Programmatic Changes
The provision of continuous sidewalks, low stress bicycle facilities, and traffic calming improvements alongside land use zoning changes
Set contextually appropriate target speeds and prioritize and implement speed management strategies to meet those targets
Standardize the selection and implementation of pedestrian and bicycle improvements based on contextual factors such as speed and volume
The prioritization of projects for transportation connections to communities of persistent poverty and underserved populations along Walk and Roll Routes and key transit corridors
The collaboration with transit, land use, and social service partners for strategies at the base of the Safe Systems Pyramid
The review and reprioritization of the city's and county's annual CIP budget to shift funding toward proactive and opportunistic opportunities to efficiently address safety priorities
The collaboration with agency partners to make meaningful progress on cross-jurisdictional efforts
The creation of a rapid response program to evaluate roadway design and context of crash locations after KSI crashes
Crash Statistics
The number of KSI crashes on Safety Corridors
The number of crashes where the crash type was identified as unsafe speed
The number of DUI-related crashes
The number of youth bicyclist-involved crashes

Funding

Below are federal and state funding sources applicable to the future implementation of this Plan.

FEDERAL FUNDING	
Funding Source	**Program Purpose**
Safe Streets and Roads for All (SS4A) Grant Program	The Safe Streets & Roads for All (SS4A) grant program is a Federal grant program established by the Bipartisan Infrastructure Law centered around the Department of Transportation's National Roadway Safety Strategy and its goal of zero deaths and serious injuries on America's roadways. It provides $5 billion in grant funding over 5 years to develop safety action plans and implement safety projects.
Congestion Mitigation and Air Quality (CMAQ) Improvement Program	The FAST Act continued the CMAQ program to provide a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas).
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	This program supports surface transportation infrastructure projects that will improve safety; environmental sustainability; quality of life; mobility and community connectivity; economic competitiveness and opportunity including tourism; state of good repair; partnership and collaboration; and innovation.
Reconnecting Communities and Neighborhoods Program	The Reconnecting Communities and Neighborhoods program combines the Reconnecting Communities Pilot (RCP) and Neighborhood Access and Equity (NAE) discretionary grant programs into a single funding opportunity. The program funds projects that address the impact of transportation infrastructure, such as freeways and railroads, that form barriers for travel in communities. The program funds the removal, retrofit, mitigation, or replacement of the infrastructure in question.
Community Development Block Grant (CDBG) Program	The Community Development Block Grant (CDBG) program is a flexible program that provides communities with resources to address a wide range of unique community development needs. Communities often use CDBG funds to construct and repair streets and sidewalks.

STATE FUNDING	
Funding Source	**Program Purpose**
Highway Safety Improvement Program (HSIP)	California's Local HSIP focuses on infrastructure projects with nationally recognized crash reduction factors (CRFs). Local HSIP projects must be identified on the basis of crash experience, crash potential, crash rate, or other data-supported means.
Active Transportation Program (ATP)	ATP is a statewide competitive grant application process with the goal of encouraging increased use of active modes of transportation. The ATP consolidates existing federal and state transportation programs, including the Transportation Alternatives Program (TAP), Bicycle Transportation Account (BTA), and State Safe Routes to School (SR2S), into a single program with a focus to make California a national leader in active transportation. The ATP is administered by the Division of Local Assistance, Office of State Programs.
SB-1 Transportation Funding	The State Transportation Improvement Program (STIP) is the biennial five-year plan for future allocations of certain state transportation funds for state highway improvements, intercity rail, and regional highway and transit improvements.
Caltrans Sustainable Transportation Planning Grant Program	This program is intended to encourage local and regional planning that furthers state goals, including, but not limited to, the goals and best practices cited in the Regional Transportation Plan Guidelines adopted by the California Transportation Commission.
California Office of Traffic Safety (OTS)	OTS administers traffic safety grants in the following areas: Alcohol Impaired Driving, Distracted Driving, Drug-Impaired Driving, Emergency Medical Services, Motorcycle Safety, Occupant Protection, Pedestrian and Bicycle Safety, Police Traffic Services, Public Relations, Advertising, and Roadway Safety and Traffic Records.
Affordable Housing and Sustainable Communities (AHSC)	The Affordable Housing and Sustainable Communities (AHSC) Program makes it easier for Californians to drive less by making housing, jobs, and key destinations accessible by walking, biking, and transit.

Action Plan

The following pages present safety strategies organized into three priorities: integrate the Safe System Approach in policy and practice; systemically and proactively address common crash focus areas; educate all roadway users.

Priority A: Integrate Safe System in Policy and Practice

These strategies aim to infuse roadway safety concepts, especially the Safe System Approach, as part of routine practices and design decisions.

Action 1

Maintain the Vision Zero Task Force and advance safety plans and projects; coordinate on funding opportunities.

Timeline

Ongoing

Responsible Agency

- Yuba County Public Works Department & Sheriff's Department
- Sutter County Public Works Department & Sheriff's Department
- City of Marysville Public Works Department
- City of Wheatland Engineering Department
- City of Yuba City Public Works Department
- City of Live Oak Public Works Department
- Caltrans
- California Highway Patrol
- Partner Organizations (Blue Zones, YABA, etc.)

Evaluation Metric

Number of meetings with Vision Zero Task Force. Number of federal, state, regional, and local funding opportunities applied for regionally.

Action 2

Prioritize safety in funding decisions, such as during regular updates to local capital improvement plans.

Timeline

Ongoing

Responsible Agency

- Yuba County Public Works Department
- Sutter County Public Works Department
- City of Marysville Public Works Department
- City of Wheatland Engineering Department
- City of Yuba City Public Works Department
- City of Live Oak Public Works Department

Evaluation Metric

Documented roadway safety considerations during decision-making processes for major plan updates, including local Capital Improvement Plans, local General Plan Updates, and SACOG's Metropolitan Transportation Plan.

Action 3

Integrate safety improvements into regular maintenance based on countermeasures from this plan. Find opportunities for partnership through infrastructure project bundling.

Timeline

Ongoing

Responsible Agency

- Yuba County Public Works Department
- Sutter County Public Works Department
- City of Marysville Public Works Department
- City of Wheatland Engineering Department
- City of Yuba City Public Works Department
- City of Live Oak Public Works Department
- Caltrans

Evaluation Metric

Percent of regular maintenance projects that infuse roadway safety countermeasures from this Plan. Number of infrastructure projects bundled.

Action 4

Evaluate and implement lower speed limits in business districts, school areas, and other areas that have a high concentration of vulnerable road users, as eligible through AB 43.

Timeline

Long Term

Responsible Agency

- Yuba County Public Works Department
- Sutter County Public Works Department
- City of Marysville Public Works Department
- City of Wheatland Engineering Department
- City of Yuba City Public Works Department
- City of Live Oak Public Works Department
- Local School Districts

Evaluation Metric

Number of qualifying roadways with lower speed limits.

Action 5

Update street design standards to include designs that reduce kinetic energy and reflect Complete Streets principles based on state and national guidance (e.g. National Association of City Transportation Officials).

Timeline

Short Term

Responsible Agency

- Yuba County Public Works Department
- Sutter County Public Works Department
- City of Marysville Public Works Department
- City of Wheatland Engineering Department
- City of Yuba City Public Works Department
- City of Live Oak Public Works Department

Evaluation Metric

Design standards updated.

Action 6

Work with emergency responders to identify barriers and improve response times, as necessary.

Timeline

Ongoing

Responsible Agency

- Yuba County
- Sutter County
- City of Marysville
- City of Wheatland
- City of Yuba City
- City of Live Oak
- Local Emergency Responders

Evaluation Metric

Annual meetings with emergency response agencies to review the previous year's emergency response metrics and methods for improvement.

Priority B: Systemically and Proactively Address Common Crash Focus Areas

These strategies target key areas for improvement identified through crash analysis, including intersection control and vulnerable users.

Action 1

Advance design concepts and apply for grant funding or identify other financing methods for three priority corridors every five years.

Timeline

Ongoing

Responsible Agency

- Yuba County Public Works Department
- Sutter County Public Works Department
- City of Marysville Public Works Department
- City of Wheatland Engineering Department
- City of Yuba City Public Works Department
- City of Live Oak Public Works Department

Evaluation Metric

Number of projects advanced through design or grant applications.

Action 2

Install low-cost safety improvements at six regional locations per year—including new road markings, signs, and minor signal modifications—that address the focus areas in this plan.

Timeline

Short Term

Responsible Agency

- Yuba County Public Works Department
- Sutter County Public Works Department
- City of Marysville Public Works Department
- City of Wheatland Engineering Department
- City of Yuba City Public Works Department
- City of Live Oak Public Works Department

Evaluation Metric

Number of low-cost projects that address focus areas implemented regionally per year.

Action 3	Complete three projects that improve bicycle and pedestrian safety near schools and community destinations such as parks and downtown business areas within five years.
Timeline	Short Term
Responsible Agency	• Yuba County Public Works Department • Sutter County Public Works Department • City of Marysville Public Works Department • City of Wheatland Engineering Department • City of Yuba City Public Works Department • City of Live Oak Public Works Department
Evaluation Metric	Number of bicycle and pedestrian projects implemented.

Priority C: Educate All Roadway Users

These strategies represent a variety of educational and outreach programs and strategies that encourage behavior change in road users.

Action 1	Launch high-visibility multilingual education PSA campaigns against speeding, distracted driving, impaired driving, and other high-risk behaviors, with a focus on safety corridors. The campaigns should have both digital and in-person components for greatest reach into the communities.
Timeline	Short Term
Responsible Agency	• Yuba County Public Works Department • Sutter County Public Works Department • City of Marysville Public Works Department • City of Wheatland Engineering Department • City of Yuba City Public Works Department • City of Live Oak Public Works Department • Local law enforcement agencies • California Higway Patrol
Evaluation Metric	Estimated number of people reached.

Action 2	Deter impaired driving by targeting education and outreach at alcohol-serving establishments. Develop a public promotional campaign encouraging the use of taxis, rideshares, on-demand transit, and other services as alternatives to impaired driving.
Timeline	Long Term
Responsible Agency	• Local Police Departments • Yuba County Sheriff • Sutter County Sheriff • California Highway Patrol • Local Businesses • Yuba-Sutter Transit
Evaluation Metric	Number of establishments reached. Number of programs established.

Action 3	Improve data collection and reporting on speed, impairment, cell phone use, and distraction for KSI crashes.
Timeline	Long Term
Responsible Agency	• Local Police Departments • Yuba County Sheriff • Sutter County Sheriff • California Highway Patrol
Evaluation Metric	Share of crash records including this data.

Action 4	Partner with community-based organizations such as YABA, Blue Zones, and Civic Thread on educational campaigns focused on vulnerable road users, such as Safe Routes to School and early driver education.
Timeline	Long Term
Responsible Agency	• Yuba County • Sutter County • City of Marysville • City of Wheatland • City of Yuba City • City of Live Oak • Local community-based organizations (CBOs) • Local School District
Evaluation Metric	Number of joint campaigns betweeen local agencies and CBOs.

Our commitment: Yuba-Sutter will periodically review the effectiveness of the strategies to identify those that would be helpful to expand and those that could be replaced. Each strategy includes an implementation timeline and evaluation metric(s), and identifies the parties and partnerships needed to be successful.

CHAPTER 5
Yuba County Crash Analysis

This Plan and Our Region

Introduction

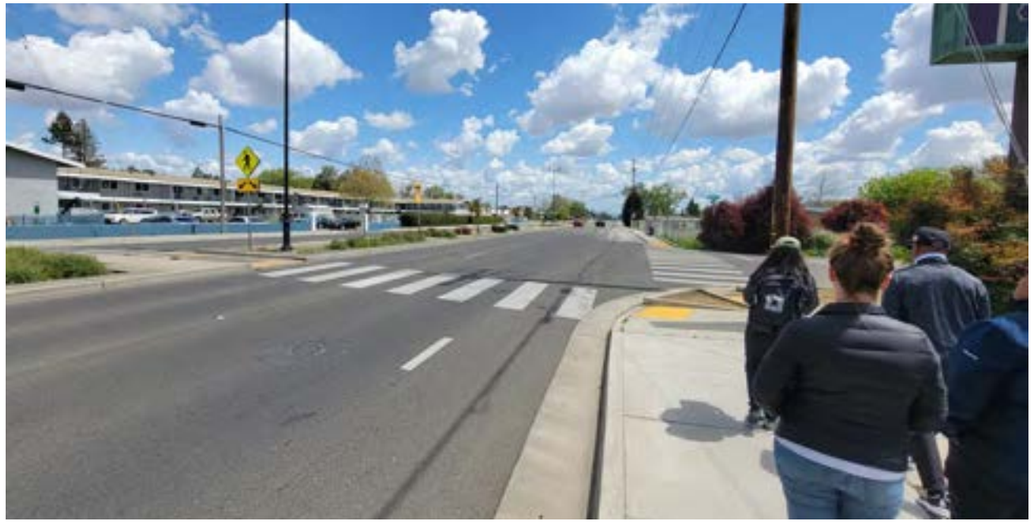
Yuba County is rich in history, natural beauty, and agricultural significance. Covering approximately 644 square miles, Yuba County is geographically diverse, with the western portion consisting of fertile valley land ideal for farming, while the eastern portion has the rugged terrain of the Sierra Nevada foothills. The county is home to the Yuba River, Feather River, and Bear River, which contribute to its scenic landscapes and recreational opportunities.

Agriculture plays a vital role in Yuba County's economy, with crops such as rice, peaches, and walnuts being widely cultivated. The county also has a strong presence of cattle ranching and dairy farming. Additionally, Yuba County is known for its biodiversity, boasting a high number of native plant species.

The county is connected to the greater Sacramento Region by a network of state facilities that carry high volumes of traffic. State Route (SR) 70 runs north-south through the county seat of Marysville, SR 20, provides east-west access, and SR 65 connects to Beale Air Force Base and the City of Wheatland to Roseville, and Rocklin in Placer County.

Yuba County is home to several fairly populous unincorporated communities that fall under county jurisdiction. These communities include Linda, Olivehurst, Arboga, Plumas Lake, Loma Rica, Browns Valley, and Oregon House, among others.

Project team conducting walk audits



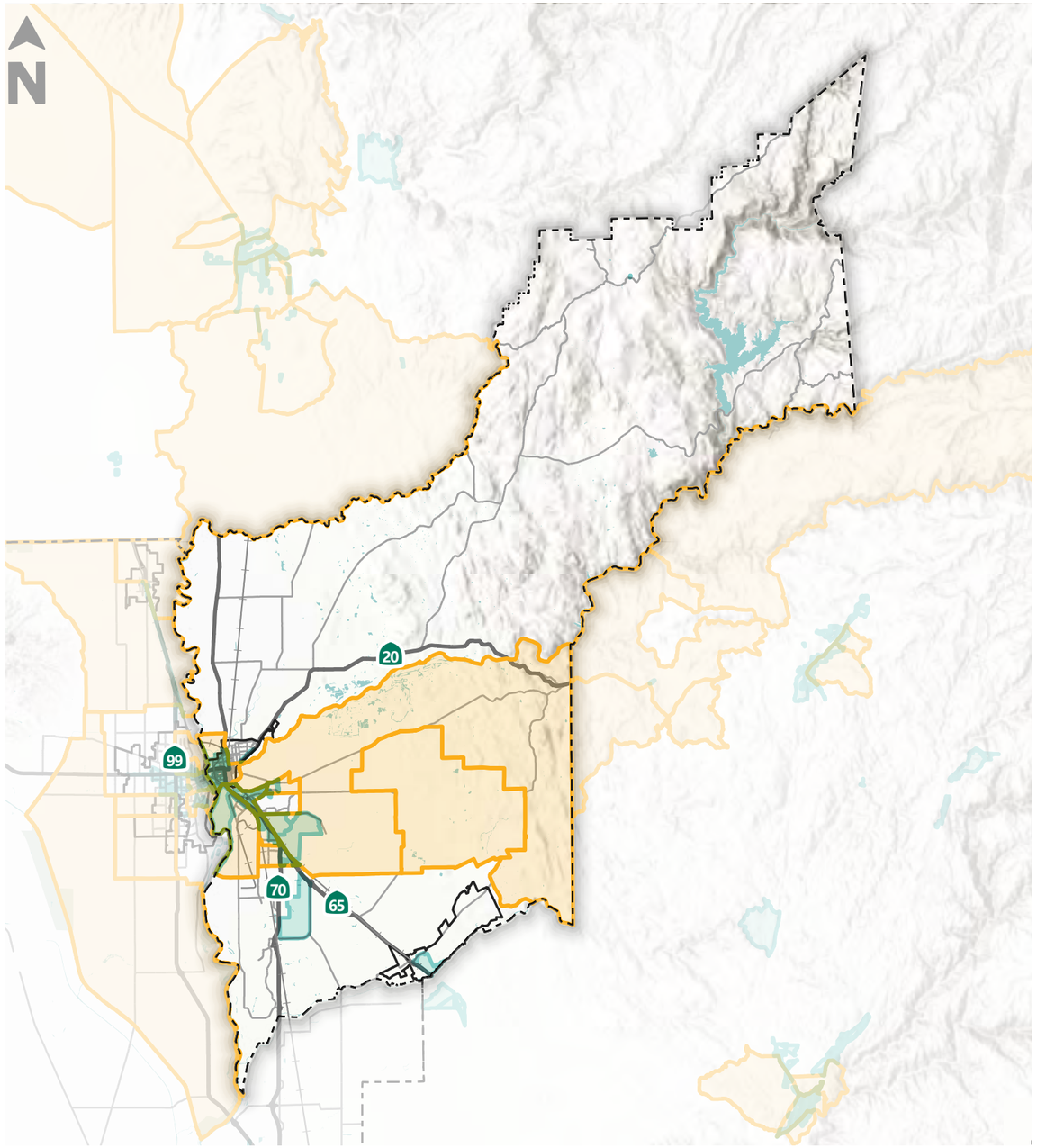
Communities of Concern

Sociodemographic data sources are helpful to better understand the community, as well as when applying for state and federal grant funding to implement infrastructure projects. Figure 5.1 shows locations in Yuba County that meet the criteria for two community metrics relevant to grant applications:

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations: 7 percent of Yuba County's population meets Caltrans' threshold for Transportation-Disadvantaged status, compared to 16 percent statewide.
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities: 41 percent of Yuba County's population lives in areas of persistent poverty and historically disadvantaged communities, compared to 28 percent statewide.

In CalEnviroScreen, which evaluates environmental burdens including air pollution, traffic density, and health vulnerabilities, Yuba County received a score of 20, where the state had a score of 23, indicating parity between Yuba County and the state as a whole.

Figure 5.1: Caltrans Transportation Equity Index & USDOT Areas of Persistent Poverty



Legend

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities (APPHDC)

Plans

Yuba County has previously made commitments to roadway safety, as outlined in the Yuba County General Plan and recently completed Local Roadway Safety Plan. Refer to **Appendix A** for a list of policies and goals supporting improving roadway safety.

Projects

There are numerous improvement projects currently underway or planned within unincorporated Yuba County.

The following roadway safety-related projects are planned on state facilities owned and operated by Caltrans:

- Install centerline or shoulder rumble strips on State Route 20 at various locations throughout Yuba County.
- Upgrade crosswalk to ladder type at various locations on SR 65 and 70 in southwest Yuba County.
- Upgrade guardrail, signs, Transportation Management System elements; install sidewalks, curb and gutter, lighting, and acceleration and deceleration lanes; rehabilitate pavement and drainage systems along SR 65 between SR 70 and South Beale Road.
- Upgrade crosswalk to ladder type on SR 70 near Algodon Road and south of Plumas Lake Boulevard.

The following safety-related projects are being designed or in construction on county roadways:

- Addition of curbs, gutters, sidewalks, and bike lanes along Arboga Road, Grand Avenue, Jay Street, Cottonwood Avenue, Garden Avenue, and Vine Avenue in West Linda, in addition to storm drains on Garden Avenue.
- Curb, gutter, sidewalk, bike lanes, and storm drain along 13 roads in Olivehurst: Second Ave, Third Ave, Fourth Ave, Fifth Ave, Sixth Ave, Eighth Ave, Ninth Ave, Tenth Ave, Eleventh Ave, Western Ave, Beaver Lane, Canal Street, and Tulsa Avenue.
- Streetscape improvements on Feather River Boulevard from Arboga Road to Alicia Avenue, including new sidewalks, crosswalks, Class II bike lanes, storm drains, striping, signage, curbs, gutters, American Disability Act compliant ramps, LED street lights, and improved transit stops.

The following recently completed projects in Yuba County enhance safety for roadway users, particularly pedestrians, bicyclists, and children:

- Bike path on the western edge of the Plumas Lake community
- Safe Routes to School: Sidewalks, crosswalks, bike lanes, curbs, and gutters on 11th Avenue in Olivehurst

INJURY CRASH TOTAL

1,972

KSI CRASH TOTAL

397

Figure 5.2
Injury Crashes by Year, 2018 - 2023

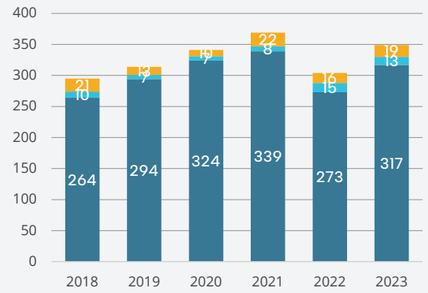
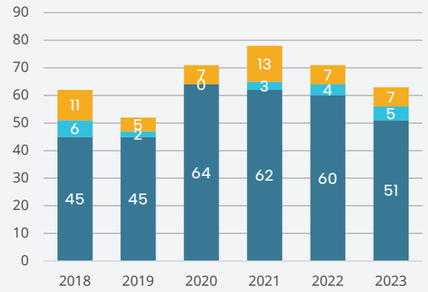


Figure 5.3
KSI Crashes by Year, 2018 - 2023



KSI = Killed or Severely Injured

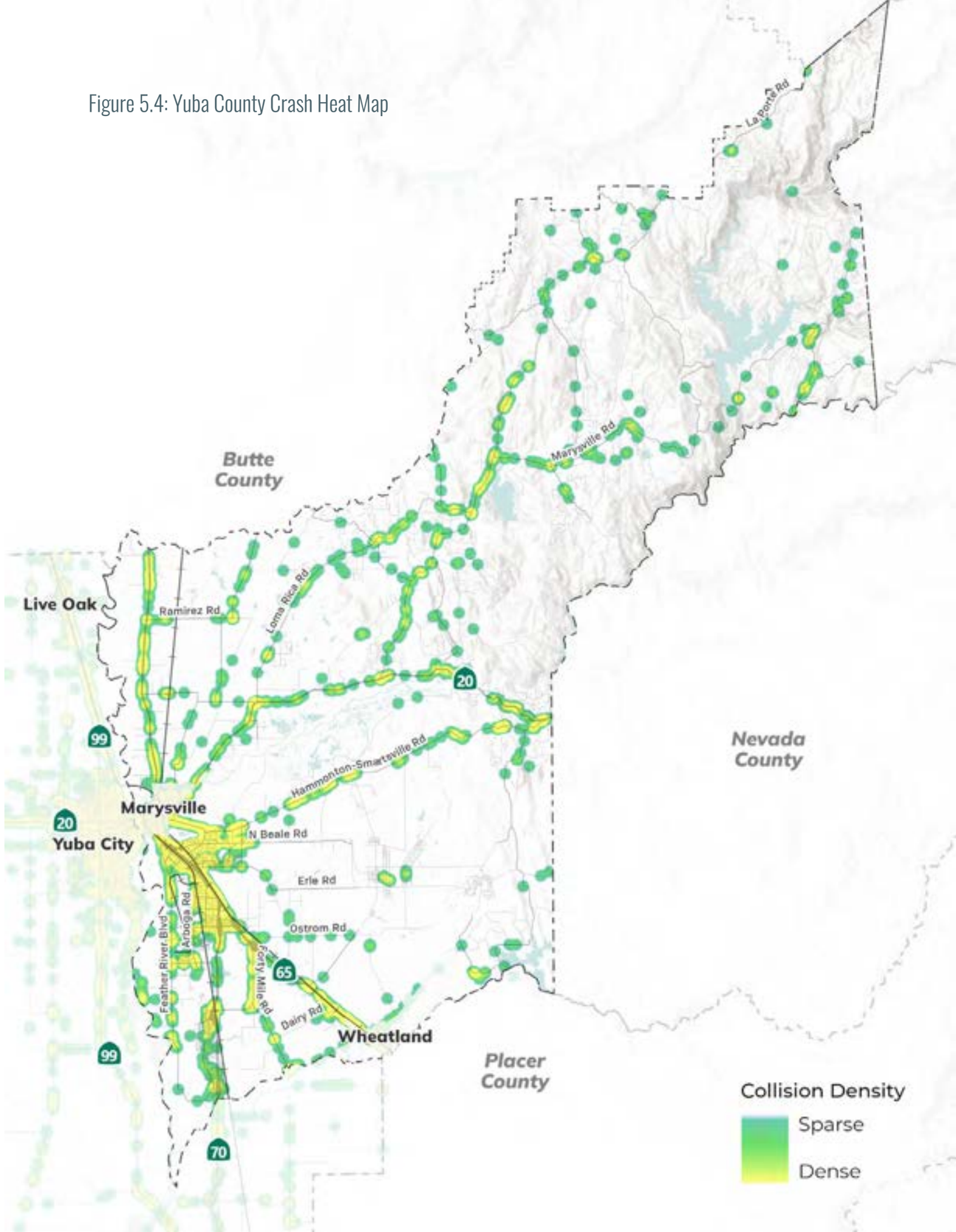
Vehicle-Only Crashes
Bicycle-Involved Crashes
Pedestrian-Involved Crashes

Crash Summary

This section summarizes key findings from the county's crash data obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database, for the years 2018 to 2023. The analysis includes all crashes that led to injury and excludes property-damage-only crashes.

Within the six-year period Yuba County saw a total of 1,972 crashes that led to some degree of injury. 82 crashes (four percent of all injury crashes) involved bicyclists and 148 (six percent) involved pedestrians. 438 crashes resulted in a victim being Killed or Severely Injured (KSI).

Figure 5.4: Yuba County Crash Heat Map



About KSI Crashes

Severe injuries resulting from a traffic crash can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

Throughout this analysis, the acronym KSI is used to denote crashes where someone was killed or severely injured.

KSI Summary

There is a disproportionately greater share of bicycle and pedestrian crashes among KSI crashes, as compared to all injury crashes. Out of 397 KSI crashes, 20 (five percent of KSI crashes) involved bicyclists, and 50 (13 percent) involved pedestrians. There was a total of 102 fatalities: 83 vehicle drivers or passengers, 14 pedestrians, and five bicyclists.

Figure 5.5
Crash Mode Share by Severity

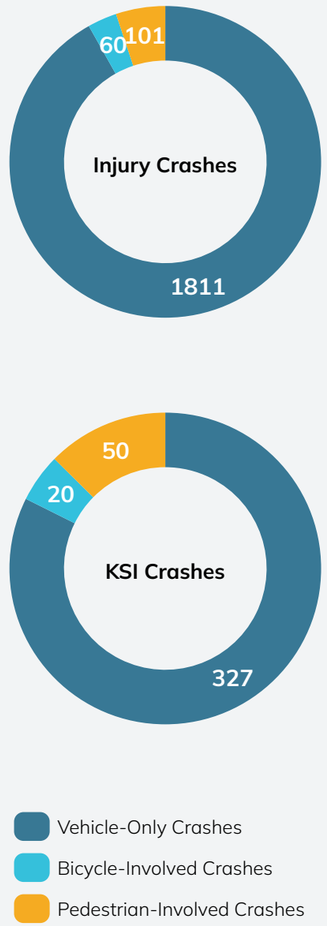
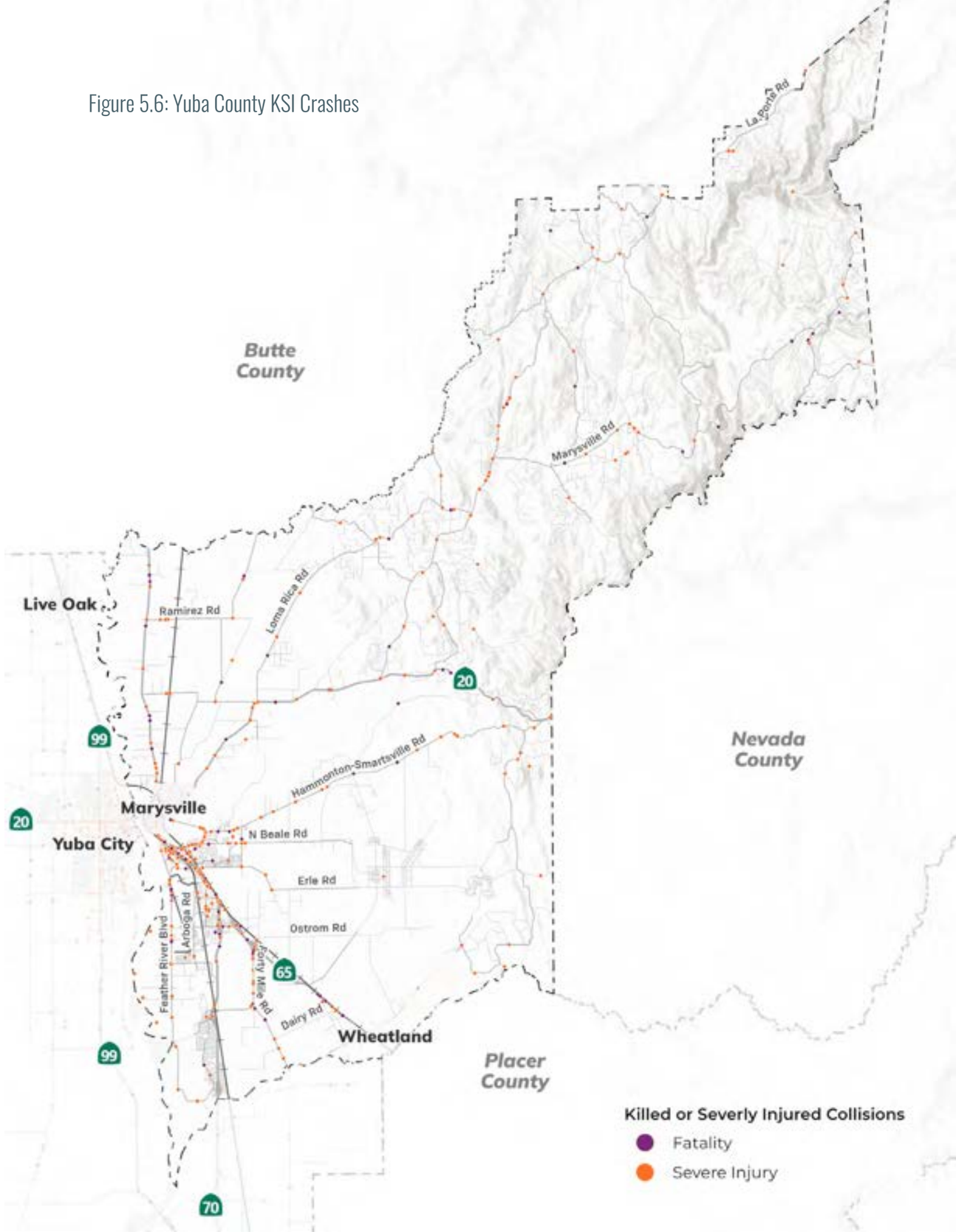


Figure 5.6: Yuba County KSI Crashes



Crashes by Crash Type

Overall, hit object (29 percent), broadside (21 percent), and rear-end (20 percent), were the most common crash types in Yuba County. Similarly, among KSI crashes, hit object (32 percent) was also the most common type of crash, followed by overturned (15 percent) and head-on (15 percent).

Crashes by Primary Crash Factor

Improper turning (28 percent) was the leading reported primary cause of crashes resulting in injury, followed by unsafe speed (25 percent) and Vehicle Right of Way Violation (14 percent).

Improper turning (33 percent) was the leading reported primary cause of KSI crashes followed by Driving or Bicycling Under the Influence (22 percent) and Unsafe Speed (17 percent).

Figure 5.7 Share of Injury Crashes by Crash Type

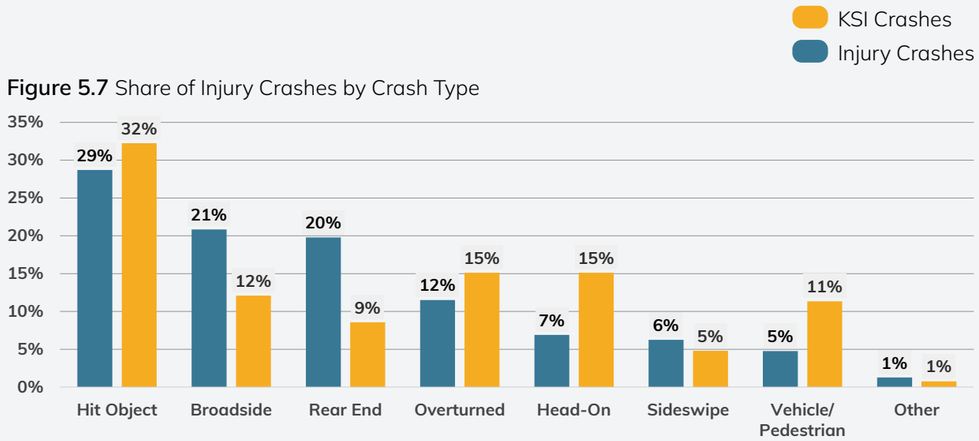
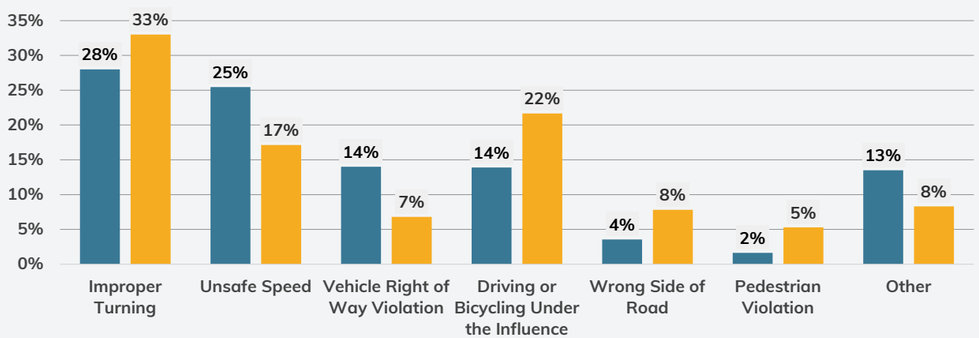


Figure 5.8 Share of Injury Crashes by Primary Crash Factor



Crashes by Time of Day and Lighting Condition

Overall, most crashes occurred in the daylight (63 percent), 4 percent occurred during dusk and dawn, 12 percent occurred in the dark where streetlight was present, and 21 percent in the dark with no lighting. 49 percent of KSI crashes happened in the daytime, 4 percent occurred during dusk and dawn, and 13 percent occurred in the dark with streetlight present. A disproportionately greater share of KSI crashes occurred during nighttime in areas that lacked lighting, at 33 percent compared to 21 percent of all injury crashes.

Driving Under the Influence

15 percent of all crashes resulting in injury involved someone driving under the influence of alcohol or drugs. Notably, this share was larger for KSI crashes, at 22 percent.

Figure 5.9
Crashes by Time of Day & Lighting

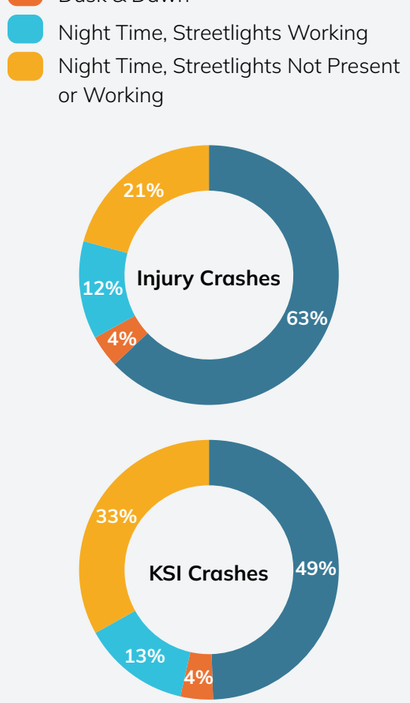
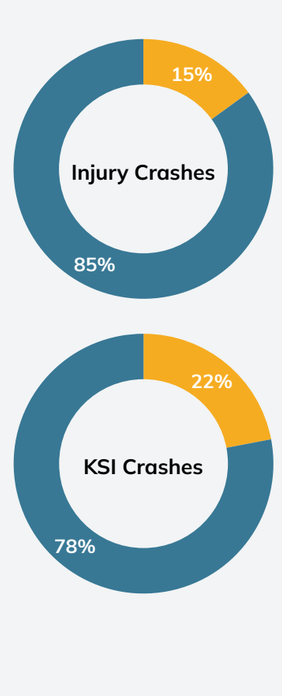


Figure 5.10
DUI Crashes



Safety Corridors

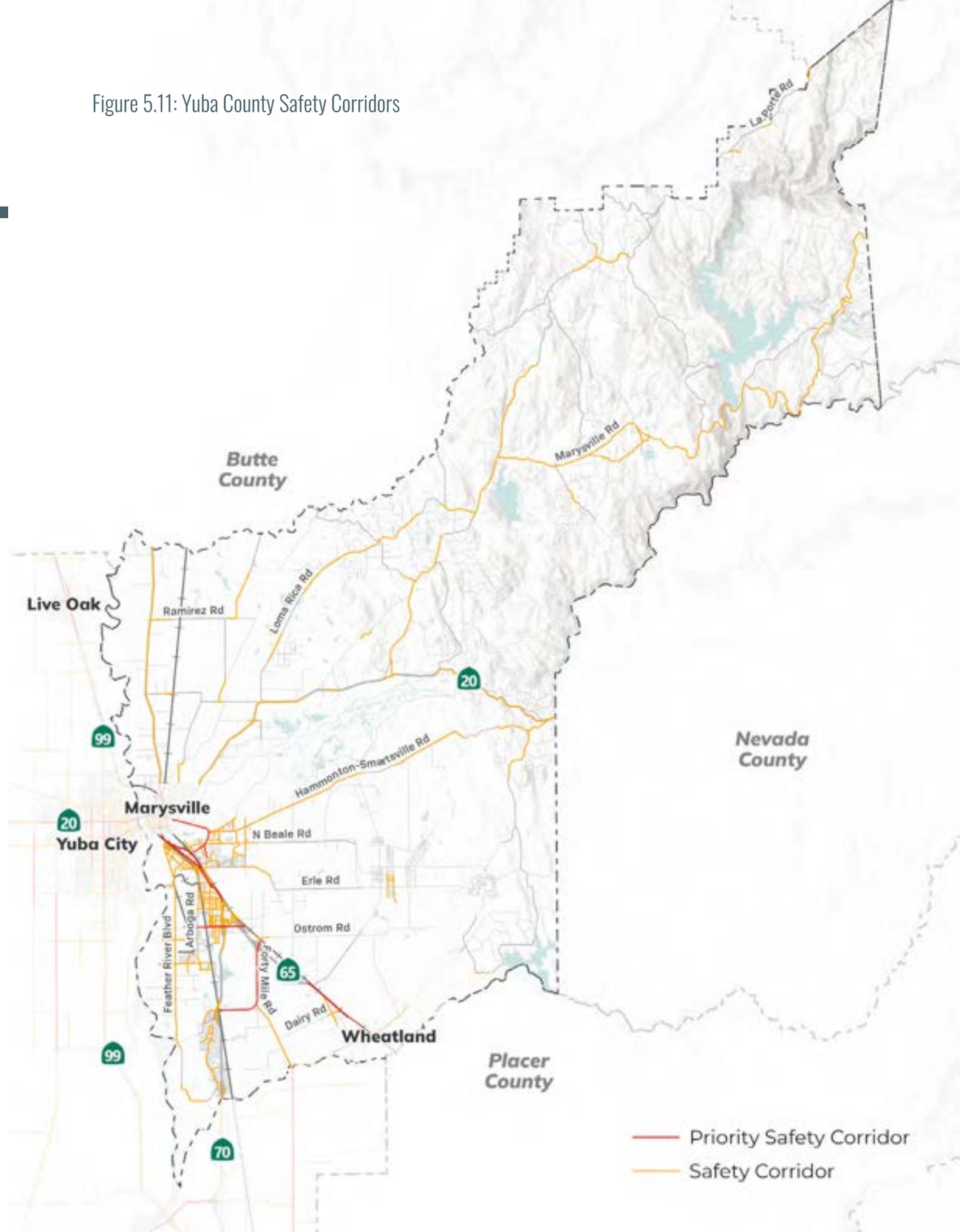
Safety corridors are the roadway segments within Yuba County that had the highest number of crashes resulting in severe injury or death (KSI) in the six-year study period. Priority safety corridors are the safety corridors that experienced the highest rate of KSI crashes, are adjacent to sensitive land uses, and have high potential for severe crashes and thus, should be prioritized for improvements. The following is a list of Yuba County's priority safety corridors as identified through a safety corridor systemic analysis, task force input, and community feedback. Figure 5.11 displays Yuba County's network of safety corridors, which are shown in orange. Priority corridors are shown in red. Refer to **Appendix C** for a more detailed explanation of the safety corridor identification technical methodology.

- SR 70 from Yuba River to SR 65 Junction
- SR 65 from Morrison Rd/Rancho Rd to Wheatland city limits
- North Beale Rd/Lindhurst Ave from SR 70 to Erle Rd
- Simpson Ln from Yuba River to Hammonton-Smartsville Rd
- Hammonton-Smartsville Rd from Simpson Ln to Avondale Ave/Rupert Ave
- Grove Ave from Hammonton Smartsville Rd to Shoreline Dr
- Olivehurst Ave from Powerline/Chestnut roundabout to Lindhurst Ave
- McGowan Pkwy from Arboga Rd to Rancho Rd
- Plumas Arboga Rd from SR 70 to Forty Mile Rd
- Forty Mile Rd from Rancho Rd to Plumas Arboga Rd

Priority Safety Corridors were identified to provide the list of locations for actionable next steps with additional study. Studies could include recommended engineering safety countermeasures with targeted improvements to address crash history or focused programs identified in the Action Plan chapter.

Safety Corridor Inset:

Figure 5.11: Yuba County Safety Corridors



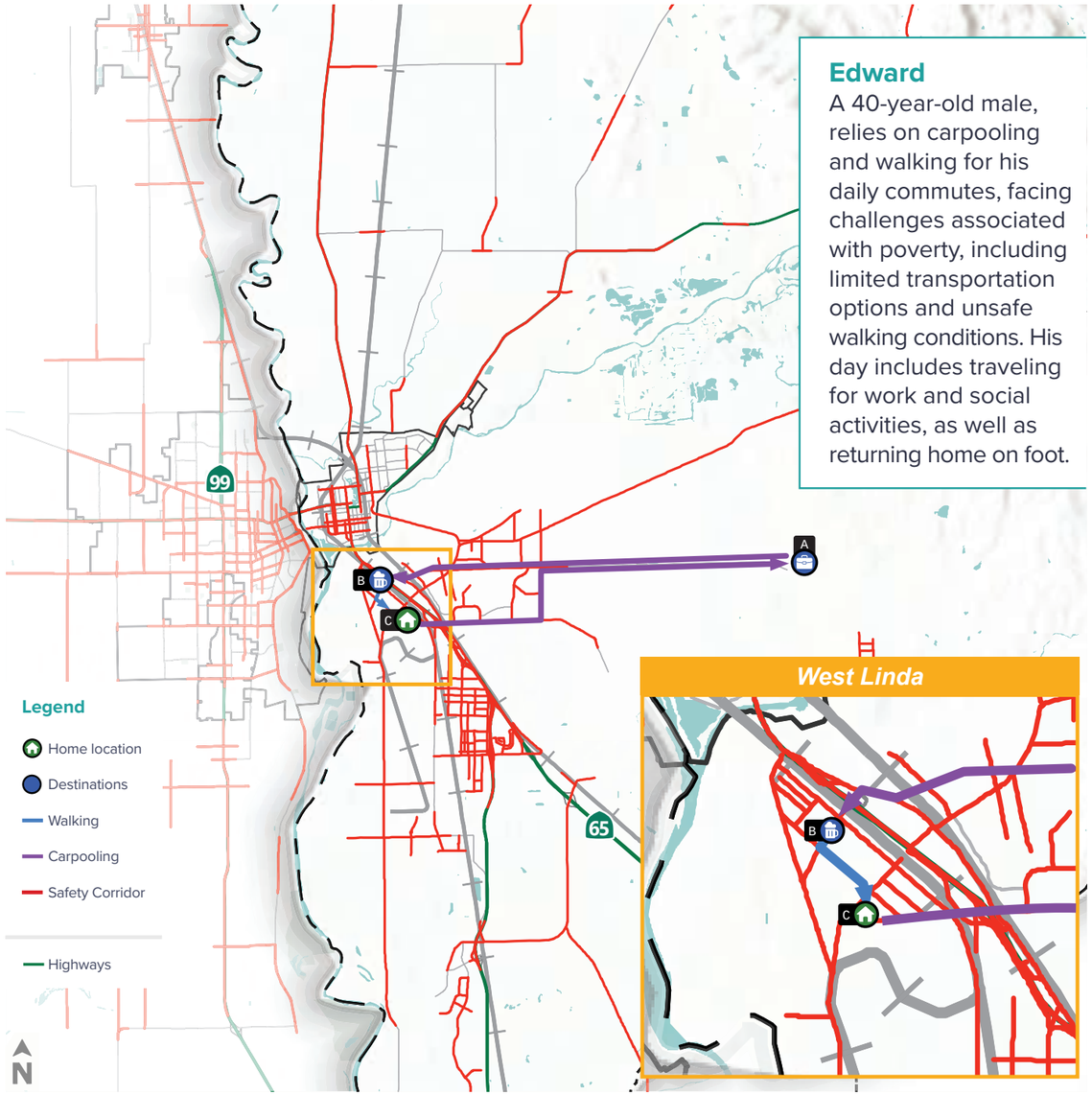
Community Snapshot

This community snapshot features Edward, a fictional character created to illustrate the daily transportation challenges faced by someone without a personal vehicle in unincorporated Yuba County. The experiences of this character are based on census data as well as local lived experiences.

Edward's daily routine highlights the transportation struggles faced by individuals living in poverty, as shown in Figure 5.12. Without access to a personal vehicle, he relies on carpooling with co-workers to travel nearly 10 miles to his job and later to a nearby bar and grill for socializing. His return home is on foot, covering about a mile. This walk, however, is fraught with safety hazards. The route along Alicia Avenue lacks sidewalks, has poor lighting, and offers limited safe crossing points, making it a dangerous journey.

Although a majority of Yuba County residents (84 percent) primarily rely on cars for transportation, a significant portion still travel on foot (11 percent). Edward's experience underscores the broader challenges of inadequate infrastructure and limited mobility options in underserved communities, and how pedestrians should be given greater consideration when planning and implementing safety improvements.

Figure 5.12: Yuba County Community Snapshot



A Edward does not have access to a vehicle and either walks or carpools throughout his day. His day starts after getting picked up by a carpool of co-workers, which takes him to his job nearly 10 miles away.

B After work, Edward and some co-workers carpool to a favorite bar and grill that is not too far from Edwards house.

C After socializing, Edward walks one mile home, facing difficulties due to a lack of sidewalks, poor lighting, and limited crossing opportunities along Alicia Avenue.

Focus Areas

Six focus areas were identified through a systemic analysis of crash records to represent the most significant patterns behind injury crashes—and especially KSI crashes—in the region. These focus areas are identified with the letters “A” through “F” and each one is applicable to one, several, or all of the communities covered by this RSAP. Following each crash focus area is a set of potential countermeasures that should be considered for implementation to improve safety outcomes. **Appendix D** contains a more detailed summary of each countermeasure.

Yuba County’s traffic safety challenges can be understood through a subset of these focus areas:

FOCUS AREA C

Driving Under the Influence

FOCUS AREA D

Crashes Involving People Walking and Biking

FOCUS AREA B

Improper Turning Away from Intersections

FOCUS AREA B

Hit Object

FOCUS AREA C

Driving Under the Influence

INJURY CRASH STATISTICS

293 (15%) **Total Crashes**

92 (23%) **KSI Crashes**

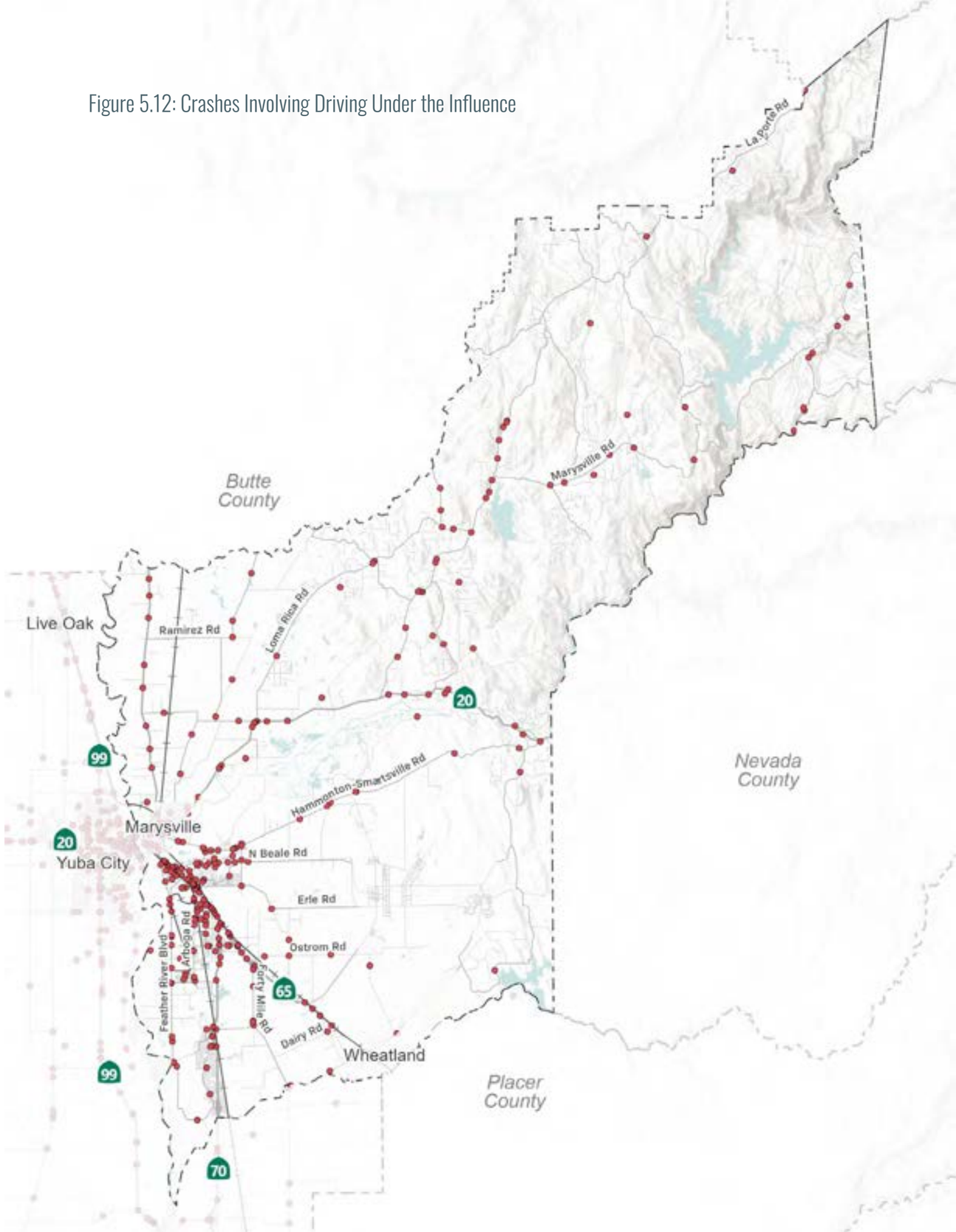
Driving under the influence (DUI) is a significant contributor to injury crashes, especially and disproportionately to KSI crashes. Alcohol impairment was involved in 15 percent (of Yuba County's total crashes but accounted for 23 percent of all Yuba County's KSI crashes. Figure 5.12 displays all DUI crashes within unincorporated Yuba County.

Two-thirds of DUI crashes were concentrated in the southwest portion of the county—many of them in and near Linda, West Linda, and Olivehurst—on Hammonton Smartville Road, North Beale Road, State Routes 65 and 70, Arboga Road, Feather River Boulevard, Olivehurst Avenue, and Forty Mile Road. The rest of the crashes were dispersed widely north of the Yuba River, on SR 70 and SR 49, and Marysville Road, mostly. Local law enforcement and public works staff identified the Amphitheater and Casino as probable influences. Friday, Saturday, and Sunday see higher crash frequency around 6pm to 3am, compared to other times of day and days of the week. Most DUI crashes occurred on county and state roads where there are posted speed limits of 55 MPH.

Hit object was the most common type of crash to result from DUI crashes and accounted for 48 percent (142 crashes) of them and 42 percent of KSI crashes (40 crashes). These DUI-hit object crashes were spread across the county in a pattern similar to that of all DUI crashes.

The most effective countermeasures for DUI crashes fall under non-engineering programs that target education and enforcement.

Figure 5.12: Crashes Involving Driving Under the Influence



FOCUS AREA D

Crashes Involving People Walking and Biking

INJURY CRASH STATISTICS

160 (8%) **Total Crashes**

70 (18%) **KSI Crashes**

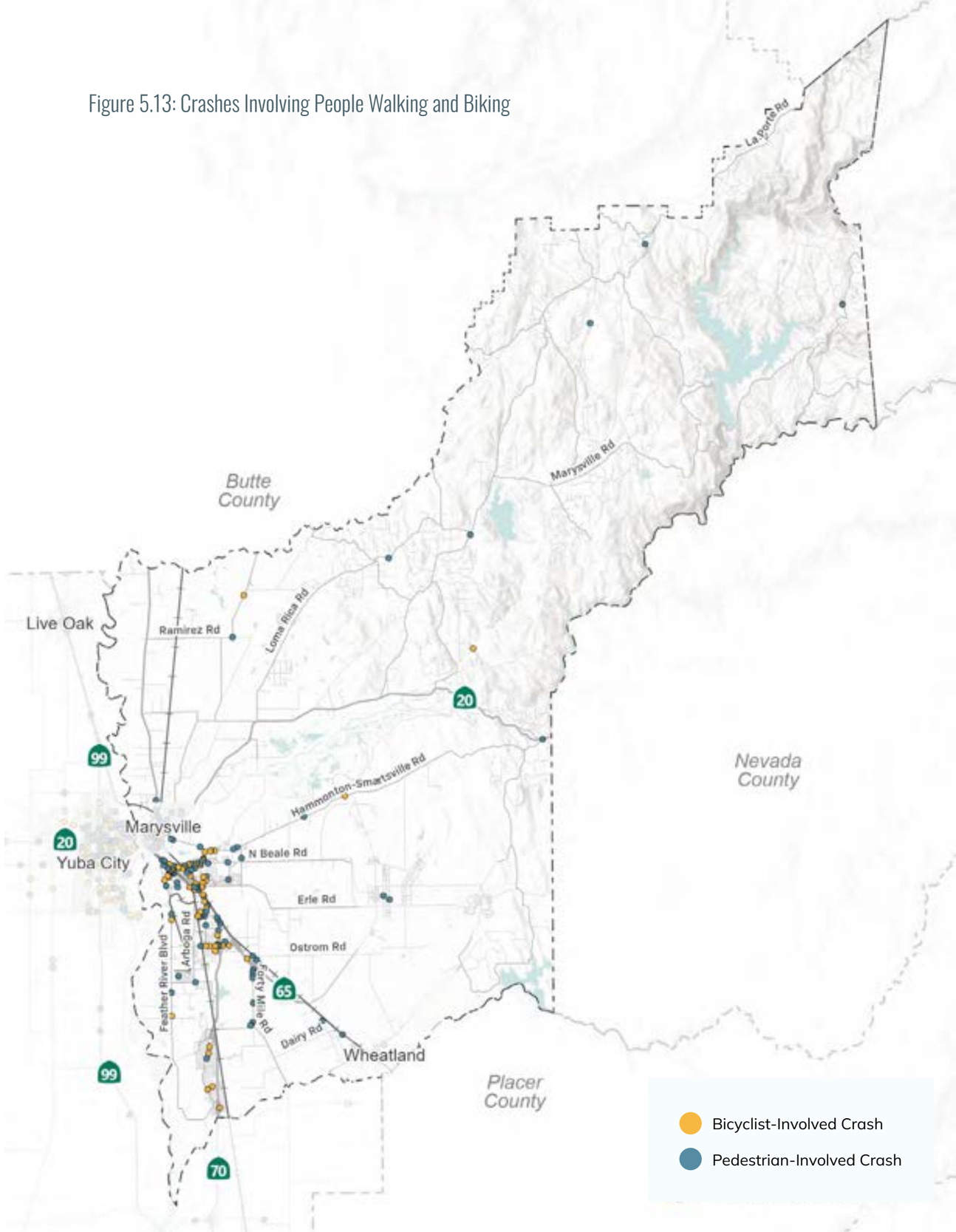
Pedestrians and bicyclists are vulnerable roadway users. Although crashes involving people walking and biking make up only eight percent of all crashes, they account for nearly eighteen percent of all KSI crashes in unincorporated Yuba County. Figure 5.13 displays all crashes that involved people walking and biking.

These crashes are concentrated in the unincorporated communities of West Linda, Linda, and Olivehurst. There are higher rates of KSI crashes involving bicyclists and pedestrians on arterials such as McGowan Parkway, Feather River Boulevard, North Beale Road, and Forty Mile Road. There are numerous crashes on arterial segments where retail businesses and homes are present along either side of the road:

- Feather River Boulevard, between Alicia Avenue and SR 70
- North Beale Road, between Silverwood Street and Hammonton Smartville Road

Mid-block crashes occurred in some areas where pedestrian crossings are sparse—particularly on Lindhurst Avenue and Hammonton Smartville Road.

Figure 5.13: Crashes Involving People Walking and Biking



Yuba County

The following countermeasures reduce risks for crashes involving pedestrians and bicyclists by making them more visible to drivers, providing safer and more frequent opportunities to cross busy roads, and creating dedicated or protected spaces for their use.

Potential Countermeasures

- Add Sidewalk
- Curb Extensions
- High-Visibility Crosswalk
- Co-Locate Bus Stops and Pedestrian Crossings
- Rectangular Rapid Flashing Beacon
- Pedestrian Hybrid Beacon
- Leading Pedestrian Interval and Pedestrian Recall
- Shared-Use Path
- Separated Bikeway
- Bike Lane
- Buffered Bike Lanes
- Green Conflict Striping

FOCUS AREA E

Improper Turning Away from Intersections

INJURY CRASH STATISTICS

383 (19%) **Total Crashes**

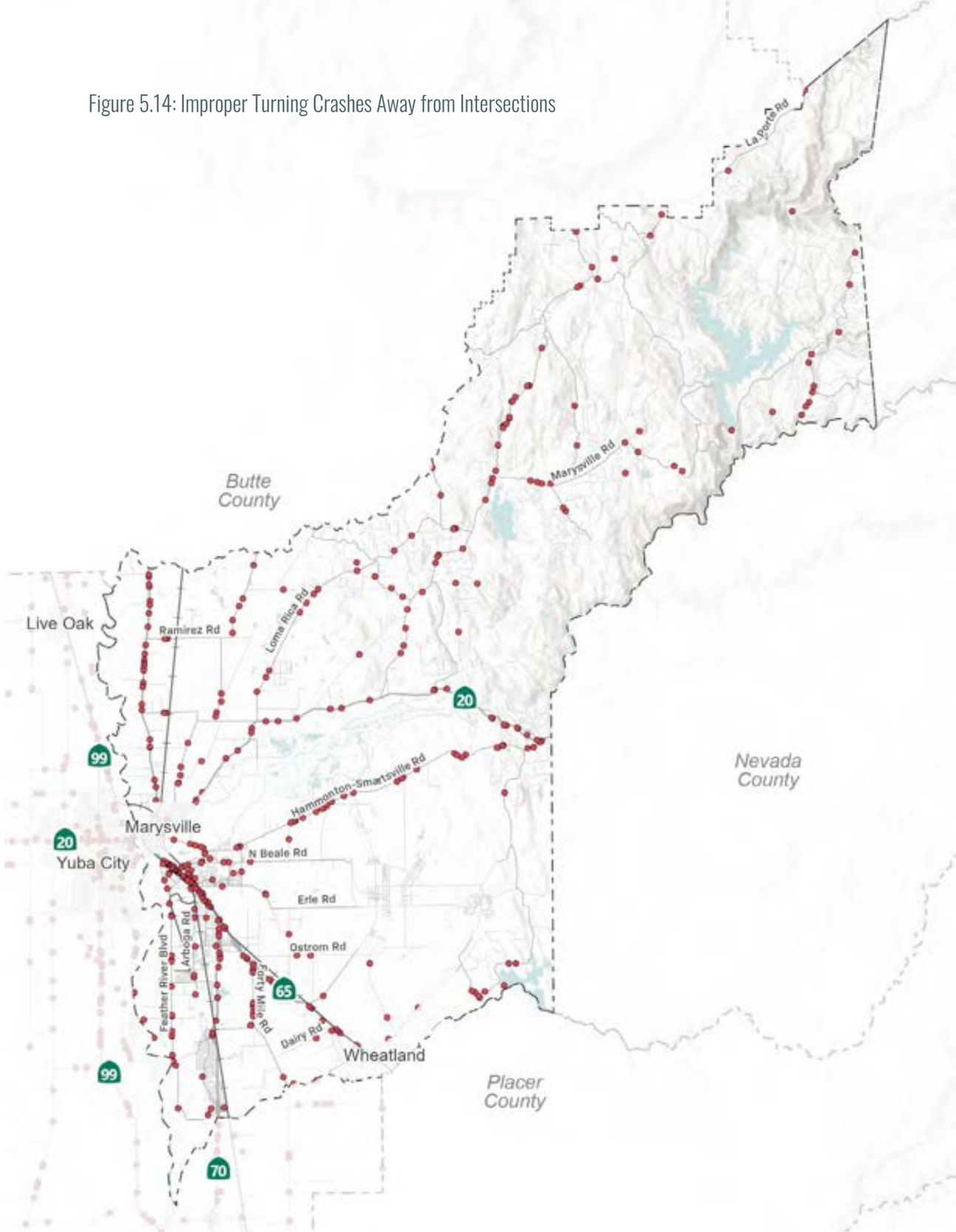
99 (25%) **KSI Crashes**

Improper turning remains one of the leading primary contributors to crashes and accounts for 552 of Yuba County's crashes. Moreover, most of them occurred away from an intersection, rather than at them. Of those 552 crashes, 383 took place away from an intersection, making up 19 percent of the county's crashes. 99 (25 percent) of Yuba County's improper-turning KSI crashes occurred away from an intersection. Figure 5.14 displays the locations of these crashes.

58 percent of these crashes led to hit object and 22 percent to overturned. 70 percent were traveling at speeds exceeding 50 MPH. In the moments leading up to them, 44 percent of parties that were at fault made an unsafe turning action and 27 percent ran off the road. This pattern could suggest that high-speed unsafe lane changes, erratic steering, or distracted driving on roads may have led to these crashes.

SR 70 experienced the highest frequency of improper turning crashes occurring away from intersections. These crashes were highly concentrated along SR 70 between the northwest limits of Linda and Olivehurst Avenue and moderately concentrated on SR 70 north of Marysville as well as Hammonton Smartville Road. The remaining crashes were mostly dispersed on corridors within the vicinity of Linda, Oliveshurst, and Wheatland, such as Feather River Boulevard, in addition to more rural roads such as SR 20, Marysville Road/ Willow Glen Road, and Loma Rica Road.

Figure 5.14: Improper Turning Crashes Away from Intersections



Yuba County

A combination of signage, roadway enhancements, and visibility improvements, such as rumble strips, curve warning signs, guardrails, and delineators, can help prevent unsafe turning and roadway departures by guiding drivers and providing recovery space. These countermeasures, especially when paired with speed limit reductions, reduce crash severity by lowering the kinetic energy transferred during high-speed impacts, helping prevent serious injuries.

Potential Countermeasures

- Rumble Strips
- Guardrail
- Safety Edge
- Widen/Pave Shoulder
- Create/Increase Clear Zone
- Speed Limit Reduction
- Curve Advance Warning Sign
- Chevron Signs on Horizontal Curves
- Delineators, Reflectors, and/or Object

FOCUS AREA F

Hit Object

INJURY CRASH STATISTICS

566 (29%) **Total Crashes**

129 (32%) **KSI Crashes**

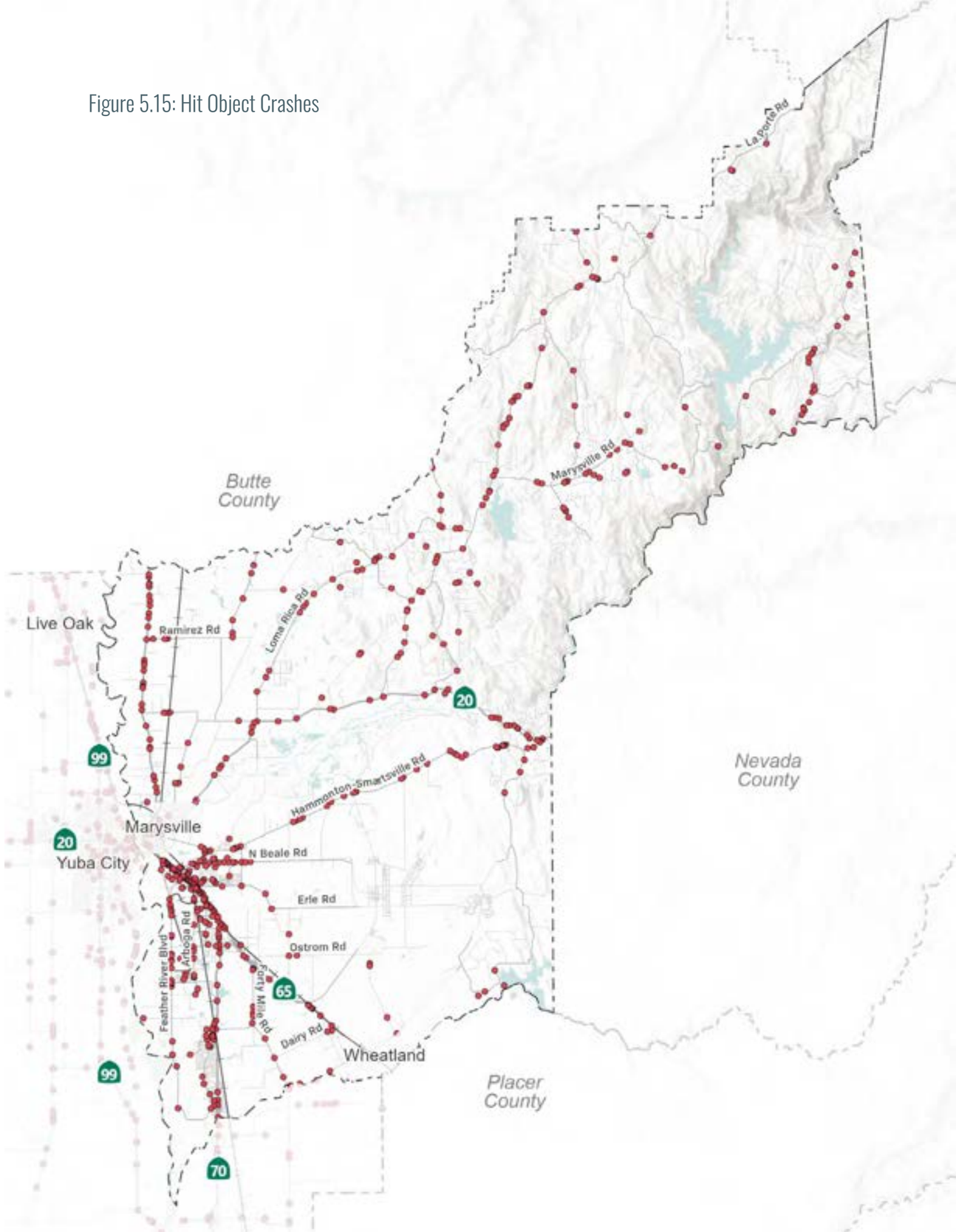
Hit-object crashes emerged as the most prevalent crash type in unincorporated Yuba County. This crash type composes 566 (29 percent) of the county's crashes overall, and 129 (32 percent) of the county's KSI crashes. As expected, 96% of all hit-object crashes involved only one party. Figure 5.15 displays all hit object crases between 2018 and 2023 in unincorporated Yuba County.

Two-thirds of this type of crash occurred on non-state facilities. Many of these county road hit object crashes occurred in rural eastern Yuba County on narrow, tree-lined roadways and near residential areas, mainly Linda and Olivehurst, where roads are two to four lanes and many have on-street parking. Leading up to the crashes, 40 percent of at-fault vehicles made some unsafe turning movement, such as abrupt lane changes or erratic steering wheel maneuvers, and 30 percent ran off the road.

A smaller share of vehicles were proceeding straight (19 percent). As a result, most of the objects hit were fixed objects (80 percent), such as trees and utility poles on the side of the road; 10 percent were other objects such as items dropped from a vehicle or a parked vehicle; and two percent were animals.

Similar to the improper turning crash focus area, a significant amount of hit object crashes took place on SR 70, especially between the northwest limits of Linda and the SR 70 and SR 65 merge. Hit object crashes were also frequently reported along Hammonton Smartsville Road, SR 20, Marysville Road/ Willow Glen Road, and Loma Rica Road. Within the unincorporated communities, hit object crashes were prominent along North Beale Road and Feather River Boulevard and in the northern portion of Plumas Lake.

Figure 5.15: Hit Object Crashes



Yuba County

Countermeasures like guardrails, clear zone improvements, and widened or paved shoulders can help prevent crashes with objects and provide recovery space. Rumble strips, safety edge treatments, and delineators or reflectors enhance driver awareness and guidance, especially in low-visibility conditions. Speed limit reductions are especially critical, as lower speeds directly reduce the kinetic energy transferred during a crash, which in turn lowers the risk of severe injury or fatality.

Potential Countermeasures

- Delineators, Reflectors, and/or Object
- Speed Limit Reduction
- Rumble Strips
- Guardrail
- Safety Edge
- Widen/Pave Shoulder
- Create/Increase Clear Zone

CHAPTER 6
Marysville Crash Analysis

This Plan and Our Region

Introduction

Marysville is the county seat of Yuba County, with a population of nearly 13,000. It lies near the confluence of the Yuba and Feather Rivers near Yuba City, which is located just across the Feather River to the west.

The city features a compact and historically rich urban layout, shaped by its riverfront location and legacy as a Gold Rush-era city. Ellis Lake, a central landmark, is in the heart of town. The western half of the city features an older, denser downtown, commercial areas, and community amenities. The eastern portion consists of schools, parks, and residential neighborhoods. State Route 20/10th Street, State Route 70/E Street, B Street, and 12th Street are the city's key corridors, connecting residents to key destinations throughout the city and around the region.

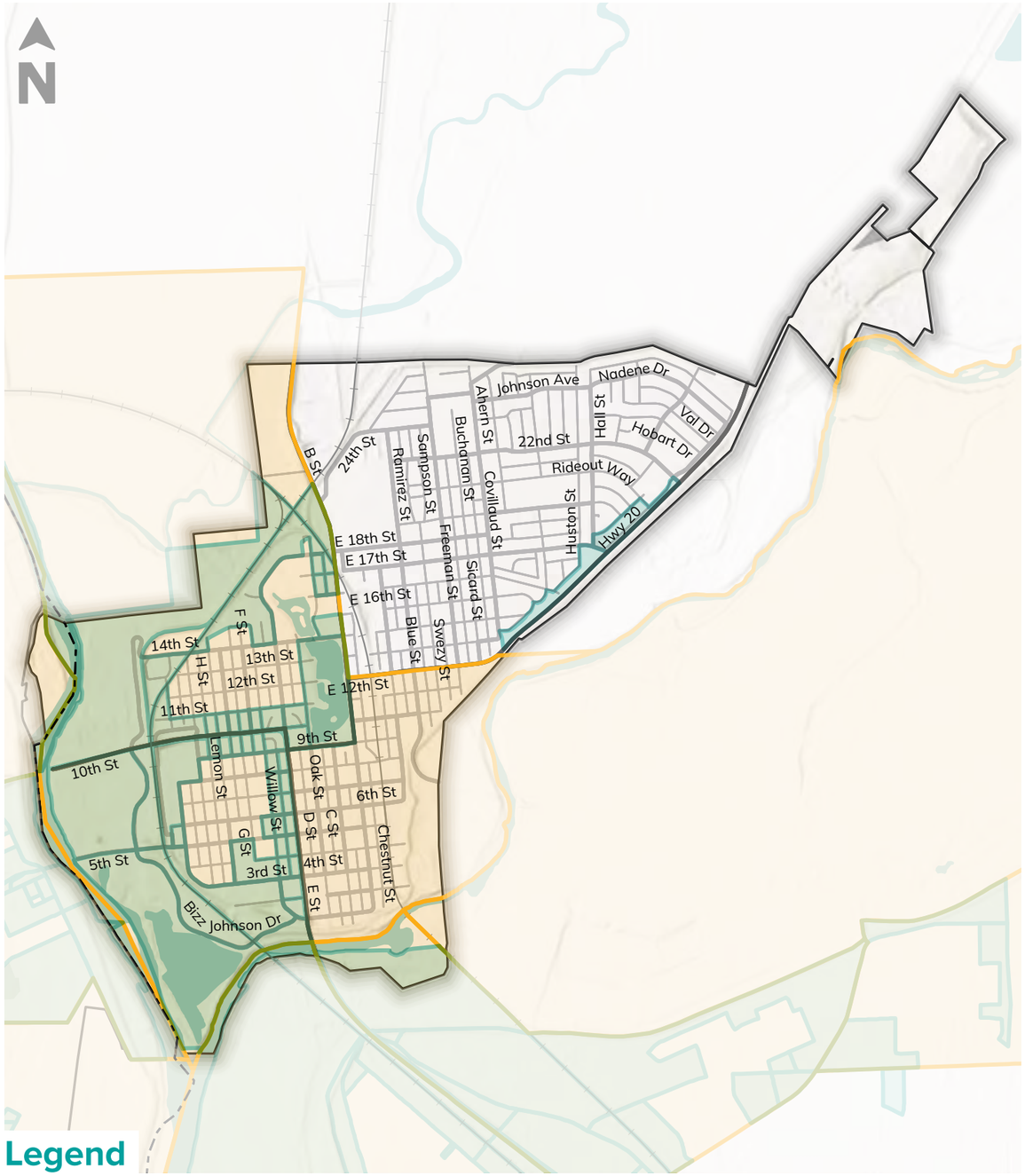
Communities of Concern

Sociodemographic data sources are helpful to better understand the community, as well as when applying for state and federal grant funding to implement infrastructure projects. Figure 6.1 shows locations in Marysville that meet the criteria for two community metrics relevant to grant applications:

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations: 10 percent of Marysville's population meets Caltrans' threshold for Transportation-Disadvantaged status, compared to 16 percent statewide.
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities: 35 percent of Marysville's population lives in areas of persistent poverty and historically disadvantaged communities, compared to 28 percent statewide.

In CalEnviroScreen, which evaluates environmental burdens including air pollution, traffic density, and health vulnerabilities, Marysville received a score of 42, where the state had a score of 23, indicating that the population of Marysville experience higher levels of environmental impacts than the state as a whole.

Figure 6.1: Caltrans Transportation Equity Index & USDOT Areas of Persistent Poverty



Legend

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities (APPHDC)

Plans

Marysville has already demonstrated a commitment to roadway safety through the adoption of several plans, namely the Bicycle and Pedestrian Plan and the Local Roadway Safety Plan. The city's Bicycle and Pedestrian Plan establishes goals and policies to support a robust and safe network for people walking and biking, expanding access to community destinations, and supporting education and enforcement programs that encourage walking and biking. Similar to this Regional Safety Action Plan (RSAP), the Marysville Local Roadway Safety Plan identifies top crash patterns and locations and recommends countermeasures and projects to reduce crashes at top crash locations.

Refer to **Appendix A** for a comprehensive list of policies that support the city's safety goals.

Projects

There are numerous infrastructure improvement projects currently underway or planned in Marysville. The following roadway safety projects are planned on state and local roadway facilities:

- Extend striping, install traffic lighting and rumble strips, upgrade existing signs and "install headlight" signs along SR 20 between the Feather River and E Street, 9th Street between E Street and B Street, and B Street between 9th Street and 12th Street.
- Install signs, green pavement markings, and crosswalks to improve bicyclist and pedestrian safety on SR 20 between G Street and 9th Street, and 9th Street between E Street and D Street.
- Upgrade existing crosswalks to ladder-type crosswalks and install signs at the following intersections with E Street: 8th Street, 7th Street, 6th Street, 5th Street, 4th Street, and 3rd Street.
- Construct a second right turn lane from Southbound SR 70 to Westbound SR 20 at the 9th Street and B Street intersection.
- Install audible pedestrian push-buttons and retro-reflective border back-plates on traffic signal heads at the East 12th and Ramirez Street intersection.
- As part of the Binney Junction project along SR 70 between 14th Street and Cemetery Road, widen the rail underpass, construct wider sidewalks, curb ramps, and enhance bike access.

INJURY CRASH TOTAL

295

KSI CRASH TOTAL

39

Figure 6.2
Injury Crashes by Year, 2018 - 2023

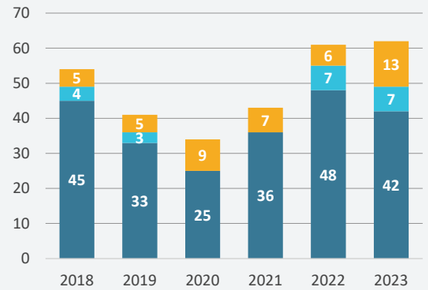
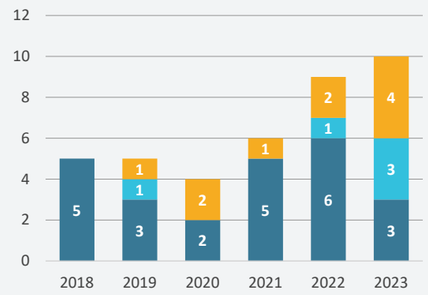


Figure 6.3
KSI Crashes by Year, 2018 - 2023



KSI = Killed or Severely Injured

Vehicle-Only Crashes
Bicycle-Involved Crashes
Pedestrian-Involved Crashes

Crash Summary

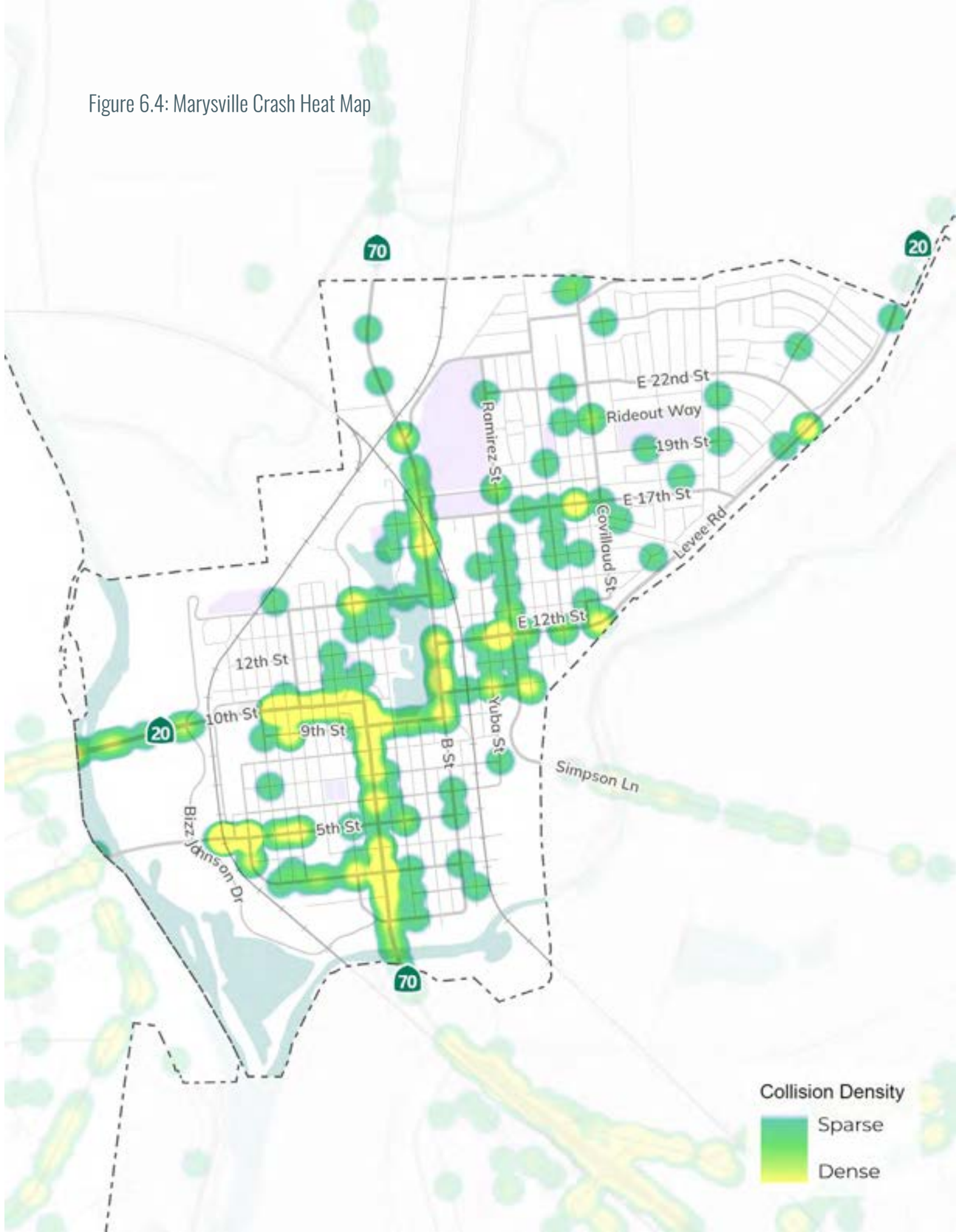
This section summarizes key findings from the city's crash data obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database, for the years 2018 to 2023. The analysis includes all crashes that led to injury and excludes property-damage-only crashes.

Within the six-year period, Marysville saw a total of 295 crashes that led to some degree of injury. 39 of those crashes involved at least one person being killed or severely injured (KSI). 21 crashes (seven percent of all injury crashes) involved bicyclists and 45 (15 percent) involved pedestrians.

Marysville saw a downward trend of overall crashes until the COVID pandemic, after which it experienced an uptick in overall crashes, specifically crashes involving bicycles. Post-2020, the share of bicycle- and pedestrian-involved KSI crashes disproportionately grew.

State Route 20 between H Street and E Street, a crash hotspot, saw 35 crashes in the six-year period, as SR 20 transitions from the freeway bridge to Downtown Marysville.

Figure 6.4: Marysville Crash Heat Map



About KSI Crashes

Severe injuries resulting from a traffic crash can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

Throughout this analysis, the acronym KSI is used to denote crashes where someone was killed or severely injured.

KSI Summary

39 of Marysville's injury crashes resulted in a victim being Killed or Severely Injured (KSI). There was a total of ten fatalities: one was a bicyclist, another a pedestrian, and eight that were a vehicle driver or passenger. As shown in Figure 6.5, KSI crashes involved a disproportionately larger share of pedestrians and cyclists, compared to all injury crashes.

Figure 6.5
Crash Mode Share by Severity

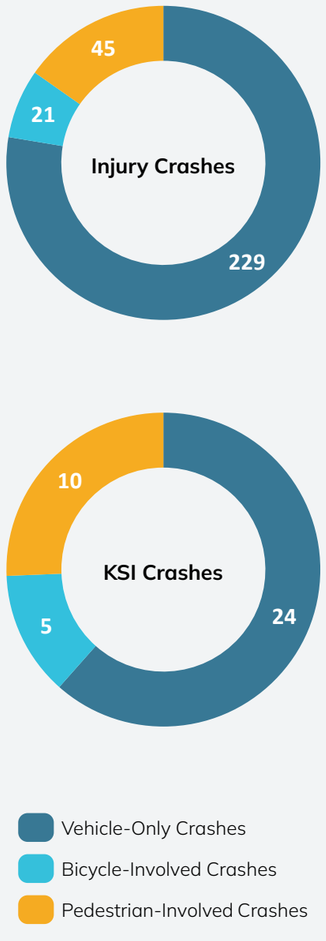


Figure 6.6: Marysville KSI Crashes

Crashes by Crash Type

Overall, broadside (37 percent), rear end (21 percent), and vehicle/pedestrian (15 percent) crashes were the most common crash types in Marysville, making up nearly three-fourths of all injury crashes. Broadside crashes are typically the result of a failure to yield to oncoming traffic that have the right of way. Similarly, broadside crashes account for 41 percent of KSI crashes, followed by vehicle/pedestrian (21 percent).

Crashes by Primary Crash Factor

Unsafe speed (25 percent), vehicle right of way (17 percent), and traffic signals and signs (14 percent) were the most common reported causes of crashes resulting in injury. SR 70, SR 20, and 3rd Street saw a majority of the unsafe speed crashes.

Driving or bicycling under the influence (21 percent), unsafe speed (18 percent), and pedestrian violation (15 percent) were the leading causes of KSI crashes. A cluster of five KSI crashes occurred on SR 70 between 2nd and 3rd St. Four of these crashes were attributed to a 'pedestrian violation.'

Figure 6.7 Share of Injury Crashes by Crash Type

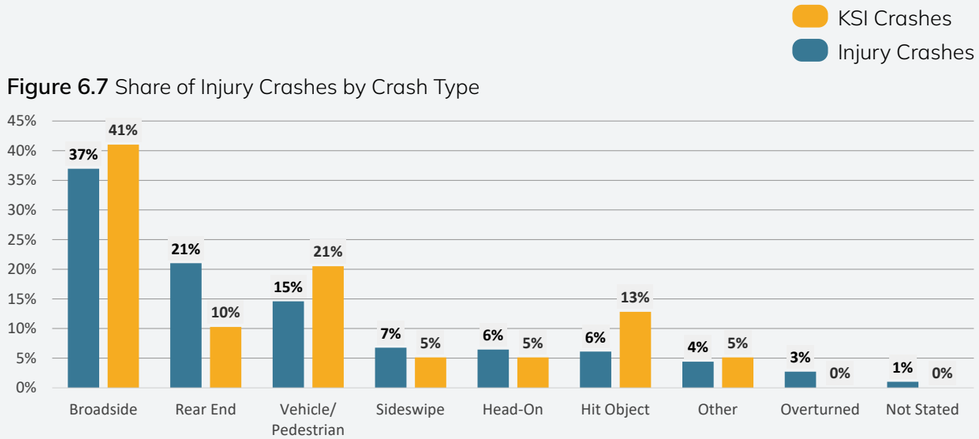
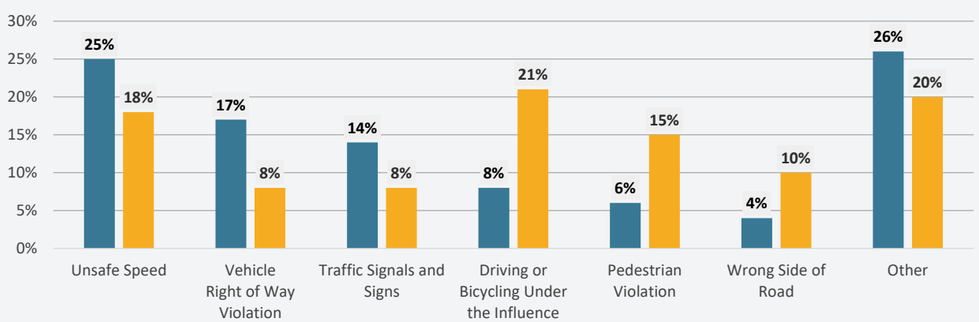


Figure 6.8 Share of Injury Crashes by Primary Crash Factor



Crashes by Time of Day and Lighting Condition

Overall, most crashes occurred in the daylight (75 percent), 21 percent occurred in the dark where streetlight was present, and three percent in the dark where streetlight was not present or working properly. The segment of 5th Street between the underpass and Olive Street had two crashes that occurred under dark and no lighting conditions.

A disproportionately greater share of KSI crashes occurred in the dark at areas lacking proper lighting, at 10 percent. There was also a larger share of KSI crashes happening in the dark with streetlight present, at 28 percent compared to 21 percent for all crashes.

Driving Under the Influence

12 percent of all crashes resulting in injury involved someone driving under the influence of alcohol or drugs. Notably, 28 percent of KSI crashes involved a DUI.

Figure 6.9
Crashes by Time of Day & Lighting

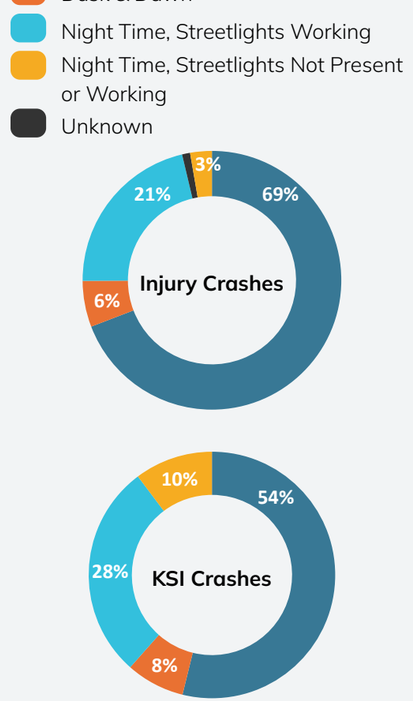
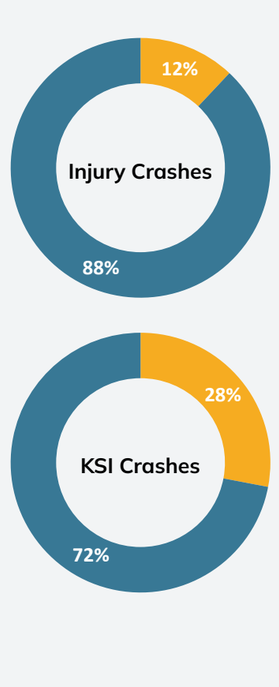


Figure 6.10
DUI Crashes



Note: Lighting conditions for two crashes (1 percent) in Marysville were unreported.

Safety Corridors

Safety corridors are the roadway segments within Marysville that had the highest number of crashes resulting in severe injury or death (KSI) in the six-year study period. Priority safety corridors are the safety corridors that experienced the highest rate of KSI crashes, are adjacent to sensitive land uses, and have high potential for severe crashes and thus, should be prioritized for improvements.

The following is a list of Marysville's priority safety corridors as identified through a safety corridor systemic analysis, task force input, and community feedback. Figure 6.11 displays Marysville's network of safety corridors, which are shown in orange. Priority corridors are shown in red. Refer to Appendix C for a more detailed explanation of the safety corridor identification technical methodology.

- 10th Street/SR 20 from the Feather River to E Street/SR 70
- E Street/SR 70 from 14th Street to the Yuba River
- B Street/SR 70 from the city boundary to 8th Street
- 14th Street from Biz Johnson Drive to B Street
- 3rd Street from J Street to A Street

Priority Safety Corridors were identified to provide the list of locations for actionable next steps with additional study. Studies could include recommended engineering safety countermeasures with targeted improvements to address crash history or focused programs identified in the Action Plan chapter.

Figure 6.11: Marysville Safety Corridors

Community Snapshot

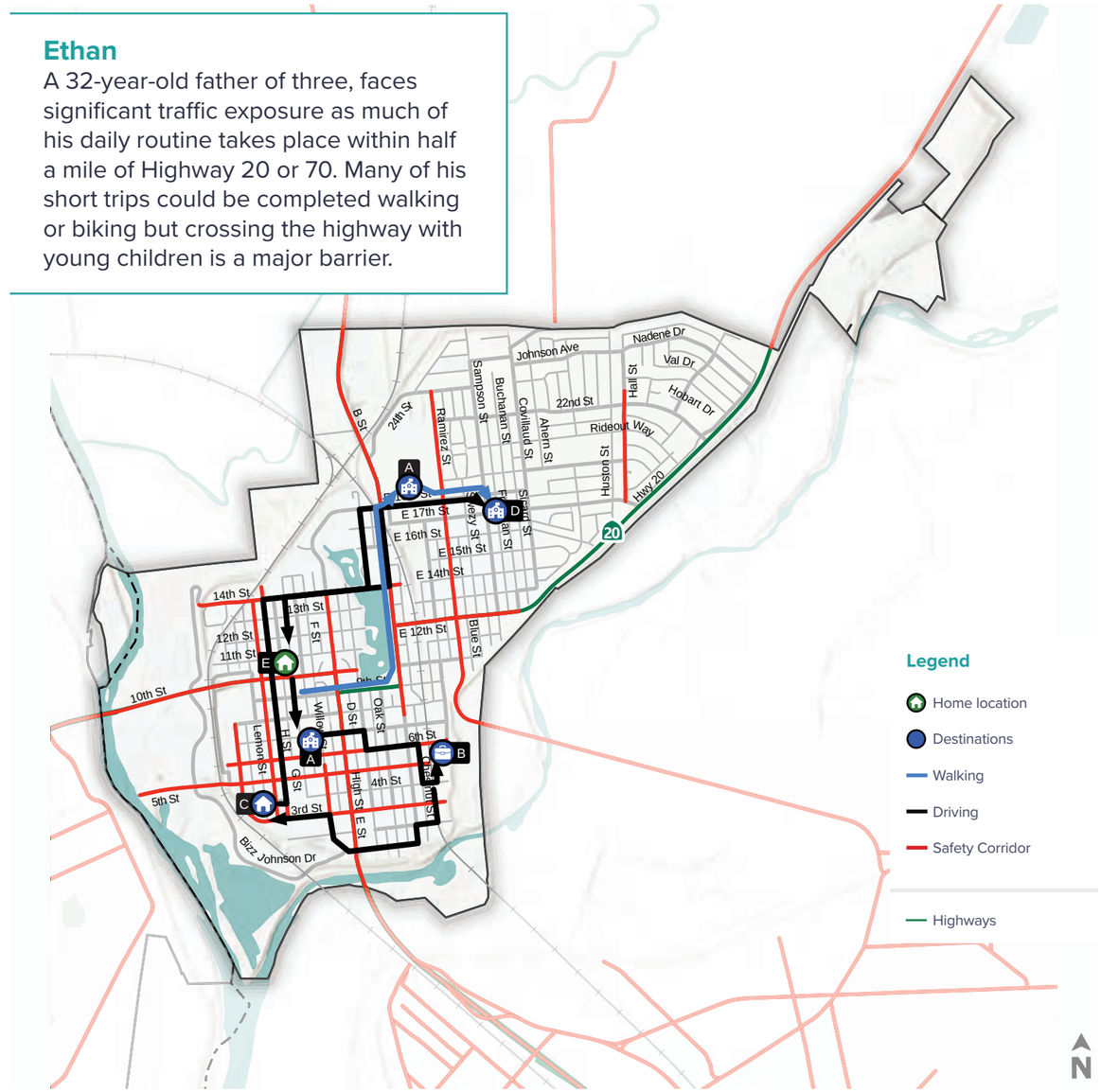
This community snapshot features Ethan, a fictional character created to illustrate the daily transportation challenges faced by a father in Marysville. The experiences of this character are based on census data as well as local lived experiences.

For Ethan, everyday travel presents a series of safety challenges that are shaped by the city's roadway design and traffic conditions. Despite the short distances between his home, children's schools, workplace, and family members' homes, Ethan's routine requires multiple crossings of State Routes 20 and 70, high-speed corridors that cut through the heart of the city. These highways, while essential for regional mobility, create significant barriers for local travel, especially for families with young children. Figure 6.12 describes Ethan's routine in greater detail, highlighting some of the factors that influence travel choices for him and his children.

Ethan's experience reflects the broader safety concerns faced by many Marysville residents, where short trips are often made by car not out of convenience, but out of necessity due to unsafe walking and biking conditions. Although a majority of trips are made by car (82 percent) a significant portion still travel by foot (15 percent). This mode share should be given greater consideration when planning and implementing safety improvements.

Figure 6.12: Marysville Community Snapshot

Ethan
A 32-year-old father of three, faces significant traffic exposure as much of his daily routine takes place within half a mile of Highway 20 or 70. Many of his short trips could be completed walking or biking but crossing the highway with young children is a major barrier.



A Ethan drives his two youngest children a third of a mile to Covillaud Elementary School, while his oldest walks to Marysville High School and across Highway 70. Ethan would let his kids walk this distance if they didn't need to cross Highway 20.

B After dropping off his kids, he travels a quarter mile to work at Pacific Gas and Electric. This short trip is complicated by the need to cross Highway 70.

C After work, Ethan picks up his youngest kids from their grandmother's house, again facing the challenge of crossing Highway 20.

D Ethan drives 1.9 miles to pick up his high schooler from a friend's house, with his two youngest kids in tow. This trip involves crossing both Highway 20 and Highway 70.

E On the way home, a 1.5-mile drive, Ethan and his three children must navigate multiple crossings of both Highway 20 and Highway 70.

Focus Areas

Six focus areas were identified through a systemic analysis of crash records to represent the most significant patterns behind injury crashes—and especially KSI crashes—in the region. These focus areas are identified with the letters "A" through "F" and each one is applicable to one, several, or all of the communities covered by this RSAP. Following each crash focus area is a set of potential countermeasures that should be considered for implementation to improve safety outcomes. **Appendix D** contains a more detailed summary of each countermeasure.

Marysville's traffic safety challenges can be understood through a subset of these focus areas:

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

FOCUS AREA B

Right-of-Way Issues at Intersections

FOCUS AREA C

Driving Under the Influence

FOCUS AREA D

Crashes Involving People Walking and Biking

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

INJURY CRASH STATISTICS

163 (55%) **Total Crashes**

25 (64%) **KSI Crashes**

State Route 20 and State Route 70, which run directly through Marysville, serve not only as regional connectors but also as primary streets within the city. These roads are designed for mobility and speed, yet they also function as main streets within the city and pass through areas where people live, shop, walk, and bike. The result is a mismatch between the functional design of the roadway and downtown/city environment, contributing to elevated crash rates.

In the six-year study period, 163 injury crashes occurred on SR 70 and SR 20 in Marysville, which equates to roughly one crash resulting in injury every 13 days.

Overall, the types of crashes that resulted on these state highways that double as main streets in Marysville are mostly broadside (32 percent) and rear end (21 percent) crashes.

Although these were the most common crash types, hit object crashes (7 percent) under this focus area made up a disproportionately larger share of KSI crashes (16 percent of KSI crashes). The vehicles in these crashes were hitting fixed objects such as trees and poles on the side of the road.

Crashes were particularly common on the following segments:

- 10th Street (SR 20) between I Street and D Street
- B Street (SR 20 and SR 70) between 9th Street and East 12th Street
- E Street (SR 70) between 3rd Street and 1st Street.

There were also clusters at the following intersections with SR 70: 4th, 6th, 7th, and 8th Streets.

Figure 6.13: Crashes on State Highways Serving as Main Streets

Marysville

The following countermeasures can improve safety along highway main streets by slowing vehicle speeds, organizing traffic flow, and reducing conflict points between drivers, pedestrians, and bicyclists. Treatments like bike lanes, sidewalks, medians, and lighting enhance visibility and protection for vulnerable users like pedestrians and bicyclists, while speed management and intersection controls help lower the likelihood and severity of crashes. Together, these strategies can create safer conditions for all roadway users.

Potential Countermeasures

- Traffic Signal
- Roundabout
- Close Slip Lane
- Slow Turn Wedge
- Advance Stop Bar
- Lane Narrowing
- Driveway Consolidation
- Directional Median Openings to Restrict Left Turns
- Bike Lane
- Buffered Bike Lanes
- Separated Bikeways
- Speed Feedback Sign
- Speed Limit Reduction
- Street Lighting
- Advanced Dilemma Zone Detection
- Flashing Yellow Turn Phase
- All-Red Signal Time
- Speed Sensitive Rest in Red Signal
- Retroreflective Tape on Signals

Ellis Lake in Marysville

FOCUS AREA B

Right-of-Way at Intersections

INJURY CRASH STATISTICS

89 (30%) **Total Crashes**

6 (15%) **KSI Crashes**

89 crashes were recorded at intersections where the primary contributing factor was a right-of-way violation. These incidents predominantly stemmed from drivers failing to yield to oncoming or cross traffic that legally possessed the right-of-way. In many cases, motorists either misjudged the speed and distance of approaching vehicles or did not come to a complete stop at the appropriate distance from the main thoroughfare. As a result, the majority of these crashes culminated in broadside, or T-bone, crashes—an especially dangerous type of crash. Broadside crashes are often severe due to the limited protection on the sides of vehicles, highlighting the importance of right-of-way compliance at intersections.

Marysville

Most of these crashes occurred in downtown Marysville on SR 20 and 70, and scattered along I, J, F, and 5th Streets. A concentration of crashes occurred on 10th Street/SR 20 east of Ellis Lake. Intersection right-of-way issues were prevalent throughout much of downtown Marysville, especially on high-traffic streets like 10th Street, 5th Street, and 12th Street.

The following countermeasures directly target right-of-way issues by making intersections safer, more predictable, and easier to navigate. Treatments such as roundabouts, traffic signals, and protected left turns mitigate crash risks by clarifying priority, and design features like lane narrowing and intersection tightening further slow vehicles down toreduce impact upon collision. High-visibility crosswalks, bike lanes, and pedestrian beacons enhance visibility of vulnerable roadway users and right-of-way compliance.

Potential Countermeasures

- Roundabout
- Neighborhood Traffic Circle
- Intersection Reconstruction and Tightening
- Advance Stop Bar
- Raised Median
- Road Diet
- Rectangular Rapid Flashing Beacon
- High-Visibility Crosswalk
- Advanced Dilemma Zone Detection
- Flashing Yellow Turn Phase
- Traffic Signal
- Close Slip Lane
- Slow Turn Wedge
- Centerline Hardening
- Lane Narrowing
- Through Bike Lane at Intersection
- Pedestrian Hybrid Beacon
- Bicycle Signal/Exclusive Bike Phase
- Protected Left Turns
- All-Red Signal Time

Figure 6.14: Crashes with Right-of-Way Issues at Intersections

FOCUS AREA C

Driving Under the Influence

INJURY CRASH STATISTICS

36 (12%) **Total Crashes**

11 (28%) **KSI Crashes**

Driving under the influence remains a leading cause of severe and fatal crashes in Marysville, with impaired driving incidents disproportionately contributing to the city's most serious roadway outcomes. While DUI-related crashes account for only 12 percent (36 crashes) of all crashes in Marysville, they represent 28 percent (11 crashes) of KSI crashes. Figure 6.12 illustrates all DUI crashes that occurred within Marysville.

A concerning trend in DUI-related crashes is the high incidence of vehicle-pedestrian crashes, which account for 19 percent of DUI crashes, followed by broadside (17 percent), and head-on collisions (17 percent). DUI crashes tend to pose a greater risk to those involved; one-fourth of DUI crashes where a driver hit a person walking resulted in severe injury or death. There is a notable concentration of these crashes around the downtown core along SR 20 and SR 70, 5th Street, and 3rd Street.

Addressing DUI-related crashes most effectively requires non-engineering strategies, particularly those focused on education and enforcement.

Figure 6.15: Crashes Involving Driving Under the Influence

FOCUS AREA D

Crashes Involving People Walking and Biking

INJURY CRASH STATISTICS

66 (22%) **Total Crashes**

15 (38%) **KSI Crashes**

Pedestrians and bicyclists are among the most vulnerable users on Marysville's roadways. While they represent a smaller share of overall traffic, they are involved in 22 percent of all crashes in the city, and account for an alarming 38 percent of KSI crashes. These incidents disproportionately affect pedestrians, who are involved in two-thirds of all crashes involving vulnerable road users.

The high volume of traffic in areas where people live, shop, walk, and bike play a role in the frequency of crashes on key corridors in the city. The majority of crashes involving people that were walking and biking occurred along SR 20 and 70, in central Marysville near downtown and commercial districts. Crashes were also observed along I, J, and F Streets, though less frequently. Notable hotspots include SR 20 between H Street and Orange Street, and SR 70 between 3rd Street and 1st Street, where crash concentrations are especially high. The rest of the crashes took place further east of Ellis Lake, primarily along SR 70, as well as on 10th Street and Hall Street.

Fatalities and severe injuries were concentrated at the following locations:

- E Street (SR 70) between 3rd Street and 2nd Street
- 3rd Street between H Street and E Street (SR 70)
- 10th Street (SR 20 between) between G Street and E Street (SR 70)

Figure 6.16: Crashes Involving People Walking and Biking

Marysville

The leading contributing factors behind these crashes were attributed to drivers failing to yield at crosswalks, pedestrians crossing outside of designated crossing areas, speeding, and vehicles/bicycles traveling on the wrong side of the road. At the

The following countermeasures can reduce risks for crashes involving pedestrians and bicyclists by making them more visible to drivers, creating dedicated or protected spaces for their use, and providing safer and more frequent opportunities to cross busy roads.

Potential Countermeasures

- Rectangular Rapid Flashing Beacon
- High-Visibility Crosswalk
- Pedestrian Hybrid Beacon
- Leading Pedestrian Interval and Pedestrian Recall
- Co-Locate Bus Stops and Pedestrian Crossings
- Curb Extensions
- Shared-Use Path
- Separated Bikeway
- Buffered Bike Lanes
- Green Conflict Striping
- Bike Lane
- Add Sidewalk

CHAPTER 7
Wheatland Crash Analysis

Introduction

Wheatland is located in southern Yuba County, about 40 miles north of Sacramento. The Beale Air Force Base, Toyota Amphitheatre, and Hard Rock Hotel & Casino are located nearby. It is the gateway city to Camp Far West, a regionally significant recreation area. Wheatland is a small but growing community with a population of approximately 3,700 residents. The city's roadway network is centered around State Route 65/D Street, a vital north-south corridor that bisects town and connects Wheatland to other parts of the region, such as Marysville and the greater Sacramento area. Adjacent to this road is the Union Pacific Railroad (UPRR). Spenceville Road is another key corridor, extending from the middle of town to the east, and provides access to the Camp Far West Reservoir and Beale Air Force Base via the Vassar Lake Gate.

Wheatland is a predominantly residential community, with about half of the city's population living on either side of State Route 65 and UPRR tracks. All of the schools are situated on the west side and the primary retail destinations on the east or along the highway. Wheatland Elementary School and Virginia School are accessed off Olive Street near SR 65, and Wheatland Union High School and Bear River Middle School via Wheatland Road. The historic downtown core is a compact, walkable district east of the highway that features a collection of well-preserved 19th- and early 20th-century buildings that house local businesses. Most residents must cross SR 65 multiple times per day either by driving, biking, or walking to access their destinations.

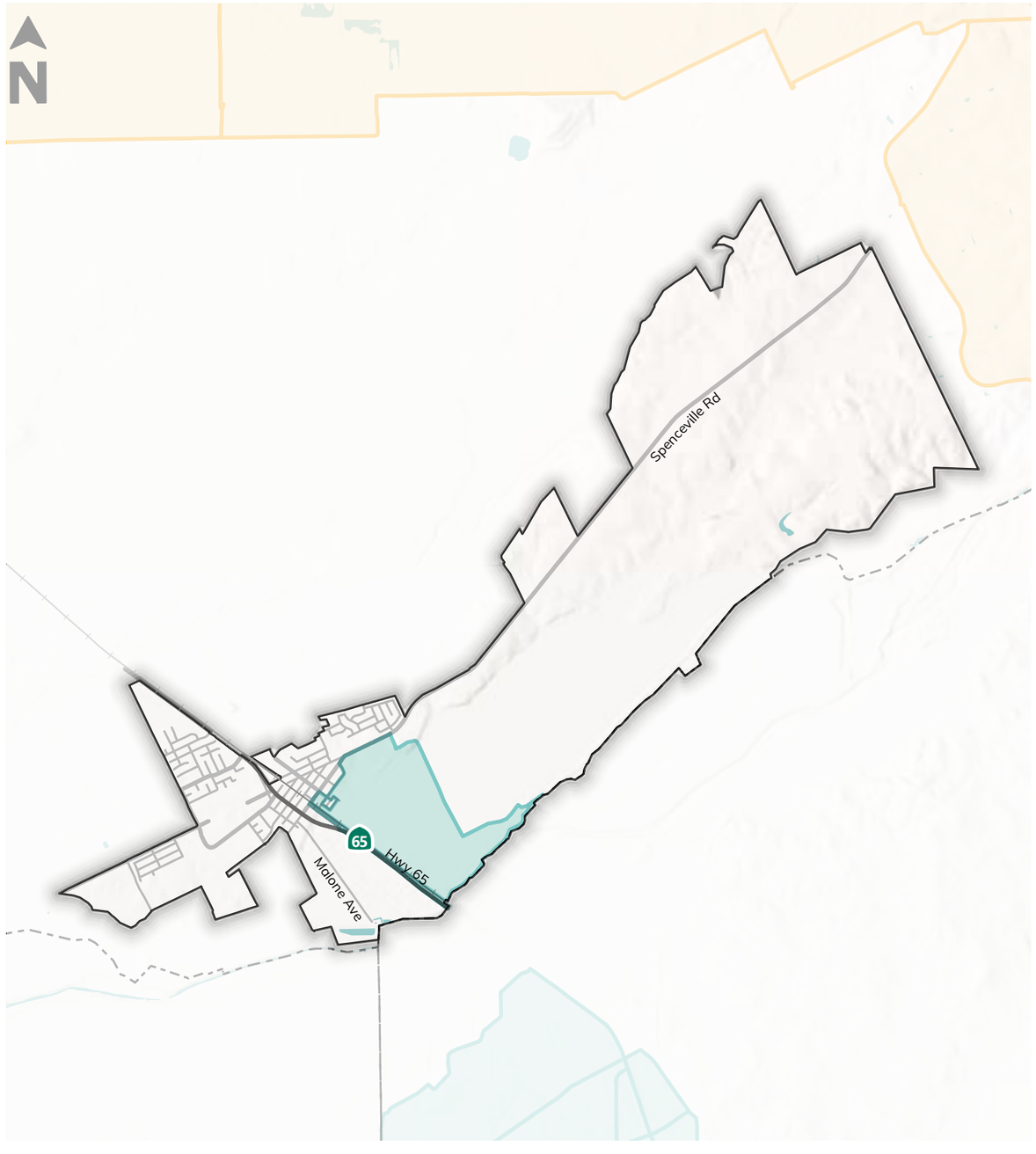
Communities of Concern

Sociodemographic data sources are helpful to better understand the community, as well as when applying for state and federal grant funding to implement infrastructure projects. Figure 7.1 shows locations in Wheatland that meet the criteria for two community metrics relevant to grant applications:

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations: 2 percent of Wheatland's population meets Caltrans' threshold for Transportation-Disadvantaged status, compared to 16 percent of Californians.
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities: none of Wheatland qualifies as an area of persistent poverty or historically disadvantaged community, compared to 28 percent statewide.

In CalEnviroScreen, which evaluates environmental burdens including air pollution, traffic density, and health vulnerabilities, Wheatland received a score of 22, where the state had a score of 23, indicating parity between Wheatland and the state as a whole.

Figure 7.1: Caltrans Transportation Equity Index & USDOT Areas of Persistent Poverty



Legend

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities (APPHDC)

Plans

The City of Wheatland has already made commitments to improving roadway safety through policies set in the Wheatland General Plan:

- 2.A.10: The City shall give priority to street and highway improvements that increase safety, minimize maintenance costs, and increase the efficiency of the street system.
- 2.C.2: The City shall promote street, alley, and sidewalk maintenance to encourage their safe use.
- 2.C.4: The City shall require ADA compliance for existing and proposed street sidewalks.
- 2.C.5: The City shall promote elderly friendly roadways, including the use of bikeways for golf carts and motorized wheelchairs.

Projects

There are numerous improvement projects currently underway or planned within Wheatland. There is a series of safety improvements planned on state facilities owned and operated by Caltrans along State Route 65 between Evergreen Drive and State Street, including rehabilitating pavement, adding bike lanes, upgrading facilities to comply with Americans with Disabilities Act (ADA) standards, constructing a multi-use path, and enhancing existing crosswalks.
There are newly installed traffic signals at the State Route 65 and McDevitt Drive intersection.

In addition, improvements are planned at the intersections of SR 65 & Oakley Lane and SR 65 & Dairy Lane. While both these intersections are located in unincorporated Yuba County, they are frequently traveled by Wheatland residents, with members of the community expressing concern during the community engagement process.

Typical Intersection in Wheatland

INJURY CRASH TOTAL

73

KSI CRASH TOTAL

2

Figure 7.2
Injury Crashes by Year, 2018 - 2023

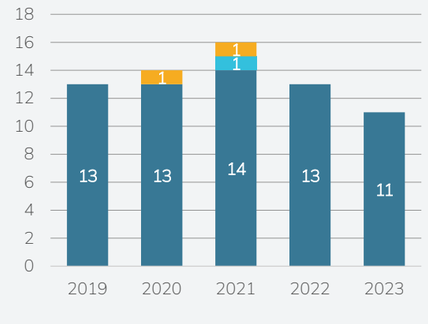
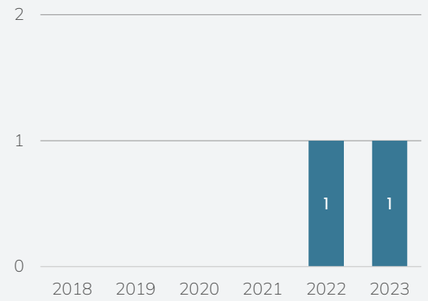


Figure 7.3
KSI Crashes by Year, 2018 - 2023



KSI = Killed or Severely Injured

Vehicle-Only Crashes
Bicycle-Involved Crashes
Pedestrian-Involved Crashes

Crash Summary

This section summarizes key findings from the city's crash data obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database, for the years 2018 to 2023. The analysis includes all crashes that led to injury and excludes property-damage-only crashes.

Within the six-year period, Wheatland saw a total of 73 crashes that led to some degree of injury. One crash involved a bicyclist and two involved pedestrians. In total, there were two crashes that involved at least one person that was killed or severely injured (KSI).

There was a concentration of crashes on D Street/ SR 65 between Main Street and State Street where cars traveling northbound rear-ended other vehicles as the posted speed limit drops from 55 MPH to 35 MPH, right before the signal at Main Street.

Figure 7.4:
Wheatland Crash Heat Map

About KSI Crashes

Severe injuries resulting from a traffic crash can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

Throughout this analysis, the acronym KSI is used to denote crashes where someone was killed or severely injured.

KSI Crash Summary

In the six-year period, there were two crashes within Wheatland that resulted in severe injury; there were no fatalities. Both crashes involved only vehicles, with no pedestrians or cyclists affected.

Figure 7.5
Crash Mode Share by Severity

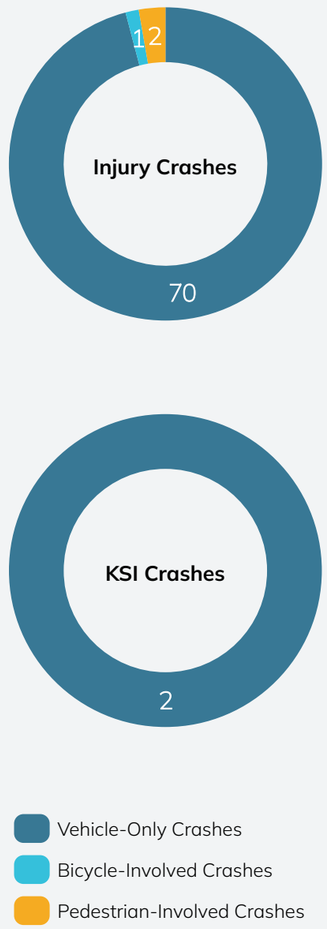


Figure 7.6: Wheatland KSI Crashes

Crashes by Crash Type

Overall, rear-end crashes were the most common type of crashes in Wheatland, making up 62 percent of all crashes resulting in injury. Most of Wheatland's crashes occurred on SR 65, the main corridor in town. Rear-rend crashes were most common approaching Main Street, as the speed limit changes from 55 MPH to 35 MPH.

Crashes by Primary Crash Factor

Unsafe speed (53 percent) was the leading reported primary cause of crashes in Wheatland. The remaining crashes were attributed to several other factors, such as vehicle right of way violation, improper turning, and driving under the influence, etc. Unsafe speed and improper turning were the causes behind one KSI crash each.

Crashes by Time of Day and Lighting Condition

Overall, most crashes occurred in the daylight (80 percent), 10 percent occurred in the dark where streetlight was present, and 10 percent happened in the dark with no lighting. All crashes that took place under no lighting conditions occurred on SR 65, except for one at the Spenceville Road and Boyd Lane intersection. Both KSI crashes occurred in daylight.

Driving Under the Influence

7 percent of crashes (5 crashes) involved someone driving under the influence of alcohol or drugs. No KSI crashes involved a DUI.

Figure 7.7 Share of Injury Crashes by Crash Type

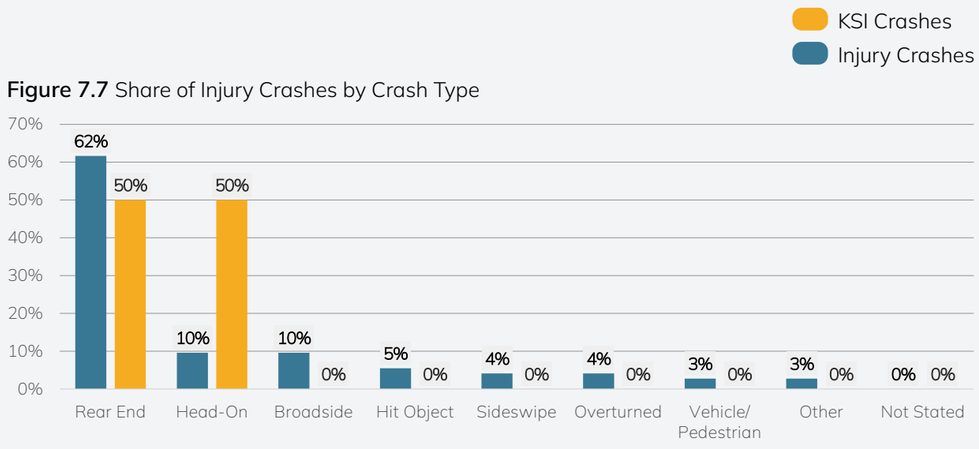


Figure 7.8 Share of Injury Crashes by Primary Crash Factor

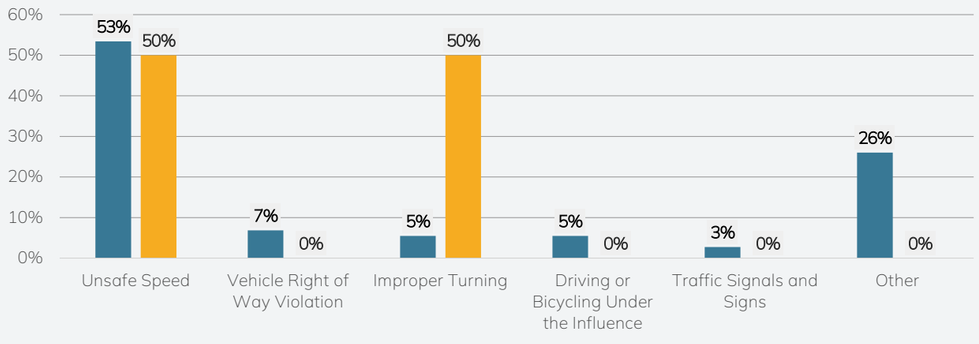


Figure 7.9
Crashes by Time of Day & Lighting

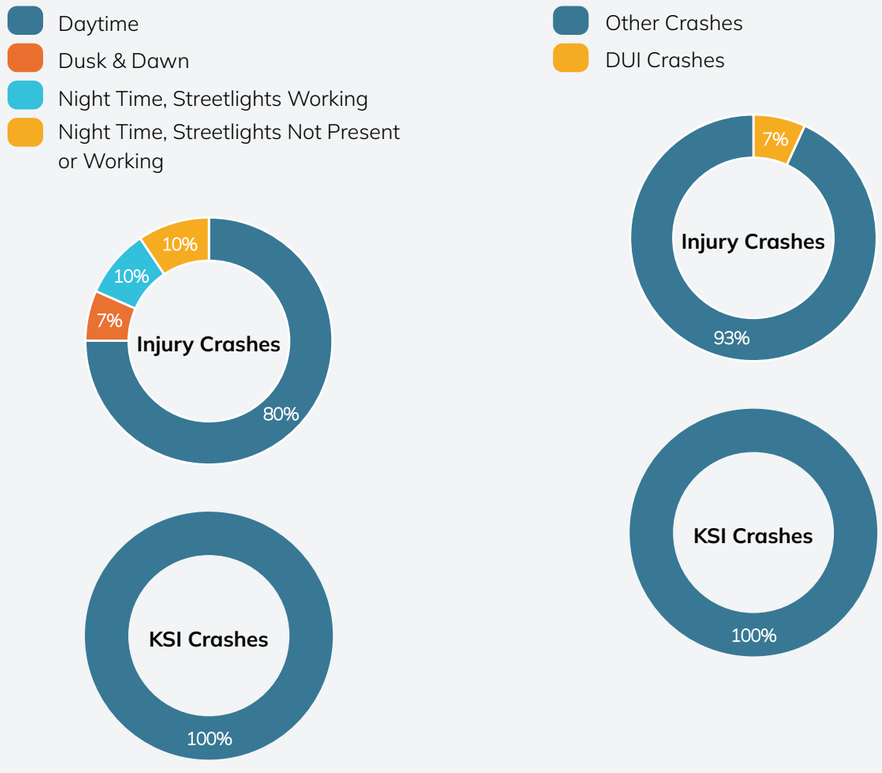


Figure 7.10
DUI Crashes

Safety Corridors

Safety corridors are the roadway segments within Wheatland that had the highest number of crashes resulting in severe injury or death (KSI) between 2018 and 2023. Priority safety corridors are the safety corridors that experienced the highest rate of KSI crashes, are adjacent to sensitive land uses, and have high potential for severe crashes and thus, should be prioritized for improvements.

The following is a list of Wheatland's priority safety corridors as identified through a safety corridor systemic analysis, task force input, and community feedback. Figure 7.11 displays Wheatland's network of safety corridors, which are shown in orange. Priority corridors are shown in red. Refer to **Appendix C** for a more detailed explanation of the safety corridor identification technical methodology.

- SR 65 beyond the city limits, from Dry Creek Levee Road to Bear River
- Main Street from SR 65 to Spenceville Road
- Spenceville Road from Main Street to east of McCurry Street

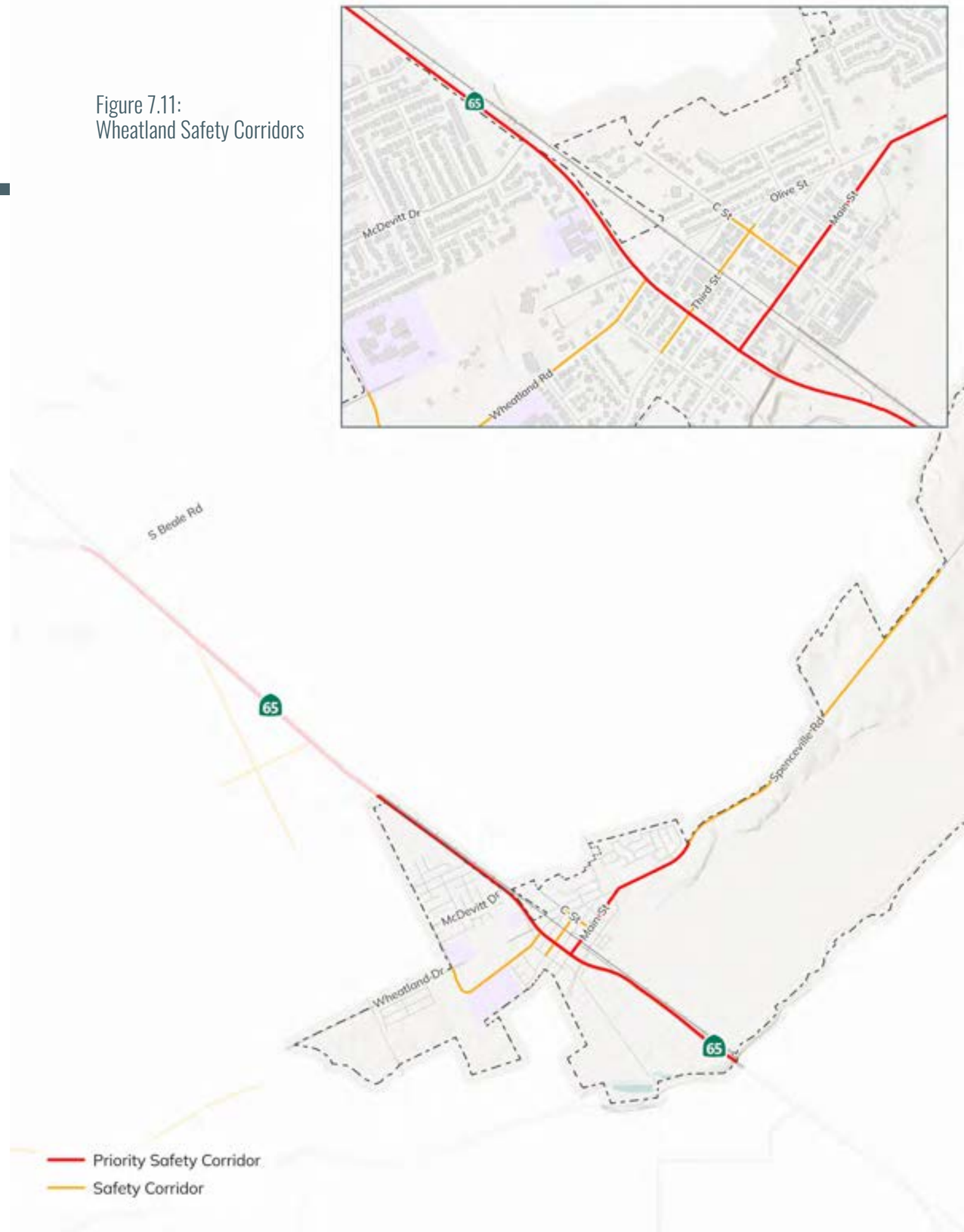
Priority Safety Corridors were identified to provide the list of locations for actionable next steps with additional study. Studies could include recommended engineering safety countermeasures with targeted improvements to address crash history or focused programs identified in the Action Plan chapter.

SR 65/Oakley Lane and SR 65/Dairy Road

Although these two intersections lie outside Wheatland's city limits, they are included in Wheatland's safety considerations due to significant safety concerns from Wheatland residents. Improvements at these sites are expected to enhance safety and mobility for the Wheatland community.

- SR 65 & Dairy Road
- SR 65 & Oakley Lane

Figure 7.11:
Wheatland Safety Corridors



Community Snapshot

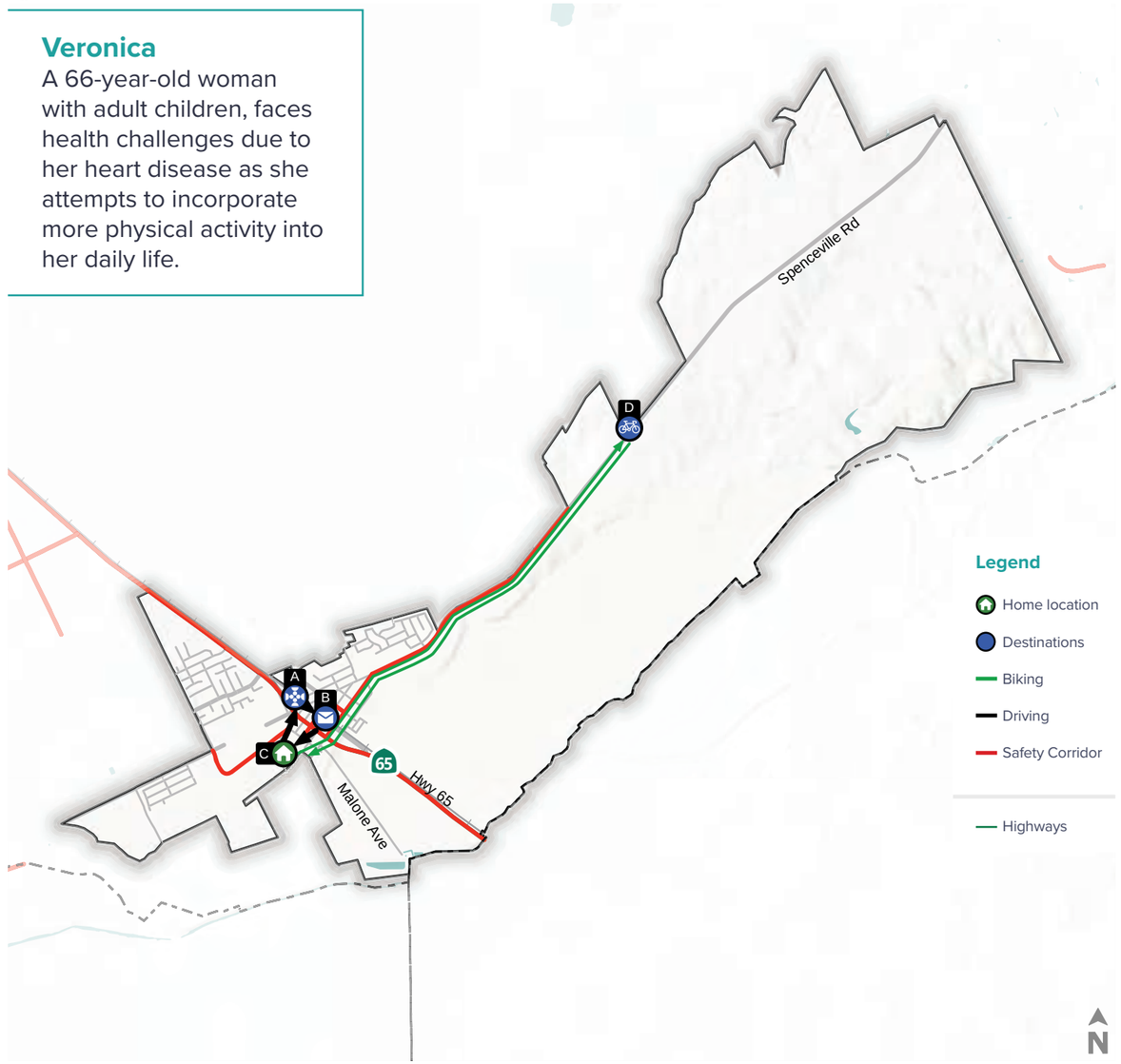
This community snapshot features Veronica, a fictional character created to illustrate the daily transportation challenges faced by a resident in Wheatland. The experiences of this character are based on census data as well as local lived experiences.

Wheatland is a small city where many destinations are within walking or biking distance. However, infrastructure challenges limit the feasibility and safety of active transportation. Veronica, a 66-year-old resident managing heart disease, is seeking to incorporate more physical activity into her daily routine. While walking and biking offer clear health benefits, she finds the current roadway conditions discouraging and unsafe, particularly due to the railroad tracks and lack of shoulders along Spenceville Road. Addressing these barriers is essential to supporting healthier, more active lifestyles for residents like Veronica. Figure 7.12 outlines the travel mode choices made by Veronica and challenges that come with them.

Although a majority of trips are made by car (75 percent), a significant portion still travel by foot (18 percent). This mode share should be given greater consideration when planning and implementing safety improvements.

Figure 7.12: Wheatland Community Snapshot

Veronica
A 66-year-old woman with adult children, faces health challenges due to her heart disease as she attempts to incorporate more physical activity into her daily life.



A Veronica drives nearly ¾ of a mile to the Wheatland Community Center for a social outing. She would bike but she does not like crossing D Street and the railroad tracks.

B After the Community Center, Veronica swings by the Post Office which is less than 1/5th of a mile away, an easily walkable or bikeable distance.

C Veronica drives the short ½ mile home, once again an easily walkable or bikeable distance.

D For recreation, Veronica goes on a 20-mile bike ride with friends, but during the ride she faces difficulties biking along Camp Beale Highway and struggles crossing D Street at Main Street.

Focus Areas

Six focus areas were identified through a systemic analysis of crash records to represent the most significant patterns behind injury crashes—and especially KSI crashes—in the region. These focus areas are identified with the letters "A" through "F" and each one is applicable to one, several, or all of the communities covered by this RSAP. Following each crash focus area is a set of potential countermeasures that should be considered for implementation to improve safety outcomes. **Appendix D** contains a more detailed summary of each countermeasure.

Wheatland's traffic safety challenges can be understood through a subset of these focus areas:

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

FOCUS AREA B

Right-of-Way Issues at Intersections

FOCUS AREA D

Crashes Involving People Walking and Biking

Some of these focus areas pertain to the crashes just outside Wheatland's northern city limits, particularly where Oakley Lane and Dairy Road intersect Highway 65. These locations remain significant safety concerns for Wheatland residents.

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

INJURY CRASH STATISTICS

33 (45%) **Total Injury Crashes**

0 (0%) **KSI Crashes**

State Route 65 is a north-south corridor that serves as a connector for local traffic as well as those passing through Wheatland to get to other parts of the region. This arterial highway bisects the city and is a road residents must cross to get to destinations from one side of town to the other. Between 2018 and 2023, 33 of 73 crashes within Wheatland occurred along the segment of State Route 65 that serves as a main street.

Crossing SR 65 presents significant challenges for people walking, biking, and driving due to limited and inadequate infrastructure. There are few signalized intersections, so people needing to cross SR 65 at non-signalized intersections have to contend with the high-speed vehicles with little traffic control. Crosswalks only exist at the two signalized intersections along SR 65 in the downtown core, and sidewalks are narrow and nonexistent at some locations along and around the highway, making it a hostile experience for people traveling on foot. In addition, the railroad tracks adjacent to SR 65 present an uncomfortable crossing experience for pedestrians and bicyclists.

The combination of high-speed traffic and more active downtown environment can worsen the likelihood and severity of conflicts. In particular, crashes were more common in transition zones,

areas near the edge of a town or city where drivers are moving from higher-speed rural or highway environments into lower-speed urban settings.

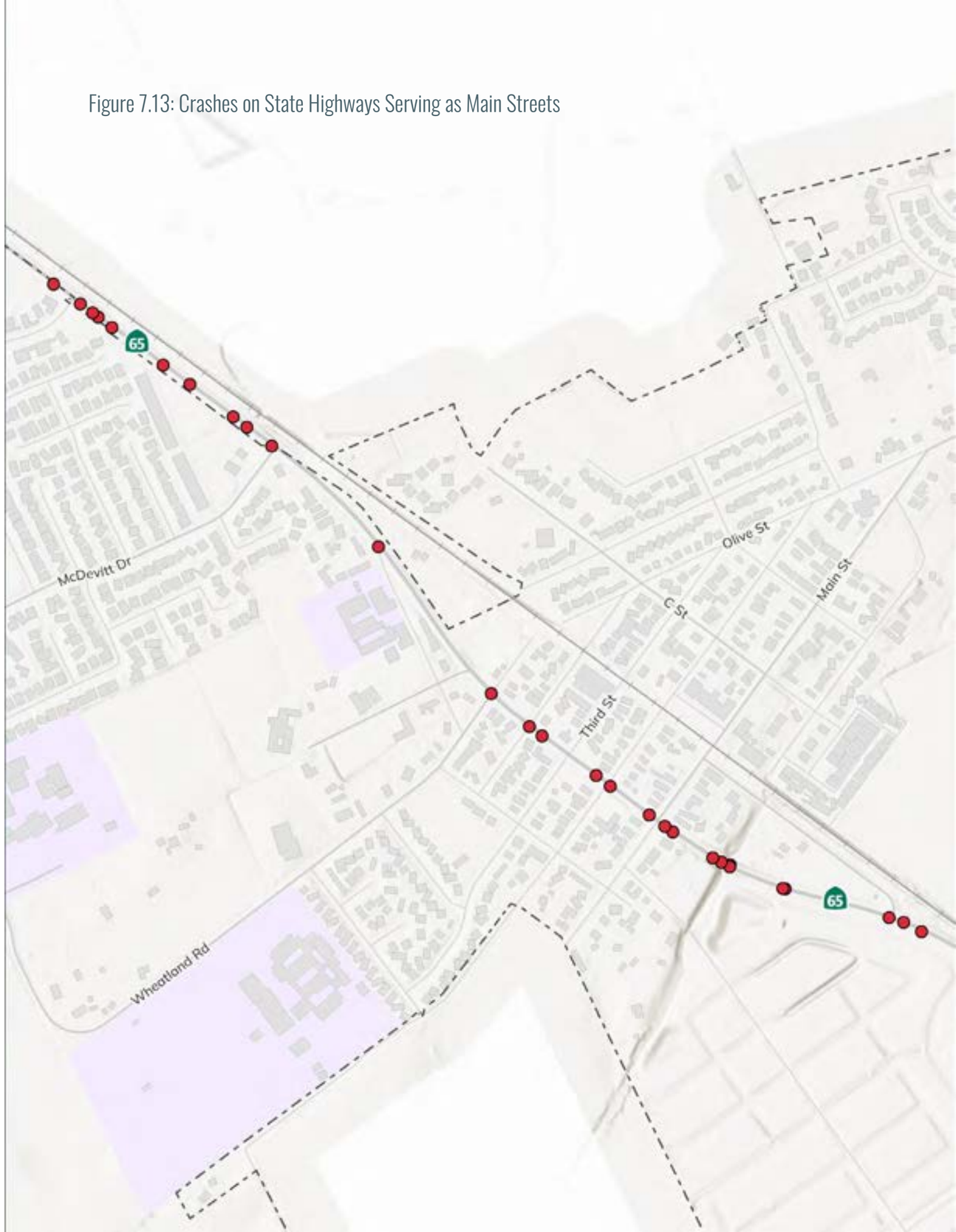
Most of the crashes in this focus area (26 out of the 33 crashes) occurred in transition zones, with 13 crashes (50 percent) primarily caused by unsafe speed and 18 crashes (69 percent) that resulted in rear end crashes. Clusters of these transition zone crashes occurred between McDevitt Drive and the Dry Creek Levee Road on the northern end of the city, and between Main Street and State Street at the southern end.

The following countermeasures can improve safety along highway main streets by slowing vehicle speeds and reducing conflict points between drivers, pedestrians, and bicyclists. Treatments like bike lanes, sidewalks, medians, and lighting enhance visibility and protection for vulnerable users, while speed management and intersection controls help lower the likelihood and severity of crashes.

Potential Countermeasures

- Buffered Bike Lanes
- Separated Bikeways
- All-Way Stop Control
- Add Sidewalk
- Traffic Signal
- Roundabout
- Slow Turn Wedge
- Advance Stop Bar
- Road Diet
- Raised Median
- Speed Feedback Sign
- Lane Narrowing
- Street Lighting
- Speed Limit Reduction
- All-Red Signal Time
- Flashing Yellow Turn Phase
- Retroreflective Tape on Signals
- Speed Sensitive Rest in Red Signal

Figure 7.13: Crashes on State Highways Serving as Main Streets



FOCUS AREA B

Right-of-Way Issues at Intersections

INJURY CRASH STATISTICS

6 (8%) **Total Injury Crashes**

0 (0%) **KSI Crashes**

In Wheatland, right-of-way violations at intersections led to six crashes during the study period, with four of them resulting in broadside crashes. The leading causes were drivers failing to yield to vehicles with the right-of-way when making left turns and neglecting to stop at stop signs.

Half of the crashes occurred when at-fault parties from side streets attempted left turns onto the main road, misjudging the time available to complete the maneuver safely; these took place at Wheatland Road & Oakley Lane, State Route 65 & 2nd Street, and SR 65 & State Street intersections. The two crashes that occurred at the E St & 3rd St and C St & 4th Street ensued when at-fault parties proceeded straight through the all-way stop intersections without stopping.

SR 65/Oakley Lane and SR 65/Dairy Road

In addition to the six crashes that occurred within city limits, there were ***four*** crashes attributed to right-of-way violations where Oakley Lane and Dairy Road intersect SR 65, just outside of the city. Two of them resulted in KSI broadside crashes after the at-fault parties failed to yield when making left turns onto SR 65. Due to the severity of crash outcomes and ongoing community concerns, these locations warrant consideration for targeted safety improvements by the county.

The following countermeasures can reduce crash risks and severity by making intersections more predictable and managing speed. Intersection controls such as roundabouts and protected left turns clarify priority, and treatments such as lane narrowing and intersection tightening further slow vehicles down, reducing impact upon collision.

Figure 7.14: Crashes with Right-of-Way Issues at Intersections

Potential Countermeasures

- Roundabout
- Traffic Signal
- Neighborhood Traffic Circle
- Intersection Reconstruction and Tightening
- Slow Turn Wedge
- Advance Stop Bar
- Centerline Hardening
- Raised Median
- Through Bike Lane at Intersection
- Protected Left Turns
- Flashing Yellow Turn Phase
- All-Red Signal Time

FOCUS AREA D

Crashes Involving People Walking and Biking

INJURY CRASH STATISTICS

3 (4%) **Total Crashes**

0 (0%) **KSI Crashes**

Pedestrians and bicyclists are among the most vulnerable users of our roadways, often navigating environments not designed with their safety in mind. In Wheatland, three crashes occurred that involved a pedestrian or bicyclist.

Two of the incidents occurred along Spenceville Road, a two-lane corridor that is generally unwelcoming to those traveling on foot or by bicycle, with narrow shoulders and few pedestrian facilities. One crash took place at the intersection with McCurry Street, where a pedestrian was struck while attempting to cross the wide side street. The second crash on Spenceville Road involved a bicyclist near Olive Street, who was sideswiped while making a left turn, a maneuver made especially hazardous by the absence of protected turning space and the speed of surrounding traffic. The third incident occurred at the intersection of Evergreen Drive and Rose Avenue, where a pedestrian was hit by a northbound vehicle while attempting a right turn from the east leg of the intersection.

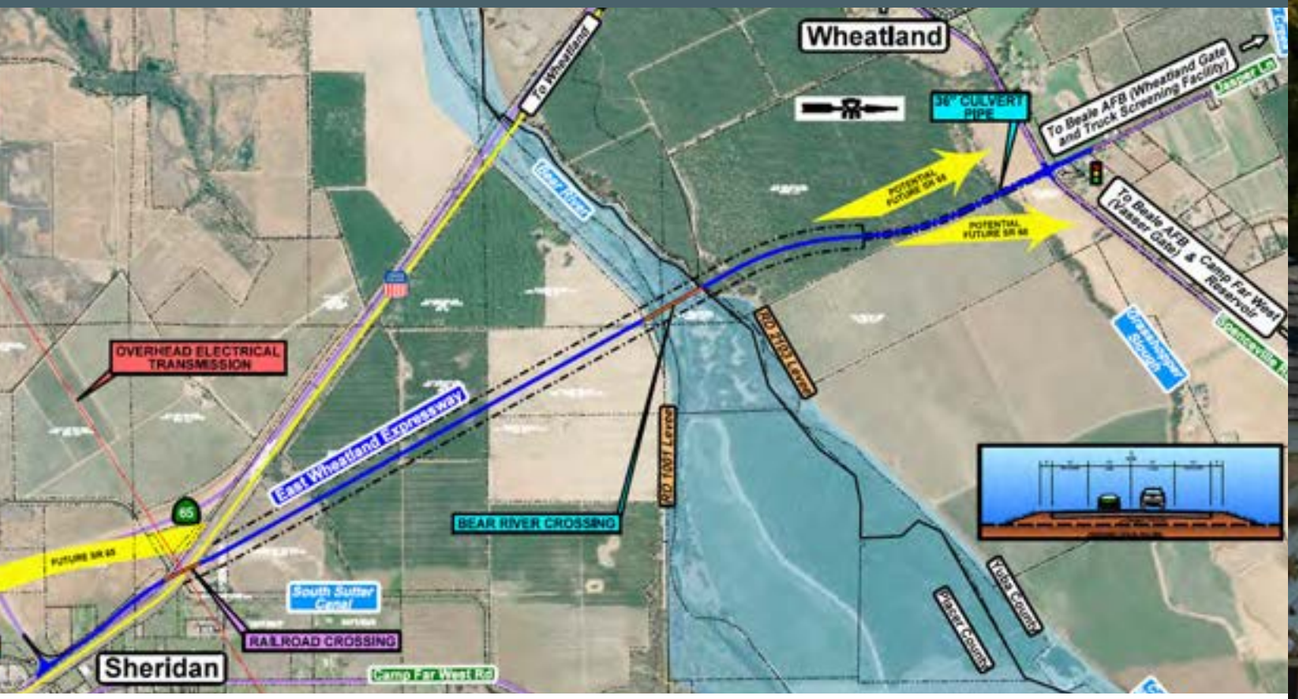
The following countermeasures help make vulnerable users more visible and provide them with dedicated, protected space: high-visibility crosswalks and signal enhancements such as pedestrian hybrid beacons help pedestrians cross safely by reducing exposure time and improving driver awareness. For bicyclists, buffered bike lanes and separated bikeways create safer conditions for turning and through movements, especially along corridors like Spenceville Road.

Figure 7.15: Crashes Involving People Walking and Biking

Potential Countermeasures

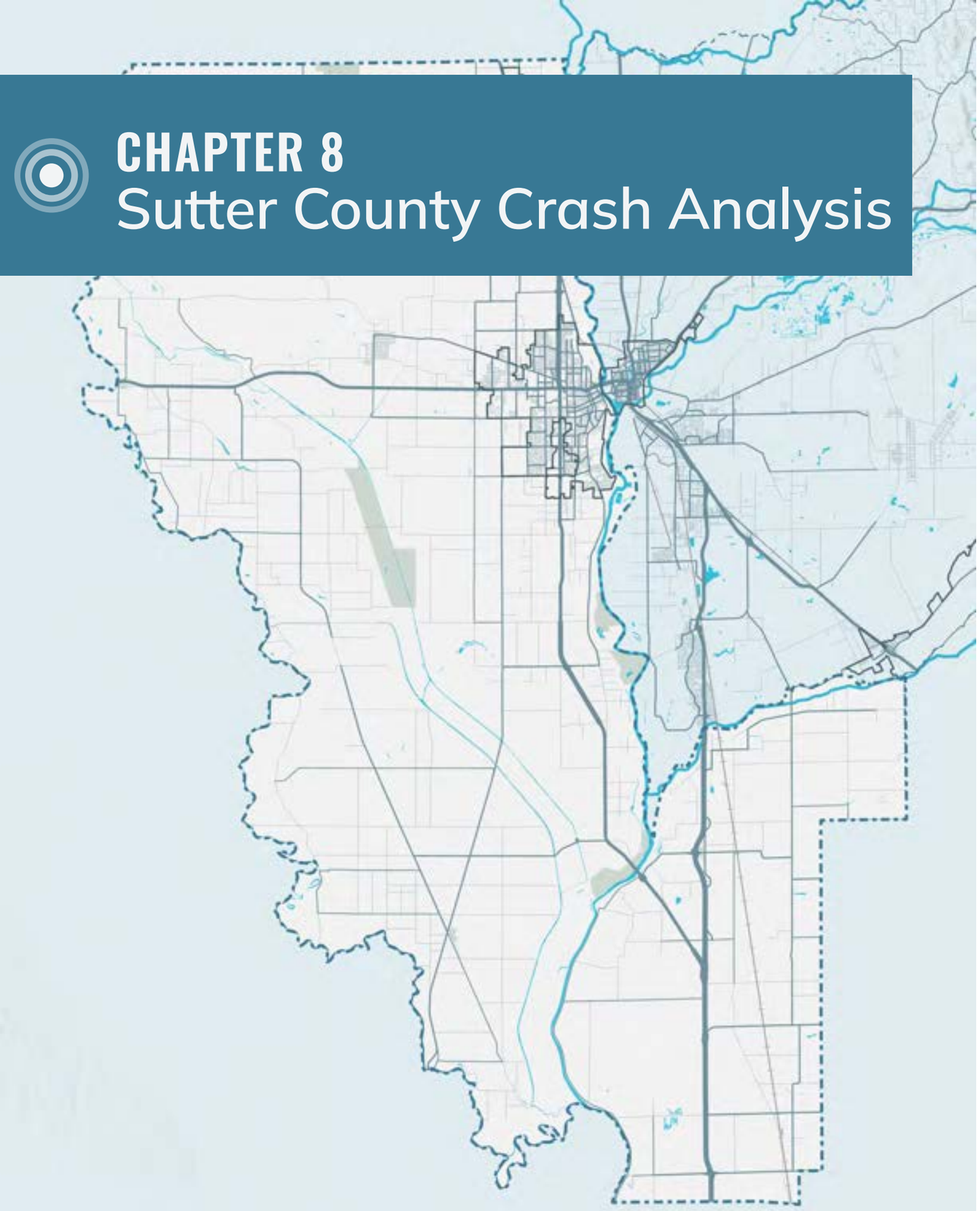
- Rectangular Rapid Flashing Beacon
- High-Visibility Crosswalk
- Pedestrian Hybrid Beacon
- Leading Pedestrian Interval and Pedestrian Recall
- Co-Locate Bus Stops and Pedestrian Crossings
- Curb Extensions
- Shared-Use Path
- Separated Bikeway
- Buffered Bike Lanes
- Green Conflict Striping
- Bike Lane
- Add Sidewalk

East Wheatland Expressway



The East Wheatland Expressway will be a new roadway that provides an alternative to SR 65 to people wanting to reach local destinations such as Beale Air Force Base, industrial facilities, and Camp Far West. The expressway would split off from SR 65 north of the town of Sheridan, extending north to Spenceville Road and connecting to Jasper Lane just east of Wheatland. It would require a new bridge over the Bear River. The proposed project would address ongoing issues with traffic congestion on SR 65 through downtown Wheatland, thus likely decreasing collision likelihood in downtown.

Once completed, the East Wheatland Expressway will divert traffic from State Route 65 through Wheatland. With reduced traffic on SR 65, more safety countermeasures recommended in this plan can be implemented downtown.



CHAPTER 8
Sutter County Crash Analysis

This Plan and Our Region

Introduction

Sutter County is a rural region situated in the heart of California's Sacramento Valley, with a population of 100,000. The terrain is predominantly flat and well-suited for agriculture, with vast expanses of farmland producing crops like rice, walnuts, and peaches. The county is bordered by the Feather River to the east and the Sacramento River to the west, both of which play important roles in irrigation and flood control. The Sutter Buttes add a unique natural landmark to the county.

Yuba City, the county seat, is the largest city in Sutter County. Sutter County is also home to the City of Live Oak and several rural communities including Sutter, Meridian, Nicolaus, Pleasant Grove, Rio Oso, and Robbins, among others. State Routes (SR) 99 and 20 serve as the primary corridors for freight movement throughout the county and regional travel, connecting Sutter County to the greater Sacramento Region.

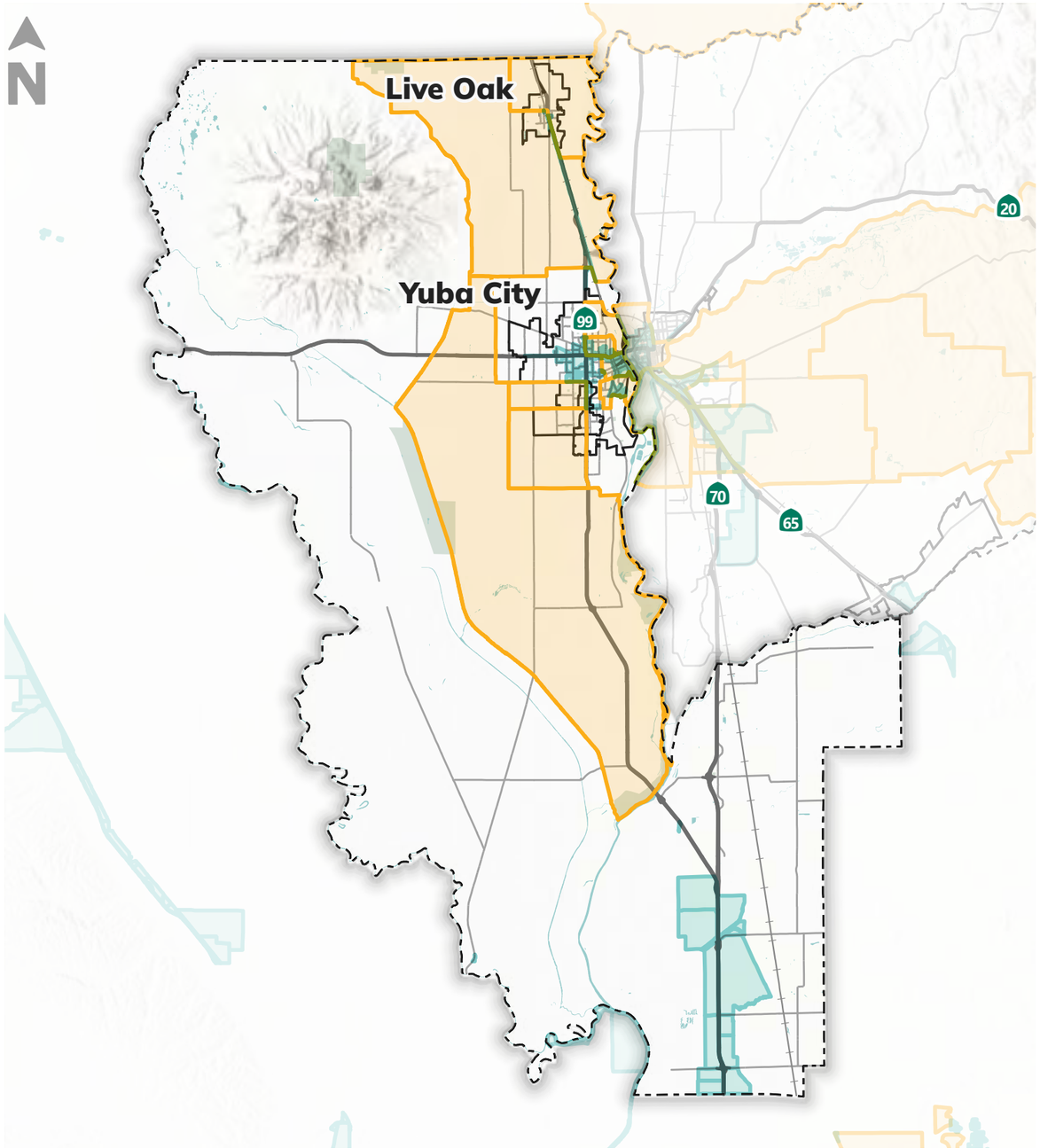
Communities of Concern

Sociodemographic data sources are helpful to better understand the community, as well as when applying for state and federal grant funding to implement infrastructure projects. Figure 8.1 shows locations in Sutter County that meet the criteria for two community metrics relevant to grant applications:

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations: 8 percent of Sutter County's population meets Caltrans' threshold for Transportation-Disadvantaged status, compared to 16 percent statewide.
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities: 51 percent of Sutter County's population lives in areas of persistent poverty and historically disadvantaged communities, compared to 28 percent statewide.

In CalEnviroScreen, which evaluates environmental burdens including air pollution, traffic density, and health vulnerabilities, Sutter County received a score of 29, where the state had a score of 23, indicating that the population of Sutter County experience higher levels of environmental impacts than the state as a whole.

Figure 8.1: Caltrans Transportation Equity Index & USDOT Areas of Persistent Poverty



Legend

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities (APPHDC)

Plans

Sutter County has previously made commitments to roadway safety, as outlined in the Sutter County General Plan. Refer to **Appendix A** for a list of policies and goals supporting improving roadway safety.

Projects

There are numerous improvement projects currently underway or planned within unincorporated Sutter County.

The following roadway safety-related projects are planned on state facilities owned and operated by Caltrans:

- Install rumble strips, upgrade signing, striping, and guardrail, and install backplates with reflective borders on to traffic signals along SR 20 from the community of Meridian to the Feather River.
- Install traffic signal at the SR 20 and Humphrey Road intersection.
- Install backplates with reflective borders on to signal lights; install touch-free pedestrian signals; and upgrade curb ramps to American with Disabilities Act (ADA) standards at various locations throughout Sutter County on State Route 20 and State Route 99.
- Install centerline or shoulder rumble strips on SR 99 at various locations throughout Sutter County.
- Safety improvements on SR 99 near Lomo: Eliminate cross traffic access to SR 99 from Encinal Road/Live Oak Boulevard, add acceleration lanes in proximity to railroad crossing, and improve access to the Eager Road Interchange.
- Install audible pedestrian push-buttons, retroreflective back-plates on traffic signal heads, video/radar detection camera system, advanced warning flashing beacon system, and a pole foundation for a future signal installation at the SR 99 and Riego Road intersection.
- Upgrade existing crosswalks and install pedestrian signs at the SR 99 and Bogue Road intersection.
- Install safety improvements at the SR 99 and Sankey Road intersection.
- Improvements at the SR 99 and Oswald Road intersection including site preparation, yellow flashing beacons installation, electrical work, signage upgrade, new traffic signal, and incidental work.
- Upgrade crosswalk at the Southbound SR 70 and Nicolaus Avenue intersection.
- Curve realignment on SR 113 near Knights Road.
- Improvements to the bridge crossing the Sutter Bypass at Verona on Garden Highway, including pavement upgrades, embankment repairs, striping, traffic control, and incidental work.

INJURY CRASH TOTAL

1,326

KSI CRASH TOTAL

301

Figure 8.2
Injury Crashes by Year, 2018 - 2023

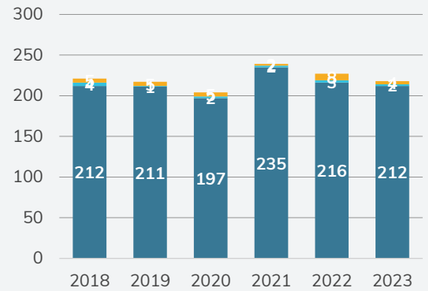
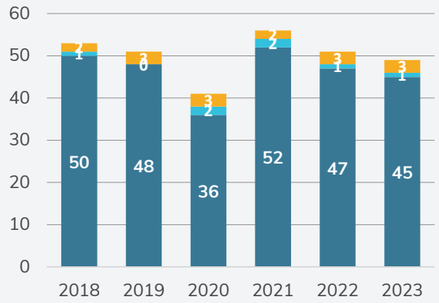


Figure 8.3
KSI Crashes by Year, 2018 - 2023



KSI = Killed or Severely Injured

Vehicle-Only Crashes
Bicycle-Involved Crashes
Pedestrian-Involved Crashes

Crash Summary

This section summarizes key findings from the city's crash data obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database, for the years 2018 to 2023. The analysis includes all crashes that led to injury and excludes property-damage-only crashes.

Within the six-year period, Sutter County saw a total of 1,326 crashes that led to some degree of injury. 7 crashes involved bicyclists and 16 involved pedestrians. 301 crashes (23 percent of all injury crashes) resulted in a victim being Killed or Severely Injured (KSI).

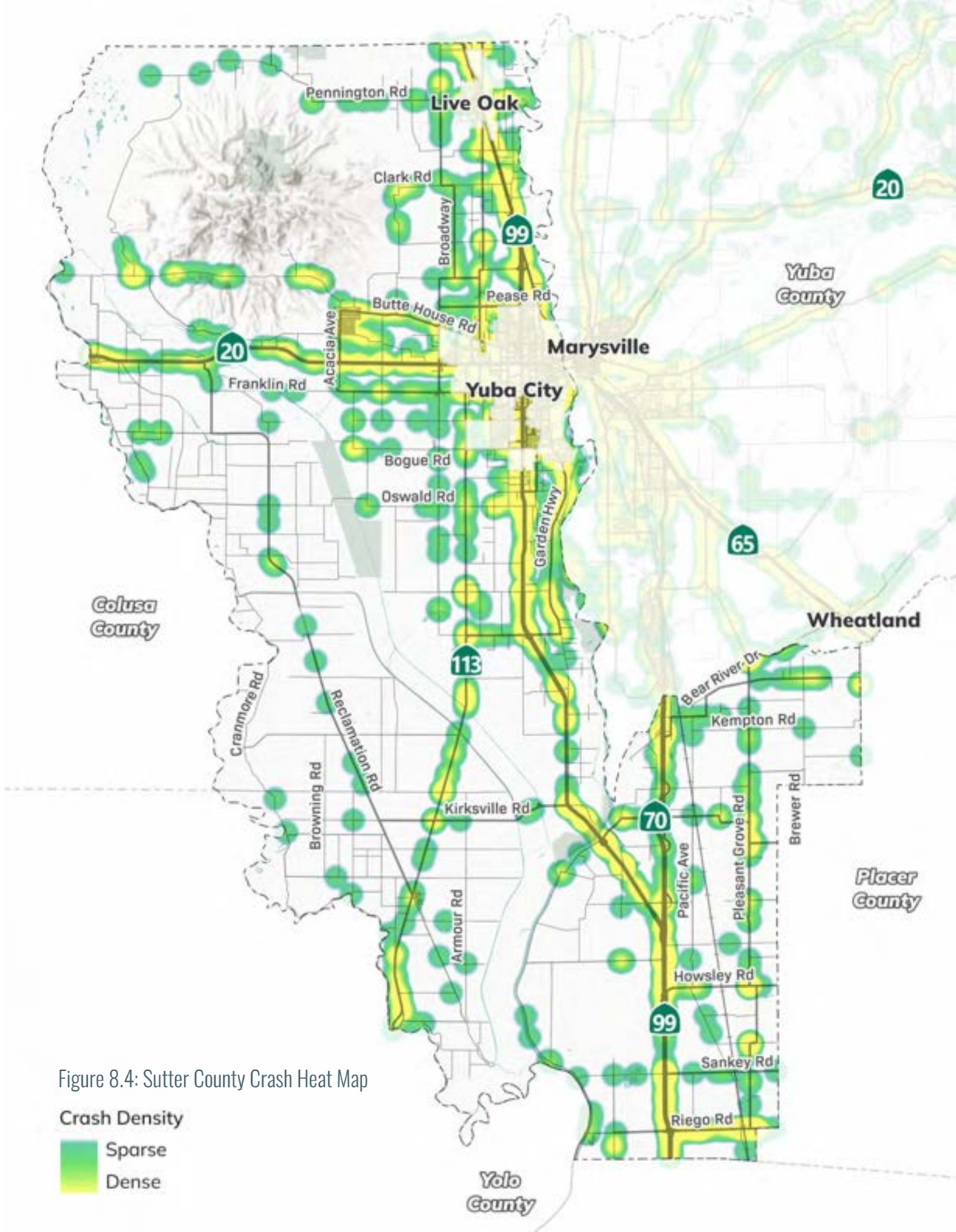


Figure 8.4: Sutter County Crash Heat Map

About KSI Crashes

Severe injuries resulting from a traffic crash can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

Throughout this analysis, the acronym KSI is used to denote crashes where someone was killed or severely injured.

KSI Summary

Out of 301 KSI crashes, 7 (2 percent) involved bicyclists, and 16 (5 percent) involved pedestrians. There was a total of 83 fatalities.

Figure 8.5
Crash Mode Share by Severity

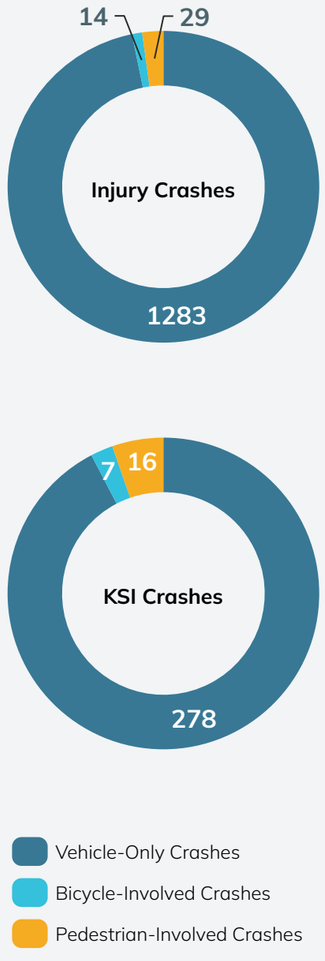


Figure 8.6: Sutter County KSI Crashes

Crashes by Crash Type

Overall, hit object (25 percent), rear end (22 percent), and broadside (20 percent) crashes were the most common crash types, making up 67 percent of all injury crashes. Similarly, among KSI crashes, hit object (26 percent) was also the most common type of crash, followed by broadside (17 percent), head-on (16 percent), and rear end (14 percent). Head-on collisions accounted for a disproportionately large share of KSI crashes—while they represented only 7 percent of all injury crashes, they made up 16 percent of KSI incidents.

Crashes by Primary Crash Factor

Unsafe speed (25 percent) was the leading reported primary cause of crashes resulting in injury, followed by improper turning (19 percent), and vehicle right of way violation (17 percent). Driving or bicycling under the influence (24 percent) was the leading reported primary cause of KSI crashes followed by improper turning (20 percent) and unsafe speed (17 percent).

Crashes by Time of Day and Lighting Condition

Overall, most crashes occurred in the daylight (64 percent), 9 percent occurred in the dark where streetlight was present, and 22 percent in the dark with no lighting. 59 percent of KSI crashes happened in the daytime, and a disproportionately greater share of KSI crashes occurred in the dark, even with streetlights present, at 37 percent compared to 31 percent of all injury crashes.

Driving Under the Influence

15 percent of all crashes resulting in injury involved someone driving under the influence of alcohol or drugs. Notably, this share was larger for KSI crashes, at 28 percent.

Figure 8.7 Share of Injury Crashes by Crash Type

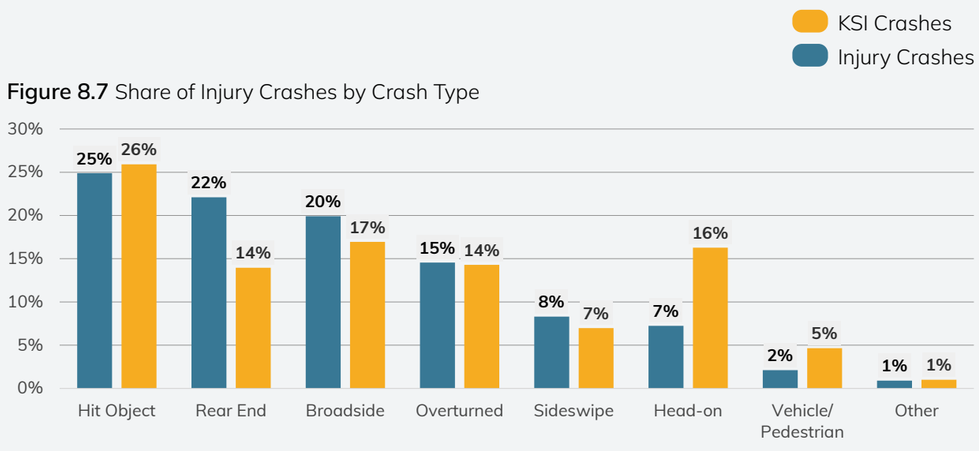


Figure 8.8 Share of Injury Crashes by Primary Crash Factor

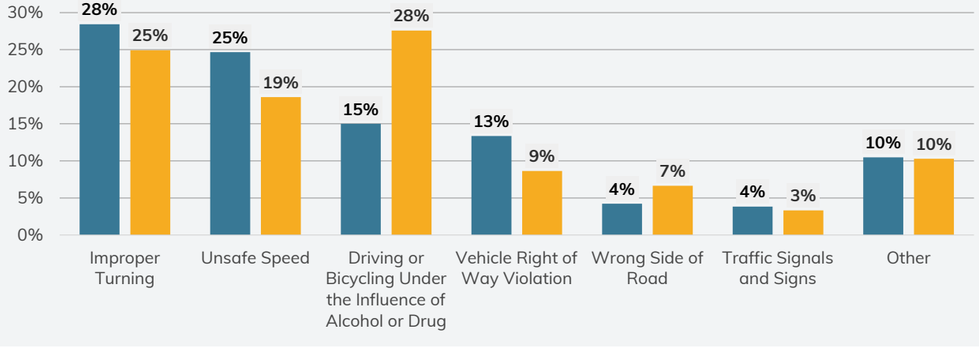


Figure 8.9
Crashes by Time of Day & Lighting

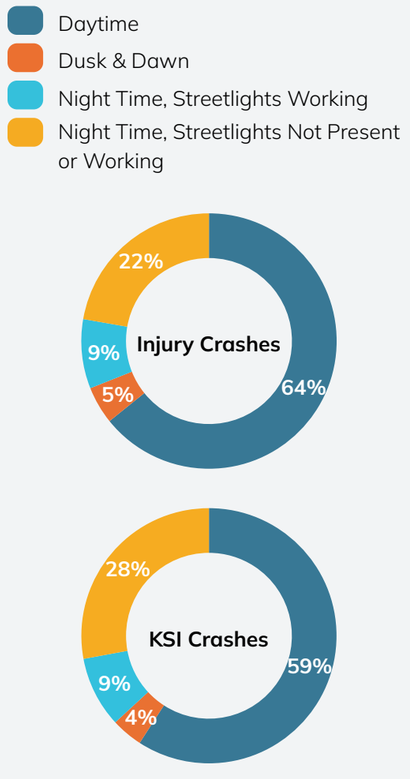
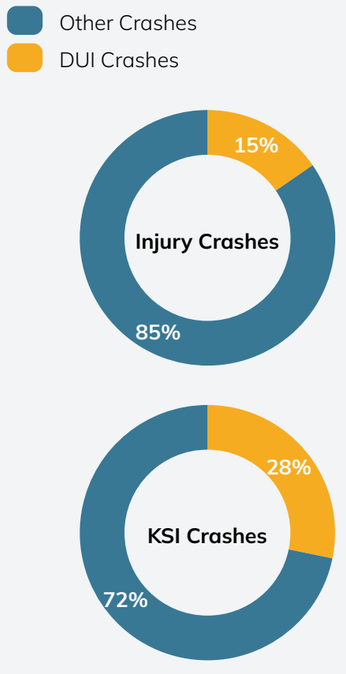


Figure 8.10
DUI Crashes



Safety Corridors

Safety corridors are the roadway segments within Sutter County that had the highest number of crashes resulting in severe injury or death (KSI) in the six-year study period. Priority safety corridors are the safety corridors that experienced the highest rate of KSI crashes, are adjacent to sensitive land uses, and have high potential for severe crashes and thus, should be prioritized for improvements.

The following is a list of Sutter County's priority safety corridors and intersections as identified through a safety corridor systemic analysis, task force input, and community feedback. Figure 8.11 displays Sutter County's network of safety corridors, which are shown in orange. Priority corridors are shown in red. Refer to **Appendix C** for a more detailed explanation of the safety corridor identification technical methodology.

Corridors

- State Route 99 from Franklin Road to Bogue Road
- Pass Road from West Butte Road to Acacia Avenue
- Township Road from Sunset Avenue to Daphne Lane
- George Washington Boulevard from Bogue Road to Tudor Road
- Nicolaus Avenue from Marcum Road to SR 70
- Pleasant Grove Road from Wheatland Road to Howsley Road
- Riego Road from SR 99 to Pleasant Grove Road

Intersections

- SR 99 and Bogue Road Intersection
- SR 99 and West Catlett Road Intersection

Priority Safety Corridors were identified to provide the list of locations for actionable next steps with additional study. Studies could include recommended engineering safety countermeasures with targeted improvements to address crash history or focused programs identified in the Action Plan chapter.

Figure 8.11: Sutter County Safety Corridors

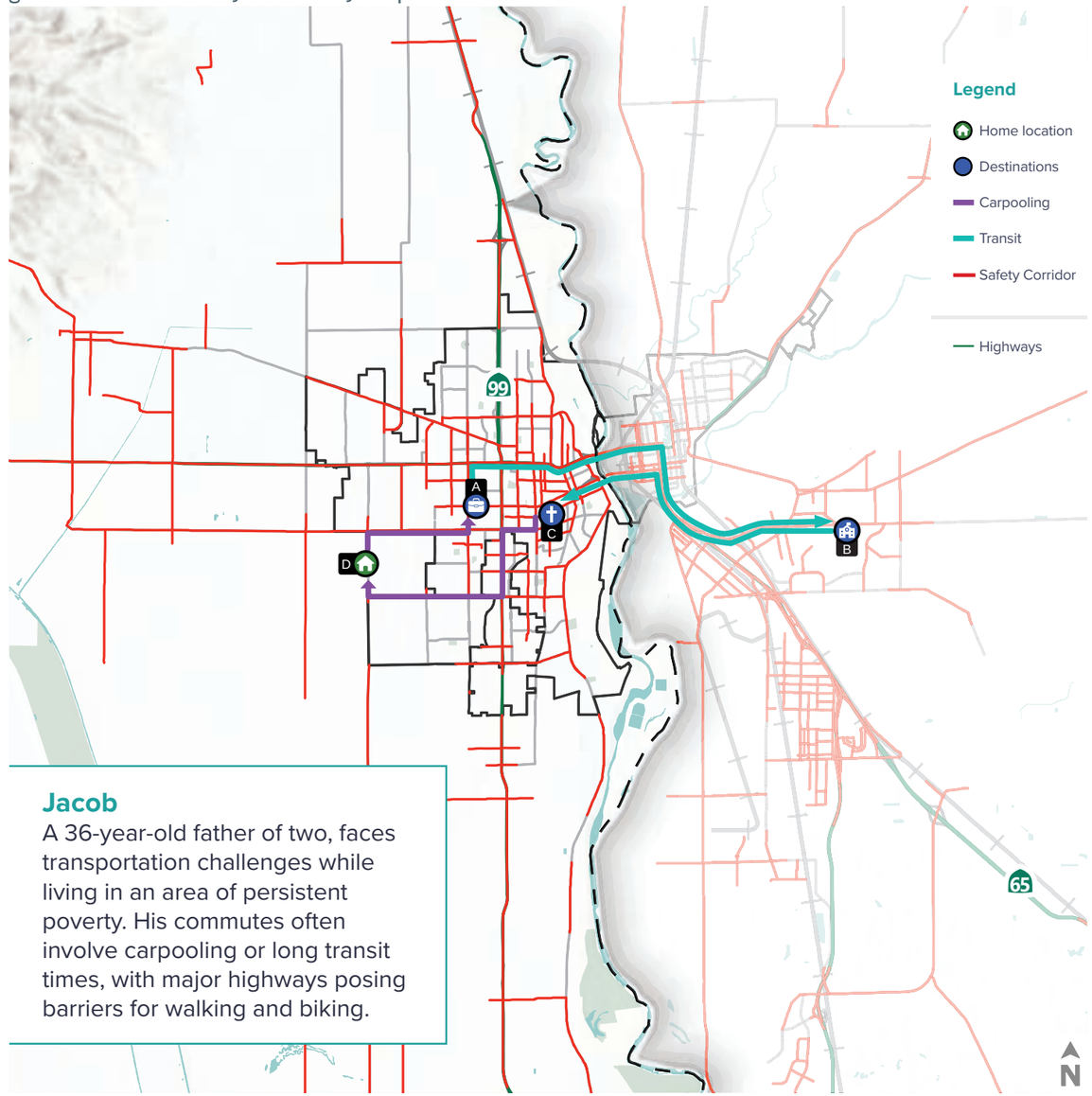
Community Snapshot

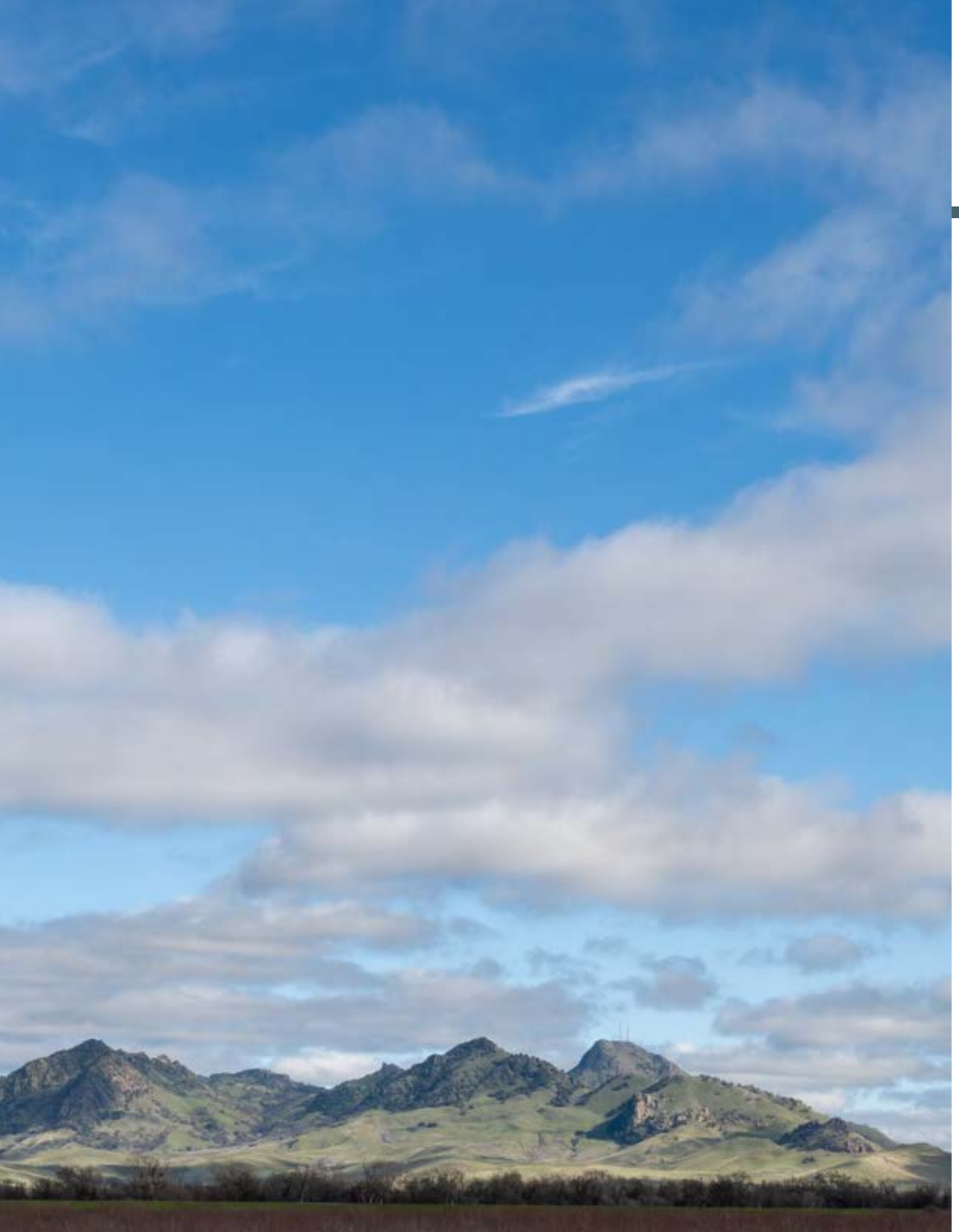
This community snapshot features Jacob, a fictional character created to illustrate the daily transportation challenges faced by a father without a personal vehicle in unincorporated Sutter County. The experiences of this character are based on census data as well as local lived experiences.

Jacob, a resident in unincorporated Sutter County, does not own a personal vehicle. Without access to a car, he must rely on walking, rides from others, and public transit, which can be unreliable and time-consuming. This lack of mobility limits his ability to access work and school, attend appointments, or manage daily responsibilities efficiently. Public transportation may not run frequently or reach all necessary destinations, further lengthening the time of his trips. The lack of safe infrastructure to support comfortable walking and cycling along major highways such as State Routes 20 and 99 also prevents Jacob from taking these modes to get around, unless necessary. Figure 8.12 shows the trips and travel modes taken to get to his destinations.

Although a majority of trips in unincorporated Sutter County are made by car (75 percent), a significant portion still travel on foot (18 percent). Jacob's experience underscores the broader challenges of inadequate infrastructure and limited mobility options in underserved communities, and how pedestrians should be given greater consideration when planning and implementing safety improvements.

Figure 8.12: Sutter County Community Snapshot





Focus Areas

Six focus areas were identified through a systemic analysis of crash records to represent the most significant patterns behind injury crashes—and especially KSI crashes—in the region. These focus areas are identified with the letters “A” through “F” and each one is applicable to one, several, or all of the communities covered by this RSAP. Following each crash focus area is a set of potential countermeasures that should be considered for implementation to improve safety outcomes. **Appendix D** contains a more detailed summary of each countermeasure.

Sutter County’s traffic safety challenges can be understood through a subset of these focus areas:

FOCUS AREA C

Driving Under the Influence

FOCUS AREA B

Improper Turning Away from Intersections

FOCUS AREA B

Hit Object

FOCUS AREA C

Driving Under the Influence

INJURY CRASH STATISTICS

208 (16%) **Total Crashes**

87 (29%) **KSI Crashes**

Driving under the influence (DUI) is a significant contributor to injury crashes, especially and disproportionately to KSI crashes. Alcohol impairment was involved in 16 percent of unincorporated Sutter County's total crashes but accounted for 29 percent of KSI crashes. Figure 8.13 displays all DUI crashes within unincorporated Sutter County.

Most of the DUI crashes were concentrated along State Routes 20, 99, 70, and 113, in addition to some county roads: Pleasant Grove Road, Garden Highway, and Pass Road. Local law enforcement and public works staff identified the Amphitheater and Casino as probable influences in some areas. Friday, Saturday, and Sunday see higher crash frequency around 6pm to 3am, compared to other times of day and days of the week. Most DUI crashes occurred on county and state facilities where there are posted speed limits of 55 MPH.

Hit object was the most common type of crash to result from DUI crashes and accounted for 38 percent of crashes; overturned (16 percent) and head-on crashes (13 percent) were the second and third most common crash types, indicating that lane and roadway departure were common occurrences moments before the crashes.

The most effective countermeasures for DUI crashes fall under non-engineering programs that target education and enforcement.

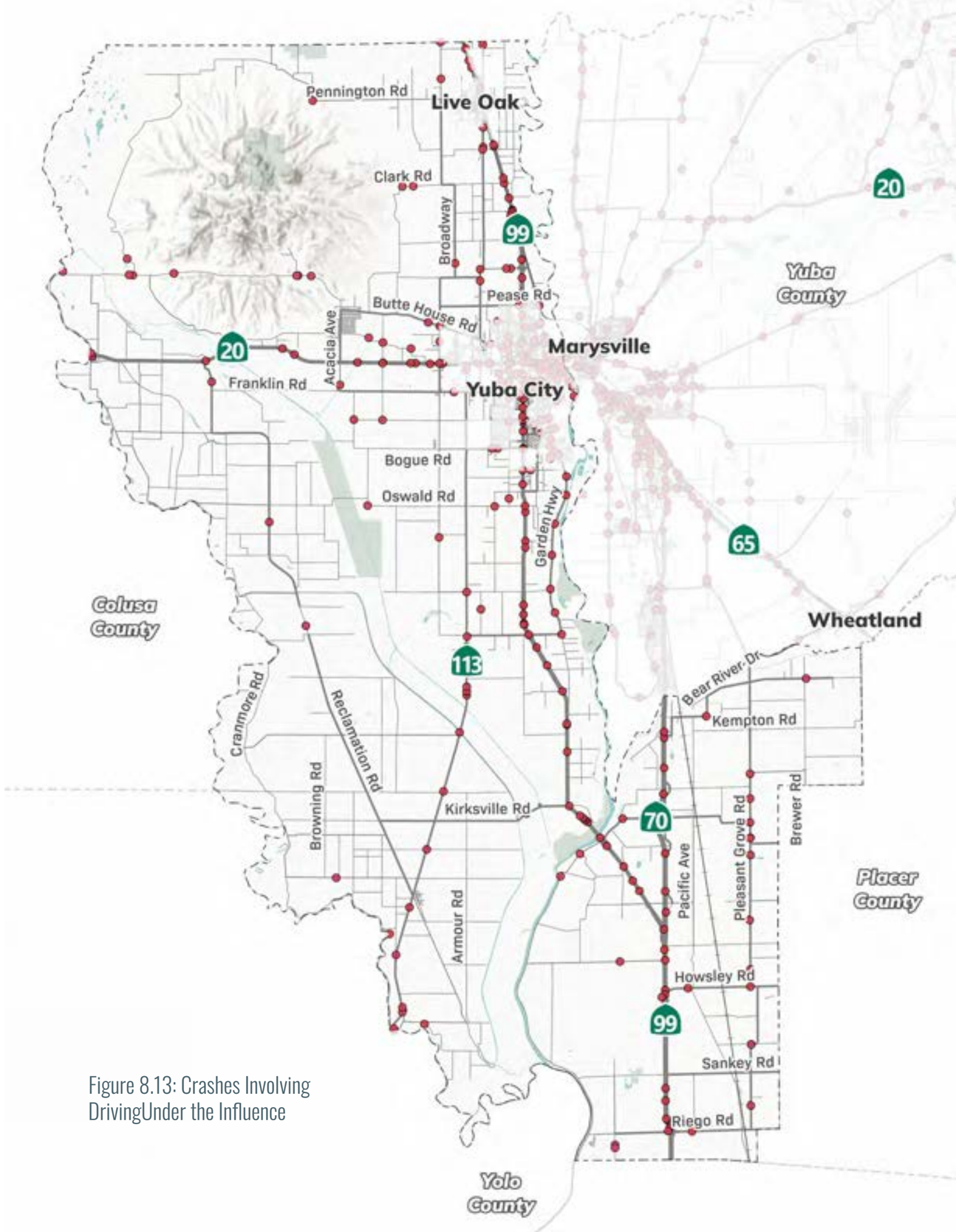


Figure 8.13: Crashes Involving DrivingUnder the Influence

FOCUS AREA E

Improper Turning Away from Intersections

INJURY CRASH STATISTICS

305 (23%) **Total Crashes**

66 (22%) **KSI Crashes**

Improper turning remains one of the leading primary contributors to crashes in unincorporated Sutter County. Moreover, most of them occurred away from an intersection, rather than at them. These improper turning crashes that occurred away from an intersection accounted for 23 percent of the county's total injury crashes and 22 percent of its KSI crashes. Figure 8.14 displays the locations of these crashes.

Crashes under this focus area occurred mainly on regional corridors such as State Routes 20, 70, 99, and 113. They were highly concentrated along SR 99. Although less frequent, these crashes also occurred on county roads: Garden Highway, Pass Road, Pleasant Grove Road, and Riego Road. 45 percent of these crashes led to hit object and 37 percent to overturned. 85 percent of these crashes involved vehicles traveling at speeds exceeding 50 MPH. In the moments leading up to them, 46 percent of parties that were at fault made an unsafe turning action and 28 percent ran off the road. This pattern could suggest that high-speed unsafe lane changes, erratic steering on roads, or distracted driving may have led to these crashes, and that a moderate amount led to roadway departures.

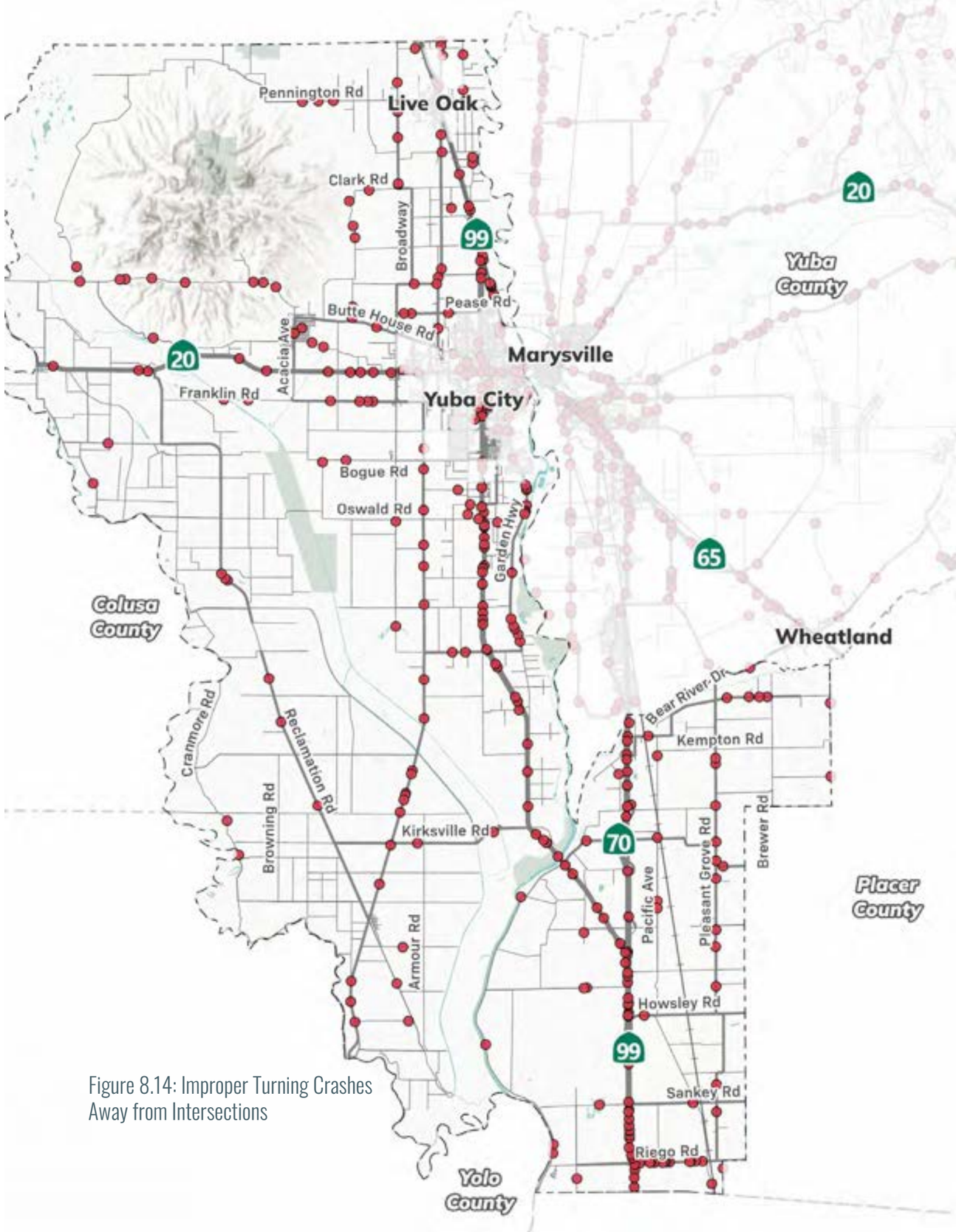


Figure 8.14: Improper Turning Crashes Away from Intersections

Sutter County

A combination of signage, roadway enhancements, and visibility improvements, such as rumble strips, curve warning signs, guardrails, and delineators, can help prevent unsafe turning and roadway departures by guiding drivers and providing recovery space. These countermeasures, especially when paired with speed limit reductions, reduce crash severity by lowering the kinetic energy transferred during high-speed impacts, helping prevent serious injuries.

Potential Countermeasures

- Rumble Strips
- Guardrail
- Safety Edge
- Widen/Pave Shoulder
- Create/Increase Clear Zone
- Speed Limit Reduction
- Curve Advance Warning Sign
- Chevron Signs on Horizontal Curves
- Delineators, Reflectors, and/or Object

FOCUS AREA F

Hit Object

INJURY CRASH STATISTICS

330 (25%) **Total Crashes**

78 (26%) **KSI Crashes**

Hit-object crashes emerged as the most prevalent crash type in unincorporated Sutter County. This crash type makes up 25 percent of the county's total injury crashes and 26 percent of its KSI crashes. As expected, 96% of all hit-object crashes involved only one party. Figure 8.15 displays all hit object crashes in unincorporated Sutter County.

Over two-thirds (68 percent) of this type of crash occurred on non-state facilities, in a more rural setting where the roads are narrow. Locations of many of these crashes include Pleasant Grove Road, Garden Highway, Pass Road, and Pennington Road. However, SR 99 also experienced a significant number of hit object crashes. Most of the objects that were hit (85 percent) were fixed objects such as trees, utility poles, and sometimes fencing or some other barrier. 75 percent of hit object crashes involved vehicles that were traveling at speeds of 50 MPH or higher. Leading up to the crashes, 41 percent of at-fault vehicles made some unsafe turning movement, such as erratic steering wheel maneuvers, and 32 percent ran off the road.

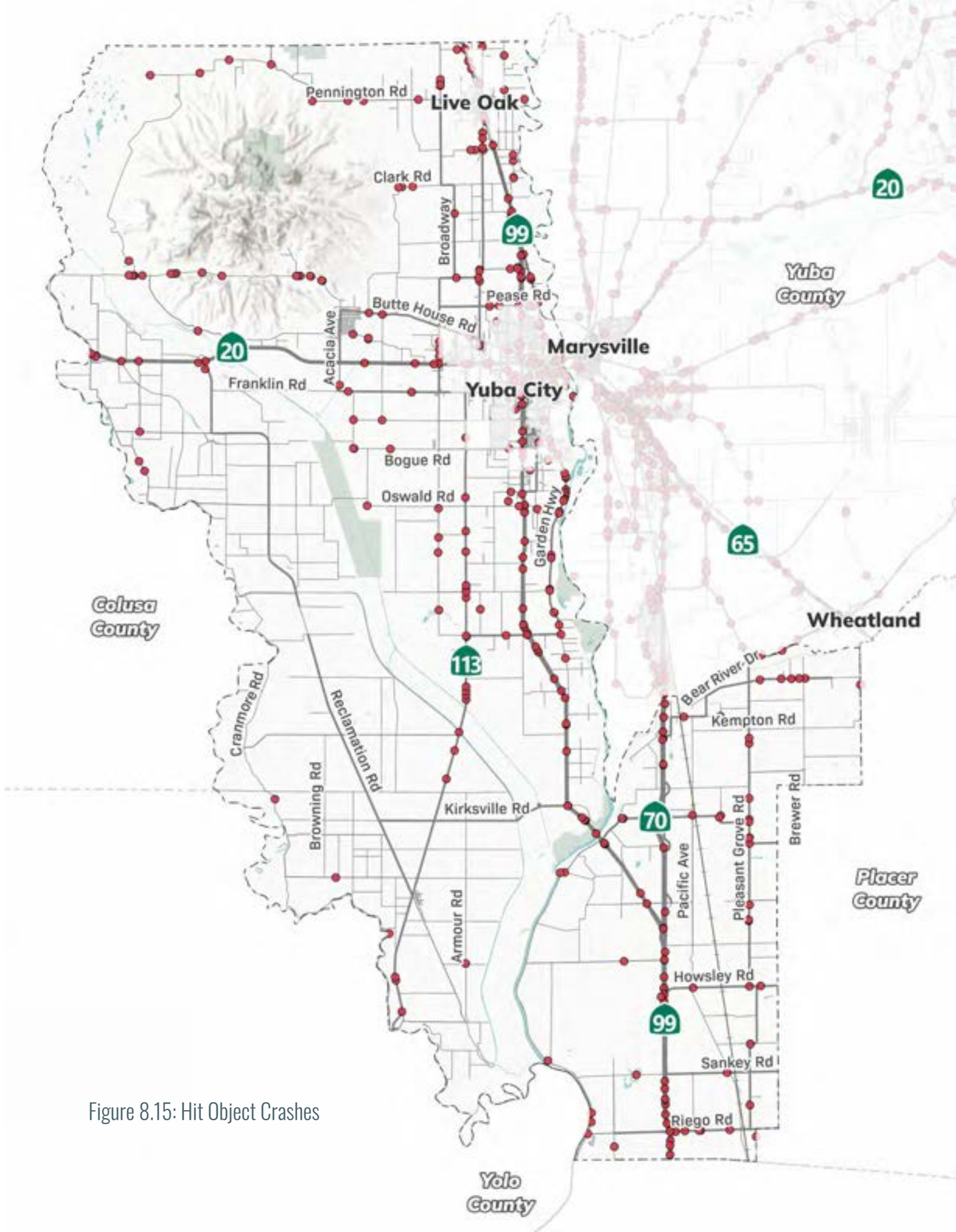


Figure 8.15: Hit Object Crashes

Sutter County

Countermeasures like guardrails, clear zone improvements, and widened or paved shoulders can help prevent crashes with objects and provide recovery space. Rumble strips, safety edge treatments, and delineators or reflectors enhance driver awareness and guidance, especially in low-visibility conditions. Speed limit reductions are especially critical, as lower speeds directly reduce the kinetic energy transferred during a crash, which in turn lowers the risk of severe injury or fatality.

Potential Countermeasures

Delineators, Reflectors, and/or Object

Speed Limit Reduction

Rumble Strips

Guardrail

Safety Edge

Widen/Pave Shoulder

Create/Increase Clear Zone

CHAPTER 9
Yuba City Crash Analysis

This Plan and Our City

Introduction

Yuba City, located in the heart of California's Sacramento Valley, serves as the county seat of Sutter County and is the central hub in the Yuba-Sutter region, along with its sister city across the river, Marysville. The city has experienced steady growth and has a population of about 70,000. Its transportation network is well-connected and supports both local and regional mobility. Major roadways include State Route 99, which runs north-south through the city and serves as a primary corridor for commuters and freight, and State Route 20, which provides east-west access across the region. Within the city, arterial roads like Franklin Road, Butte House Road, and Bridge Street facilitate local travel. Public transportation is available through Yuba-Sutter Transit, offering fixed-route and paratransit services.

Yuba City plays a vital role in the Yuba-Sutter region as an economic and cultural center. It hosts a diverse range of businesses, from local shops and restaurants to regional retail centers and industrial parks. Yuba City provides critical support to the region's extensive agricultural industry. The city is home to the Sunsweet Cannery, Holt Ag Solutions, Tractor Supply, Beeler Tractor, Pape Machinery, the Yuba-Sutter Farm Bureau, NorTech Ag, the regional USDA office, and the Cooperative Extension of the University of California - Climate Smart Agriculture Program.

Residential areas such as Lincoln East, Butte Vista, and El Margarita are spread throughout the city with access to schools, civic facilities, and other amenities. Commercial activity is concentrated along SR 20/Colusa Highway, Bridge Street, and in the historic downtown along Plumas Street, where shops, restaurants, and services are located. The city's strategic location, combined with its planning framework and transportation infrastructure, makes it a key driver of regional growth and a focal point for community services, commerce, and connectivity.

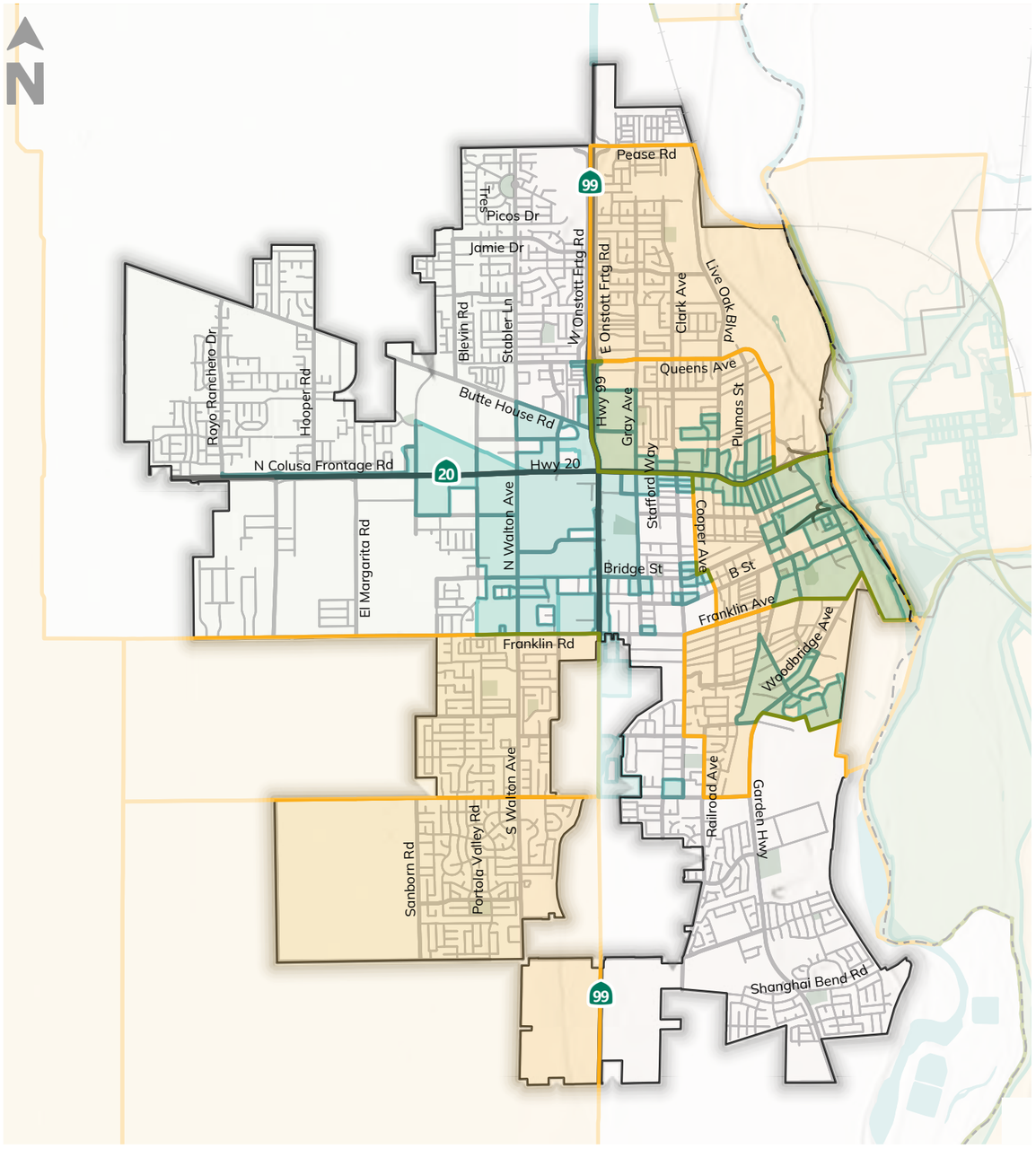
Communities of Concern

Sociodemographic data sources are helpful to better understand the community, as well as when applying for state and federal grant funding to implement infrastructure projects. Figure 9.1 shows locations in Yuba City that meet the criteria for two community metrics relevant to grant applications:

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations: 10 percent of Yuba City's population meets Caltrans' threshold for Transportation-Disadvantaged status, compared to 16 percent statewide.
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities: 52 percent of Yuba City's population lives in areas of persistent poverty and historically disadvantaged communities, compared to 28 percent statewide.

In CalEnviroScreen, which evaluates environmental burdens including air pollution, traffic density, and health vulnerabilities, Yuba City received a score of 32, where the state had a score of 23, indicating that the population of Yuba City experience higher levels of environmental impacts than the state as a whole.

Figure 9.1: Caltrans Transportation Equity Index & USDOT Areas of Persistent Poverty



Legend

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities (APPHDC)

Plans

CITY OF YUBA CITY 2040 GENERAL PLAN UPDATE

Yuba City has already made commitments to improving roadway safety, as encapsulated in the following General Plan Policies:

- CI 1-5: As appropriate, implement traffic calming measures such as minimum road right of ways, roundabouts, traffic circles, and other measures.
- CI 5-1: When feasible, construct complete streets for new and modified roadways, plan for usage of the roadway space by all users, including motor vehicles, transit vehicles, bicyclists, and pedestrians (complete streets).
- CI 7-1: Establish a network of on- and off-roadway bicycle routes and encourage their use for commute, recreational, schools and other trips. Design bike routes with the safety of cyclists as a priority.
- CI 7-6: In accordance with Public Works Standard Details, design new pedestrian facilities to be accessible to all persons regardless of ability and ensure that roadway improvement projects address mobility or accessibility for bicyclists or pedestrians.

YUBA CITY LOCAL ROADWAY SAFETY PLAN

The Yuba City Local Roadway Safety Plan (LRSP) is a strategic framework designed to improve traffic safety by identifying crash trends, prioritizing high-risk locations, and recommending targeted countermeasures to reduce severe and fatal crashes. The LRSP identified safety recommendations for the following corridor segments:

- Walton Avenue Between SR 20 and Franklin Avenue
- Gray Avenue Between SR 20 and Franklin Avenue
- Sutter Street/2nd Street/ Garden Highway Between SR 20 and Franklin Avenue
- Bridge Street Between SR 99 and Shasta Street
- Live Oak Boulevard Between Pease Road and Queens Avenue

Projects and Programs

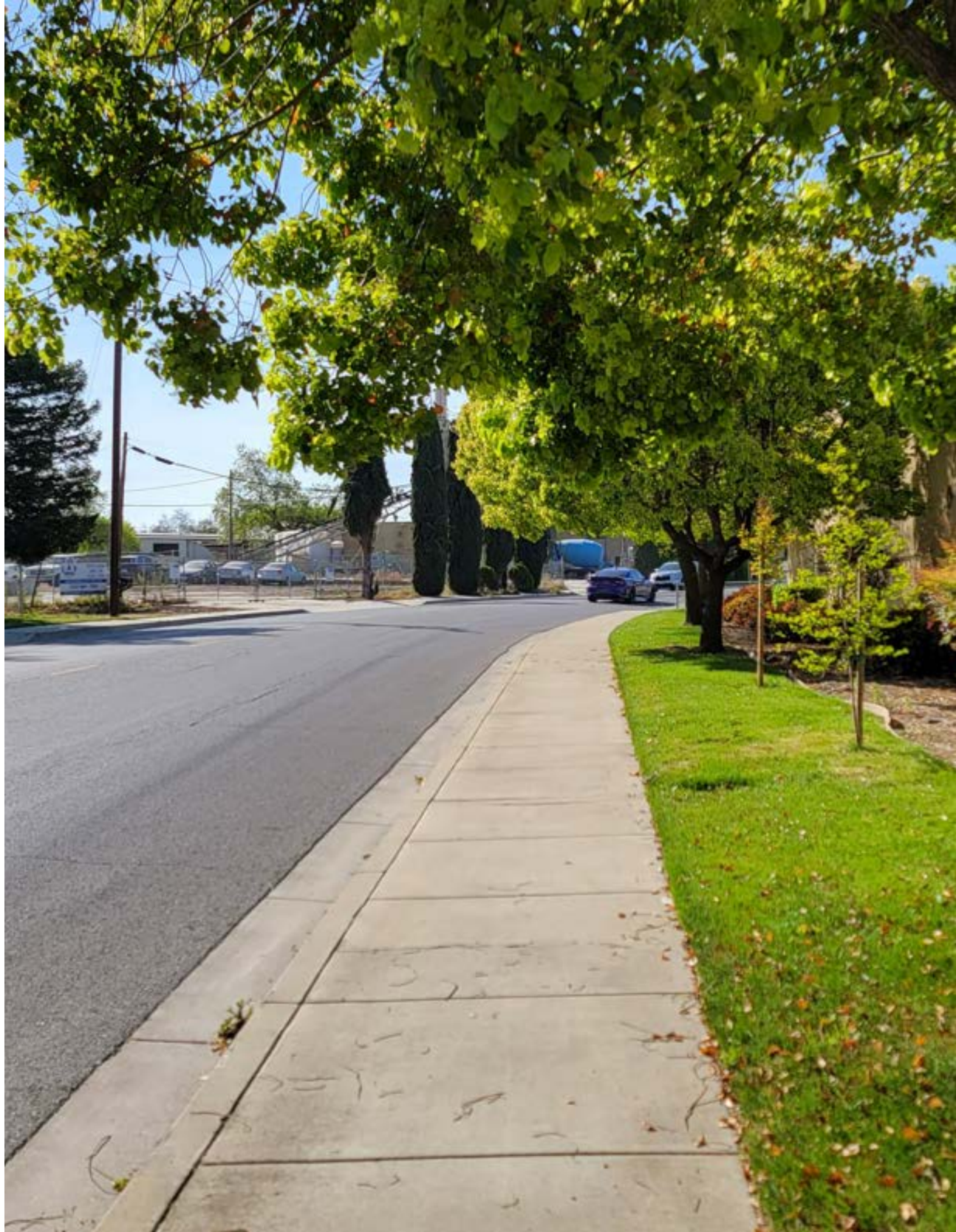
There are numerous infrastructure improvement projects currently underway or planned in Yuba City. The following roadway safety projects are planned on state and local roadway facilities:

- Install backplates with reflective borders to signal lights; install touch-free pedestrian signals; and upgrade curb ramps to American with Disabilities Act (ADA) standards at various locations on SR 20 and SR 99.
- Install signs and restripe crosswalk to ladder type at two intersections: SR 99 and Queens Avenue and SR 20/Colusa Highway and North George Washington Boulevard
- Install traffic signals at the SR 20/Colusa Highway and Stafford Way intersection
- Build concrete barriers and pullouts for maintenance vehicles; upgrade lighting, signs, and facilities to comply with Americans with Disabilities Act (ADA) standards along SR 99 between Encinal Road/Live Oak Boulevard and SR 20/ Colusa Highway
- Extend striping; install traffic signals, headlight signs, and rumble strips; and upgrade existing signs along SR 20 between Central Street and Sutter County limits.

YUBA CITY SAFE ROUTES TO SCHOOL

Yuba City's Safe Routes to School is a multidisciplinary program aimed at making streets safer for students to walk and bike to school and reducing school travel by vehicle. The plan identifies infrastructure improvements, safety education initiatives, and other nonengineering measures at 15 schools in the Yuba City Unified School District:

- Andros Karperos School
- April Lane Elementary School
- Barry Elementary School
- Bridge Street Elementary School
- Butte Vista Elementary School
- Central Gaither Elementary School
- Gray Avenue Middle School
- King Avenue Elementary School
- Lincoln Elementary School
- Lincrest Elementary School
- Park Avenue Elementary School
- River Valley High
- Riverbend Elementary School
- Tierra Buena School
- Yuba City High



INJURY CRASH TOTAL

1,589

KSI CRASH TOTAL

142

Figure 9.2
Injury Crashes by Year, 2018 - 2023

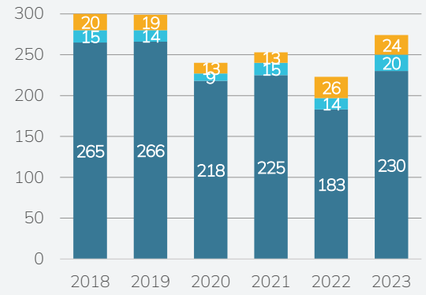
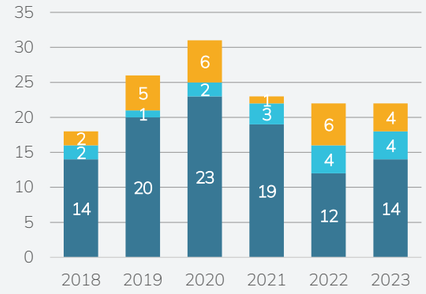


Figure 9.3
KSI Crashes by Year, 2018 - 2023



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Pedestrian-Involved Crashes

Crash Summary

This section summarizes key findings from the city's crash data obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database, for the years 2018 to 2023. The analysis includes all crashes that led to injury and excludes property-damage-only crashes.

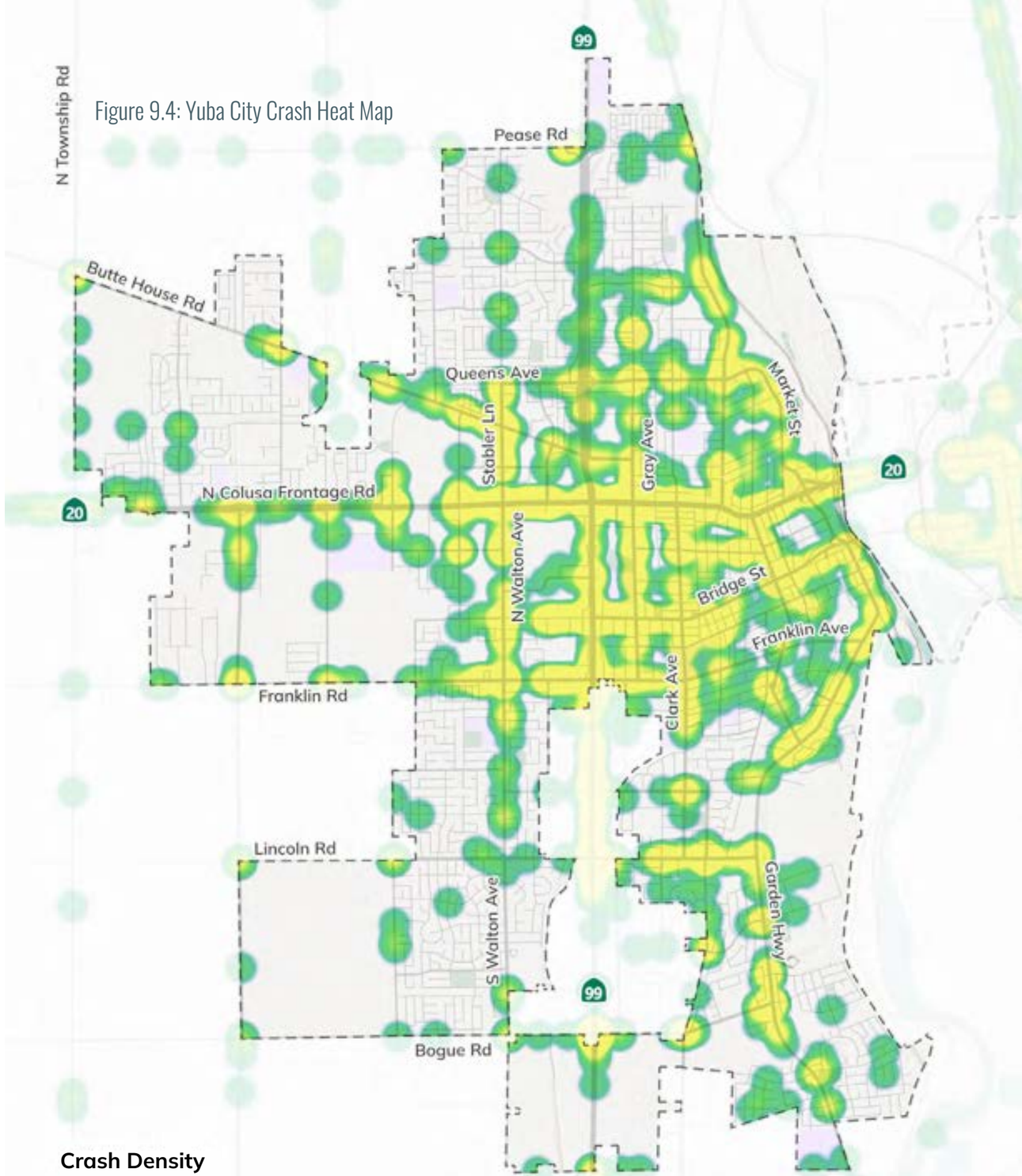
Within the six-year period, Yuba City saw a total of 1,589 crashes that led to some degree of injury, 87 crashes (five percent of all injury crashes) that involved bicyclists, and 115 (seven percent) that involved pedestrians. Yuba City's crashes account for over half (53 percent) of Sutter County's crashes. 142 of Yuba City's injury crashes involved at least one person being killed or severely injured (KSI).

As shown in Figures 9.2 and 9.3, the total number of yearly crashes decreased from 2019 into 2020, the first year of the COVID pandemic, while the number of KSI crashes increased, relative to the prior year. Crash trends have been inconsistent since 2020.

There are several noteworthy corridors with high crash rates:

- About a quarter of all Yuba City crashes took place on State Route 20/Colusa Highway.
- On SR 20/Colusa Highway between Gray Avenue and Clark Avenue, eight crashes involved pedestrians.
- Many rear end crashes occurred where SR 99 intersects Bridge Street and Franklin Road, two major intersections.
- 14 crashes occurred at the Garden Highway and Percy Avenue intersection alone. A cluster of broadside crashes occurred on Bridge Street between North Palora Avenue and North Barrett Road.

Figure 9.4: Yuba City Crash Heat Map



About KSI Crashes

Severe injuries resulting from a traffic crash can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

Throughout this analysis, the acronym KSI is used to denote crashes where someone was killed or severely injured.

KSI Crash Summary

As shown in Figure 9.5, there is a disproportionately greater share of bicycle and pedestrian crashes among KSI crashes, compared to all injury crashes. Out of 142 KSI crashes, 16 (11 percent) involved bicyclists, and 24 (17 percent) involved pedestrians. There was a total of 16 fatalities: 9 drivers or passengers, 5 pedestrians, and 2 bicyclists.

Figure 9.5
Crash Mode Share by Severity

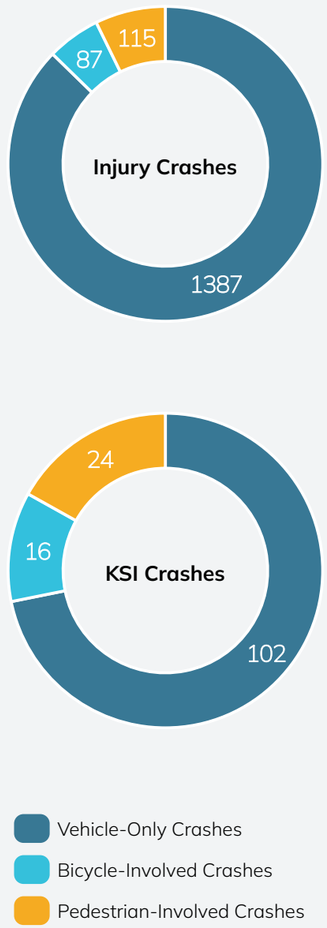
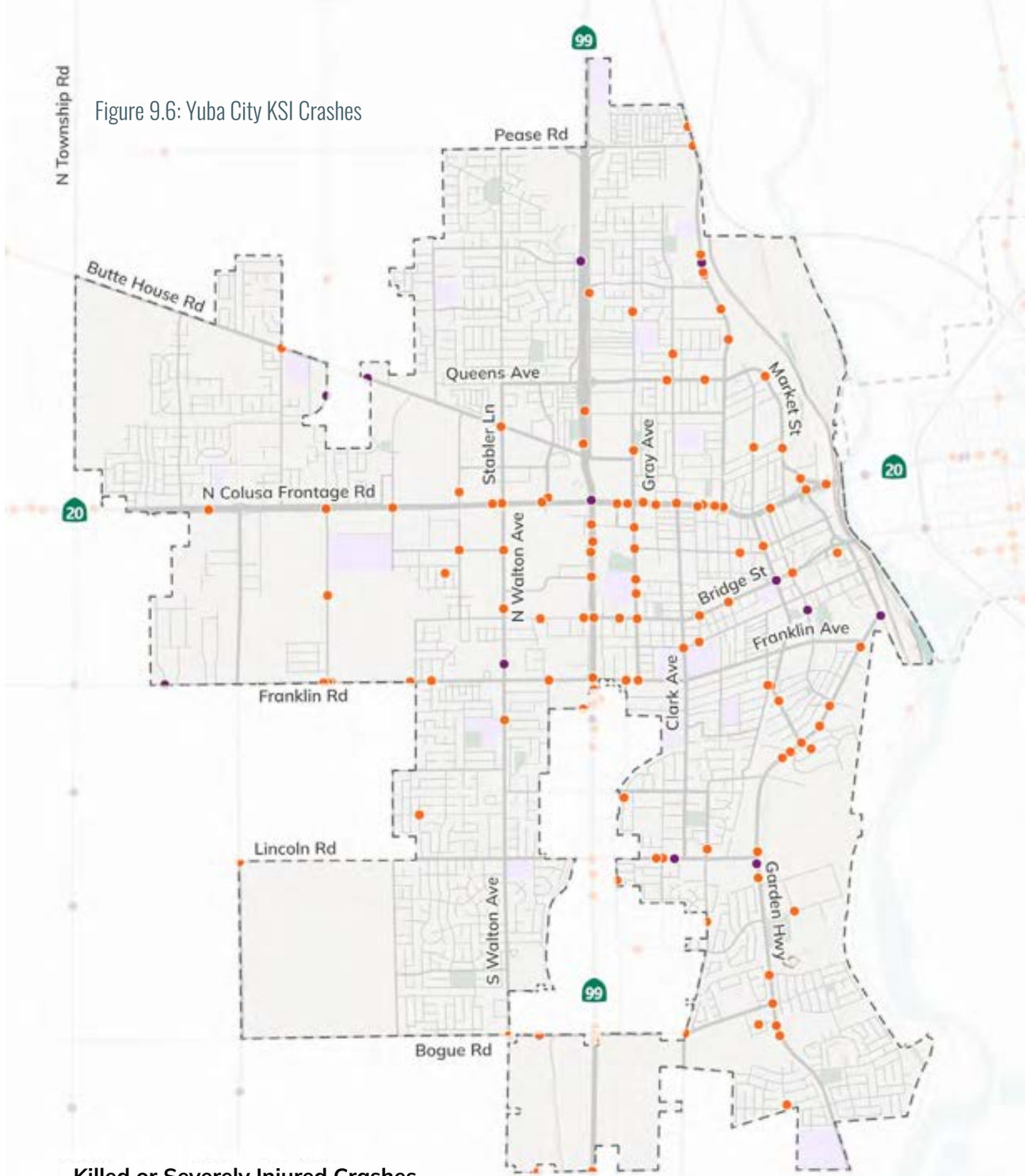


Figure 9.6: Yuba City KSI Crashes



Crashes by Crash Type

Overall, broadside (38 percent) and rear end (29 percent) crashes were the most common crash types, making up two thirds of all injury crashes. Broadside crashes are typically the result of a failure to yield to oncoming traffic that has the right of way. Similarly, among KSI crashes, broadside (37 percent) was also the most common type of crash, followed by vehicle/pedestrian (16 percent), and rear end (14 percent).

Crashes by Primary Crash Factor

Unsafe speed (25 percent) was the leading reported primary cause of crashes, followed by vehicle right of way violation (19 percent). Nearly half the crashes attributed to unsafe speed occurred on state facilities within Yuba City, with one-third along SR 20—mostly between Tharp Road and the eastern city limit—and 15 percent on SR 99. Notably, these were clustered where SR 99 intersects Bridge Street and Franklin Avenue. Overall, 85 percent of all unsafe speed crashes led to rear end crashes.

Driving or bicycling under the influence (18 percent) was the leading reported primary cause of KSI crashes followed by vehicle right of way violation (15 percent) and unsafe speed (13 percent).

Figure 9.7 Share of Injury Crashes by Crash Type

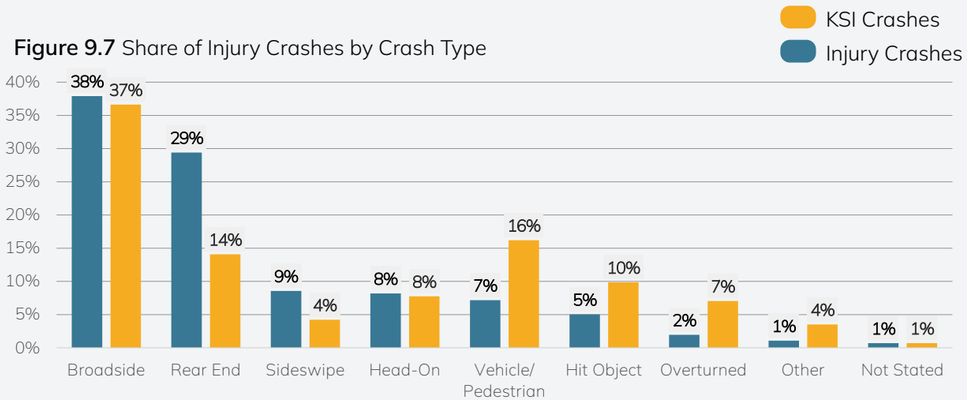
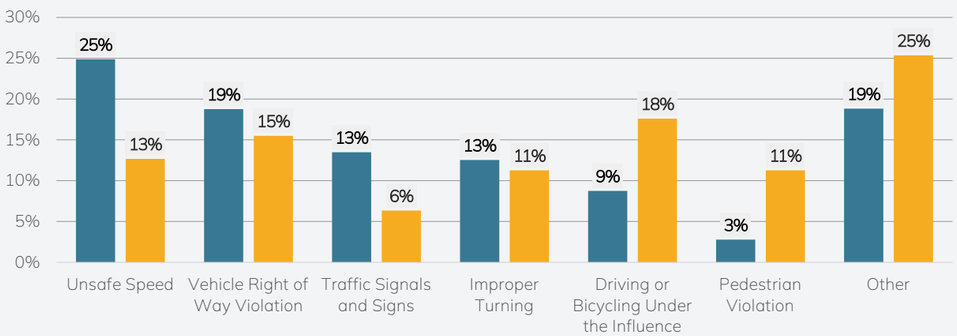


Figure 9.8 Share of Injury Crashes by Primary Crash Factor



Crashes by Time of Day and Lighting Condition

Overall, most crashes occurred in the daylight (73 percent), 20 percent occurred in the dark where streetlight was present, and 3 percent in the dark with no lighting. A disproportionately greater share of KSI crashes occurred during nighttime in areas with lighting, at 35 percent. 55 percent of KSI crashes happened in daylight, and 4 percent took place during the nighttime in areas that lacked lighting.

Most of the crashes that took place under the absence of working streetlights in the dark happened along the SR 20, SR 99, Garden Highway/2nd Street, Live Oak Boulevard, and Pease Road corridors.

Driving Under the Influence

While DUI was involved in 10 percent of all crashes, it accounted for a significantly higher proportion of KSI crashes, at 25 percent. 19 out of 25 DUI KSI crashes led to broadside, rear end, and hit object crashes.

Figure 9.9
Crashes by Time of Day & Lighting

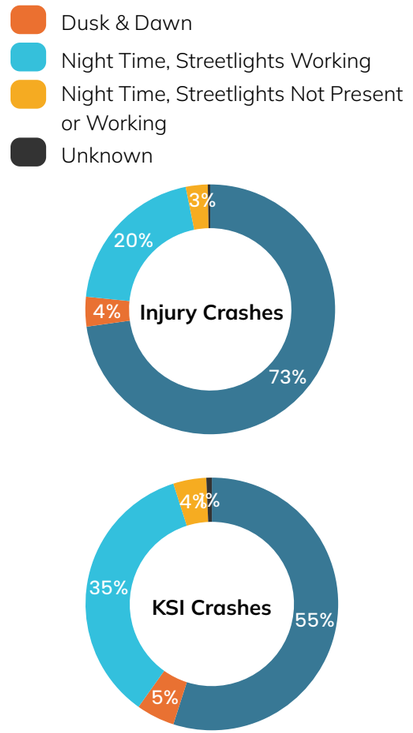
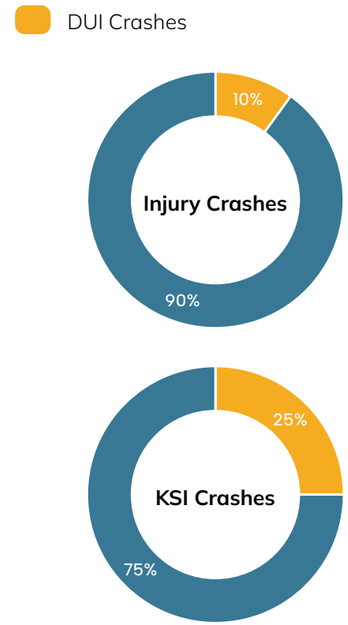


Figure 9.10
DUI Crashes



Note: Lighting conditions for five crashes (<1 percent) in Yuba City were unreported.

Safety Corridors

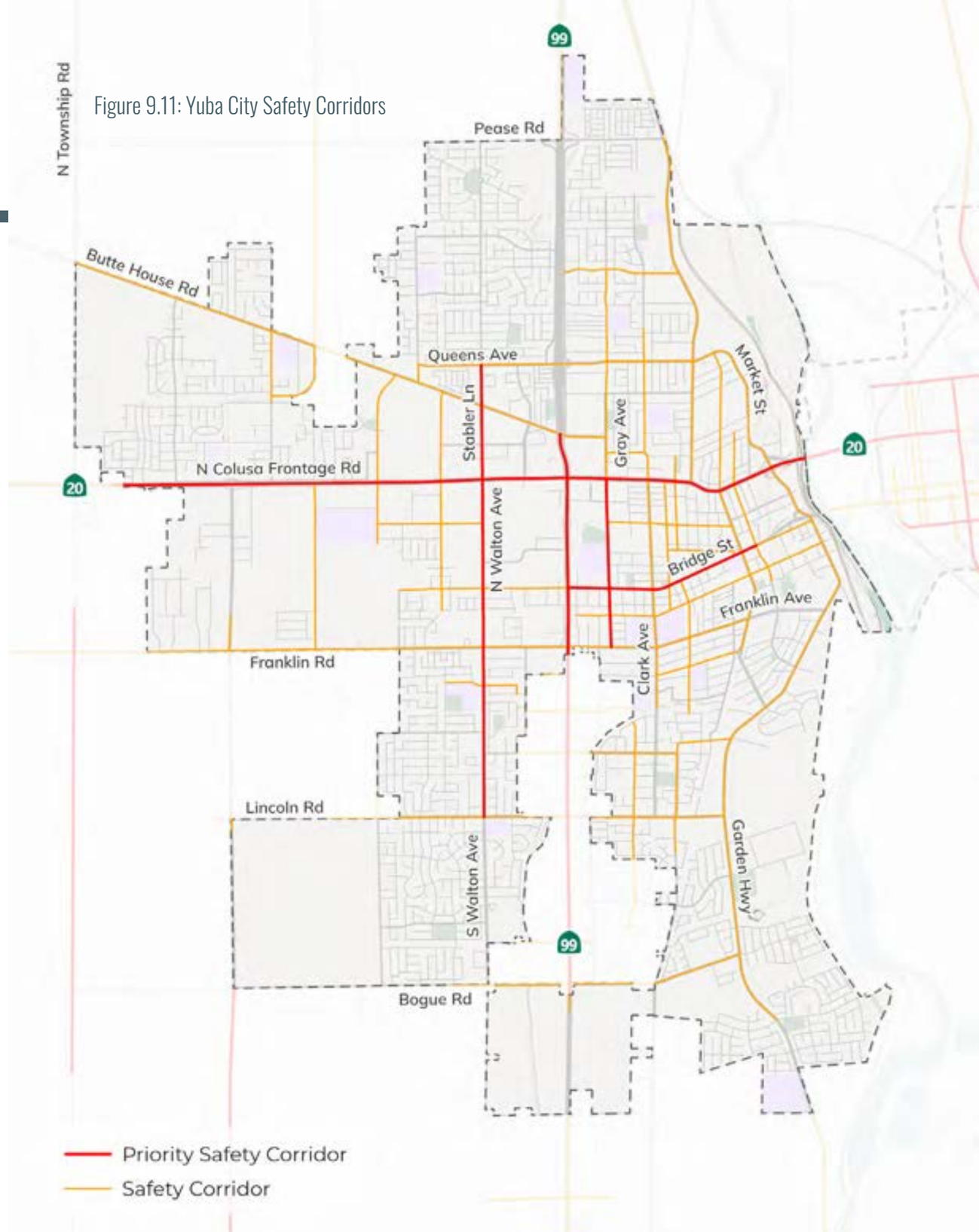
Safety corridors are the roadway segments within Yuba City that had the highest number of crashes resulting in severe injury or death (KSI) in the six-year study period. Priority safety corridors are the safety corridors that experienced the highest rate of KSI crashes, are adjacent to sensitive land uses, and have high potential for severe crashes and thus, should be prioritized for improvements.

The following is a list of Yuba City's priority safety corridors as identified through a safety corridor systemic analysis, task force input, and community feedback. Figure 9.11 displays Yuba City's network of safety corridors, which are shown in orange. Priority corridors are shown in red. Refer to Appendix C for a more detailed explanation of the safety corridor identification technical methodology.

- SR 20 from Western Parkway to Feather River
- SR 99 from Butte House Road to Franklin Avenue
- Stabler Lane from SR 20 to Queens Avenue
- Walton Avenue from SR 20 to Lincoln Road
- Gray Avenue from SR 20 to Franklin Avenue
- Bridge Street from SR 99 to Shasta Street

Priority Safety Corridors were identified to provide the list of locations for actionable next steps with additional study. Studies could include recommended engineering safety countermeasures with targeted improvements to address crash history or focused programs identified in the Action Plan chapter.

Figure 9.11: Yuba City Safety Corridors

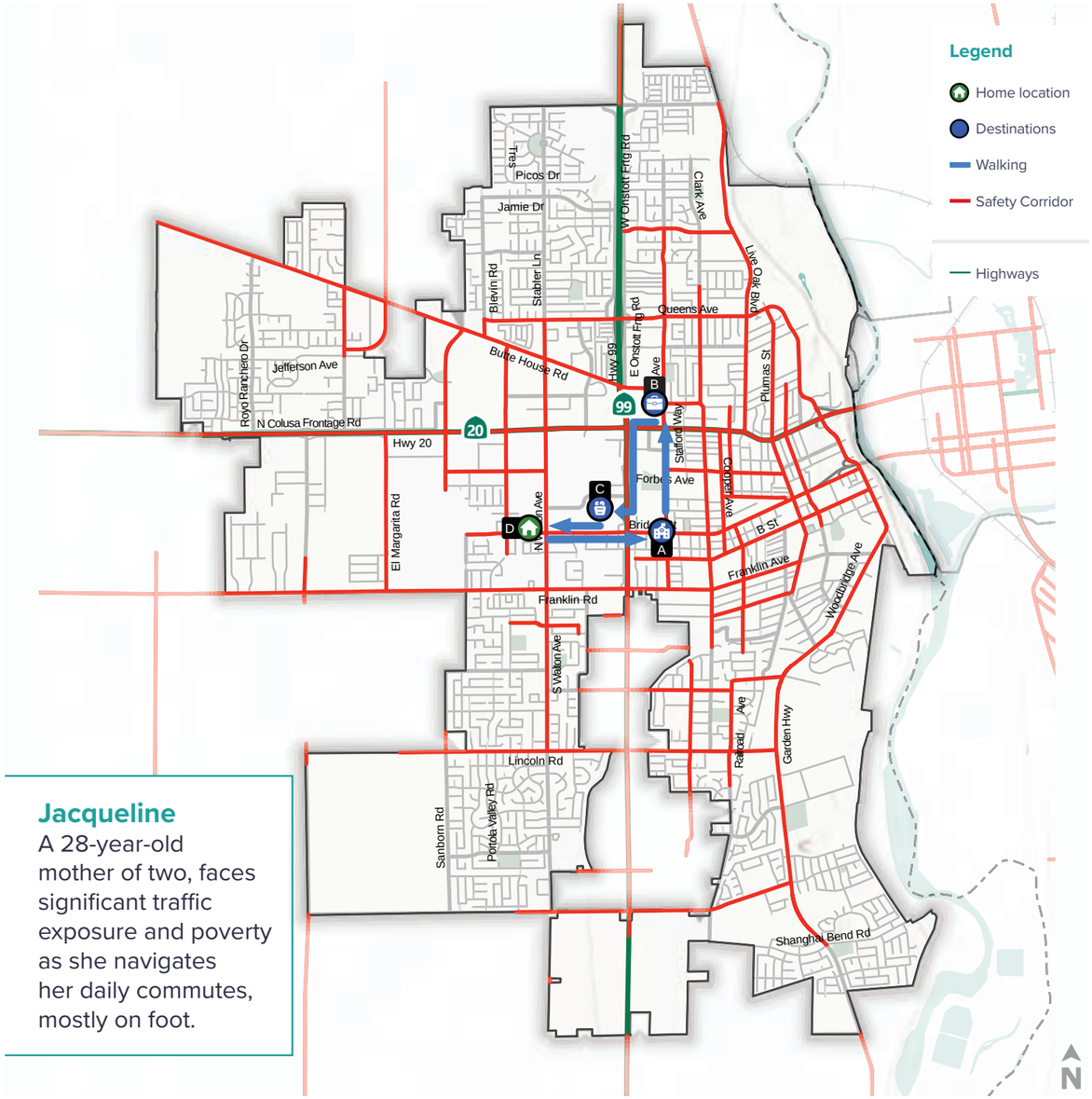


Community Snapshot

This community snapshot features Jacqueline, a fictional character created to illustrate the daily transportation challenges faced by a mother without a personal vehicle in Yuba City. The experiences of this character are based on census data as well as local lived experiences.

A majority of trips within Yuba City are made by driving, but one-tenth are done via walking. Jacqueline, a 28-year-old mother of two, faces daily transportation and safety challenges as she commutes primarily on foot. Her routine includes walking nearly a mile with her twin boys to Gray Avenue Middle School, where crossing Highway 99 at Bridge Street presents a major safety concern. She then walks another mile to work, navigating the dangerous crossing at Highway 20 and Gray Avenue. On her way home, Jacqueline walks 1.25 miles to buy groceries, again encountering hazards along and across Highway 99. Although her final stretch home along Bridge Street is relatively safer, her daily routes expose her to significant traffic risks and reflect the broader challenges of navigating essential errands without access to safe, reliable transportation. Figure 9.12 illustrates Jacqueline's typical daily trip sequence.

Figure 9.12: Yuba City Community Snapshot



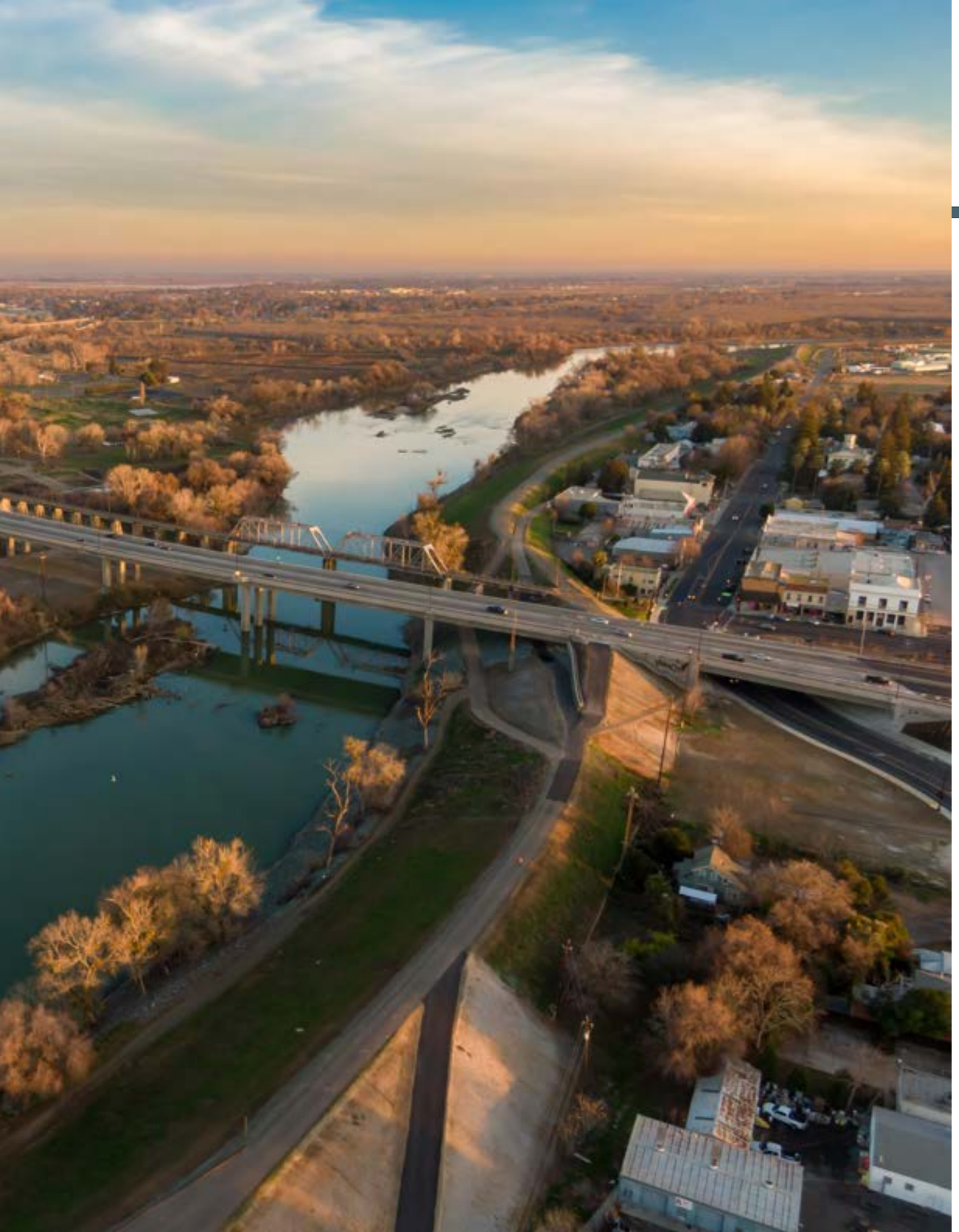
Jacqueline
A 28-year-old mother of two, faces significant traffic exposure and poverty as she navigates her daily commutes, mostly on foot.

A Jacqueline walks nearly a mile with her twin boys to Gray Avenue Middle School. The main challenge on this leg is safely crossing Highway 99 at Bridge Street.

B On her way to work, Jacqueline walks another mile, with the difficulty of crossing Highway 20 at Gray Avenue along the way.

C To buy groceries on her way home, she walks 1.25 miles, facing hazards walking along and crossing Highway 99.

D After the grocery store, Jacqueline enjoys a short walk back home, along Bridge Street.



Focus Areas

Six focus areas were identified through a systemic analysis of crash records to represent the most significant patterns behind injury crashes—and especially KSI crashes—in the region. These focus areas are identified with the letters “A” through “F” and each one is applicable to one, several, or all of the communities covered by this RSAP. Following each crash focus area is a set of potential countermeasures that should be considered for implementation to improve safety outcomes. Appendix D contains a more detailed summary of each countermeasure.

Yuba City’s traffic safety challenges can be understood through a subset of these focus areas:

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

FOCUS AREA B

Right-of-Way Issues at Intersections

FOCUS AREA C

Driving Under the Influence

FOCUS AREA D

Crashes Involving People Walking and Biking

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

INJURY CRASH STATISTICS

532 (34%) **Total Crashes**

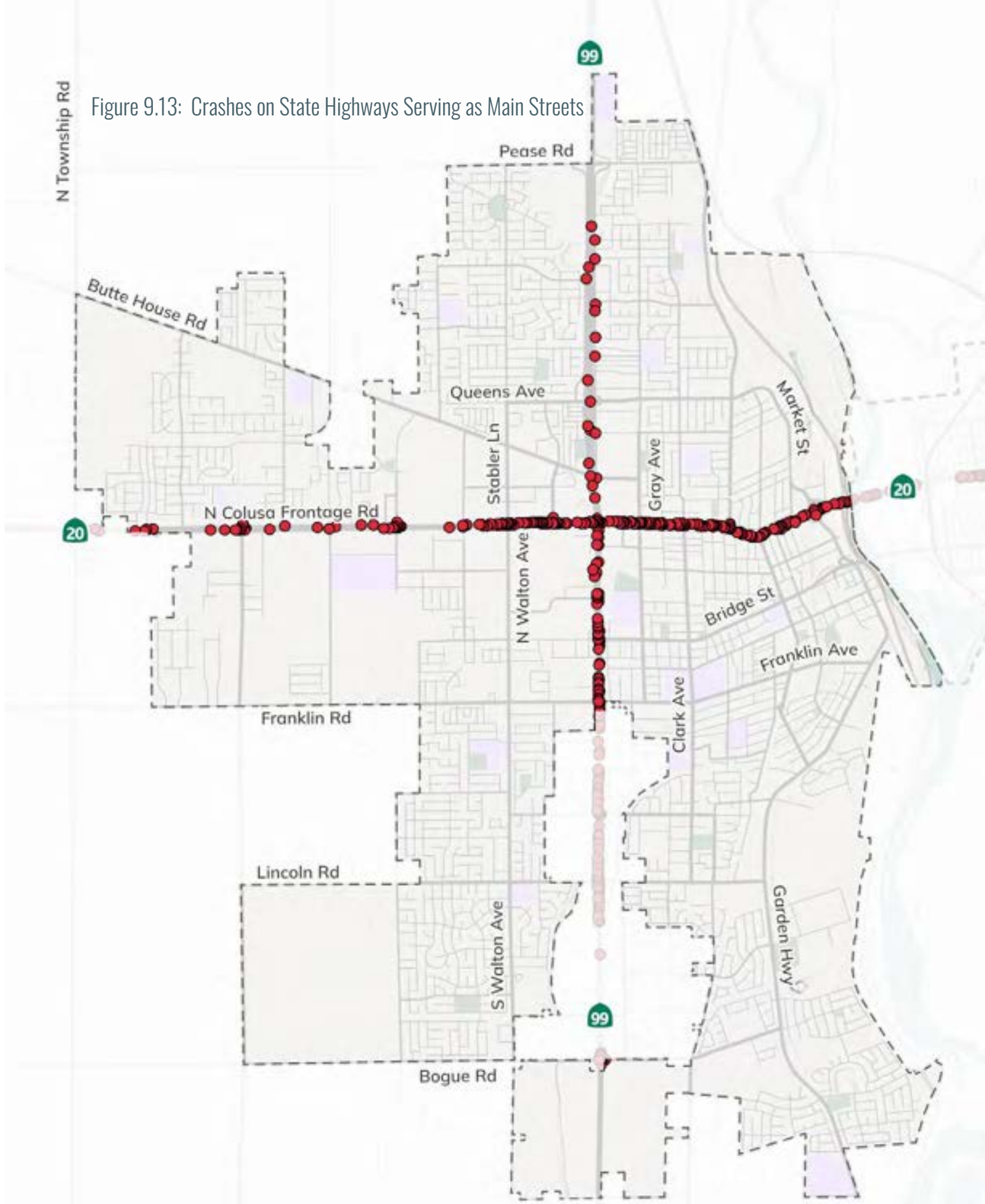
42 (30%) **KSI Crashes**

State Routes 99 and 20 serve as main streets within Yuba City, traversing the middle of the city in a north-south and east-west direction, respectively. Roads of this nature—arterials designed not just for local but also regional mobility and situated along key destinations—typically have higher crash rates and often see conflict between the different modes of transportation. Within the six-year period, 532 total crashes occurred on this road type, making up 34 percent of Yuba City's crashes; 42 of these crashes resulted in a fatal or severe outcome, which account for 30 percent of KSI crashes.

These roads are heavily utilized in Yuba City by residents and visitors since they provide access to shops and businesses and connectivity to other parts of the city and region. These roads are four lanes wide in order to accommodate the high volumes. Wider roads typically induce travel at higher speeds and increase the time needed to safely cross them. The top leading causes behind the crashes that happened under this focus area were unsafe speed (38 percent) and right-of-way violation (29 percent). The most common crash types to result were rear end (42 percent) and broadside (33 percent), crash types that are typically more severe.

The following countermeasures can improve safety along highway main streets by slowing vehicle speeds, organizing traffic flow, and reducing conflict points between roadway users.

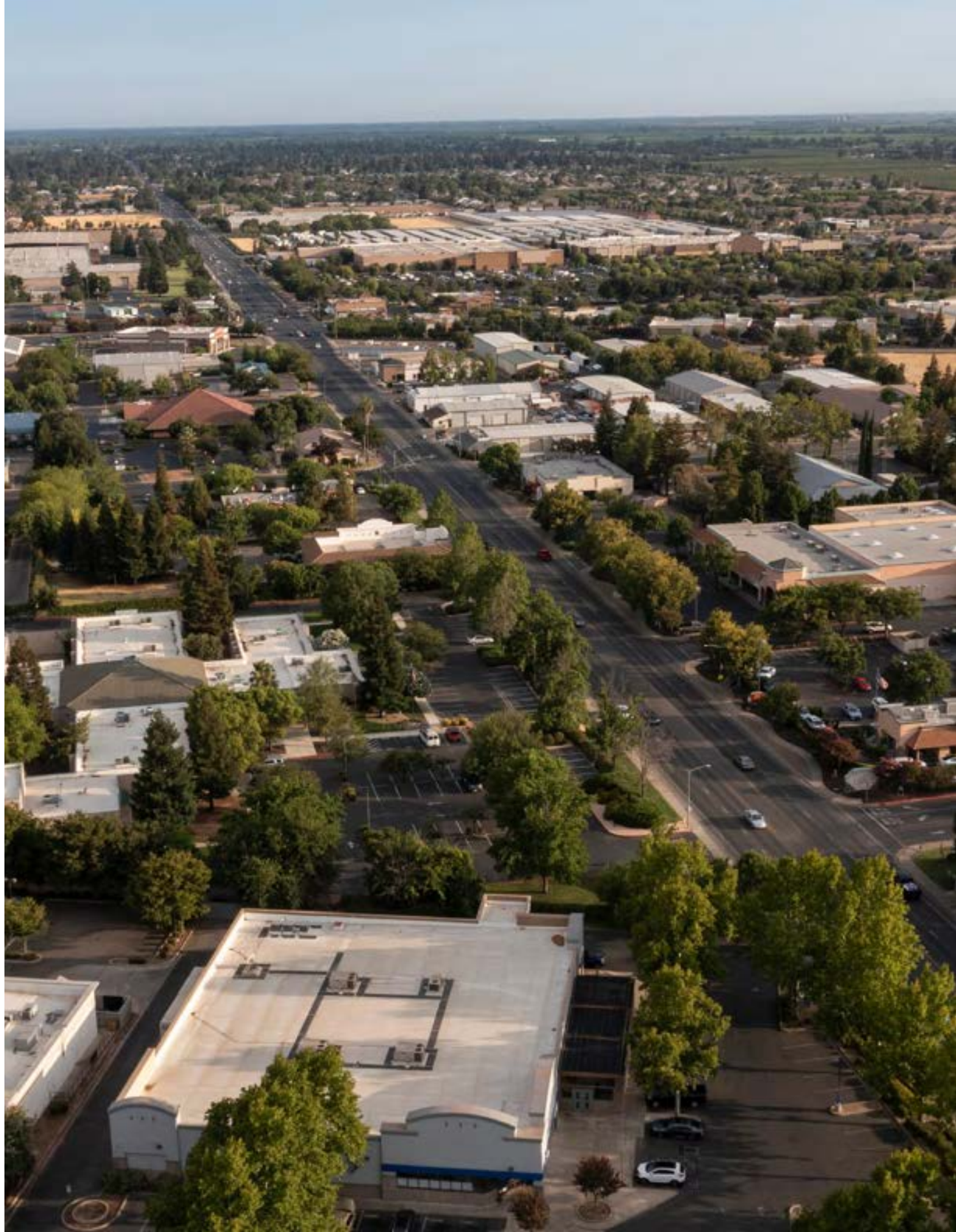
Figure 9.13: Crashes on State Highways Serving as Main Streets



Yuba City

Potential Countermeasures

- Traffic Signal
- Roundabout
- All-Way Stop Control
- Close Slip Lane
- Slow Turn Wedge
- Advance Stop Bar
- Lane Narrowing
- Road Diet
- Driveway Consolidation
- Raised Median
- Directional Median Openings to Restrict Left Turns
- Separated Bikeways
- Buffered Bike Lanes
- Bike Lane
- Add Sidewalk
- Street Lighting
- Speed Limit Reduction
- Speed Feedback Sign
- Advanced Dilemma Zone Detection
- Flashing Yellow Turn Phase
- All-Red Signal Time
- Speed Sensitive Rest in Red Signal
- Retroreflective Tape on Signals



FOCUS AREA B

Right-of-Way Issues at Intersections

INJURY CRASH STATISTICS

446 (28%) **Total Crashes**

27 (19%) **KSI Crashes**

In Yuba City, 446 crashes (28 percent of Yuba City's total crashes from 2018 to 2023) were recorded at intersections where the primary contributing factor was right-of-way violation; 27 resulted in someone being killed or seriously injured, making up 19 percent of Yuba City's KSI crashes.

These incidents predominantly stemmed from drivers failing to yield to oncoming or cross traffic that legally possessed the right-of-way. In many cases, motorists either misjudged the speed and distance of approaching vehicles or did not come to a complete stop at the appropriate distance from the main thoroughfare. As a result, a majority of these crashes culminated in broadside, or T-bone, crashes—an especially dangerous type of crash due to the limited protection on the sides of vehicles—highlighting the importance of right-of-way compliance at intersections.

SR 20/Colusa Highway, Bridge Street, Clark Avenue, Walton Avenue, Gray Avenue, Franklin Boulevard, and Garden Highway saw the highest frequency of this type of crash.

The following countermeasures directly target right-of-way issues by making intersections safer, more predictable, and easier to navigate.

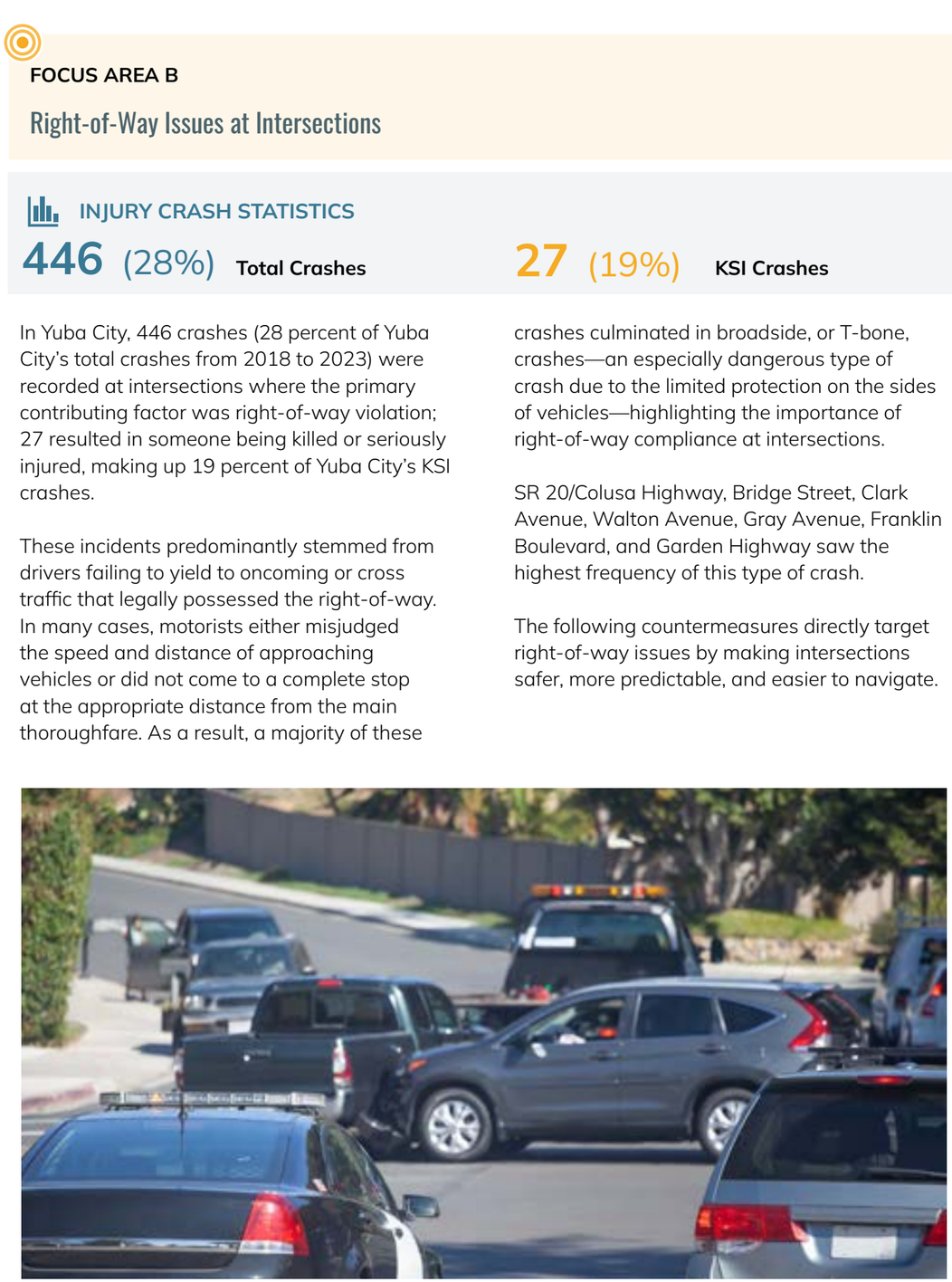
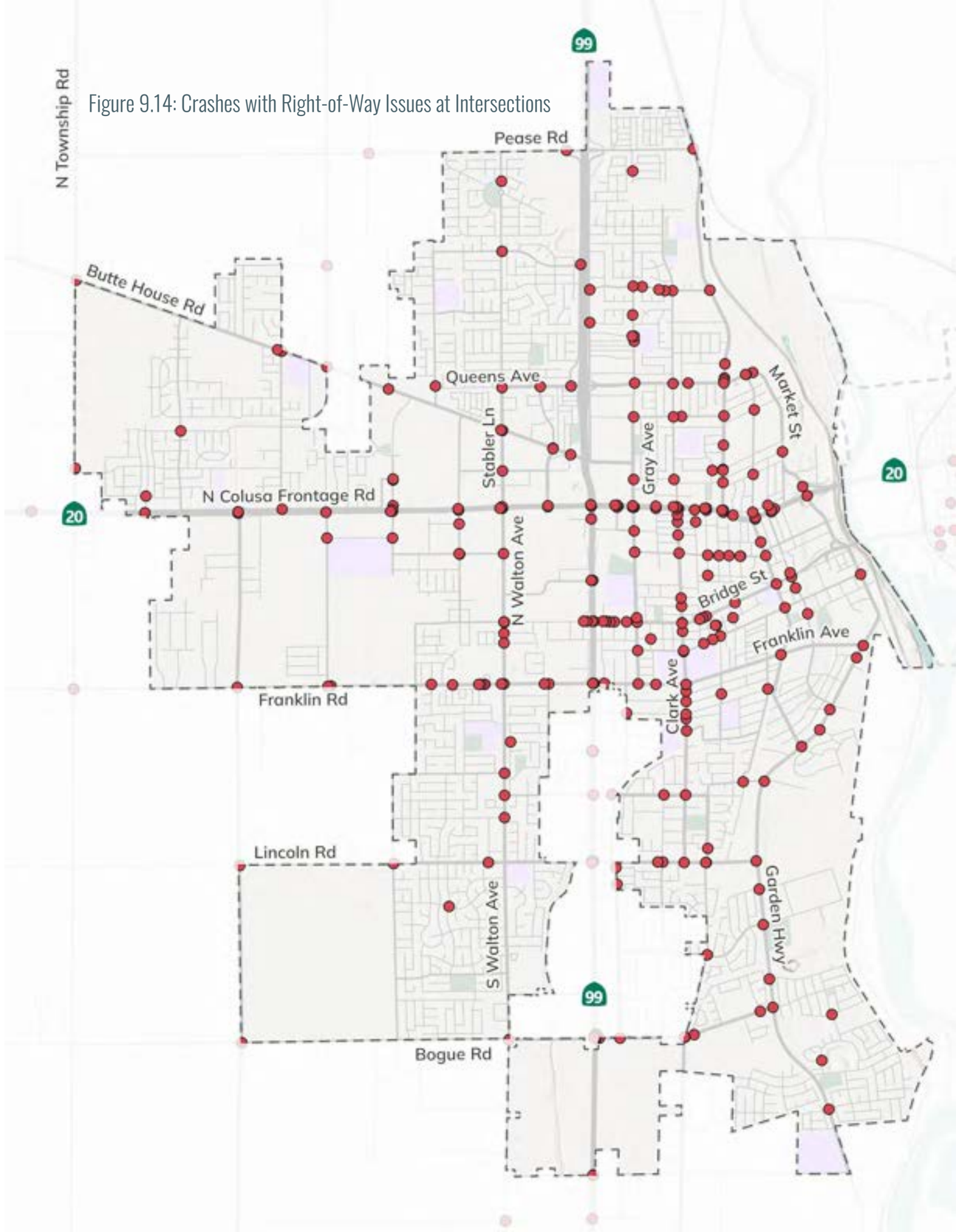


Figure 9.14: Crashes with Right-of-Way Issues at Intersections



Potential Countermeasures

- Roundabout
- Neighborhood Traffic Circle
- Intersection Reconstruction and Tightening
- Advance Stop Bar
- Raised Median
- Road Diet
- Rectangular Rapid Flashing Beacon
- High-Visibility Crosswalk
- Advanced Dilemma Zone Detection
- Flashing Yellow Turn Phase
- Traffic Signal
- Close Slip Lane
- Slow Turn Wedge
- Centerline Hardening
- Lane Narrowing
- Through Bike Lane at Intersection
- Pedestrian Hybrid Beacon
- Bicycle Signal/Exclusive Bike Phase
- Protected Left Turns
- All-Red Signal Time

FOCUS AREA C

Driving Under the Influence

INJURY CRASH STATISTICS

160 (10%) **Total Crashes**

37 (26%) **KSI Crashes**

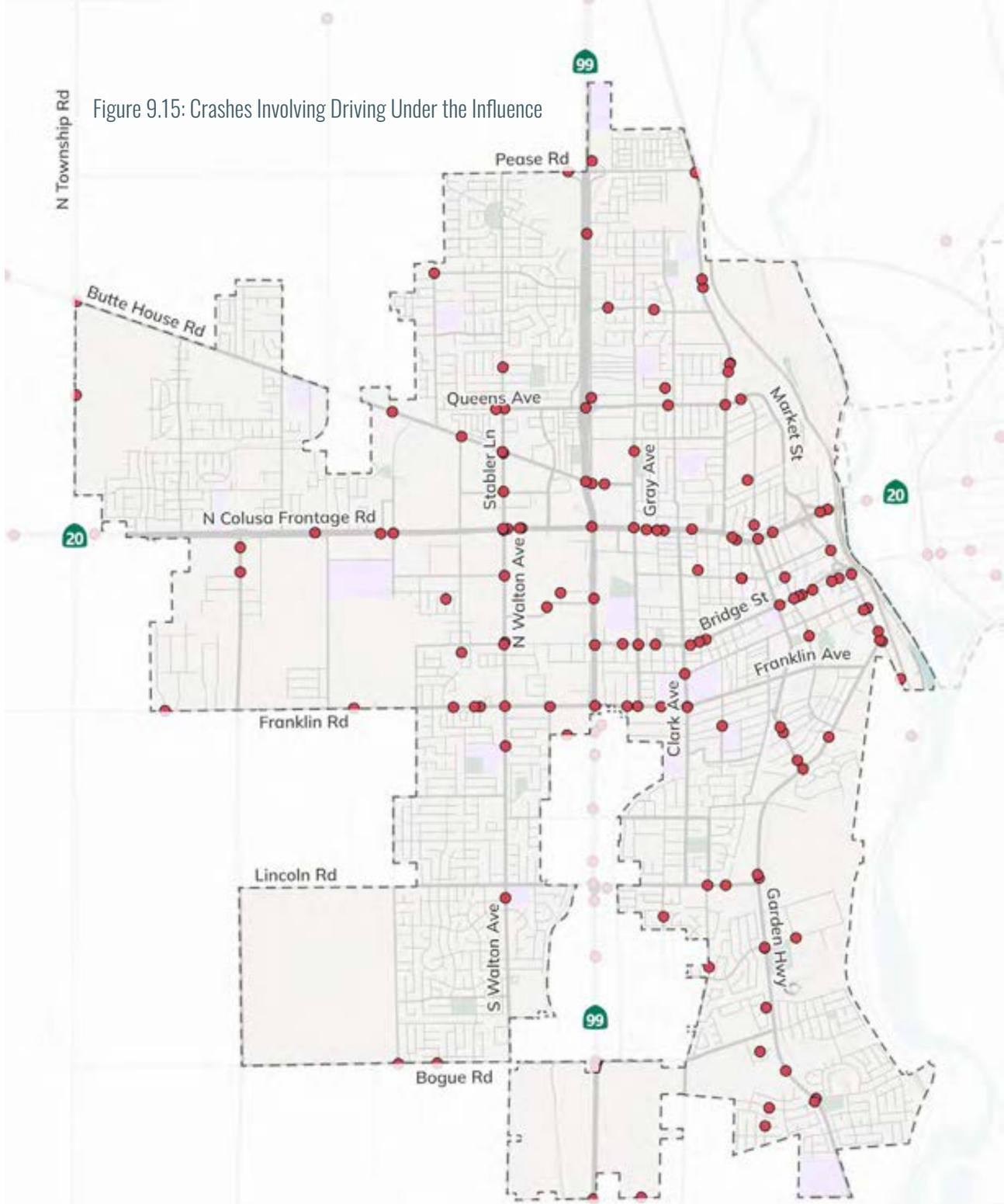
Driving under the influence remains a leading cause of severe and fatal crashes in Yuba City, with impaired driving incidents disproportionately contributing to the city's most serious roadway outcomes. While DUI-related crashes account for only 10 percent of all crashes in Yuba City, they represent 26 percent of KSI crashes. Figure 9.15 displays all DUI crashes that occurred in Yuba City.

Crashes are primarily concentrated along major roadways and intersections, with the highest densities appearing in the central and eastern parts of the city. Notable clusters are visible along SR 20/Colusa Highway, Bridge Street, and Garden Highway, which serve as key thoroughfares for local and regional traffic.

Intersections such as Queens Avenue and Live Oak Boulevard also show a significant number of incidents. Some crashes are scattered throughout residential neighborhoods, but these are less frequent. Rear end crashes were the most common crash type to result from DUIs, accounting for 33 percent, followed by broadside (23 percent). DUI-related crashes tend to pose a greater risk to those involved; in Yuba City, nearly one-fourth of these crashes had a KSI outcome.

Addressing DUI-related crashes most effectively requires non-engineering strategies, particularly those focused on education and enforcement.

Figure 9.15: Crashes Involving Driving Under the Influence



FOCUS AREA D

Crashes Involving People Walking and Biking

INJURY CRASH STATISTICS

201 (13%) **Total Crashes**

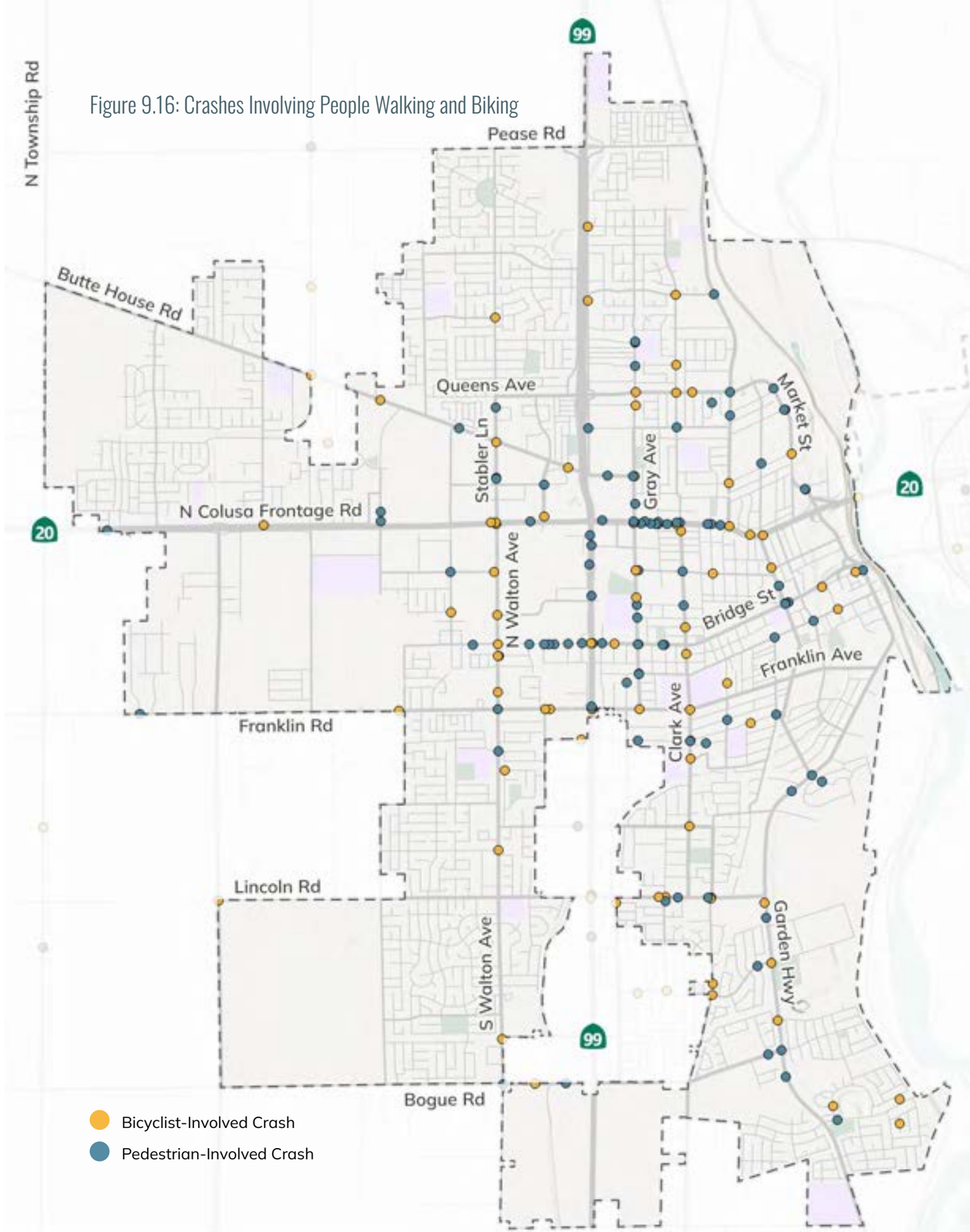
40 (28%) **KSI Crashes**

Pedestrians and bicyclists are among the most vulnerable users on Yuba City's roadways. While they represent a smaller share of overall traffic, they are involved in 13% of all crashes in the city, and account for an alarming 28% of KSI crashes. The leading contributing factors behind these crashes were attributed to drivers failing to yield at crosswalks or signal, pedestrians crossing outside of designated crossing areas, and traveling on the left side of the road.

The convergence of high traffic volumes with areas where people live, shop, walk, and bike play a role in the frequency of crashes on key corridors in the city. Central Yuba City has the highest density of crashes; SR 20/Colusa Highway, Bridge Street, Walton Avenue, Gray Avenue, and Clarke Avenue are high incidence corridors. Notably, there are dense clusters of (mostly) pedestrian crashes on SR 20 between Gray Avenue and Clarke Avenue and Bridge Street between Joann Way and North Lawrence Avenue, locations within busy commercial areas that are adjacent to residential neighborhoods and served by wide, four-lane roads. There is a series of crashes right outside Gray Avenue Middle School along Gray Avenue. Additional crashes occurred along Garden Highway and Franklin Road.

The following countermeasures reduce risks for crashes involving pedestrians and bicyclists by making them more visible to drivers, providing safer and more frequent opportunities to cross busy roads, and creating dedicated or protected spaces for their use.

Figure 9.16: Crashes Involving People Walking and Biking



Yuba City

Potential Countermeasures

- Rectangular Rapid Flashing Beacon
- High-Visibility Crosswalk
- Pedestrian Hybrid Beacon
- Leading Pedestrian Interval and Pedestrian Recall
- Co-Locate Bus Stops and Pedestrian Crossings
- Curb Extensions
- Shared-Use Path
- Separated Bikeway
- Buffered Bike Lanes
- Green Conflict Striping
- Bike Lane
- Add Sidewalk

CHAPTER 10
Live Oak Crash Analysis

This Plan and Our Region

Introduction

Live Oak is a small city in northeast Sutter County, about 10 miles north of Yuba City and 50 miles north of Sacramento. It has a population of about 9,100. The city is surrounded by rich farmlands, orchards, the Feather River, and Sutter Buttes.

State Route 99 bisects the city, serving as a connection to nearby cities such as Yuba City. Pennington Road, another key corridor, traverses east-west through the city. The transportation system reflects the city's rural character, with limited but functional public transit options such as Yuba-Sutter Transit, which offers weekday round-trips to nearby cities like Yuba City and Marysville, along with several scheduled stops within Live Oak itself. For those traveling by car, the city is easily navigable, and recent infrastructure upgrades to SR 99 have made walking and biking much more viable in some areas.

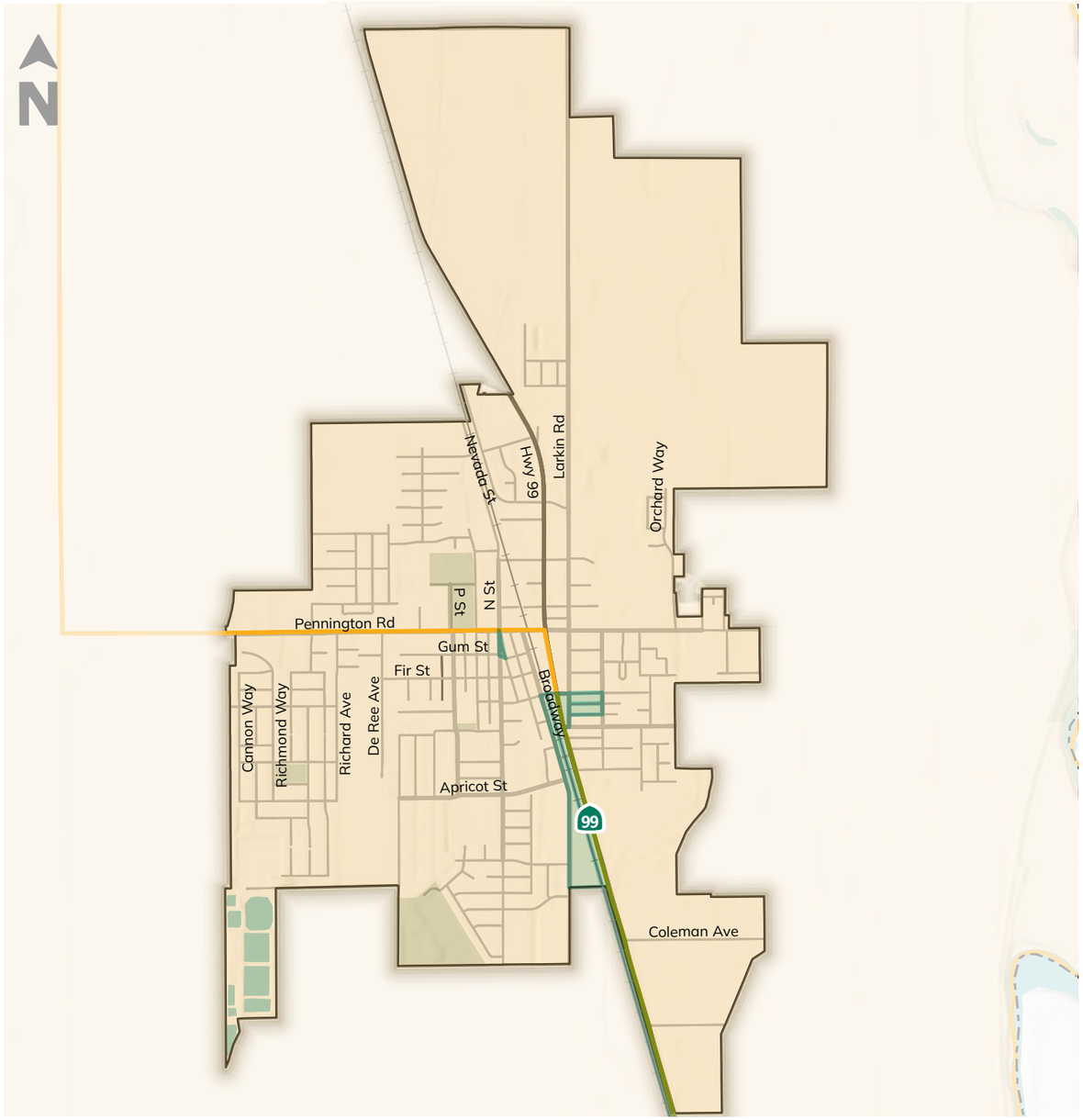
Communities of Concern

Sociodemographic data sources are helpful to better understand the community, as well as when applying for state and federal grant funding to implement infrastructure projects. Figure 10.1 shows locations in Live Oak that meet the criteria for two community metrics relevant to grant applications:

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations: 0.4 percent of Live Oak's population meets Caltrans' threshold for Transportation-Disadvantaged status, compared to 16 percent statewide.
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities: 100 percent of Live Oak's population lives in areas of persistent poverty and historically disadvantaged communities, compared to 28 percent statewide.

In CalEnviroScreen, which evaluates environmental burdens including air pollution, traffic density, and health vulnerabilities, Live Oak received a score of 31, where the state had a score of 23, indicating that the population of Live Oak experience higher levels of environmental impacts than the state as a whole.

Figure 10.1: Caltrans Transportation Equity Index & USDOT Areas of Persistent Poverty



Legend

- Caltrans Transportation Equity Index (EQI) Transportation-Based Priority Populations
- USDOT Areas of Persistent Poverty and Historically Disadvantaged Communities (APPHDC)

Projects

Live Oak has already demonstrated a commitment to roadway safety through the adoption of several plans, namely the Highway 99 Streetscape Master Plan, Bicycle, Pedestrian & Trails Plan and Circulation Element of the Live Oak General Plan. The Highway 99 Streetscape Master Plan is a long-range, multi-phase infrastructure and urban design strategy to transform SR 99 through Live Oak into a safer, more attractive, and multimodal corridor. The city's Bicycle, Pedestrian & Trails Plan establishes policies and identifies projects and programs to support a robust and safe network for people walking and biking, connecting them to community destinations. In addition, there are several policies within the Circulation Element that support roadway safety for all users.

Refer to **Appendix A** for a comprehensive list of policies that support the city's safety goals.

Projects

There are numerous infrastructure improvement projects currently underway or planned in Live Oak on state and local roadway facilities. These include the development of Class I off-street bikeways, the construction and reconstruction of roads with integrated sidewalks and bike lanes, and streetscape improvements along SR 99 as part of the Highway 99 Streetscape Master Plan's later phases.

Major safety improvements made to the Highway 99 corridor between Ramsdell Drive and Ash Street were completed in 2022, as part of the Highway 99 Streetscape Master Plan Phases 1 through 3.

INJURY CRASH TOTAL

108

KSI CRASH TOTAL

5

Figure 10.2
Injury Crashes by Year, 2018 - 2023

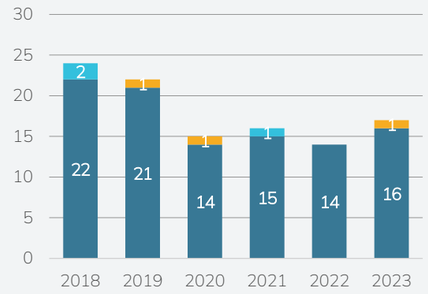
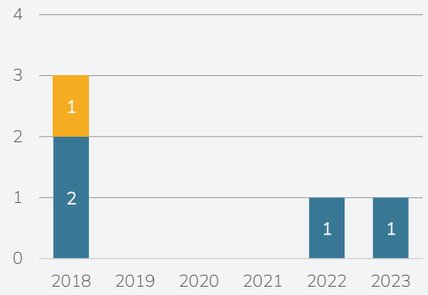


Figure 10.3
KSI Crashes by Year, 2018 - 2023



KSI = Killed or Severely Injured

Vehicle-Only Crashes
Bicycle-Involved Crashes
Pedestrian-Involved Crashes

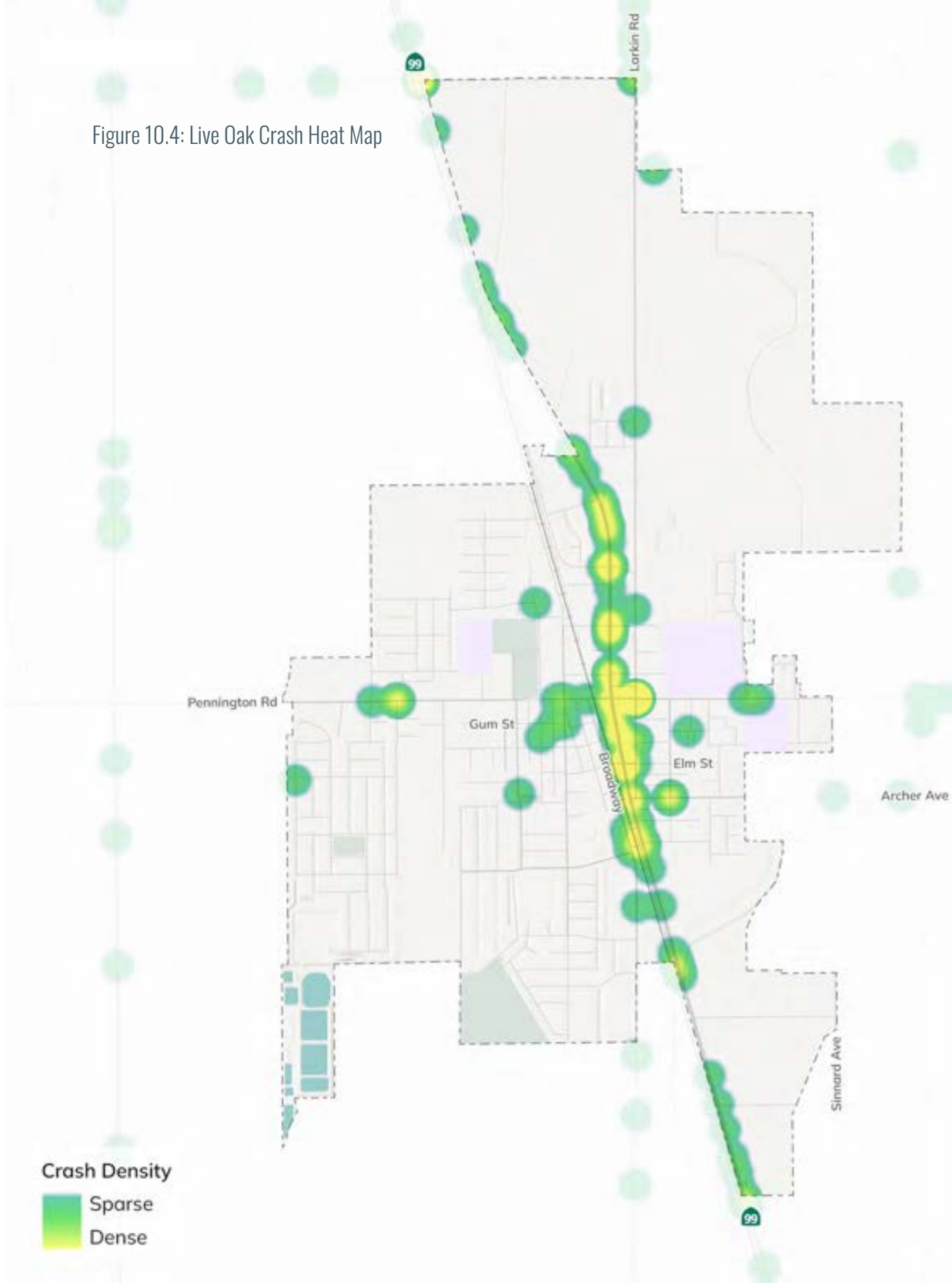
Crash Summary

This section summarizes key findings from the city's crash data obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database, for the years 2018 to 2023. The analysis includes all crashes that led to injury and excludes property-damage-only crashes.

Within the six-year period, Live Oak saw a total of 108 crashes that led to some degree of injury, three crashes (three percent of all injury crashes) involved bicyclists and three (three percent) involved pedestrians.

State Route 99/Nevada Street, Pennington Road/Larkin Road, and Live Oak Boulevard/ Elm Street are hotspot intersections that saw a higher number of crashes than others. Notably, at the SR 99 and Nevada Street intersection, there are stop signs on Nevada Street, the side street, while the main corridor SR 99 is free-flow with a posted speed limit of 40 MPH. The Larkin Road and Pennington Road intersection is another hotspot location of concern, as it is near the high school.

Figure 10.4: Live Oak Crash Heat Map



About KSI Crashes

Severe injuries resulting from a traffic crash can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

Throughout this analysis, the acronym KSI is used to denote crashes where someone was killed or severely injured.

KSI Crash Summary

Five out of 108 injury crashes in Live Oak resulted in a victim being Killed or Severely Injured (KSI). There was a total of two fatalities, both of which were a vehicle driver or passenger. All KSI crashes occurred on SR 99.

Figure 10.5
Crash Mode Share by Severity

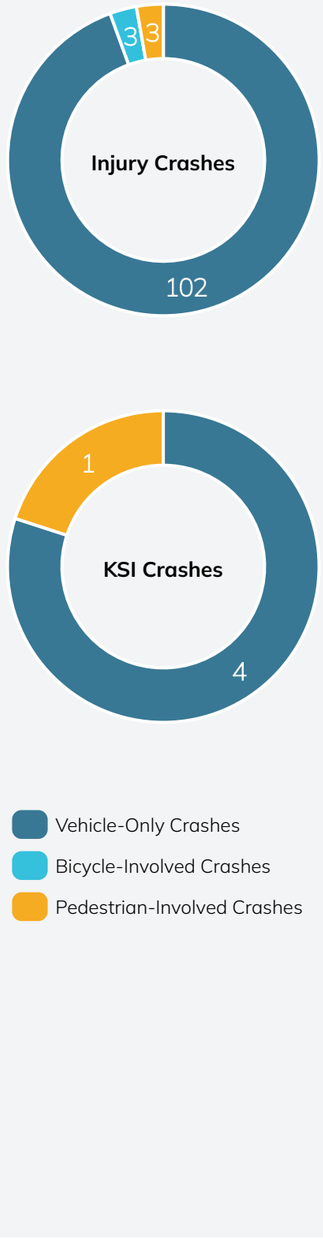


Figure 10.6: Live Oak KSI Crashes

Crashes by Crash Type

Overall, broadside (43 percent) and rear end (32 percent) crashes were the most common crash types, making up three-fourths of all injury crashes. Broadside crashes are typically the result of a failure to yield to oncoming traffic that have the right of way. Similarly, broadside crashes account for the majority of KSI crashes (three of five). The other two KSI crashes were hit object and vehicle/pedestrian.

Crashes by Primary Crash Factor

Vehicle right of way (27 percent) and unsafe speed (26 percent) were the leading reported primary causes of crashes resulting in injury. Additional causes included traffic signals and signs, following too closely, improper turning, and driving on the wrong side of road. Two KSI crashes were due to vehicle right of way and two due to unsafe speed. Another KSI crash was related to a pedestrian violation.

Crashes by Time of Day and Lighting Condition

Overall, most crashes occurred in daylight (77 percent), 11 percent occurred in the dark where streetlight was present, and 6 percent in the dark where streetlight was not present or working properly. A disproportionately greater share of KSI crashes occurred in the dark in areas lacking proper lighting, at 40 percent, while the other 60 percent occurred in daylight. 14 out of the 18 crashes that occurred under dark/no lighting conditions took place before the SR 99 improvements construction was completed in 2022.

Driving Under the Influence

Five percent of all crashes involved someone driving under the influence of alcohol or drugs. No KSI crashes involved a DUI.

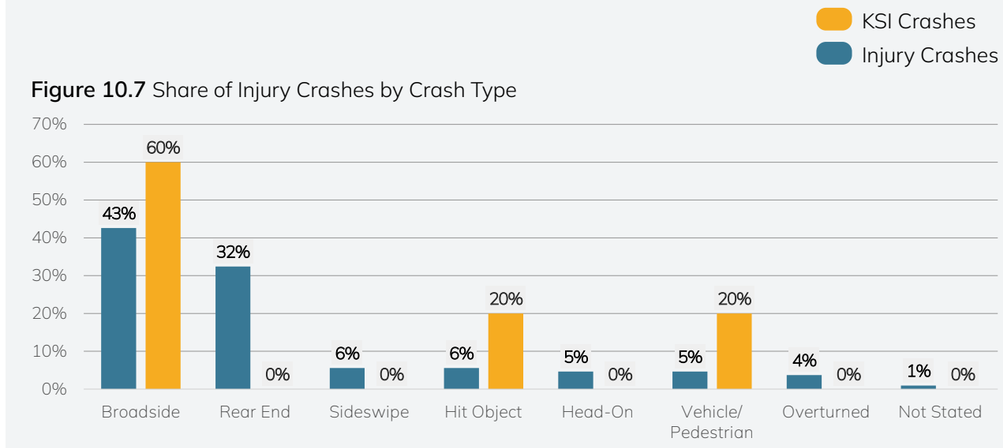


Figure 10.7 Share of Injury Crashes by Crash Type

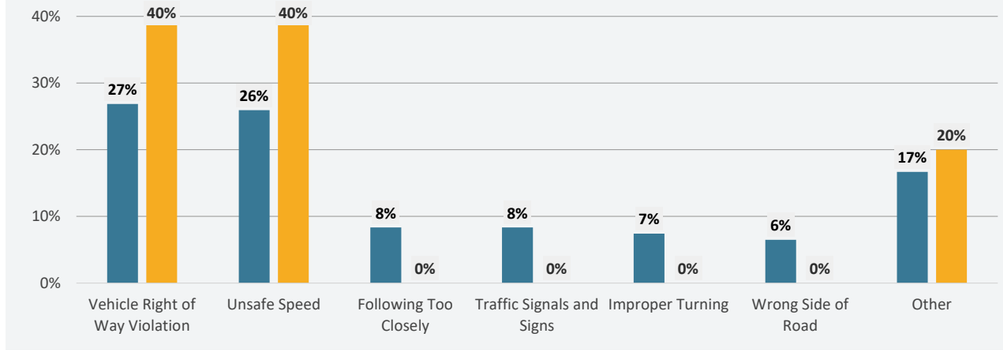
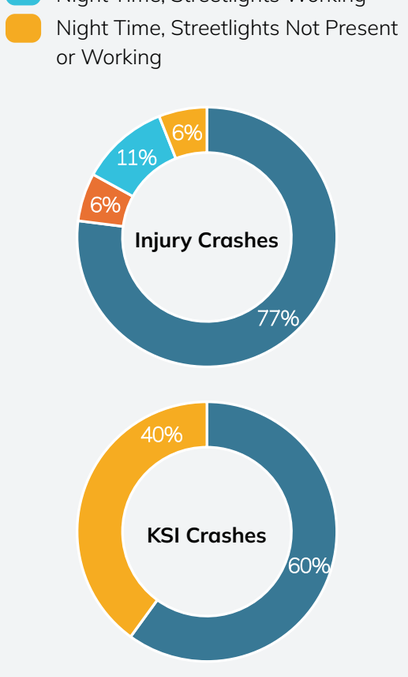


Figure 10.8 Share of Injury Crashes by Primary Crash Factor

Figure 10.9
Crashes by Time of Day & Lighting



Safety Corridors

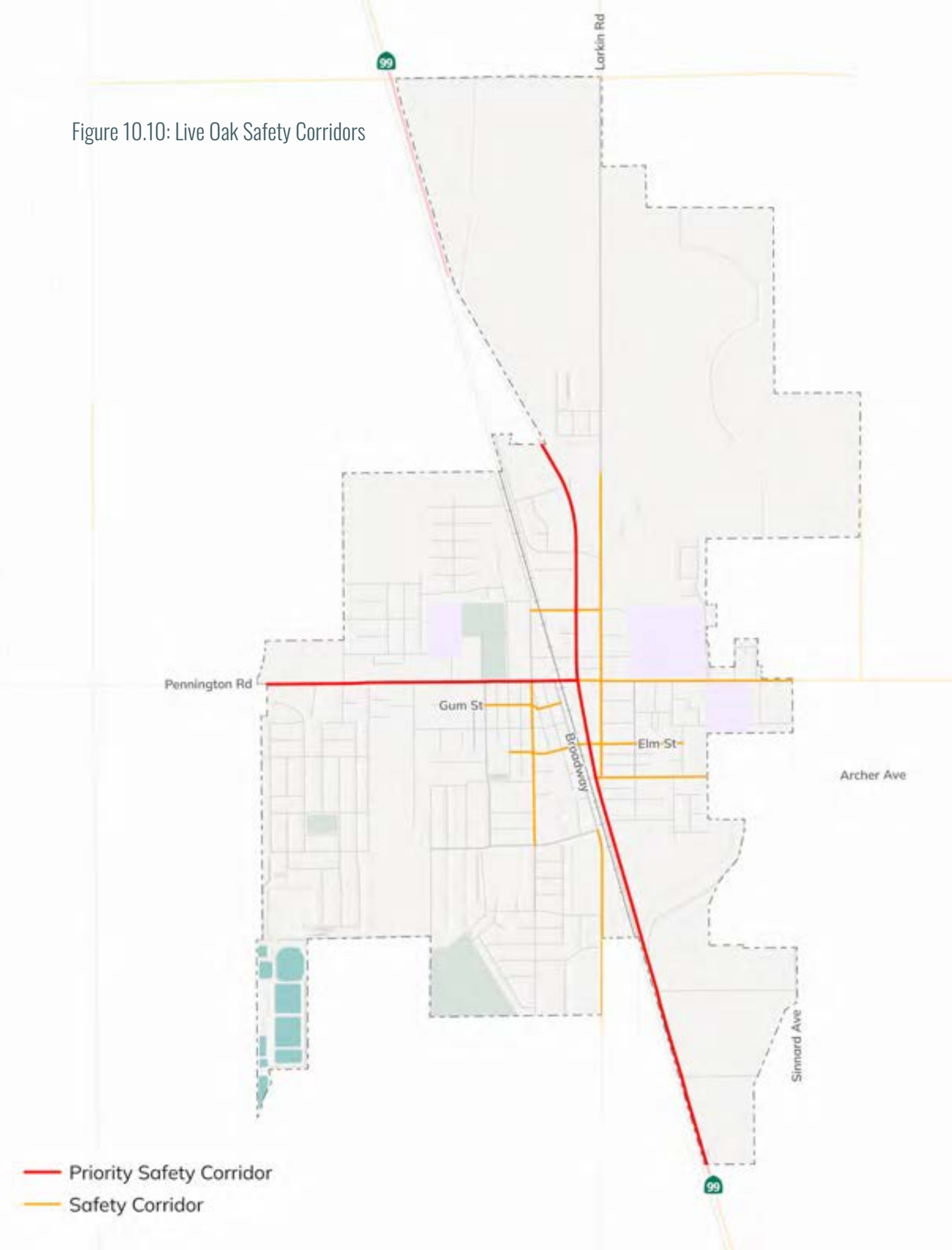
Safety corridors are the roadway segments within Live Oak that had the highest number of crashes resulting in severe injury or death (KSI) in the six-year study period. Priority safety corridors are the safety corridors that experienced the highest rate of KSI crashes, are adjacent to sensitive land uses, and have high potential for severe crashes and thus, should be prioritized for improvements.

The following is a list of Live Oak's priority safety corridors as identified through a safety corridor systemic analysis, task force input, and community feedback. Figure 10.10 displays Live Oak's network of safety corridors, which are shown in orange. Priority corridors are shown in red. Refer to **Appendix C** for a more detailed explanation of the safety corridor identification technical methodology.

- State Route 99 from northern city limit to southern city limit
- Pennington Road from Live Oak Cemetery to SR 99

Priority Safety Corridors were identified to provide the list of locations for actionable next steps with additional study. Studies could include recommended engineering safety countermeasures with targeted improvements to address crash history or focused programs identified in the Action Plan chapter.

Figure 10.10: Live Oak Safety Corridors



Community Snapshot

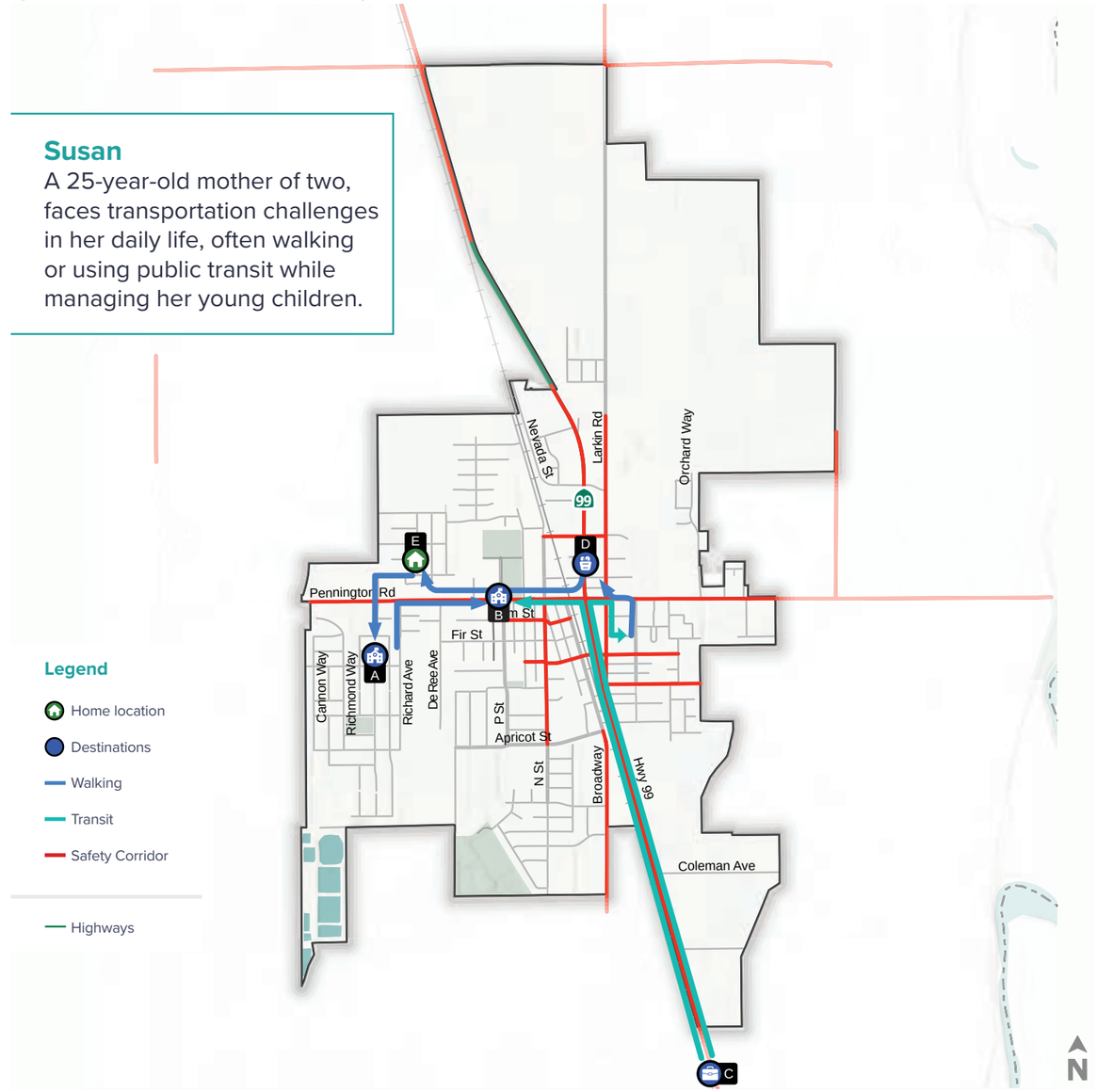
This community snapshot features Susan, a fictional character created to illustrate the daily transportation challenges faced by a mother without a personal vehicle in Live Oak. The experiences of this character are based on census data as well as local lived experiences.

Figure 10.11 illustrates the daily transportation journey of Susan, a 25-year-old mother of two, as she navigates her community without a personal vehicle. The map highlights key destinations for her: Twins Playhouse Daycare, Luther Elementary School, Live Oak Park bus stop, and El Bajio Market, along with the walking and transit routes she takes. Susan is met with several challenges in her daily commute, including dangerous crossings at major roads and railroad tracks and a lack of bus stop shelters and lighting, and long walking distances. Clearly, there is a need for improved infrastructure and safer, more accessible transportation options for families like hers.

Although a majority of trips in Live Oak are made by car (82 percent), a significant portion still travel on foot (15 percent). Susan's experience highlights the broader challenges of inadequate infrastructure and limited mobility options in underserved communities, and how pedestrians should be given greater consideration when planning and implementing safety improvements.

Figure 10.11: Live Oak Community Snapshot

Susan
A 25-year-old mother of two, faces transportation challenges in her daily life, often walking or using public transit while managing her young children.



A Susan walks with her two daughters just over half a mile to Twins Playhouse Daycare and drops off the youngest. Their main challenge on this leg is safely crossing Pennington Road at Luther Road.

B She then walks with her oldest daughter another half mile to Luther Elementary School which takes them across Pennington Road again.

C Then Susan heads to work by waiting at the Live Oak Park bus stop for the next bus. Waiting for the bus in an unsheltered area is a difficulty in hot and cold weather.

D After work, Susan drops by the El Barjio Market on her way home, after getting off the bus. She navigates crossing Pennington Road at L Street which has posed challenges before.

E On her way home, she walks nearly a mile while navigating dangerous crossings at Highway 99 and the railroad tracks with poor pedestrian lighting.

Focus Areas

Six focus areas were identified through a systemic analysis of crash records to represent the most significant patterns behind injury crashes—and especially KSI crashes—in the region. These focus areas are identified with the letters “A” through “F” and each one is applicable to one, several, or all of the communities covered by this RSAP. Following each crash focus area is a set of potential countermeasures that should be considered for implementation to improve safety outcomes. **Appendix D** contains a more detailed summary of each countermeasure.

Live Oak’s traffic safety challenges can be understood through a subset of these focus areas.

FOCUS AREA A

Crashes on State Highways Serving as Main Streets

FOCUS AREA B

Right-of-Way Issues at Intersections

FOCUS AREA B

Crashes on State Highways Serving as Main Streets

INJURY CRASH STATISTICS

55 (51%) **Total Crashes**

3 (60%) **KSI Crashes**

State Route 99/Live Oak Boulevard is a north-south highway that serves as a main street in Live Oak. Major improvements were made to this corridor within the boundaries of the city between 2020 and 2022. These upgrades led to some positive safety outcomes, including a reduction in overall crash frequency. However, they also coincided with a gradual increase in the severity of crash outcomes. A later section presents a focused case study on the crash history of and improvements made to State Route 99.

The following countermeasures can improve safety along highway main streets by slowing vehicle speeds, organizing traffic flow, and reducing conflict points between drivers, pedestrians, and bicyclists. Treatments like bike lanes, sidewalks, medians, and lighting enhance visibility and protection for vulnerable users like pedestrians and bicyclists, while speed management and intersection controls help lower the likelihood and severity of crashes. Together, these strategies can create safer conditions for all roadway users.

Figure 10.12: Crashes on State Highways Serving as Main Streets

Potential Countermeasures

- All-Way Stop Control
- Traffic Signal
- Slow Turn Wedge
- Buffered Bike Lanes
- Add Sidewalk
- Lane Narrowing
- Driveway Consolidation
- Speed Limit Reduction
- Flashing Yellow Turn Phase
- All-Red Signal Time
- Retroreflective Tape on Signals
- Roundabout
- Advance Stop Bar
- Separated Bikeways
- Bike Lane
- Raised Median
- Road Diet
- Speed Feedback Sign
- Street Lighting
- Advanced Dilemma Zone Detection
- Speed Sensitive Rest in Red Signal

Case Study

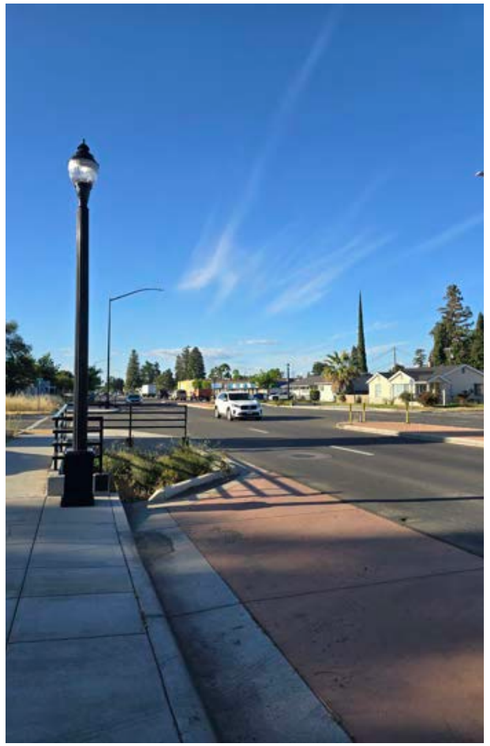
Live Oak Boulevard/State Route 99 Streetscape and Road Improvement Project

Recent safety improvements along the State Route 99/Live Oak Boulevard corridor in Live Oak's downtown core area, between Nevada Street and Ash Street, serve as a compelling example of how State Highway "main street" improvements with safety countermeasures can lead to meaningful reductions in crash frequency and severity. This $36 million project undertaken by Caltrans enhanced traffic safety and added multimodal improvements for the people walking and biking along this main street.

State Route 99/Live Oak Boulevard

Between July 2020 and April 2022, a series of improvements were constructed along SR 99 between Ash Street and north of Ramsdell Drive. These recent improvements were completed under Phases 1 through 3 as part of the Collaborative Highway 99 Streetscape Master Plan, a long-range, multi-phase infrastructure and urban design strategy to transform SR 99 through Live Oak into a safer, more attractive, and multimodal corridor.

The roadway was rehabilitated to ensure a 40-year pavement life and improve driving conditions. Traffic signals were improved at key intersections of Pennington Road and Elm Street, and a new traffic signal was installed



Upgrades along the corridor include lighting, landscaping, median islands, benches, trash bins, and bicycle racks

at Kola Street. The corridor was widened from two lanes to four lanes with either a median, two-way left-turn lane or room for left-turn pockets at intersections. A pedestrian-focused downtown environment was achieved via enhancements in parking, wayfinding signage, landscaping, and facilities for both bicyclists and pedestrians. New sidewalks with bulbouts, curbs, and gutters were constructed, and improvements were made to existing ones. Curb ramps were upgraded to meet current Americans with Disabilities Act (ADA) standards, ensuring greater accessibility for all users. Clay-colored stamped parking bays, decorative streetlamps, trees, and benches were added.

Within the study period of 2018 – 2023, a total of 52 crashes occurred along the segment of SR 99 that received improvements. The following information illustrates the crash reduction successes seen over time as improvements were implemented along the corridor segment, along with other changes in crash trends. To account for the varying time periods of the three construction stages, crash history is represented as a crash rate of the average number of crashes per month.

BEFORE CONSTRUCTION (JANUARY 2018 – JUNE 2020)

Crash Rate: 1 per month

In the 30 months of the study period before construction began, the segment experienced 30 crashes, for a rate of 1 crash per month. Two of these crashes involved pedestrians, and two led to severe injury—one happening at Elm Street and the other on Ash Street. Clusters of crashes occurred in downtown Live Oak as well as the transition zones, areas closer to the edge of the city where travel speeds are higher as vehicles reached downtown. Rear-end (16 crashes) and broadside (11 crashes) emerged as the most frequent types of crashes that occurred. Unsafe speed (14 crashes), automobile right-of-way violation (six crashes), and following too closely (five crashes) were the primary causes behind pre-construction crashes. Overall, this time period saw crashes clustered around the Ramsdell Drive, Kola Court, Pennington Road, and Elm Street intersections.

DURING CONSTRUCTION (JULY 2020 – APRIL 2022)

Crash Rate: 0.6 per month

In the span of 22 months in which construction took place, there were 14 crash occurrences, none of which involved pedestrians, bicyclists, or severe/fatal outcomes. Rear-end remained the top resulting crash type, accounting for 7 out of 14 crashes in this time period—3 of which occurred on Elm Street. Unsafe speed was the primary cause of 6 crashes, improper turning and vehicle right-of-way were each responsible for two crashes. Kola Street, Nevada Street, and Pennington Road experienced more than one crash.

AFTER CONSTRUCTION (MAY 2022 - DECEMBER 2023)

Crash Rate: 0.4 per month

The months following the completion of construction saw a significant reduction in crash rates. There was a total of 8 crashes, for a rate of 0.4 crashes/month. There was a change in crash distribution patterns as more crashes occurred closer to the downtown area, and fewer in the transition zones. Speeding and rear end crashes were no longer the top primary cause and crash type. Instead, broadside became the most prominent type, making up 5 of the 8 crashes, and one of which led to a fatal outcome. 3 broadside crashes occurred at the Nevada, Ivy, and Ash Street intersections, the fatal crash happening at Ivy Street. The other two broadside crashes occurred on driveways between Pennington Road and Elm Street. One was caused by improper turning and the rest by vehicle right-of-way violation.

Safety enhancements along the State Route 99/Live Oak Boulevard corridor demonstrate the tangible benefits of safety-oriented infrastructure investment.

The project not only upgraded the roadway and improved accessibility and comfort for all users, but also significantly reduced crash frequency and severity—from 1 crash per month before construction to just 0.4 crashes per month after completion. No crashes involving people walking and biking occurred on the corridor once construction started, which can likely be attributed to the addition of adequate bicycle and pedestrian facilities. The improvements combine to create an overall vibrant downtown environment that likely induced traffic calming and a reduction of speed and rear end crashes, and crashes involving bicycle/pedestrian crashes. The new, improved, and continuous sidewalks and crosswalks bolster the feel of a multimodal corridor and signal to drivers that the road is a shared space for bicyclists, pedestrians, and vehicles alike. Clay-colored facilities, roadside landscaping, decorative street lighting, and other aesthetic design elements add visual interest that influences driving behavior by drawing drivers' attention to their surroundings other than just the road, causing them to slow down their driving. These results underscore the effectiveness of comprehensive safety countermeasures as well as thoughtful streetscape design.

However, the changes in crash trends were not all positive, and there is still work to be done.

Although rear-end crashes were substantially reduced, broadside rose as the most common type of crash after construction completed. Widening the road from two lanes to four lanes might have increased the risk of broadsides by increasing the time and distance needed to cross safely. The vehicles at fault in these crashes were making left and U-turns, and had to cross two lanes of oncoming traffic. This rise in broadside crashes is concerning because broadside crashes typically result in more severe outcomes than rear-end crashes, and usually account for a disproportionately greater share of KSI crashes. There is also increased speeding, which could possibly be attributed to the widening of the highway. As a result, short-term safety improvements along this corridor segment should prioritize addressing speeding and the causes of broadside collisions, particularly improper turning movements and right-of-way violations.

Collaborative Highway 99 Streetscape Master Plan - Later Phases

Building upon the improvements completed in Phases 1 through 3, the Later Phases of the Collaborative Highway 99 Streetscape Master Plan will extend safety, mobility, and aesthetic enhancements to the areas past the northern and southern limits of the city—identified as the New Growth Areas—which are planned for annexation. Later Phase improvements will focus on creating a safe and inviting complete streets environment through context-sensitive design, enhanced landscaping, improved pedestrian and bicycle infrastructure, and traffic calming strategies that reflect the community's small-town identity while supporting regional connectivity.

Observed post-construction crash trends along the Highway 99 corridor highlight important lessons for future design phases. These findings underscore both the strategies that should be reinforced and the design elements that should be reconsidered as Later Phase improvements advance in tandem with the planned development surrounding Live Oak. Encouragingly, several of the planned enhancements already align with Caltrans' Design Information Bulletin (DIB) 94: Complete Streets – Contextual Design Guidance, which emphasizes context-sensitive, multimodal safety. For example, the plan's strategy to limit ingress and egress along the corridor directly supports DIB 94 principles by reducing potential conflict points between vehicles, pedestrians, and cyclists. This access management approach is expected to mitigate crash risk at driveways and intersections, (i.e. broadside crashes) while simultaneously fostering a safer, more predictable travel environment for all corridor users. The following improvements are recommendations informed by the crash patterns that emerged from earlier improvement phases of Live Oak's streetscape improvement project as well as Caltrans' DIB 94 guidance.

Collaborative Highway 99 Streetscape Master Plan - Later Phases Improvement Recommendations

Speed Management and Traffic Calming

- Narrow lanes where feasible to reduce operating speeds while maintaining freight mobility.
- Provide gateway treatments (landscaping, textured pavements, vertical features, or raised medians) at city entrances to reinforce appropriate speed expectations.
- Install traffic calming elements such as curb extensions, pedestrian refuge islands, and raised or textured crosswalks at frequent intervals
- Implement progressive speed management zones supported by speed feedback signs and roadway design cues to transition drivers from higher rural highway speeds to lower community speeds.

Intersection Safety and Conflict Reduction

- Where feasible, consider protected left-turn phasing, roundabouts, or raised medians to address broadside crash risk.
- Provide high-visibility crosswalks, upgraded lighting, and advance warning signage at all major intersections.
- Apply access management strategies, including driveway consolidation, to minimize turning movement conflicts along the corridor.

Multimodal Separation and Protection

- Increase the frequency of pedestrian crossings: approximately 500 feet in New Growth Areas, where feasible.

Context-Sensitive Design Application

- Where feasible, emphasize human-scaled design, including narrower lane widths, enhanced pedestrian amenities, and consistent streetscape elements, to reinforce low-speed, multimodal travel.
- At community gateways, integrate placemaking features that signal a transition from high-speed highway conditions to a small-town, pedestrian-oriented environment.

FOCUS AREA B

Right-of-Way Issues at Intersections

INJURY CRASH STATISTICS

31 (29%) **Total Crashes**

2 (40%) **KSI Crashes**

A total of 31 crashes (29 percent) occurred at intersections where the primary cause was failure to yield the right-of-way. Of these 31 crashes, 2 resulted in a KSI crash. These incidents stemmed from drivers failing to yield to oncoming or cross traffic that legally possessed the right-of-way. In many cases, motorists either misjudged the speed and distance of approaching vehicles or did not come to a complete stop at the appropriate distance from the main thoroughfare. As a result, all but one culminated in a broadside, or T-bone, crash—an especially dangerous type of crash. These types of crashes are often severe due to the limited protection on the sides of vehicles, highlighting the critical importance of right-of-way compliance at intersections.

Crashes with these right-of-way issues tended to involve vehicles pulling out of driveways, and intersections where side streets are controlled by stop signs, while the main thoroughfare was uncontrolled. Most of these occurred along SR 99 and Pennington Road.

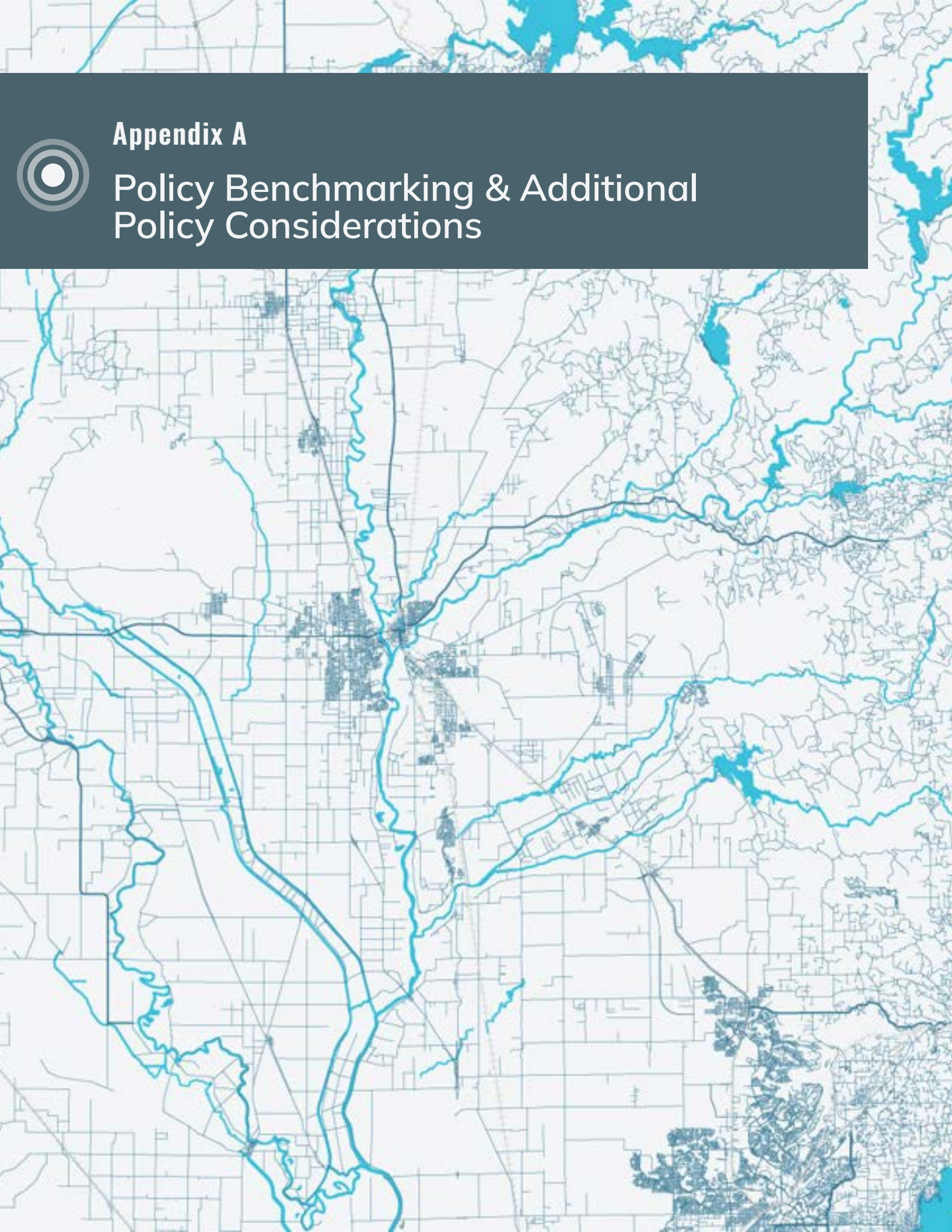
The following countermeasures directly target right-of-way issues by making intersections safer, more predictable, and easier to navigate. Treatments such as roundabouts, traffic signals, and protected left turns mitigate crash risks by clarifying priority. Design features like lane narrowing and intersection tightening further slow vehicles down, reducing impact upon collision. High-visibility crosswalks, bike lanes, and pedestrian beacons enhance visibility of vulnerable roadway users and right-of-way compliance.

Figure 10.13: Crashes with Right-of-Way Issues at Intersections

Live Oak

Potential Countermeasures

- Roundabout
- Neighborhood Traffic Circle
- Slow Turn Wedge
- Raised Median
- Lane Narrowing
- Rectangular Rapid Flashing Beacon
- High-Visibility Crosswalk
- Protected Left Turns
- All-Red Signal Time
- Traffic Signal
- Intersection Reconstruction and Tightening
- Advance Stop Bar
- Centerline Hardening
- Through Bike Lane at Intersection
- Pedestrian Hybrid Beacon
- Advanced Dilemma Zone Detection
- Flashing Yellow Turn Phase



Appendix A

Policy Benchmarking & Additional Policy Considerations

Yuba County Policy Benchmarking

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Yuba County	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safety Planning and Culture	Leadership and commitment	Leaders publicly commit to a "Zero" goal for traffic fatalities and serious injuries within a specific timeframe, and exhibit buy-in for the Safe System approach through media, public events, and support for related policies and programs.	Yuba County; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Develop a safety plan aligned with the Safe System approach that establishes a "Zero" goal for traffic fatalities and serious injuries and identifies concrete actions to help Yuba/Sutter achieve zero including designation of lead agency, timeline, and funding. Safety plan should include an assessment of the local challenges that have hindered safety interventions in the past and create a roadmap for addressing them.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish key safety performance indicators and implement a monitoring process to evaluate progress and intervene if county/region is not on track.	Yuba-Sutter Region	"For the success of the LRSP, it is crucial to monitor and evaluate the 4 E's strategies continuously. Monitoring and evaluation help provide accountability, ensure the effectiveness of the countermeasures for each emphasis area, and help make decisions on the need for new strategies. The process would help the County make informed decisions regarding the implementation plan's progress and accordingly, update the goals and objectives of the plan." *Current effort with RSAP.*	Yuba County LRSP	*Not publicly ava	8 - Implementation and Evaluation	80				x	
		Convene and/or participate in an inter-agency committee, task force, implementation group, or working group that is charged with a Safety Action Plan's development, implementation, and monitoring. The group should include a representative from every agency or department that plays a critical role in advancing each Safe System element. It may be desireable to identify a staff coordinator to manage the agency's safety program.	Yuba County; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Provide training to Yuba/Sutter staff, directors, elected officials, and community stakeholders on the Safe System approach.	Yuba County; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish an ongoing Safe Routes to Schools program and funding mechanism.	Yuba County; Yuba-Sutter Region; School Districts						x				
	Meaningful Engagement	Engage with the public and relevant stakeholders, including the private sector and community groups. Incorporate information received from the engagement and collaboration into the safety plan.	Yuba County; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish a website to inform the public about Yuba/Sutter's safety program goals and progress and the effectiveness of implemented safety projects.	Yuba County; Yuba-Sutter Region	Yuba County LRSP website established	Yuba County LRSP website	https://www.yubacountysafetyplan.com/							x
		Provide public safety materials in common languages spoken by Yuba/Sutter residents whose first language is not English.	Yuba County; Yuba-Sutter Region	*Current effort with RSAP*					x				
	Data and analysis	Apply a proactive and transparent approach to data-driven safety analysis, including the use of systemic profiles, emphasis areas based on roadway or contextual contributing factors, mode-specific conditions assessments (e.g., bicycle network stress or distance between marked crossings), and equity considerations.	Yuba-Sutter Region	"The Local Roadway Safety Plan (LRSP) is a localized data-driven traffic safety plan that provides opportunities to address unique roadway safety needs and reduce the number of collisions."	Yuba County LRSP	*Not publicly ava	1 - Project Background; 5 - Emphasis Areas	14, 53				x	
		Establish a process for citizens to report safety hazards or request safety interventions and a data-driven approach for evaluating the reports/requests.	Yuba County; Yuba-Sutter Region						x				
		Focus network screening and benefit/cost calculations on fatal and serious injuries, instead of all collisions, to identify the core safety issues for human vulnerability.	Yuba County; Yuba-Sutter Region	Detailed KSI analysis was done. *Current effort with RSAP.*	Yuba County LRSP	*Not publicly ava	4 - Collision Data and Analysis	33				x	
		Maintain a GIS inventory and actively work to improve accuracy of crash data and roadway data such as missing sidewalks, bikeways, intersection controls, etc.	Yuba County; Yuba-Sutter Region						x				
		Use innovative data collection and analysis approaches, such as crowdsourcing or video detection data, to identify emphasis areas related to near misses or crashes previously unreported by vulnerable communities.	Yuba County; Yuba-Sutter Region						x				
	Funding	Develop a project evaluation framework that prioritizes funding based on fatal and serious injury crash reduction opportunities, especially for equity populations. Audit the region's Transportation Improvement Program (TIP) for opportunities to enhance safety benefits and remove safety risks of funded projects.	Yuba County; Yuba-Sutter Region	Action CD18.1 - "The traffic impact fees will be used to fund improvements that will be needed in the future as development occurs." The General Plan references a traffic impact fee program, but it did not specify a framework that prioritizes funding based on fatal and serious injury crash reduction opportunities, especially for equity populations. *Current effort with RSAP.*	Yuba County General Plan	https://cms7files.	Community Development	77	x				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Yuba County	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
	Funding	Apply for grant programs to fund safety projects.	Yuba County; Yuba-Sutter Region	Funding sources identified in LRSP	Yuba County LRSP	*Not publicly ava	8 - Implementation and Evaluation	78				x	
		Institutionalize safety considerations in all project types to systematically fund projects through operations and maintenance efforts (such as repaving projects).	Yuba County; Yuba-Sutter Region	"Funding is a critical component of implementing any safety project. While the HSIP program is a common source of funding for safety projects, numerous other funding sources could be pursued for such projects (See Table 22)"	Yuba County LRSP	*Not publicly ava	8 - Implementation and Evaluation	77				x	
	Development review	Conduct safety impact assessments of new developments to identify mitigation and cost sharing opportunities.	Yuba County	Action CD 16.2 - "The County will continue to require specific plans to identify funding for transportation facilities needed to serve development within each subject specific plan." The General Plan did not specify safety impact assessments for mitigation.	Yuba County General Plan	https://cms7files.	Community Development	73			x		
	Equity first	Identify underserved communities through data. This should include data that identifies underserved communities and/or reflects the impact of crashes on underserved communities, prioritization criteria that consider equity, or a description of meaningful engagement and collaboration with appropriate stakeholders.	Yuba County; Yuba-Sutter Region	"Commit to equity in all aspects of Safe System, including data analysis that acknowledges and addresses reporting biases, project prioritization efforts that promote projects in historically underinvested communities, and implementation strategies that follow data-driven approaches." *Current effort with RSAP.*	Yuba County LRSP	*Not publicly ava	2 - Safety Partners	19				x	
		Incorporate equity considerations in implementation and assessment plans, such as goals related to safety improvements for populations that are traditionally underserved.	Yuba County; Yuba-Sutter Region	"Commit to equity in all aspects of Safe System, including data analysis that acknowledges and addresses reporting biases, project prioritization efforts that promote projects in historically underinvested communities, and implementation strategies that follow data-driven approaches." *Current effort with RSAP.*	Yuba County LRSP	*Not publicly ava	2 - Safety Partners	19				x	
		Meaningfully engage populations that are traditionally underserved in shared decision-making for safety efforts.	Yuba County; Yuba-Sutter Region	"Commit to equity in all aspects of Safe System, including data analysis that acknowledges and addresses reporting biases, project prioritization efforts that promote projects in historically underinvested communities, and implementation strategies that follow data-driven approaches." *Current effort with RSAP.*	Yuba County LRSP	*Not publicly ava	2 - Safety Partners	19				x	
Safe Users	Education	Perform outreach through educational programs, with a focus on the behaviors and target audiences most linked to death and serious injuries. Utilize partnerships with community-based organizations and advocacy groups.	Yuba County; Yuba-Sutter Region	LRSP mentions multiple education initiatives and efforts to promote safer road user behavior. *Current effort with RSAP.*	Yuba County LRSP	*Not publicly available online						x	
		Use demonstration projects to raise awareness of new designs, encourage support among stakeholders for safety projects requiring capacity trade-offs, and solicit feedback from the public. Demonstration projects also provide opportunity to measure safety effects and encourage innovation and design flexibility.	Yuba County; Yuba-Sutter Region						x				
	Enforcement	Investigate and document the impacts of traffic safety enforcement and traffic safety surveillance on minority communities. Take steps to mitigate disproportionate impact of enforcement on disadvantaged populations.	Yuba County						x				
		Reallocate enforcement activities to target those behaviors and locations most linked to death and serious injury.	Yuba County						x				
	Research	Develop and implement strategies for robust demographic data collection in crash reporting.	Yuba County; Yuba-Sutter Region						x				
	Collision avoidance	Systemically install proven countermeasures to separate users in space, separate users in time, and increase attentiveness and awareness, such as: protected signal phases, clear zones, and vertical and horizontal separation for pedestrians and bicyclists.	Yuba County; Yuba-Sutter Region	Goal: A transportation system that is safe for bicycle use, with reduced numbers of bicycle-related collisions	Yuba County Bikeway Master Plan Update	https://cms7files.	Goals, Policies, and Actions	26	x				
		Complete infrastructure connectivity for pedestrians and bicyclists and make progress toward providing separation where needed based on crash exposure, crash history, characteristics of the roadway, and adjacent land uses associated with higher levels of use.	Yuba County; Yuba-Sutter Region	Policies 19.4, 19.5, 19.6, 19.8, 20.7 aim to create networks of safe trails/ped infrastructure and bike paths	Yuba County General Plan	https://cms7files.	Community Development	62, 63					x

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Yuba County	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safe Roadways	Kinetic energy reduction	Systemically install proven countermeasures to manage motor vehicle speed and collision angles, such as roadside appurtenances, roundabouts, refuge islands, hardened center lines, and road diets.	Yuba County; Yuba-Sutter Region						x				
		Evaluate intersection design and control decisions in the planning or scoping stage for opportunities to better prioritize reducing kinetic energy transfer, following new FHWA guidance.	Yuba County						x				
	Policies and tradeoffs	Designate functional class and modal priority for roadways to pinpoint the most effective safety countermeasures and streamline tradeoff decisions - evaluated at a network scale for network-based priorities.	Yuba County; Yuba-Sutter Region	Policy 19.7 - "The County's improvement standards and street classification system will be designed to accommodate the full range of locally available travel modes. Intersection dimensions and turning radii should be minimized in areas where high pedestrian and bicycle activity is expected."	Yuba County General Plan	https://cms7files.	Community Development	79					x
		Ensure safety for all users is prioritized, and accessibility maintained, during construction and road maintenance projects.	Yuba County						x				
	Innovation	Provide infrastructure for smarter roadways and intelligent transportation systems (ITS) in support of data collection and analysis, as well as proactive system management. Consider long-term network priorities and immediate pedestrian and bicyclist safety and mobility needs when citing EV charging stations.	Yuba County; Yuba-Sutter Region						x				
Safe Vehicles	Supportive infrastructure	Enable infrastructure-to-vehicle communication to provide warnings to drivers that support safer driving behavior.	Yuba County						x				
		Provide supportive infrastructure for dynamic curbside management and autonomous vehicles to enable active safety technology.	Yuba County						x				
	Fleet Management	Support safer operations of county and commercial vehicles through a transition plan of county's vehicle fleet to lower-mass and safety feature enhanced vehicles; heavy vehicle route restrictions to avoid high-pedestrian areas; and curbside management programs to limit user conflicts around stopped or loading vehicles.	Yuba County						x				
	Autonomous Vehicle Data	Collect data about the involvement of AVs in crashes for future data analysis, and to inform design and policies.	Yuba County						x				
Safe Speeds	Design and operations	Adopt roadway design standards that are focused on speed management, such as target speed-based design, for residential and arterial roadways. Adjust roadway geometries for context-appropriate speeds.	Yuba County	Policy CD19.8 - "The County will seek funding for and, as feasible, install traffic-calming measures, such as planted medians, landscaped planter strips, landscaped traffic circles, and other designs in areas with excessive or high-speed traffic, as appropriate. The County will not support street closures, half closures, or other measures that limit connectivity as a way to calm traffic." Policy 20.2 - "New developments in the Valley Growth Boundary shall arrange roads in an interconnected block pattern, so that local pedestrian, bicycle, and automobile traffic do not have to use Arterials to circulate within the neighborhood." The county also has standard plans & specifications: https://www.yuba.org/departments/community_development/public_works/standard_plans/index.php	Yuba County General Plan	https://cms7files.	Community Development	79, 81					x
	Enforcement	Deploy speed safety cameras, with a focus on equitable fee structures. Where not permitted, monitor changes in state legislation that may allow for this in the future.	Yuba County; Yuba-Sutter Region						x				
	Policy and training	Follow speed limit setting methodologies that determine appropriate or target speeds based on land use context, roadway context, and/or modal priority - accounting for the human body's ability to tolerate crash forces rather than the historic behavior of road users. Consider utilizing innovative data sources to systemically assess prevailing versus target speeds and develop a plan to lower speeds in areas with a large discrepancy.	Yuba County; Yuba-Sutter Region						x				
		Provide speed management training to staff focused on fatality and serious injury minimization.	Yuba County; Yuba-Sutter Region						x				
Post Crash Care	Crash investigation	Employ collision reporting practices that promote complete and accurate data collection and documentation of road user behavior and infrastructure.	Yuba County; Yuba-Sutter Region						x				
		Establish a feedback loop such that key insights from crash investigations are shared with roadway designers and/or influence outreach and education. Consider the creation of an inter-agency rapid response team to immediately investigate the sites of collisions and make recommendations for near-term safety enhancements.	Yuba County; Yuba-Sutter Region						x				
	Partnerships	Share data across agencies and organizations, including first responders and hospitals, to develop a holistic understanding of the safety landscape and improve accuracy.	Yuba-Sutter Region						x				
		Connect with victims' families and the advocacy community to offer support and resources, and encourage partnerships with outreach and education.	Yuba County; Yuba-Sutter Region						x				

Marysville Policy Benchmarking

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Marysville	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safety Planning and Culture	Leadership and commitment	Leaders publicly commit to a "Zero" goal for traffic fatalities and serious injuries within a specific timeframe, and exhibit buy-in for the Safe System approach through media, public events, and support for related policies and programs.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Develop a safety plan aligned with the Safe System approach that establishes a "Zero" goal for traffic fatalities and serious injuries and identifies concrete actions to help Yuba/Sutter achieve zero including designation of lead agency, timeline, and funding. Safety plan should include an assessment of the local challenges that have hindered safety interventions in the past and create a roadmap for addressing them.	Yuba-Sutter Region	Vision Zero Statement mentions striving towards eliminating all traffic fatalities and severe injuries.	City of Marysville LRSP	*Not available online*						x	
		Establish key safety performance indicators and implement a monitoring process to evaluate progress and intervene if city is not on track.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Convene and/or participate in an inter-agency committee, task force, implementation group, or working group that is charged with a Safety Action Plan's development, implementation, and monitoring The group should include a representative from every agency or department that plays a critical role in advancing each Safe System element. It may be desireable to identify a staff coordinator to manage the agency's safety program.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Provide training to Yuba/Sutter staff, directors, elected officials, and community stakeholders on the Safe System approach.	Marysville; Yuba-Sutter Region						x				
		Establish an ongoing Safe Routes to Schools program and funding mechanism.	Marysville; Yuba-Sutter Region; School Districts	No Safe Routes to Schools Program					x				
	Meaningful Engagement	Engage with the public and relevant stakeholders, including the private sector and community groups. Incorporate information received from the engagement and collaboration into the safety plan.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish a website to inform the public about Yuba/Sutter's safety program goals and progress and the effectiveness of implemented safety projects.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Provide public safety materials in common languages spoken by Yuba/Sutter residents whose first language is not English.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
	Data and analysis	Apply a proactive and transparent approach to data-driven safety analysis, including the use of systemic profiles, emphasis areas based on roadway or contextual contributing factors, mode-specific conditions assessments (e.g., bicycle network stress or distance between marked crossings), and equity considerations.	Yuba-Sutter Region	Marysville LRSP Emphasis Area: Making Safety Improvements at the Highest Incident Location	City of Marysville LRSP	*Not available online*		2				x	
		Establish a process for citizens to report safety hazards or request safety interventions and a data-driven approach for evaluating the reports/requests.	Marysville; Yuba-Sutter Region	Current effort with RSAP					x				
		Focus network screening and benefit/cost calculations on fatal and serious injuries, instead of all collisions, to identify the core safety issues for human vulnerability.	Marysville; Yuba-Sutter Region	Report identifies and ranks the top collision rate locations within the City, assesses the collision patterns and contributing factors at the highest ranking locations, and recommends countermeasures for those locations.	City of Marysville LRSP	*Not available online*		3				x	
		Maintain a GIS inventory and actively work to improve accuracy of crash data and roadway data such as missing sidewalks, bikeways, intersection controls, etc.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Use innovative data collection and analysis approaches, such as crowdsourcing or video detection data, to identify emphasis areas related to near misses or crashes previously unreported by vulnerable communities.	Marysville; Yuba-Sutter Region						x				
	Funding	Develop a project evaluation framework that prioritizes funding based on fatal and serious injury crash reduction opportunities, especially for equity populations. Audit the region's Transportation Improvement Program (TIP) for opportunities to enhance safety benefits and remove safety risks of funded projects.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Apply for grant programs to fund safety projects.	Marysville; Yuba-Sutter Region	HSIP funding opportunity mentioned.	City of Marysville LRSP	*Not available*		9				x	
		Institutionalize safety considerations in all project types to systematically fund projects through operations and maintenance efforts (such as repaving projects).	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
	Development review	Conduct safety impact assessments of new developments to identify mitigation and cost sharing opportunities.	Marysville						x				
	Equity first	Identify underserved communities through data. This should include data that identifies underserved communities and/or reflects the impact of crashes on underserved communities, prioritization criteria that consider equity, or a description of meaningful engagement and collaboration with appropriate stakeholders.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Incorporate equity considerations in implementation and assessment plans, such as goals related to safety improvements for populations that are traditionally underserved.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Meaningfully engage populations that are traditionally underserved in shared decision-making for safety efforts.	Marysville; Yuba-Sutter Region	*Current effort with RSAP*					x				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Marysville	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safe Users	Education	Perform outreach through educational programs, with a focus on the behaviors and target audiences most linked to death and serious injuries. Utilize partnerships with community-based organizations and advocacy groups.	Marysville; Yuba-Sutter Region	Educational measures identified in plan.	City of Marysville LRSP	*Not available online*						x	
		Use demonstration projects to raise awareness of new designs, encourage support among stakeholders for safety projects requiring capacity trade-offs, and solicit feedback from the public. Demonstration projects also provide opportunity to measure safety effects and encourage innovation and design flexibility.	Marysville; Yuba-Sutter Region						x				
	Enforcement	Investigate and document the impacts of traffic safety enforcement and traffic safety surveillance on minority communities. Take steps to mitigate disproportionate impact of enforcement on disadvantaged populations.	Marysville						x				
		Reallocate enforcement activities to target those behaviors and locations most linked to death and serious injury.	Marysville	"Where possible increase frequency and visual presence of patrol activity in high-speed incident areas."	City of Marysville LRSP	*Not available online*	11.2	37				x	
	Research	Develop and implement strategies for robust demographic data collection in crash reporting.	Marysville; Yuba-Sutter Region						x				
Safe Roadways	Collision avoidance	Systemically install proven countermeasures to separate users in space, separate users in time, and increase attentiveness and awareness, such as: protected signal phases, clear zones, and vertical and horizontal separation for pedestrians and bicyclists.	Marysville; Yuba-Sutter Region	BP Plan identifies safety countermeasures for bicycle and pedestrian travel.	Marysville Bicycle & Pedestrian Plan	https://www.fraqmd.org/files/486e35bb9/Final+++Marysville-Bicycle-and-Pedestrian-Plan-2016-A						x	
		Complete infrastructure connectivity for pedestrians and bicyclists and make progress toward providing separation where needed based on crash exposure, crash history, characteristics of the roadway, and adjacent land uses associated with higher levels of use.	Marysville; Yuba-Sutter Region	Policies and goals were set to improve mobility via bicycle and pedestrian infrastructure.	Marysville Bicycle & Pedestrian Plan	https://www.fraqmd.org/files/486e35bb9/Final+++Marysville-Bicycle-and-Pedestrian-Plan-2016-A						x	
	Kinetic energy reduction	Systemically install proven countermeasures to manage motor vehicle speed and collision angles, such as roadside appurtenances, roundabouts, refuge islands, hardened center lines, and road diets.	Marysville; Yuba-Sutter Region						x				
		Evaluate intersection design and control decisions in the planning or scoping stage for opportunities to better prioritize reducing kinetic energy transfer, following new FHWA guidance.	Marysville						x				
	Policies and tradeoffs	Designate functional class and modal priority for roadways to pinpoint the most effective safety countermeasures and streamline tradeoff decisions - evaluated at a network scale for network-based priorities.	Marysville; Yuba-Sutter Region						x				
		Ensure safety for all users is prioritized, and accessibility maintained, during construction and road maintenance projects.	Marysville						x				
	Innovation	Provide infrastructure for smarter roadways and intelligent transportation systems (ITS) in support of data collection and analysis, as well as proactive system management. Consider long-term network priorities and immediate pedestrian and bicyclist safety and mobility needs when citing EV charging stations.	Marysville; Yuba-Sutter Region						x				
Safe Vehicles	Supportive infrastructure	Enable infrastructure-to-vehicle communication to provide warnings to drivers that support safer driving behavior.	Marysville						x				
		Provide supportive infrastructure for dynamic curbside management and autonomous vehicles to enable active safety technology.	Marysville						x				
	Fleet Management	Support safer operations of city and commercial vehicles through a transition plan of city's vehicle fleet to lower-mass and safety feature enhanced vehicles; heavy vehicle route restrictions to avoid high-pedestrian areas; and curbside management programs to limit user conflicts around stopped or loading vehicles.	Marysville						x				
	Autonomous Vehicle Data	Collect data about the involvement of AVs in crashes for future data analysis, and to inform design and policies.	Marysville						x				
Safe Speeds	Design and operations	Adopt roadway design standards that are focused on speed management, such as target speed-based design, for residential and arterial roadways. Adjust roadway geometries for context-appropriate speeds.	Marysville	Roadway design measures to manage speed were listed.	City of Marysville LRSP	*Not available online*	11.2	37				x	
	Enforcement	Deploy speed safety cameras, with a focus on equitable fee structures. Where not permitted, monitor changes in state legislation that may allow for this in the future.	Marysville; Yuba-Sutter Region						x				
	Policy and training	Follow speed limit setting methodologies that determine appropriate or target speeds based on land use context, roadway context, and/or modal priority - accounting for the human body's ability to tolerate crash forces rather than the historic behavior of road users. Consider utilizing innovative data sources to systemically assess prevailing versus target speeds and develop a plan to lower speeds in areas with a large discrepancy.	Marysville; Yuba-Sutter Region						x				
		Provide speed management training to staff focused on fatality and serious injury minimization.	Marysville; Yuba-Sutter Region	Action item: Continue to conduct training targeted at responding to speed related collisions.	City of Marysville LRSP	*Not available online*	11.2	37				x	

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Marysville	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Post Crash Care	Crash investigation	Employ collision reporting practices that promote complete and accurate data collection and documentation of road user behavior and infrastructure.	Marysville; Yuba-Sutter Region						x				
		Establish a feedback loop such that key insights from crash investigations are shared with roadway designers and/or influence outreach and education. Consider the creation of an inter-agency rapid response team to immediately investigate the sites of collisions and make recommendations for near-term safety enhancements.	Marysville; Yuba-Sutter Region						x				
	Partnerships	Share data across agencies and organizations, including first responders and hospitals, to develop a holistic understanding of the safety landscape and improve accuracy.	Yuba-Sutter Region						x				
		Connect with victims' families and the advocacy community to offer support and resources, and encourage partnerships with outreach and education.	Marysville; Yuba-Sutter Region						x				

Wheatland Policy Benchmarking

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Wheatland	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safety Planning and Culture	Leadership and commitment	Leaders publicly commit to a “Zero” goal for traffic fatalities and serious injuries within a specific timeframe, and exhibit buy-in for the Safe System approach through media, public events, and support for related policies and programs.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Develop a safety plan aligned with the Safe System approach that establishes a "Zero" goal for traffic fatalities and serious injuries and identifies concrete actions to help Yuba Sutter achieve zero including designation of lead agency, timeline, and funding. Safety plan should include an assessment of the local challenges that have hindered safety interventions in the past and create a roadmap for addressing them.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish key safety performance indicators and implement a monitoring process to evaluate progress and intervene if city is not on track.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Convene and/or participate in an inter-agency committee, task force, implementation group, or working group that is charged with a Safety Action Plan's development, implementation, and monitoring. The group should include a representative from every agency or department that plays a critical role in advancing each Safe System element. It may be desireable to identify a staff coordinator to manage the agency's safety program.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Provide training to Yuba Sutter staff, directors, elected officials, and community stakeholders on the Safe System approach.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish an ongoing Safe Routes to Schools program and funding mechanism.	Wheatland; Yuba-Sutter Region; School Districts	No current SRTS program.					x				
	Meaningful Engagement	Engage with the public and relevant stakeholders, including the private sector and community groups. Incorporate information received from the engagement and collaboration into the safety plan.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish a website to inform the public about Yuba Sutter's safety program goals and progress and the effectiveness of implemented safety projects.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Provide public safety materials in common languages spoken by Yuba Sutter residents whose first language is not English.	Wheatland; Yuba-Sutter Region						x				
	Data and analysis	Apply a proactive and transparent approach to data-driven safety analysis, including the use of systemic profiles, emphasis areas based on roadway or contextual contributing factors, mode-specific conditions assessments (e.g., bicycle network stress or distance between marked crossings), and equity considerations.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Establish a process for citizens to report safety hazards or request safety interventions and a data-driven approach for evaluating the reports/requests.	Wheatland; Yuba-Sutter Region						x				
		Focus network screening and benefit/cost calculations on fatal and serious injuries, instead of all collisions, to identify the core safety issues for human vulnerability.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Maintain a GIS inventory and actively work to improve accuracy of crash data and roadway data such as missing sidewalks, bikeways, intersection controls, etc.	Wheatland; Yuba-Sutter Region						x				
		Use innovative data collection and analysis approaches, such as crowdsourcing or video detection data, to identify emphasis areas related to near misses or crashes previously unreported by vulnerable communities.	Wheatland; Yuba-Sutter Region						x				
	Funding	Develop a project evaluation framework that prioritizes funding based on fatal and serious injury crash reduction opportunities, especially for equity populations. Audit the region's Transportation Improvement Program (TIP) for opportunities to enhance safety benefits and remove safety risks of funded projects.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Apply for grant programs to fund safety projects.	Wheatland; Yuba-Sutter Region						x				
		Institutionalize safety considerations in all project types to systematically fund projects through operations and maintenance efforts (such as repaving projects).	Wheatland; Yuba-Sutter Region	Related policy: "2.A.10. The City shall give priority to street and highway improvements that increase safety, minimize maintenance costs, and increase the efficiency of the street system"	Wheatland General Plan	https://e4ki3oz9tby.exactdn.com/wp-content/uploads/General-Plan-	Transportation and Circulation Element	2-5	x	?			

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Wheatland	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
	Development review	Conduct safety impact assessments of new developments to identify mitigation and cost sharing opportunities.	Wheatland; Yuba County	Related policy: "2.A.6. The City shall require an analysis of the effects of traffic from proposed major development projects. Each such project shall construct or fund improvements necessary to mitigate the effects of traffic from the project. Such improvements may include a fair share of improvements that provide benefits to others."	Wheatland General Plan	https://e4ki3oz9tby.exactdn.com/wp-content/uploads/General-Plan-Policy-Document-Adopted-7-	Transportation and Circulation Element	2-5	x	?			

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Wheatland	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
	Equity first	Identify underserved communities through data. This should include data that identifies underserved communities and/or reflects the impact of crashes on underserved communities, prioritization criteria that consider equity, or a description of meaningful engagement and collaboration with appropriate stakeholders.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Incorporate equity considerations in implementation and assessment plans, such as goals related to safety improvements for populations that are traditionally underserved.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Meaningfully engage populations that are traditionally underserved in shared decision-making for safety efforts.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
Safe Users	Education	Perform outreach through educational programs, with a focus on the behaviors and target audiences most linked to death and serious injuries. Utilize partnerships with community-based organizations and advocacy groups.	Wheatland; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Use demonstration projects to raise awareness of new designs, encourage support among stakeholders for safety projects requiring capacity trade-offs, and solicit feedback from the public. Demonstration projects also provide opportunity to measure safety effects and encourage innovation and design flexibility.	Wheatland; Yuba-Sutter Region						x				
	Enforcement	Investigate and document the impacts of traffic safety enforcement and traffic safety surveillance on minority communities. Take steps to mitigate disproportionate impact of enforcement on disadvantaged populations.	Wheatland; Yuba County						x				
		Reallocate enforcement activities to target those behaviors and locations most linked to death and serious injury.	Wheatland; Yuba County						x				
	Research	Develop and implement strategies for robust demographic data collection in crash reporting.	Wheatland; Yuba County; Yuba-Sutter Region						x				
Safe Roadways	Collision avoidance	Systemically install proven countermeasures to separate users in space, separate users in time, and increase attentiveness and awareness, such as: protected signal phases, clear zones, and vertical and horizontal separation for pedestrians and bicyclists.	Wheatland; Yuba-Sutter Region						x				
		Complete infrastructure connectivity for pedestrians and bicyclists and make progress toward providing separation where needed based on crash exposure, crash history, characteristics of the roadway, and adjacent land uses associated with higher levels of use.	Wheatland; Yuba-Sutter Region						x				
	Kinetic energy reduction	Systemically install proven countermeasures to manage motor vehicle speed and collision angles, such as roadside appurtenances, roundabouts, refuge islands, hardened center lines, and road diets.	Wheatland; Yuba-Sutter Region						x				
		Evaluate intersection design and control decisions in the planning or scoping stage for opportunities to better prioritize reducing kinetic energy transfer, following new FHWA guidance.	Wheatland; Yuba-Sutter Region						x				
	Policies and tradeoffs	Designate functional class and modal priority for roadways to pinpoint the most effective safety countermeasures and streamline tradeoff decisions - evaluated at a network scale for network-based priorities.	Wheatland; Yuba-Sutter Region						x				
		Ensure safety for all users is prioritized, and accessibility maintained, during construction and road maintenance projects.	Wheatland; Yuba-Sutter Region						x				
	Innovation	Provide infrastructure for smarter roadways and intelligent transportation systems (ITS) in support of data collection and analysis, as well as proactive system management. Consider long-term network priorities and immediate pedestrian and bicyclist safety and mobility needs when citing EV charging stations.	Wheatland; Yuba-Sutter Region						x				
Safe Vehicles	Supportive infrastructure	Enable infrastructure-to-vehicle communication to provide warnings to drivers that support safer driving behavior.	Yuba-Sutter Region						x				
		Provide supportive infrastructure for dynamic curbside management and autonomous vehicles to enable active safety technology.	Wheatland; Yuba County						x				
	Fleet Management	Support safer operations of city and commercial vehicles through a transition plan of city's vehicle fleet to lower-mass and safety feature enhanced vehicles; heavy vehicle route restrictions to avoid high-pedestrian areas; and curbside management programs to limit user conflicts around stopped or loading vehicles.	Wheatland; Yuba County						x				
	Autonomous Vehicle Data	Collect data about the involvement of AVs in crashes for future data analysis, and to inform design and policies.	Wheatland; Yuba County						x				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Wheatland	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safe Speeds	Design and operations	Adopt roadway design standards that are focused on speed management, such as target speed-based design, for residential and arterial roadways. Adjust roadway geometries for context-appropriate speeds.	Wheatland; Yuba County	Wheatland has street design criteria, last revised in 2011	https://www.wheatland.ca.gov/wp-content/uploads/Complete-Wheatland-Public-Works-Standards-8-12-2011R.pdf				x				
	Enforcement	Deploy speed safety cameras, with a focus on equitable fee structures. Where not permitted, monitor changes in state legislation that may allow for this in the future.	Wheatland; Yuba County						x				
	Policy and training	Follow speed limit setting methodologies that determine appropriate or target speeds based on land use context, roadway context, and/or modal priority - accounting for the human body's ability to tolerate crash forces rather than the historic behavior of road users. Consider utilizing innovative data sources to systemically assess prevailing versus target speeds and develop a plan to lower speeds in areas with a large discrepancy.	Wheatland; Yuba County						x				
		Provide speed management training to staff focused on fatality and serious injury minimization.	Wheatland; Yuba-Sutter Region						x				
Post Crash Care	Crash investigation	Employ collision reporting practices that promote complete and accurate data collection and documentation of road user behavior and infrastructure.	Wheatland; Yuba-Sutter Region						x				
		Establish a feedback loop such that key insights from crash investigations are shared with roadway designers and/or influence outreach and education. Consider the creation of an inter-agency rapid response team to immediately investigate the sites of collisions and make recommendations for near-term safety enhancements.	Wheatland; Yuba County; Yuba-Sutter Region						x				
	Partnerships	Share data across agencies and organizations, including first responders and hospitals, to develop a holistic understanding of the safety landscape and improve accuracy.	Yuba County; Yuba-Sutter Region						x				
		Connect with victims' families and the advocacy community to offer support and resources, and encourage partnerships with outreach and education.	Wheatland; Yuba-Sutter Region						x				

Sutter County Policy Benchmarking

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice	Source, Chapter/Section, Page Number	Link	Assessed Level of Commitment/Implementation				
							Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safety Planning and Culture	Leadership and commitment	Leaders publicly commit to a "Zero" goal for traffic fatalities and serious injuries within a specific timeframe, and exhibit buy-in for the Safe System approach through media, public events, and support for related policies and programs.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Develop a safety plan aligned with the Safe System approach that establishes a "Zero" goal for traffic fatalities and serious injuries and identifies concrete actions to help Yuba/Sutter achieve zero including designation of lead agency, timeline, and funding. Safety plan should include an assessment of the local challenges that have hindered safety interventions in the past and create a roadmap for addressing them.	Yuba-Sutter Region	*Current effort with RSAP*			x				
		Establish key safety performance indicators and implement a monitoring process to evaluate progress and intervene if jurisdiction is not on track.	Yuba-Sutter Region	*Current effort with RSAP*			x				
		Convene and/or participate in an inter-agency committee, task force, implementation group, or working group that is charged with a Safety Action Plan's development, implementation, and monitoring. The group should include a representative from every agency or department that plays a critical role in advancing each Safe System element. It may be desireable to identify a staff coordinator to manage the agency's safety program.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Provide training to Yuba/Sutter staff, directors, elected officials, and community stakeholders on the Safe System approach.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Establish an ongoing Safe Routes to Schools program and funding mechanism.	Sutter County; Yuba-Sutter Region; School Districts				x				
	Meaningful Engagement	Engage with the public and relevant stakeholders, including the private sector and community groups. Incorporate information received from the engagement and collaboration into the safety plan.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Establish a website to inform the public about Yuba/Sutter's safety program goals and progress and the effectiveness of implemented safety projects.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Provide public safety materials in common languages spoken by Yuba/Sutter residents whose first language is not English.	Sutter County; Yuba-Sutter Region				x				
	Data and analysis	Apply a proactive and transparent approach to data-driven safety analysis, including the use of systemic profiles, emphasis areas based on roadway or contextual contributing factors, mode-specific conditions assessments (e.g., bicycle network stress or distance between marked crossings), and equity considerations.	Yuba-Sutter Region	*Current effort with RSAP*			x				
		Establish a process for residents to report safety hazards or request safety interventions and a data-driven approach for evaluating the reports/requests.	Sutter County; Yuba-Sutter Region				x				
		Focus network screening and benefit/cost calculations on fatal and serious injuries, instead of all collisions, to identify the core safety issues for human vulnerability.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Maintain a GIS inventory and actively work to improve accuracy of crash data and roadway data such as missing sidewalks, bikeways, intersection controls, etc.	Sutter County; Yuba-Sutter Region				x				
		Use innovative data collection and analysis approaches, such as crowdsourcing or video detection data, to identify emphasis areas related to near misses or crashes previously unreported by vulnerable communities.	Sutter County; Yuba-Sutter Region				x				
	Funding	Develop a project evaluation framework that prioritizes funding based on fatal and serious injury crash reduction opportunities, especially for equity populations. Audit the region's Transportation Improvement Program (TIP) for opportunities to enhance safety benefits and remove safety risks of funded projects.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Apply for grant programs to fund safety projects.	Sutter County; Yuba-Sutter Region				x				
		Institutionalize safety considerations in all project types to systematically fund projects through operations and maintenance efforts (such as repaving projects).	Sutter County; Yuba-Sutter Region				x				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice	Source, Chapter/Section, Page Number	Link	Assessed Level of Commitment/Implementation				
							Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
	Development review	Conduct safety impact assessments of new developments to identify mitigation and cost sharing opportunities.	Sutter County	Policy "M 1.2. Consider all transportation improvements as opportunities to enhance safety, access, and mobility for all travelers including people with special needs, recognizing bicycle, pedestrian, and transit modes as integral elements of the transportation system." Implementation: "M 2-E Condition new development to finance and construct appropriate circulation improvements necessary to mitigate a project's transportation impacts including pedestrian and bicycle mobility, safety, and level of service-related impacts. Collect the fair share cost of required circulation improvements through established fees, and/or construction estimates of needed improvements, as appropriate, where construction is not practical at the time of development."	Sutter County General Plan, Chapter 6 pg 9	https://www.suttercounty.org/government/county-departments/development-services/planning-services/general-plan		?			
	Equity first	Identify underserved communities through data. This should include data that identifies underserved communities and/or reflects the impact of crashes on underserved communities, prioritization criteria that consider equity, or a description of meaningful engagement and collaboration with appropriate stakeholders.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Incorporate equity considerations in implementation and assessment plans, such as goals related to safety improvements for populations that are traditionally underserved.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Meaningfully engage populations that are traditionally underserved in shared decision-making for safety efforts.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
Safe Users	Education	Perform outreach through educational programs, with a focus on the behaviors and target audiences most linked to death and serious injuries. Utilize partnerships with community-based organizations and advocacy groups.	Sutter County; Yuba-Sutter Region	*Current effort with RSAP*			x				
		Use demonstration projects to raise awareness of new designs, encourage support among stakeholders for safety projects requiring capacity trade-offs, and solicit feedback from the public. Demonstration projects also provide opportunity to measure safety effects and encourage innovation and design flexibility.	Sutter County; Yuba-Sutter Region				x				
	Enforcement	Investigate and document the impacts of traffic safety enforcement and traffic safety surveillance on minority communities. Take steps to mitigate disproportionate impact of enforcement on disadvantaged populations.	Sutter County				x				
		Reallocate enforcement activities to target those behaviors and locations most linked to death and serious injury.	Sutter County				x				
	Research	Develop and implement strategies for robust demographic data collection in crash reporting.	Sutter County; Yuba-Sutter Region				x				
Safe Roadways	Collision avoidance	Systemically install proven countermeasures to separate users in space, separate users in time, and increase attentiveness and awareness, such as: protected signal phases, clear zones, and vertical and horizontal separation for pedestrians and bicyclists.	Sutter County; Yuba-Sutter Region				x				
		Complete infrastructure connectivity for pedestrians and bicyclists and make progress toward providing separation where needed based on crash exposure, crash history, characteristics of the roadway, and adjacent land uses associated with higher levels of use.	Sutter County; Yuba-Sutter Region				x				
	Kinetic energy reduction	Systemically install proven countermeasures to manage motor vehicle speed and collision angles, such as roadside appurtenances, roundabouts, refuge islands, hardened center lines, and road diets.	Sutter County; Yuba-Sutter Region				x				
		Evaluate intersection design and control decisions in the planning or scoping stage for opportunities to better prioritize reducing kinetic energy transfer, following new FHWA guidance.	Sutter County				x				
	Policies and tradeoffs	Use functional class and modal priority for roadways to pinpoint the most effective safety countermeasures and streamline tradeoff decisions (evaluated at a network scale for network-based prioritization).	Sutter County; Yuba-Sutter Region				x				
		Ensure safety for all users is prioritized, and accessibility maintained, during construction and road maintenance projects.	Sutter County				x				
	Innovation	Provide infrastructure for smarter roadways and intelligent transportation systems (ITS) in support of data collection and analysis, as well as proactive system management. Consider long-term network priorities and immediate pedestrian and bicyclist safety and mobility needs when citing EV charging stations.	Sutter County; Yuba-Sutter Region				x				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice	Source, Chapter/Section, Page Number	Link	Assessed Level of Commitment/Implementation				
							Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safe Vehicles	Supportive infrastructure	Enable infrastructure-to-vehicle communication to provide warnings to drivers that support safer driving behavior.	Sutter County				x				
		Provide supportive infrastructure for dynamic curbside management and autonomous vehicles to enable active safety technology.	Sutter County				x				
	Fleet Management	Support safer operations of county and commercial vehicles through a transition plan of county's vehicle fleet to lower-mass and safety feature enhanced vehicles; heavy vehicle route restrictions to avoid high-pedestrian areas; and curbside management programs to limit user conflicts around stopped or loading vehicles.	Sutter County				x				
	Autonomous Vehicle Data	Collect data about the involvement of AVs in crashes for future data analysis, and to inform design and policies.	Sutter County				x				
Safe Speeds	Design and operations	Adopt roadway design standards that are focused on speed management, such as target speed-based design, for residential and arterial roadways. Adjust roadway geometries for context-appropriate speeds.	Sutter County	Sutter County Improvement Standards last revised in 2010. Could update to focus on speed management.	Sutter County Improvement Standards, Chapter 4: Streets	https://www.suttercounty.org/home/showpublisheddocument/2598/637554856376670000	x				
	Enforcement	Deploy speed safety cameras, with a focus on equitable fee structures. Where not permitted, monitor changes in state legislation that may allow for this in the future.	Sutter County; Yuba-Sutter Region				x				
	Policy and training	Follow speed limit setting methodologies that determine appropriate or target speeds based on land use context, roadway context, and/or modal priority - accounting for the human body's ability to tolerate crash forces rather than the historic behavior of road users. Consider utilizing innovative data sources to systemically assess prevailing versus target speeds and develop a plan to lower speeds in areas with a large discrepancy.	Sutter County; Yuba-Sutter Region				x				
		Provide speed management training to staff focused on fatality and serious injury minimization.	Sutter County; Yuba-Sutter Region				x				
Post Crash Care	Crash investigation	Employ collision reporting practices that promote complete and accurate data collection and documentation of road user behavior and infrastructure.	Sutter County; Yuba-Sutter Region				x				
		Establish a feedback loop such that key insights from crash investigations are shared with roadway designers and/or influence outreach and education. Consider the creation of an inter-agency rapid response team to immediately investigate the sites of collisions and make recommendations for near-term safety enhancements.	Sutter County; Yuba-Sutter Region				x				
	Partnerships	Share data across agencies and organizations, including first responders and hospitals, to develop a holistic understanding of the safety landscape and improve accuracy.	Yuba-Sutter Region				x				
		Connect with victims' families and the advocacy community to offer support and resources, and encourage partnerships with outreach and education.	Sutter County; Yuba-Sutter Region				x				

Yuba City Policy Benchmarking

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Yuba City	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safety Planning and Culture	Leadership and commitment	Leaders publicly commit to a “Zero” goal for traffic fatalities and serious injuries within a specific timeframe, and exhibit buy-in for the Safe System approach through media, public events, and support for related policies and programs.	Yuba City; Yuba-Sutter Region	Commitment through City LRSP. *Current effort with RSAP.*								x	
		Develop a safety plan aligned with the Safe System approach that establishes a "Zero" goal for traffic fatalities and serious injuries and identifies concrete actions to help Yuba Sutter achieve zero including designation of lead agency, timeline, and funding. Safety plan should include an assessment of the local challenges that have hindered safety interventions in the past and create a roadmap for addressing them.	Yuba-Sutter Region	LRSP was finalized in October 2023, and integrates the Safe System Approach concepts into the development of the plan. *Also current effort with RSAP.*	Yuba City Local Roadway Safety Plan	https://cms3	Ch. 3	18				x	
		Establish key safety performance indicators and implement a monitoring process to evaluate progress and intervene if city is not on track.	Yuba-Sutter Region	LRSP identifies what implementation of the plan entails. *Also current effort with RSAP.*	Yuba City Local Roadway Safety Plan		Ch. 7	102				x	
		Identify a staff coordinator to manage the agency’s safety program and convene an inter-agency working group that discusses safety projects and initiatives. The working group includes a representative from every agency or department that plays a critical role in advancing each Safe System element. Actively work to identify and overcome barriers to coordination across departments and agencies.	Yuba City; Yuba-Sutter Region	Stakeholder group was formed to ensure a local persepective was maintained in the LRSP planning effort. LRSP implementation entails identifying a roadway safety champion who is the plan's main advocate and is the city's point of contact for safety efforts. *Also current effort with RSAP.*	Yuba City Local Roadway Safety Plan		Ch. 3, Ch. 7	20, 94				x	
		Provide training to Yuba Sutter staff, directors, elected officials, and community stakeholders on the Safe System approach.	Yuba City; Yuba-Sutter Region	LRSP encourages outreach and education be done to inform users of safe roadway use. *Also current effort with RSAP.*	Yuba City Local Roadway Safety Plan							x	
		Establish an ongoing Safe Routes to Schools program and funding mechanism.	Yuba City; Yuba-Sutter Region; School Districts	Safe Routes to School Program implemented.	Yuba City Safe Routes To School Plan	https://cms3.revize.com/revize/yubacity/Document%20Center/Departments/Public%20Works/						x	
	Meaningful Engagement	Engage with the public and relevant stakeholders, including the private sector and community groups. Incorporate information received from the engagement and collaboration into the safety plan.	Yuba City; Yuba-Sutter Region	*Current effort with RSAP*									
		Establish a website to inform the public about Yuba Sutter's safety program goals and progress and the effectiveness of implemented safety projects.	Yuba-Sutter Region	*Current effort with RSAP*					x				
		Provide public safety materials in common languages spoken by Yuba Sutter residents whose first language is not English.	Yuba City; Yuba-Sutter Region						x				
	Data and analysis	Apply a proactive and transparent approach to data-driven safety analysis, including the use of systemic profiles, emphasis areas based on roadway or contextual contributing factors, mode-specific conditions assessments (e.g., bicycle network stress or distance between marked crossings), and equity considerations.	Yuba-Sutter Region	LRSP applies a data-driven approach to safety analysis. *Also current effort with RSAP.*			Ch. 5					x	
		Establish a process for citizens to report safety hazards or request safety interventions and a data-driven approach for evaluating the reports/requests.	Yuba City; Yuba-Sutter Region	LRSP Implementation Action: "Include a safety data reporting option in the 'Report an Issue' section of the My Yuba City mobile app"	Roadway Safety Plan		Ch. 7	94				x	
		Focus network screening and benefit/cost calculations on fatal and serious injuries, instead of all collisions, to identify the core safety issues for human vulnerability.	Yuba City; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Maintain a GIS inventory and actively work to improve accuracy of crash data and roadway data such as missing sidewalks, bikeways, intersection controls, etc.	Yuba City; Yuba-Sutter Region										
		Use innovative data collection and analysis approaches, such as crowdsourcing or video detection data, to identify emphasis areas related to near misses or crashes previously unreported by vulnerable communities.	Yuba City; Yuba-Sutter Region						x				
	Funding	Develop a project evaluation framework that prioritizes funding based on fatal and serious injury crash reduction opportunities, especially for equity populations. Audit the region's Transportation Improvement Program (TIP) for opportunities to enhance safety benefits and remove safety risks of funded projects.	Yuba City; Yuba-Sutter Region	*Current effort with RSAP*					x				
		Apply for grant programs to fund safety projects.	Yuba City; Yuba-Sutter Region	Yuba City LRSP identifies funding opportunities.	Roadway Safety Plan							x	
		Institutionalize safety considerations in all project types to systematically fund projects through operations and maintenance efforts (such as repaving projects).	Yuba City; Yuba-Sutter Region	Circulation Element guiding policy: "Develop a system of sidewalks and bikeways that promote safe walking and bicycle riding for transportation and recreation."	Yuba City General Plan			5-18					x
	Development review	Conduct safety impact assessments of new developments to identify mitigation and cost sharing opportunities.	Yuba City; Sutter County						x				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Yuba City	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
	Equity first	Clearly define equity in the safety plan and include equity considerations throughout the emphasis areas and strategies.	Yuba City; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Incorporate equity considerations in implementation and assessment plans, such as goals related to safety improvements for populations that are traditionally underserved.	Yuba City; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Meaningfully engage populations that are traditionally underserved in shared decision-making for safety efforts.	Yuba City; Yuba-Sutter Region	*Current effort with RSAP*					X				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Yuba City	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safe Users	Education	Perform outreach through educational programs, with a focus on the behaviors and target audiences most linked to death and serious injuries. Utilize partnerships with community-based organizations and advocacy groups.	Yuba City; Yuba-Sutter Region	LRSP Countermeasure: Establish and enforce communications and outreach supporting enforcement. *Also current effort with RSAP.*	Yuba City Local Roadway Safety Plan		Ch. 5	74				x	
		Use demonstration projects to raise awareness of new designs, encourage support among stakeholders for safety projects requiring capacity trade-offs, and solicit feedback from the public. Demonstration projects also provide opportunity to measure safety effects and encourage innovation and design flexibility.	Yuba City; Yuba-Sutter Region	Implementation Action: "Rolling out safety projects as pilots presents the opportunity for the City to gather valuable public and stakeholder feedback to make improvements and adjustments before moving on with similar projects."	Yuba City Local Roadway Safety Plan		Ch. 7	96				x	
	Enforcement	Investigate and document the impacts of traffic safety enforcement and traffic safety surveillance on minority communities. Take steps to mitigate disproportionate impact of enforcement on disadvantaged populations.	Yuba City						x				
		Reallocate enforcement activities to target those behaviors and locations most linked to death and serious injury.	Yuba City	LRSP suggested countermeasures focused on deterrence through enforcement for alcohol and drug-impaired driving.			Ch. 5	74				x	
	Research	Develop and implement strategies for robust demographic data collection in crash reporting.	Yuba City; Yuba-Sutter Region						x				
Safe Roadways	Collision avoidance	Systemically install proven countermeasures to separate users in space, separate users in time, and increase attentiveness and awareness, such as: protected signal phases, clear zones, and vertical and horizontal separation for pedestrians and bicyclists.	Yuba City; Yuba-Sutter Region	1. City of Yuba City General Plan contains policies regarding bicycle safety, and calls out specific projects such as the provision of bicycle paths or lanes on bridges and overpasses 2. Planned installation of over 190 sharrows per Yuba City website	City of Yuba City General Plan; Yuba City website	https://www.yubacity.net/city_hall/departments/parks__recreation/recreation							x
		Complete infrastructure connectivity for pedestrians and bicyclists and make progress toward providing separation where needed based on crash exposure, crash history, characteristics of the roadway, and adjacent land uses associated with higher levels of use.	Yuba City; Yuba-Sutter Region	LRSP makes countermeasure recommendations based on common collision sites and other variables Yuba City also completed a Bicycle Master Plan in 2011.	Yuba City Bicycle Master Plan	https://cms3.revize.com/revize/yubacity/Document%20Cent				x			
	Kinetic energy reduction	Systemically install proven countermeasures to manage motor vehicle speed and collision angles, such as roadside appurtenances, roundabouts, refuge islands, hardened center lines, and road diets.	Yuba City; Yuba-Sutter Region	Yuba City LRSP identified that unsafe speed was a common primary collision factor, and suggested road diets among other proven countermeasures.	Yuba City Local Roadway Safety Plan		Ch. 6	72				x	
		Evaluate intersection design and control decisions in the planning or scoping stage for opportunities to better prioritize reducing kinetic energy transfer, following new FHWA guidance.	Yuba City						x				
	Policies and tradeoffs	Designate functional class and modal priority for roadways to pinpoint the most effective safety countermeasures and streamline tradeoff decisions - evaluated at a network scale for network-based priorities.	Yuba City; Yuba-Sutter Region						x				
		Ensure safety for all users is prioritized, and accessibility maintained, during construction and road maintenance projects.	Yuba City						x				
	Innovation	Provide infrastructure for smarter roadways and intelligent transportation systems (ITS) in support of data collection and analysis, as well as proactive system management. Consider long-term network priorities and immediate pedestrian and bicyclist safety and mobility needs when citing EV charging stations.	Yuba City; Yuba-Sutter Region						x				
Safe Vehicles	Supportive infrastructure	Enable infrastructure-to-vehicle communication to provide warnings to drivers that support safer driving behavior.	Yuba-Sutter Region						x				
		Provide supportive infrastructure for dynamic curbside management and autonomous vehicles to enable active safety technology.	Yuba City						x				
	Fleet Management	Support safer operations of city and commercial vehicles through a transition plan of city's vehicle fleet to lower-mass and safety feature enhanced vehicles; heavy vehicle route restrictions to avoid high-pedestrian areas; and curbside management programs to limit user conflicts around stopped or loading vehicles.	Yuba City						x				
	Data	Collect data about the involvement of AVs in crashes for future data analysis, and to inform design and policies.	Yuba City						x				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Yuba City	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safe Speeds	Design and operations	Adopt roadway design standards that are focused on speed management, such as target speed-based design, for residential and arterial roadways. Adjust roadway geometries for context-appropriate speeds.	Yuba City	LRSP Implementation Action: "Create new standards for typical maintenance that reflect LRSP project goals."	Yuba City Local Roadway Safety Plan		Ch. 7	96				x	
	Enforcement	Deploy speed safety cameras, with a focus on equitable fee structures. Where not permitted, monitor changes in state legislation that may allow for this in the future.	Yuba City; Yuba-Sutter Region						x				
	Policy and training	Follow speed limit setting methodologies that determine appropriate or target speeds based on land use context, roadway context, and/or modal priority - accounting for the human body's ability to tolerate crash forces rather than the historic behavior of road users. Consider utilizing innovative data sources to systemically assess prevailing versus target speeds and develop a plan to lower speeds in areas with a large discrepancy.	Yuba City; Yuba-Sutter Region	Is Yuba City doing anything on this front?					x				
		Provide speed management training to staff focused on fatality and serious injury minimization.	Yuba City; Yuba-Sutter Region						x				
Post Crash Care	Crash investigation	Employ collision reporting practices that promote complete and accurate data collection and documentation of road user behavior and infrastructure.	Yuba City; Yuba-Sutter Region						x				
		Establish a feedback loop such that key insights from crash investigations are shared with roadway designers and/or influence outreach and education. Consider the creation of an inter-agency rapid response team to immediately investigate the sites of collisions and make recommendations for near-term safety enhancements.	Yuba City; Yuba-Sutter Region						x				
	Partnerships	Share data across agencies and organizations, including first responders and hospitals, to develop a holistic understanding of the safety landscape and improve accuracy.	Yuba City; Yuba-Sutter Region						x				
		Connect with victims' families and the advocacy community to offer support and resources, and encourage partnerships with outreach and education.	Yuba City; Yuba-Sutter Region						x				

Live Oak Policy Benchmarking

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Live Oak	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safety Planning and Culture	Leadership and commitment	Leaders publicly commit to a "Zero" goal for traffic fatalities and serious injuries within a specific timeframe, and exhibit buy-in for the Safe System approach through media, public events, and support for related policies and programs.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Develop a safety plan aligned with the Safe System approach that establishes a "Zero" goal for traffic fatalities and serious injuries and identifies concrete actions to help Yuba Sutter achieve zero including designation of lead agency, timeline, and funding. Safety plan should include an assessment of the local challenges that have hindered safety interventions in the past and create a roadmap for addressing them.	Yuba-Sutter Region	*Current effort with RSAP*					X				
		Establish key safety performance indicators and implement a monitoring process to evaluate progress and intervene if city is not on track.	Yuba-Sutter Region	*Current effort with RSAP*					X				
		Convene and/or participate in an inter-agency committee, task force, implementation group, or working group that is charged with a Safety Action Plan's development, implementation, and monitoring. The group should include a representative from every agency or department that plays a critical role in advancing each Safe System element. It may be desireable to identify a staff coordinator to manage the agency's safety program.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Provide training to Yuba Sutter staff, directors, elected officials, and community stakeholders on the Safe System approach.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Establish an ongoing Safe Routes to Schools program and funding mechanism.	Live Oak; Yuba-Sutter Region; School Districts	No current SRTS program.					X				
	Meaningful Engagement	Engage with the public and relevant stakeholders, including the private sector and community groups. Incorporate information received from the engagement and collaboration into the safety plan.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Establish a website to inform the public about Yuba Sutter's safety program goals and progress and the effectiveness of implemented safety projects.	Yuba-Sutter Region	*Current effort with RSAP*					X				
		Provide public safety materials in common languages spoken by Yuba Sutter residents whose first language is not English.	Live Oak; Yuba-Sutter Region						X				
	Data and analysis	Apply a proactive and transparent approach to data-driven safety analysis, including the use of systemic profiles, emphasis areas based on roadway or contextual contributing factors, mode-specific conditions assessments (e.g., bicycle network stress or distance between marked crossings), and equity considerations.	Yuba-Sutter Region	*Current effort with RSAP*					X				
		Establish a process for citizens to report safety hazards or request safety interventions and a data-driven approach for evaluating the reports/requests.	Live Oak; Yuba-Sutter Region						X				
		Focus network screening and benefit/cost calculations on fatal and serious injuries, instead of all collisions, to identify the core safety issues for human vulnerability.	Yuba-Sutter Region	*Current effort with RSAP*					X				
		Maintain a GIS inventory and actively work to improve accuracy of crash data and roadway data such as missing sidewalks, bikeways, intersection controls, etc.	Live Oak; Yuba-Sutter Region						X				
		Use innovative data collection and analysis approaches, such as crowdsourcing or video detection data, to identify emphasis areas related to near misses or crashes previously unreported by vulnerable communities.	Live Oak; Yuba-Sutter Region						X				
	Funding	Develop a project evaluation framework that prioritizes funding based on fatal and serious injury crash reduction opportunities, especially for equity populations. Audit the region's Transportation Improvement Program (TIP) for opportunities to enhance safety benefits and remove safety risks of funded projects.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Apply for grant programs to fund safety projects.	Live Oak; Yuba-Sutter Region						X				
		Institutionalize safety considerations in all project types to systematically fund projects through operations and maintenance efforts (such as repaving projects).	Live Oak; Yuba-Sutter Region						X				
	Development review	Conduct safety impact assessments of new developments to identify mitigation and cost sharing opportunities.	Live Oak; Sutter County						X				
	Equity first	Identify underserved communities through data. This should include data that identifies underserved communities and/or reflects the impact of crashes on underserved communities, prioritization criteria that consider equity, or a description of meaningful engagement and collaboration with appropriate stakeholders.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Incorporate equity considerations in implementation and assessment plans, such as goals related to safety improvements for populations that are traditionally underserved.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Meaningfully engage populations that are traditionally underserved in shared decision-making for safety efforts.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Live Oak	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Safe Users	Education	Perform outreach through educational programs, with a focus on the behaviors and target audiences most linked to death and serious injuries. Utilize partnerships with community-based organizations and advocacy groups.	Live Oak; Yuba-Sutter Region	*Current effort with RSAP*					X				
		Use demonstration projects to raise awareness of new designs, encourage support among stakeholders for safety projects requiring capacity trade-offs, and solicit feedback from the public. Demonstration projects also provide opportunity to measure safety effects and encourage innovation and design flexibility.	Live Oak; Yuba-Sutter Region						X				
	Enforcement	Investigate and document the impacts of traffic safety enforcement and traffic safety surveillance on minority communities. Take steps to mitigate disproportionate impact of enforcement on disadvantaged populations.	Live Oak; Sutter County						X				
		Reallocate enforcement activities to target those behaviors and locations most linked to death and serious injury.	Live Oak; Sutter County						X				
	Research	Develop and implement strategies for robust demographic data collection in crash reporting.	Live Oak; Sutter County; Yuba-Sutter Region						X				
Safe Roadways	Collision avoidance	Systemically install proven countermeasures to separate users in space, separate users in time, and increase attentiveness and awareness, such as: protected signal phases, clear zones, and vertical and horizontal separation for pedestrians and bicyclists.	Live Oak; Yuba-Sutter Region						X				
		Complete infrastructure connectivity for pedestrians and bicyclists and make progress toward providing separation where needed based on crash exposure, crash history, characteristics of the roadway, and adjacent land uses associated with higher levels of use.	Live Oak; Yuba-Sutter Region	*"Policy CIRC-2.1: The City will seek funding for, and include pedestrian and bicycle improvements in Capital Improvements Planning, as feasible. "*	Live Oak 2030 General Plan	https://www.liveoakcity.org/home/showpublisheddocume	CIRC	26	X				
	Kinetic energy reduction	Systemically install proven countermeasures to manage motor vehicle speed and collision angles, such as roadside appurtenances, roundabouts, refuge islands, hardened center lines, and road diets.	Live Oak; Yuba-Sutter Region						X				
		Evaluate intersection design and control decisions in the planning or scoping stage for opportunities to better prioritize reducing kinetic energy transfer, following new FHWA guidance.	Live Oak; Yuba-Sutter Region						X				
	Policies and tradeoffs	Designate functional class and modal priority for roadways to pinpoint the most effective safety countermeasures and streamline tradeoff decisions - evaluated at a network scale for network-based priorities.	Live Oak; Yuba-Sutter Region						X				
		Ensure safety for all users is prioritized, and accessibility maintained, during construction and road maintenance projects.	Live Oak; Yuba-Sutter Region						X				
	Innovation	Provide infrastructure for smarter roadways and intelligent transportation systems (ITS) in support of data collection and analysis, as well as proactive system management. Consider long-term network priorities and immediate pedestrian and bicyclist safety and mobility needs when citing EV charging stations.	Live Oak; Yuba-Sutter Region						X				
Safe Vehicles	Supportive infrastructure	Enable infrastructure-to-vehicle communication to provide warnings to drivers that support safer driving behavior.	Yuba-Sutter Region						X				
		Provide supportive infrastructure for dynamic curbside management and autonomous vehicles to enable active safety technology.	Live Oak; Sutter County						X				
	Fleet Management	Support safer operations of city and commercial vehicles through a transition plan of city's vehicle fleet to lower-mass and safety feature enhanced vehicles; heavy vehicle route restrictions to avoid high-pedestrian areas; and curbside management programs to limit user conflicts around stopped or loading vehicles.	Live Oak; Sutter County						X				
	Autonomous Vehicle Data	Collect data about the involvement of AVs in crashes for future data analysis, and to inform design and policies.	Live Oak; Sutter County						X				
Safe Speeds	Design and operations	Adopt roadway design standards that are focused on speed management, such as target speed-based design, for residential and arterial roadways. Adjust roadway geometries for context-appropriate speeds.	Live Oak; Sutter County						X				
	Enforcement	Deploy speed safety cameras, with a focus on equitable fee structures. Where not permitted, monitor changes in state legislation that may allow for this in the future.	Live Oak; Sutter County						X				
	Policy and training	Follow speed limit setting methodologies that determine appropriate or target speeds based on land use context, roadway context, and/or modal priority - accounting for the human body's ability to tolerate crash forces rather than the historic behavior of road users. Consider utilizing innovative data sources to systemically assess prevailing versus target speeds and develop a plan to lower speeds in areas with a large discrepancy.	Live Oak; Sutter County						X				
		Provide speed management training to staff focused on fatality and serious injury minimization.	Live Oak; Yuba-Sutter Region						X				

Core Element	Category	Benchmark	Jurisdictional Responsibility	State of Current Practice in Live Oak	Source	Link	Chapter/ Section	Page Number	Assessed Level of Commitment/Implementation				
									Not a Current Practice	Codified in Standard or Policy, but Not in Practice	Codified and Occasional Practice	Codified and Usual Practice	Institutionalized Practice
Post Crash Care	Crash investigation	Employ collision reporting practices that promote complete and accurate data collection and documentation of road user behavior and infrastructure.	Live Oak; Yuba-Sutter Region						X				
		Establish a feedback loop such that key insights from crash investigations are shared with roadway designers and/or influence outreach and education. Consider the creation of an inter-agency rapid response team to immediately investigate the sites of collisions and make recommendations for near-term safety enhancements.	Live Oak; Sutter County; Yuba-Sutter Region						X				
	Partnerships	Share data across agencies and organizations, including first responders and hospitals, to develop a holistic understanding of the safety landscape and improve accuracy.	Sutter County; Yuba-Sutter Region						X				
		Connect with victims' families and the advocacy community to offer support and resources, and encourage partnerships with outreach and education.	Live Oak; Yuba-Sutter Region						X				

Additional Local Policy Considerations

Beyond the policies considered in the Safe System Policy Benchmarking assessment, there are a range of transportation, land use, and housing policies in the Yuba–Sutter region partner agencies' General Plans they may, directly or indirectly, influence roadway safety outcomes. The following goals and policies bolster a Safe System by addressing the built environment or socioeconomic factors that have an impact on roadway safety, such as influencing types and amounts of vehicle travel, thus reducing exposure.

Yuba County 2030 General Plan

RELEVANT CIRCULATION ELEMENT POLICIES:

Policy CD19.6: New developments shall provide attractive streetscapes with street trees and sidewalks, planting strips, transit shelters, benches, and pedestrian-scale lighting, as required by County standards, as well as safe and frequent crosswalks along roadways, particularly in areas expected to have higher pedestrian traffic.

Policy CD19.8: The County will seek funding for and, as feasible, install traffic-calming measures, such as planted medians, landscaped planter strips, landscaped traffic circles, and other designs in areas with excessive or high-speed traffic, as appropriate. The County will not support street closures, half closures, or other measures that limit connectivity as a way to calm traffic.

RELEVANT LAND USE ELEMENT GOALS:

Goal CD1: Provide for efficient valley development patterns

Goal CD2: Promote growth and reinvestment in existing developed unincorporated communities

Goal CD4: Accessible, convenient, and successful community retail, service, and employment centers

Goal CD5: Valley Neighborhoods provide a long-term, high quality of life for the County's existing and future residents

Goal CD6: Provide higher-density housing, neighborhood services, and retail in pedestrian- friendly Neighborhood Centers

Goal CD7: Revitalize Yuba County's Mixed-Use Corridors to better serve existing Valley Neighborhoods

Goal CD8: Promote high-quality neighborhood design that ensures pedestrian comfort and convenience

RELEVANT HOUSING ELEMENT GOALS:

Goal H-1: Provide adequate sites to meet housing needs among all income groups.

Goal H-2: Assist in the provision of affordable housing for extremely low-, very low-, low-, and moderate-income households.

Goal H-3: Remove constraints to the availability and affordability of housing for all income groups.

Goal H-5: Preserve affordable housing.

Goal H-6: Ensure equal housing opportunity for all county residents.

Marysville 2050 General Plan

Draft not available online as of June 2025.

Live Oak 2030 General Plan

RELEVANT CIRCULATION ELEMENT POLICIES:

Policy CIRC-2.1: The City will seek funding for and include pedestrian and bicycle improvements in Capital Improvements Planning, as feasible.

Policy CIRC-2.2: The City and Redevelopment Agency will prioritize transportation investments that better connect neighborhoods to major destinations, with safer and more convenient pedestrian, bicycle, and transit stops and routes.

Policy CIRC-2.4: The City will seek funding for and, as feasible, install traffic-calming measures, such as planted medians, landscaped planter strips, landscaped traffic circles, and other designs in areas with excessive traffic, as appropriate.

Policy CIRC-3.5: In areas with high pedestrian activity, streets should be relatively narrow and curb radii should be designed to promote pedestrian safety and convenience, while also ensuring adequate emergency access.

Sutter County 2030 General Plan

RELEVANT MOBILITY ELEMENT POLICIES:

Policy M 1.2: Consider all transportation improvements as opportunities to enhance safety, access, and mobility for all travelers including people with special needs, recognizing bicycle, pedestrian, and transit modes as integral elements of the transportation system.

Policy M 1.3: Rights-of-Way. Secure adequate right-of-way to allow for the planning, design, and operation of transportation systems that provide safe access for all users.

Policy M 5.1: Prepare a Bicycle and Pedestrian Master Plan that supports implementation of a comprehensive, safe, and convenient system of commuter and recreational routes for pedestrians and cyclists.

RELEVANT LAND USE ELEMENT GOALS:

Goal LU 1: Promote the efficient and sensitive use of lands to protect and enhance Sutter County's quality of life and meet the needs of existing and future residents and businesses.

Goal LU 4: Facilitate orderly, well-planned, sustainable, and efficient growth that balances aesthetic, considerations.

Goal LU 8: Facilitate well planned large-scale mixed-use residential, industrial, and commercial development, bringing housing and jobs to South Sutter County consistent with the terms of advisory Measure M.

RELEVANT HOUSING ELEMENT GOALS & POLICIES:

Goal H 1: Provide for an adequate supply of new housing to meet the needs of present and future Sutter County residents incorporating a variety of housing types and densities that accommodate all income groups.

Policy H 1.1: Adequate Supply of Land Suitable for Housing. Identify and maintain an adequate supply of residential land with appropriate zoning classifications, land use designations, development standards, infrastructure, and public services to accommodate the County's fair share of regional housing needs, including housing for extremely low-, very low-, low-, and moderate-income households.

Goal H 2: Facilitate the development of affordable housing to meet the housing needs of lower-income households in the County.

Goal H 3: Remove governmental constraints, address accessibility needs, and provide a regulatory framework to encourage a variety of housing types that accommodate all income groups.

Goal H 4: Provide housing for special needs groups, including persons with disabilities, seniors, farmworkers, persons experiencing homelessness, and extremely low-income households.

Goal H 6: Promote equal housing opportunities and affirmatively further fair housing for all residents of Sutter County.

Wheatland General Plan

RELEVANT CIRCULATION ELEMENT POLICIES:

Policy 2.A.10: The City shall give priority to street and highway improvements that increase safety, minimize maintenance costs, and increase the efficiency of the street system.

Policy 2.A.6: The City shall require an analysis of the effects of traffic from proposed major development projects. Each such project shall construct or fund improvements necessary to mitigate the effects of traffic from the project. Such improvements may include a fair share of improvements that provide benefits to others.

RELEVANT LAND USE ELEMENT GOALS:

Goal 1.B: To provide adequate land in a range of residential densities to accommodate the housing needs of all income groups expected to reside in Wheatland.

Goal 1.C: To provide for new residential development in planned neighborhoods that are designed to promote walking, bicycling, and transit use.

Goal 1.G: To support development of employment uses to meet the present and future needs of Wheatland residents for jobs and to maintain Wheatland's economic vitality.

Goal 4.A: Provide for the city's regional share of new housing for all income groups

Goal 4.C: Meet the special housing needs of homeless persons, seniors, large families, disabled persons, and farmworkers.

Yuba City General Plan

RELEVANT CIRCULATION ELEMENT POLICIES:

Policy 5.2-I-7: When constructing or modifying roadways, plan for usage of the roadway space by all users, including motor vehicles, transit vehicles, bicyclists, and pedestrians.

Policy 5.2-I-21: Implement traffic calming measures to slow traffic on local and collector residential streets and prioritize these measures over congestion management. Include roundabouts, traffic circles, and other traffic calming devices among these measures.

Policy 5.4-I-1: Establish a network of on- and off-roadway bicycle routes and encourage their use for commute, recreational, and other trips. Design bike routes with the safety of cyclists as a priority.

Policy 5.4-I-4: Provide bicycle lanes with a minimum width of five feet (six feet along all parkways) on new streets and existing streets whenever they are widened to more than two travel lanes.

Policy 5.4-I-7: Increase bicycle safety by:

- *Sweeping and repairing bicycle lanes and paths on a regular basis;*
- *Ensuring that bikeways are delineated and signed in accordance with Caltrans' standards, and lighting is provided, where needed;*
- *Providing bicycle paths or lanes on bridges and overpasses;*
- *Ensuring that all new and improved streets have bicycle-safe drainage grates and are free of hazards such as uneven pavement and gravel;*
- *Provide adequate signage and markings warning vehicular traffic of the existence of merging or crossing bicycle traffic where bike routes and paths make transitions into or across roadways; and*
- *Work with the Yuba City Unified School District to promote classes on bicycle safety in the schools.*

Policy 5.4-I-8: Give bikes equal treatment in terms of provisions for safety and comfort on arterials and collectors as motor vehicles.

Policy 5.4-I-10 Provide for pedestrian-friendly zones in conjunction with the development, redevelopment, and design of mixed-use neighborhood core areas, the Downtown area, schools, parks, and other high use areas by:

- *Providing intersection "bump outs" to reduce walking distances across streets in the Downtown and other high use areas;*
- *Providing pedestrian facilities at all signalized intersections;*
- *Providing landscaping that encourages pedestrian use;*
- *Constructing adequately lit and safe access through subdivision sites.*
- *The following land use policies bolster a Safe System by addressing the built environment or socioeconomic factors that have an impact on roadway safety:*

RELEVANT LAND USE ELEMENT POLICIES:

Policy 3.4-G-1: Maintain a well-defined compact urban form, with a defined urban growth boundary and urban development intensities on land designated for urban uses.

Policy 3.4-G-2: Promote a balanced land use program that increases the ability of people to live and work in the city.

Policy 3.4-G-3: Promote development patterns that maximize residents' accessibility to parks, open space, and shopping areas.

Live Oak 2030 General Plan

RELEVANT CIRCULATION ELEMENT POLICIES:

Policy CIRC-2.1: The City will seek funding for and include pedestrian and bicycle improvements in Capital Improvements Planning, as feasible.

Policy CIRC-2.2: The City and Redevelopment Agency will prioritize transportation investments that better connect neighborhoods to major destinations, with safer and more convenient pedestrian, bicycle, and transit stops and routes.

Policy CIRC-2.4: The City will seek funding for and, as feasible, install traffic-calming measures, such as planted medians, landscaped planter strips, landscaped traffic circles, and other designs in areas with excessive traffic, as appropriate.

Policy CIRC-3.5: In areas with high pedestrian activity, streets should be relatively narrow and curb radii should be designed to promote pedestrian safety and convenience, while also ensuring adequate emergency access.

Federal and State Safety Policies and Guidelines

Federal Policy Considerations

The United States Department of Transportation (US DOT) incorporated the Safe System Approach as part of its most recent *National Roadway Safety Strategy* (NRSS), adopted in January 2022. This NRSS is the first national commitment to the goal of zero fatalities on America's roadways, and names the Safe System Approach as the way to accomplish that goal. Federal transportation officials have since unveiled a number of policies and programs geared towards the application and implementation of the Safe System Approach at the state and local levels.

Safe Streets and Roads for All

The Safe Streets and Roads for All (SS4A) grant program was established by the Bipartisan Infrastructure Law in 2022, centered around the Department of Transportation's National Roadway Safety Strategy and its goal of zero deaths and serious injuries on America's roadways. Over its five-year duration ending in approximately 2026, it will provide $5 billion in grant funding to develop and implement safety plans and projects.

The SS4A grant program provides funding for local agencies to create Comprehensive Safety Action Plans (CSAPs). It also provides funding to implement safety projects, but only to those agencies that have an adopted CSAP or an equivalent. In order to qualify as a CSAP (and allow an agency to be eligible for implementation planning grant funding), a plan must meet a nine-point criteria as set forth by the Department of Transportation. They include an official commitment and goal to eliminate roadway fatalities and serious injuries; the creation of a standing task force or working group that will lead and monitor the implementation of the plan; data-driven safety analysis; public engagement and inter-governmental collaboration; consideration of equity in the planning process; assessment of current policies and guidelines to identify changes that will better prioritize safety; identification of a comprehensive set of projects and strategies that address safety issues; posting of the plan online along with description of how future progress will be measured; and that the plan would be updated every five years.

Safe System Roadway Design Hierarchy

The *Safe System Roadway Design Hierarchy*, created by the Federal Highway Administration (FHWA) in 2024, provides guidance in contextualizing and assessing infrastructure-based countermeasures and strategies on their alignment with the principles of the Safe System Approach.

The *Hierarchy* classifies countermeasures into four tiers, from most to least aligned with Safe System principles. These tiers are:

1. **Removing severe conflicts**, which can act to eliminate high-risk conditions that involve users with different speeds or moving in different directions sharing space. This tier can include countermeasures that remove potential points of conflicts (for example, removing conflicting turning movements), and those that separate vulnerable users from vehicles in space (for example, protecting people biking through a separated bike lane).
2. **Reducing vehicle speeds**, which reduces the kinetic energy present within systems and thereby reduces the severity of crashes that do occur. As driver behavior, especially when it comes to speed, is highly influenced by roadway features, countermeasures that reduce prevailing speeds can include lane narrowing and features that channelize vehicle traffic such as median islands.
3. **Managing conflicts in time**, which covers instances (such as intersections) where space needs to be shared between different users, but where they can be separated in time. An example is the Leading Pedestrian Interval, which allows people walking to have a "head start" interval at a signalized intersection before conflicting vehicle traffic enters the crosswalk.
4. **Increasing attentiveness and awareness**, which involves alerting users to conflicts and potential risks, can involve such countermeasures as intersection daylighting and warning signage.

Crucially, the *Hierarchy* prioritizes improvements and countermeasures that make physical changes to the system for the whole population as more effective than measures that rely on roadway users and individual decisions. This is consistent with the Safe System Approach's central premise that humans make mistakes, and that the roadway system should be designed to accommodate them through redundant and proactive interventions.

In addition to presenting this tiered hierarchy as a framework for understanding countermeasures as they relate to the principles of the Safe System Approach, the guidance also presents examples of both common and novel countermeasures that fall under each tier.

Safe System Approach for Speed Management

Speeding continues to be one of the leading causes of collisions across the country, especially those causing fatalities and severe injuries, and the relationship between higher speeds and increased collision severity is well-documented. The FHWA's 2023 report on the S*afe System Approach for Speed Management* provides targeted recommendations around speed management. The report notes the need for agencies to place safety and the prevention of injury collisions (as opposed to throughput or travel times) as the highest priority when it comes to speed setting on roadways, and highlights the need to change the physical design and context of the roadway beyond merely changing regulatory speed limits in order to achieve target speeds.

The report outlines a five-stage framework to speed management that is consistent with the Safe System Approach. The process begins with establishing a vision and building consensus within the community to manage speeds; the creation of a strategic safety plan, such as a Vision Zero plan or Local Roadway Safety Plan, can serve this purpose. Second, speed data should be collected and analyzed, which can help both guide the rest of the process and provide the backing to build public support. Third, locations for speed management should be prioritized proactively, taking into account both collision and speeding history as

well as contextual factors (such as the presence of vulnerable users or traffic generators like schools and commercial areas). Countermeasures can then be selected for prioritized locations. Finally, ongoing monitoring and evaluation should be conducted to ensure efficacy and allow for flexibility and adjustment. The report also provides real-world case studies of how these principles were applied in practice.

Primer on Safe System Approach for Pedestrians and Bicyclists

The *Primer on Safe System Approach for Pedestrians and Bicyclists*, released by the FHWA in 2021, emphasizes the importance of protecting pedestrians and bicyclists, as vulnerable users, under the Safe System Approach. The Primer details the considerations surrounding pedestrians and bicyclists under each of the five elements of the Safe System Approach – Safe Speeds, Safe Roads, Safe Vehicles, Safe Road Users, and Post-Crash Care. It also provides strategies and actions that can be taken at the Federal, state, and local levels towards implementing the Safe System Approach. Also included is an appendix on benchmarking policies, programs, and practices for Safe System consistency. The benchmarking used for City of Sacramento is based on this benchmarking tool.

Other National Guidance

In addition to policy and guidance from Federal agencies, other national-level documents provide additional guidance towards applying and implementing the Safe System Approach for local agencies.

The Safe Systems Pyramid

The Safe Systems Pyramid is a new framework for traffic safety proposed in a 2023 paper which adapts the Health Impact Pyramid framework into the Safe Systems Pyramid for roadway safety practitioners. Building on established public health practice, the Safe Systems Pyramid illustrates how interventions that have the largest reach and require the least personal effort will be the most impactful.

In addition to identifying the kinetic energy transfer as the cause of injury, the Safe Systems Pyramid also relates energy to exposure. It explains how the many possible safety interventions differ in their effectiveness at reducing risk in the transportation system by prioritizing interventions that reduce exposure to kinetic energy transfer at the system level. Those that require more individual effort, such as driver education programs, have the least impact on improving system-wide safety. Meanwhile, those that change the quality of people's lives and the built environment in which they travel more broadly, such as affordable housing near transit, zoning reform, traffic calming, and limiting crossing distances at intersections, have the largest impacts on safety.

Source: David Ederer, Rachael Thompson Panik, Nisha Botchwey, and Kari Watkins. The Safe Systems Pyramid: A new framework for traffic safety, https://doi.org/10.1016/j.trip.2023.100905. Graphic from Vision Zero Network, https://visionzeronetwork.org/applying-the-health-impact-pyramid-to-roadway-safety/

At the top of the Safe System Pyramid is education, which generally correspond to Tier 4 of the Safe System Hierarchy, and encompasses driver education programs and campaigns – for example, asking drivers to slow down and obey the speed limit. As the authors of the paper note, "the need to urge behavioral change is symptomatic of failure to establish contexts in which healthy choices are default actions," and education programs are thus considered to be most reliant on individual behavior and least effective in producing improvements.

Below education on the Pyramid are active and latent safety measures, which generally correspond to Tier 3 of the Hierarchy. Active safety measures encompass such countermeasures as warning signals and signs, as well as in-vehicle devices such as seatbelts and collision warnings. These safety measures are effective when used, but rely on individual opt-in (for example, for a driver to react to signage or to a collision warning) to function. Latent safety measures encompass countermeasures such as signal timing modifications such as leading pedestrian intervals (LPIs) that create redundancy, as well as vehicle features such as lane departure prevention and automated emergency braking. Latent measures are considered more effective than active measures, as they require less individual opt-in, but their efficacy is still limited by the fact that they are applied individually. For example, while automated braking is superior to a warning signal that warns the driver to manually brake, only those who choose and have the means to drive a vehicle with the feature will have access to this technology.

Further down on the pyramid is the built environment level, which corresponds to Tiers 1 and 2 of the Hierarchy, and refers to physical alterations to the roadway that promotes slower speeds, physically separate vulnerable users, and reduce the number of high-risk conflicts. Such interventions can also improve the experience for walking and biking, and reduce the number of vehicle trips by encouraging mode shift. Unlike the higher levels of the pyramid, changes to the environment creates contexts that

encourage safer user behaviors (for example, narrower lanes that induce lower speeds) and are thus less dependent on active user participation and are more effective.

Finally, the socioeconomic factors level lies at the base of the pyramid. Typically, roadway safety interventions do not go beyond the roadway infrastructure, but today's safety outcomes are inexorably linked by socioeconomic factors of the places that our roadways serve. Across the country, communities of color and low-income communities are disproportionately exposed to the most dangerous roadways that feature high speeds, high traffic volumes, and outdated design and safety features. Moreover, many communities across the country also trapped by a lack of viable alternative transportation options as a result of car dependency, a crisis that is likely going to persist as the national phenomenon of the suburbanization of poverty continues. These are overarching socioeconomic factors that dictate urban form and the built environment, which in turn dictate safety outcomes. This category of interventions is often considered outside the traditional purview of transportation professionals, as they must come in the form of policy around land use, zoning, and economics that go beyond (but work in tandem with) transportation policy. However, they also must be considered when attempting to address roadway safety, as these socioeconomic factors form the root causes of roadway safety issues.

The pyramid should be seen as a structure for prioritizing the roadway design and operations tools that will have the most impact for safety while also collaborating outside the safety silo with other agency and community stakeholders to engage in upstream and more wide-ranging root cause topics.

NCHRP 1036: Roadway Cross-Section Reallocation Guide

The National Cooperative Highway Research Program (NCHRP)'s Report 1036, the Roadway Cross-Section Reallocation Guide, was developed in 2023 as a tool for practitioners to use in the development of roadway cross-sections that better assess the tradeoffs that are involved in the allocation of the limited width of a roadway. The guide begins with the premise that roadway space is scarce, and trade-offs are inevitable, and provides guidance for planning roadway cross-sections that center community priorities for that limited space. The guidelines also infuse Safe System considerations by establishing minimum floors for safety standards, such as the provisions of pedestrian and bike facilities and minimum widths for sidewalks and bike lanes. Finally, the guide discusses approaches for community engagement and operational analysis to facilitate the decision-making process consistent with the goals and minimum standards outlined in the guide. The guide also includes a companion Excel spreadsheet that can be used for new roadway and retrofit planning.

California Policy Considerations

The California Department of Transportation (Caltrans), like Federal authorities, has also adopted the Safe System Approach and committed to Vision Zero. Similarly, recently legislation at the State level has supported prioritization and cross-department collaboration consistent with the Safe Systems Pyramid strategies and hierarchy. Several State Senate and Assembly Bills and Caltrans Directors' Policies (DPs) have been essential policy building blocks to support the ongoing Safe System pivot in California.

AB 43

California Assembly Bill (AB) 43 was passed in 2021 to provide additional flexibility to local jurisdictions to set speed limits on their roadways. Specifically, it offers them a means to lower speed limits on additional corridors. Cities now have increasing flexibility to enforce context-sensitive speed limits.

AB 43 features the following five major components, focused on giving local jurisdictions more flexibility in setting speed limits, especially regarding vulnerable road users:

- **Engineering & Traffic Survey (E&TS)**: An option to extend enforceable time period
- **Post E&TS:** An agency can elect to retain current or immediately prior speed limit
- **Speed Limit Reduction:** Reduction of additional 5 mph based on several factors, including designation of local "*Safety Corridors*"
- **Prima Facie Speed Limits:** Options for 15 and 25 mph in certain areas depending on context
- **Business Activity Districts:** Option for 20 or 25 mph

In particular, in this Regional Safety Action Plan, the designation of "Safety Corridors" is applied to roadways where the highest number of serious injury and fatality crashes occur, identifying specific locations or corridor-level segments with high crash occurrences and stratified by mode. AB 43 stipulates that a jurisdiction's set of safety corridors must account for at least 25 percent of all killed or seriously injured (KSI) crashes and must comprise 20 percent of its streets or less.

If a jurisdiction, after completing an engineering and traffic survey, finds that the speed limit on a roadway segment is higher than reasonable or safe, they may declare a default speed limit that has been reduced an additional five miles per hour if that segment is designated as a safety corridor.

DP 36

In Caltrans Director's Policy (DP) 36, made effective in 2022, the agency committed to eliminating fatal and serious injury crashes by the year 2050, and committed to achieving this goal through the application of the Safe System Approach.

DP 37

DP 37, issued in 2021, establishes creating complete streets that support people walking, biking, taking transit, and accessing passenger rail. It recognizes these priorities as a means of advancing state goals in climate and the environment, in public health, and in equity and repairing harm to underserved communities. It also recognizes complete streets as valuable community spaces that can boost economic vitality and resiliency. To these ends, it directs that "all transportation projects funded or overseen by Caltrans will provide comfortable, convenient, and connected complete streets facilities for people walking, biking, and taking transit or passenger rail unless an exception is documented and approved."

Caltrans Intersection Safety and Operations Assessment Process (ISOAP)

What is ISOAP?

The Intersection Safety and Operational Assessment Process (ISOAP) is a performance-based, data-driven framework developed by Caltrans to evaluate and select intersection improvement alternatives. It incorporates the Safe System Approach to improve safety and operations for all road users. ISOAP's purpose is to screen and identify the most viable intersection control and geometric design alternatives, ensuring they fit within the surrounding land use context and available resources. It replaces the prior Intersection Control Evaluation (ICE) process, aiming to reduce severe crashes and support Caltrans' long-term goal of eliminating traffic fatalities and serious injuries.

Note: ISOAP applications can differ between land development and infrastructure projects (e.g., interchanges, corridor improvements) processed through Caltrans' standard project development phases (PID and PA/ED).

Safe System Approach

The Safe System Approach is a safety framework used in ISOAP to reduce fatalities and serious injuries. It accepts that human errors are inevitable and designs road systems to minimize harm.

CORE PRINCIPLES

- Zero Fatalities Goal – Safety is prioritized above all.
- Human Error Is Expected – Roads must be forgiving.
- Human Vulnerability – Designs account for physical limits.
- Shared Responsibility – Safety is a collective effort.
- Redundancy – Multiple safety layers protect users.
- Proactive & Reactive Safety – Prevent crashes and reduce severity.

KEY ELEMENTS

- Safe Road Users – Education and enforcement.
- Safe Vehicles – Crash avoidance technologies.
- Safe Speeds – Lower speeds reduce crash impact.
- Safe Roads – Infrastructure that reduces conflict points.
- Post-Crash Care – Emergency response and trauma care.

In ISOAP, this approach guides intersection design by emphasizing conflict reduction, speed management, and multimodal safety.

When is ISOAP Required?

ISOAP is required if a land development project proposes the following improvements to the State Highway System (SHS):

- Connecting a new public road, private road, or high-volume (average daily traffic volumes of 1,000 or greater) driveway to a state highway or a new interchange to a freeway.
- Changing the type of traffic control, such as from stop-control to signal-control or from a two-way stop to all-way stop.
- Installing a pedestrian hybrid beacon at an intersection.
- Making major physical changes to intersection approaches, including at ramp terminals, such as adding a leg to an intersection or widening to provide an additional through or turn lane.

Note that development projects entitled prior to ISOAP adoption are not exempt from the process, unless an ICE evaluation was previously prepared and approved by Caltrans.

Development projects often propose right-turn in/right-turn out driveways on state highways. ISOAP is not required for these driveways if the driveway approach volume is less than 1,000 vehicles per day.

ISOAP Process Summary

STAGE 1: SCREENING AND INITIAL ASSESSMENT

This stage identifies viable intersection strategies early in the project development process, typically during the Project Initiation Document (PID) phase.

- **Determine ISOAP Applicability**: ISOAP is required for new intersections or major modifications (e.g., traffic control changes, new legs, pedestrian hybrid beacons). Exceptions must be approved by Caltrans HQ.
- **Define Project Outcomes, Place Type, and Design Vehicle**
  - Outcomes may include safety improvements, multimodal access, or traffic calming.
  - Place types (urban, suburban, rural) influence design.
  - Design vehicle selection depends on truck access needs.
- **Pedestrian and Bicycle Assessment:** Evaluate current and future needs using Complete Streets guidance. Consider accessibility, school zones, and senior housing.
- **Right-of-Way and Operational Feasibility**: Use tools like CAP-X and VJust to assess footprint and multimodal capacity. LOS is no longer a primary metric; use Daily Person Hours of Delay (DPHD) or other MOEs.
- **Transit and Freight Assessment**: Ensure intersection accommodates transit stops, queuing, and turning movements for large vehicles.
- **Initial Safety Assessment**: Use tools like SPICE, SSI methodology, and crash modification factors to compare strategies.
- **Eliminate Infeasible Strategies**: Remove options with insurmountable environmental, safety, or cost barriers.
- **Document Findings**: Complete the Stage 1 ISOAP form/documentation. If only one viable strategy remains, it becomes the recommendation. Otherwise, proceed to Stage 2.

STAGE 2: DETAILED ANALYSIS

- **Detailed Safety Analysis**: Use the Highway Safety Manual (HSM) to predict crash frequency/severity and calculate safety-related costs.
- **Detailed Operational Analysis**: Use tools like Synchro, SIDRA, VISSIM, and Highway Capacity Software. Include multimodal data and forecast volumes.
- **Functional Sketches and Performance Checks**: Prepare conceptual layouts showing lanes, pedestrian/bike facilities, and transit stops. Conduct geometric checks (e.g., sight distance, roundabout fastest path).
- **Cost Estimate and Right-of-Way Impacts**: Include construction, maintenance, and crash costs. Consider drainage, utilities, and staging impacts.
- **Performance-Based Analysis Matrix**: Compare strategies using safety, operations, cost, and benefit-cost ratio. Consider equity and Safe System principles.
- **Document Final Recommendation**: Submit the Stage 2 ISOAP form/documentation. The selected strategy may not be the cheapest but must align with safety and community goals.

Appendix B: Community Engagement Materials & Feedback

Community Listening Sessions Summary

Introduction

Community Meeting Directional Sign

In close collaboration with local communities, the Yuba-Sutter Regional Safety Action Plan (YSRSAP) was launched with the primary goal of improving roadway safety throughout the region. This comprehensive initiative is designed to evaluate existing transportation conditions and identify critical safety concerns that affect all road users, including pedestrians, bicyclists, motorists, and public transit riders. By thoroughly assessing the locations and causes of traffic-related hazards, the plan seeks to implement targeted interventions that will lead to safer streets, a reduction in traffic-related injuries and fatalities, and an overall improvement in quality of life for residents.

The development of the YSRSAP was made possible through an $800,000 grant awarded in 2023 to the Yuba County Department of Public Works by the U.S. Department of Transportation. This funding supports a collaborative planning process that includes Yuba County, Sutter County, and the incorporated cities of Marysville, Wheatland, Yuba City, and Live Oak. Central to the planning effort is the commitment to transparency, community involvement, and data-driven decision-making.

Marysville Health & Human Services Center, May 1st

To ensure that the plan reflects the perspectives and needs of those who live and travel within the region, the project team organized a series of public listening sessions. These sessions served as a vital platform for community members to engage directly with the planning process, learn about proposed safety strategies, and provide meaningful input that will shape the final recommendations.

Listening Session Overview

From May 1 through May 14, 2025, the YSRSAP project team hosted a total of four in-person community listening sessions across the Yuba-Sutter region. Each session ran from 5:30 to 7:00 p.m. and was strategically scheduled and located to maximize accessibility and encourage participation from a diverse cross-section of residents.

Yuba City Gauche Aquatic Park Meeting Room, May 7th

These listening sessions provided an open and welcoming environment where attendees could learn more about the safety action plan, meet with members of the project team, and voice their observations, concerns, and ideas about local transportation safety. The input gathered during these sessions plays an essential role in shaping the priorities of the plan and ensuring that the solutions developed are responsive to the specific needs of the communities involved.

Live Oak Community Center, May 13th

The sessions took place at the following locations:

- **Thursday, May 1:** Marysville Health & Human Services Building
- **Wednesday, May 7:** Yuba City Gauche Aquatic Park Meeting Room
- **Tuesday, May 13:** Live Oak Community Center
- **Wednesday, May 14:** Wheatland Community Center

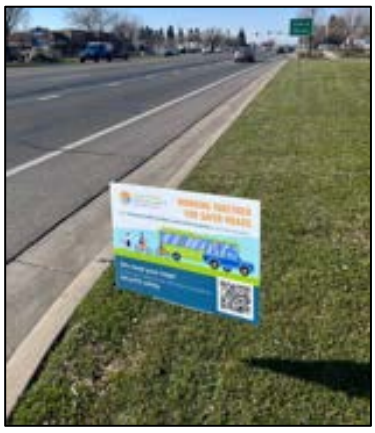
Each event was promoted through multiple channels, including flyers, local news outlets, social media, and direct outreach to community groups, with the goal of ensuring broad awareness and encouraging robust attendance.

Wheatland Community Center, May 14th

Event Format and Engagement

Each listening session followed a relaxed, open-house format that encouraged free movement and informal dialogue. Upon arrival, attendees were greeted by project team members and offered complimentary items such as bottled water, bicycle safety accessories, and small treats like candy to create a friendly and inclusive atmosphere.

The venue layout included a series of display boards arranged throughout the room, each highlighting different components of the safety action plan. These exhibits covered a wide range of topics, including key goals of the plan, data on current roadway conditions, maps of high-priority safety areas, and preliminary recommendations for improvement. The visual displays were designed to be easy to understand and accessible to a general audience, encouraging thoughtful discussion and feedback.



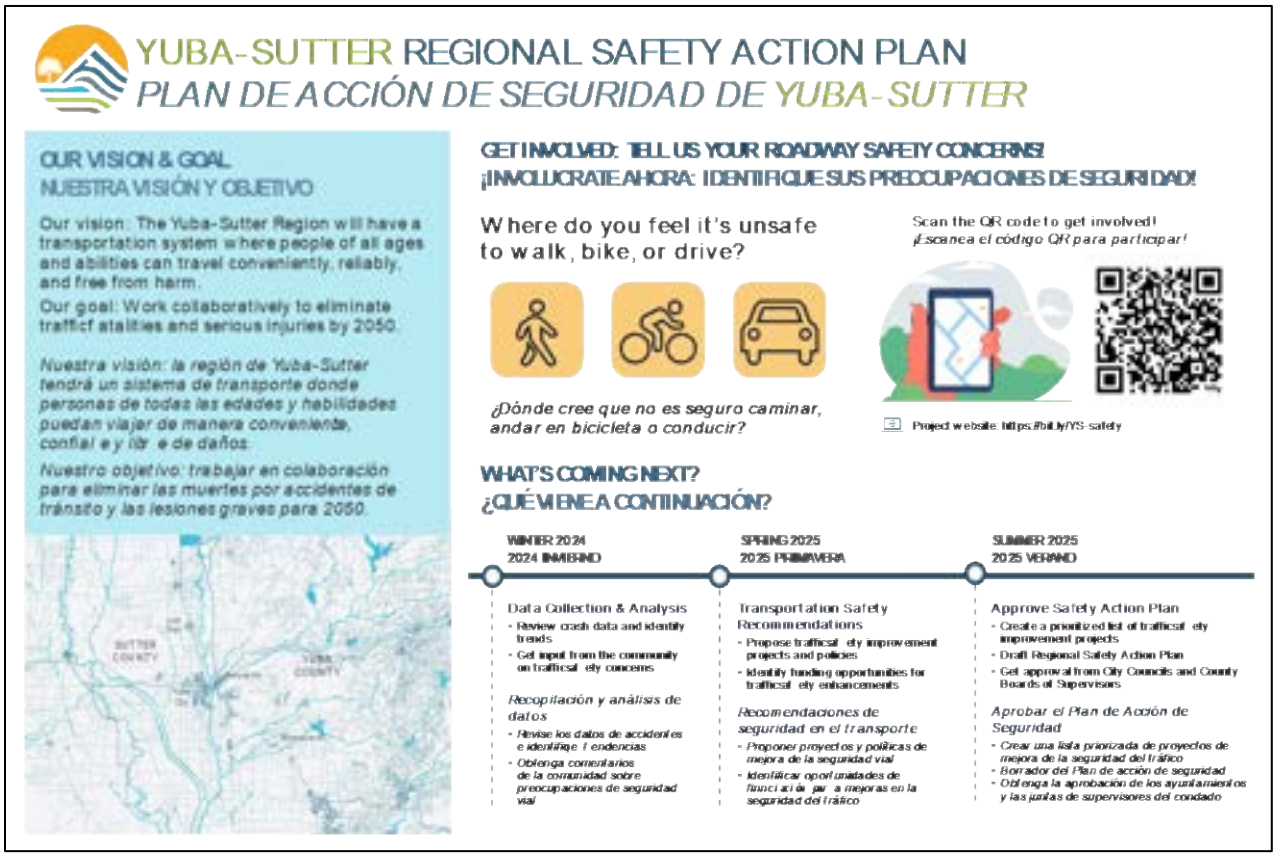
Awareness Lawn Sign

Project team members were stationed at each board to answer questions, explain technical details, and engage in one-on-one conversations. This personal interaction helped foster trust and allowed participants to share firsthand experiences and local insights, which are critical to developing solutions that are both effective and community-centered.

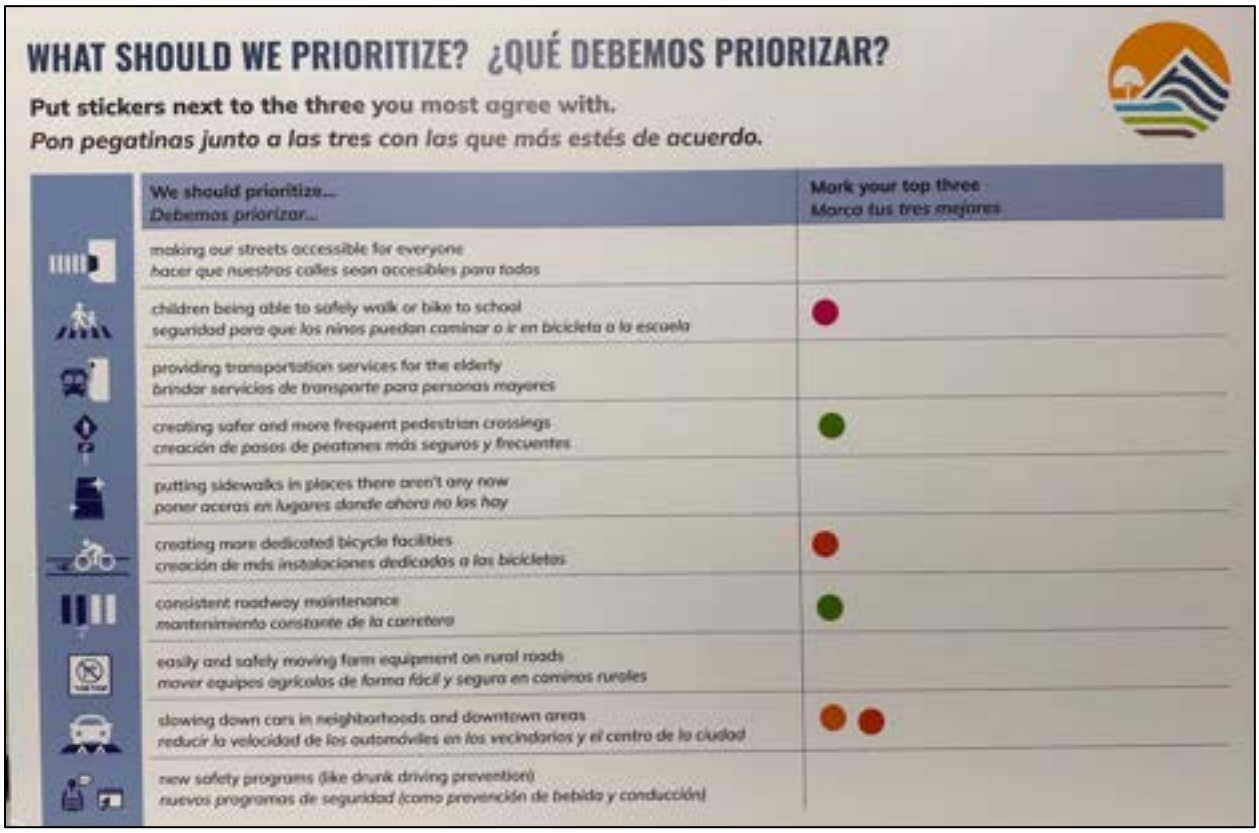
Stations and Board Exhibits

The listening sessions featured several themed stations and informational boards, each addressing a unique aspect of the Yuba-Sutter Regional Safety Action Plan. The following section provides a detailed overview of the content presented at these stations.

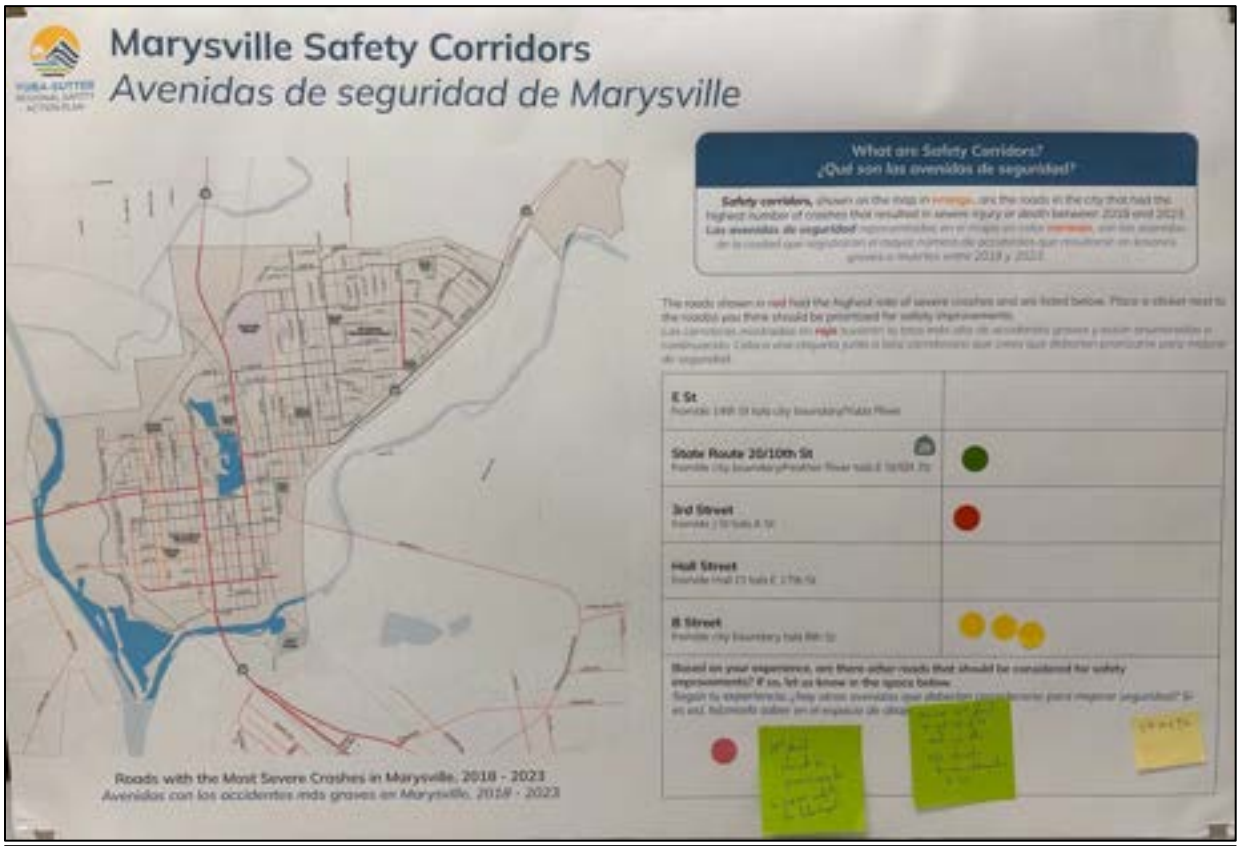
Information Board:

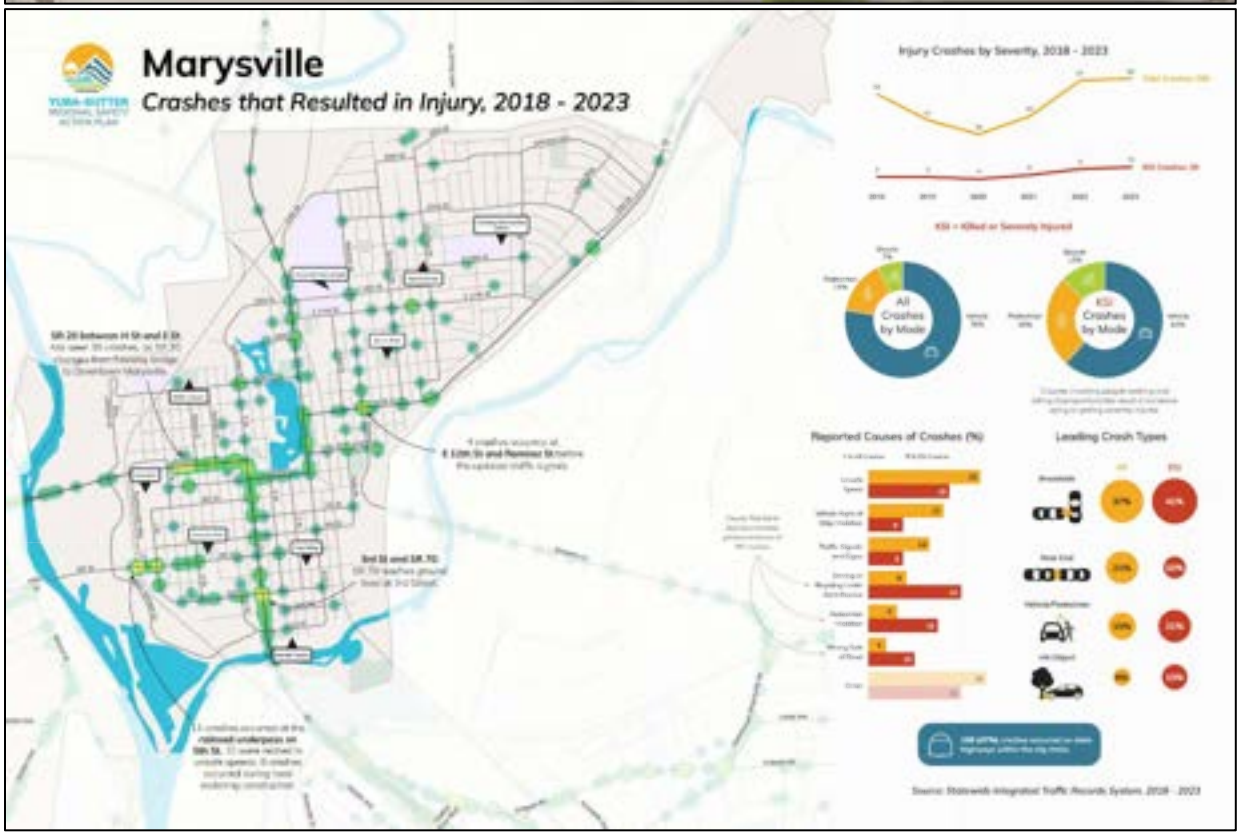


Plan Voting Board & Feedback:

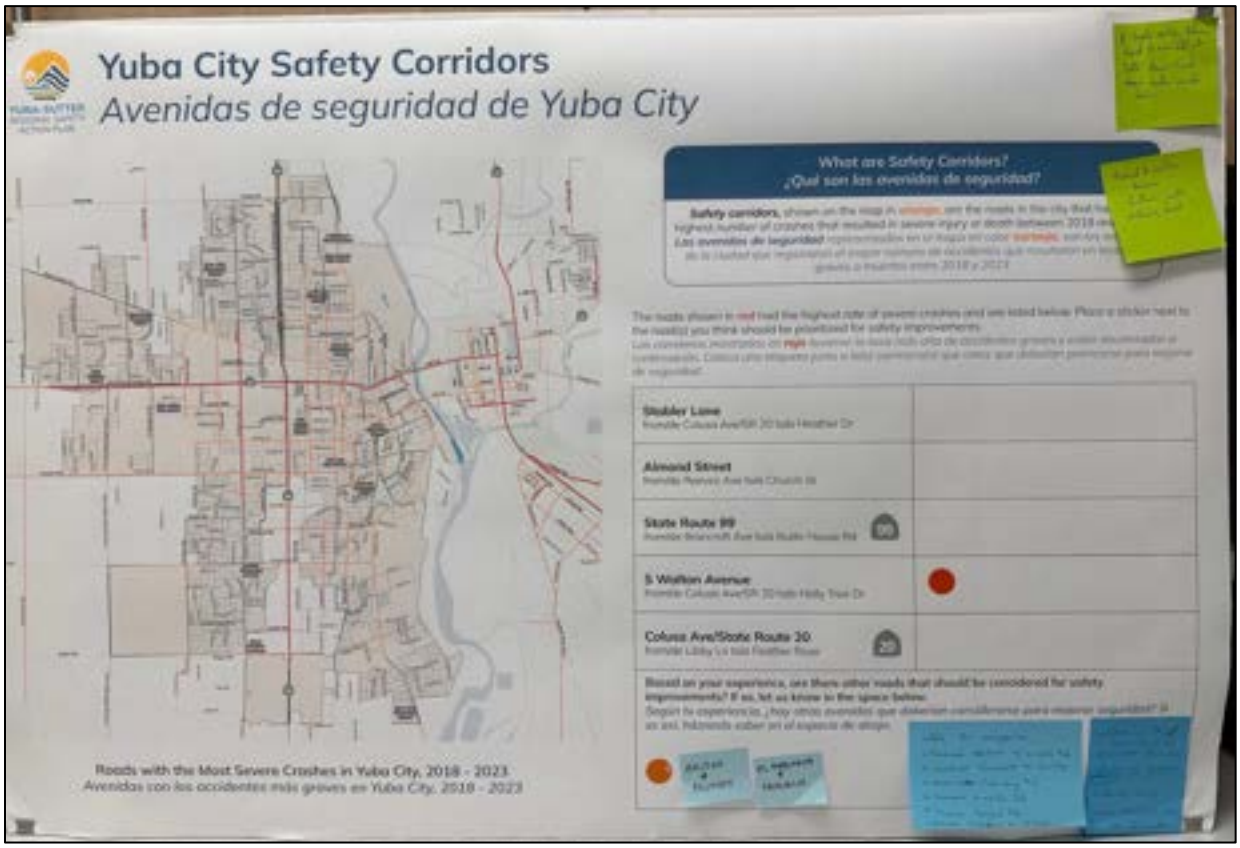


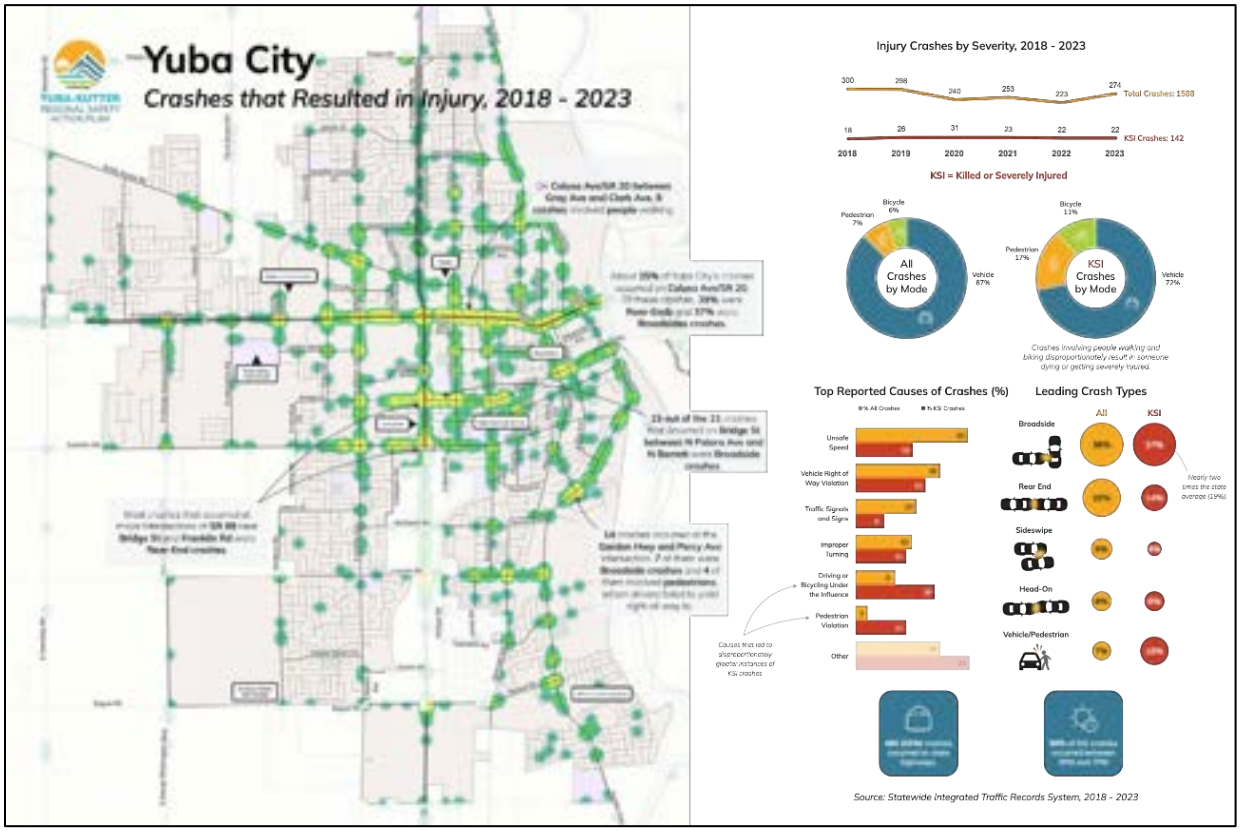
Marysville Boards & Feedback:



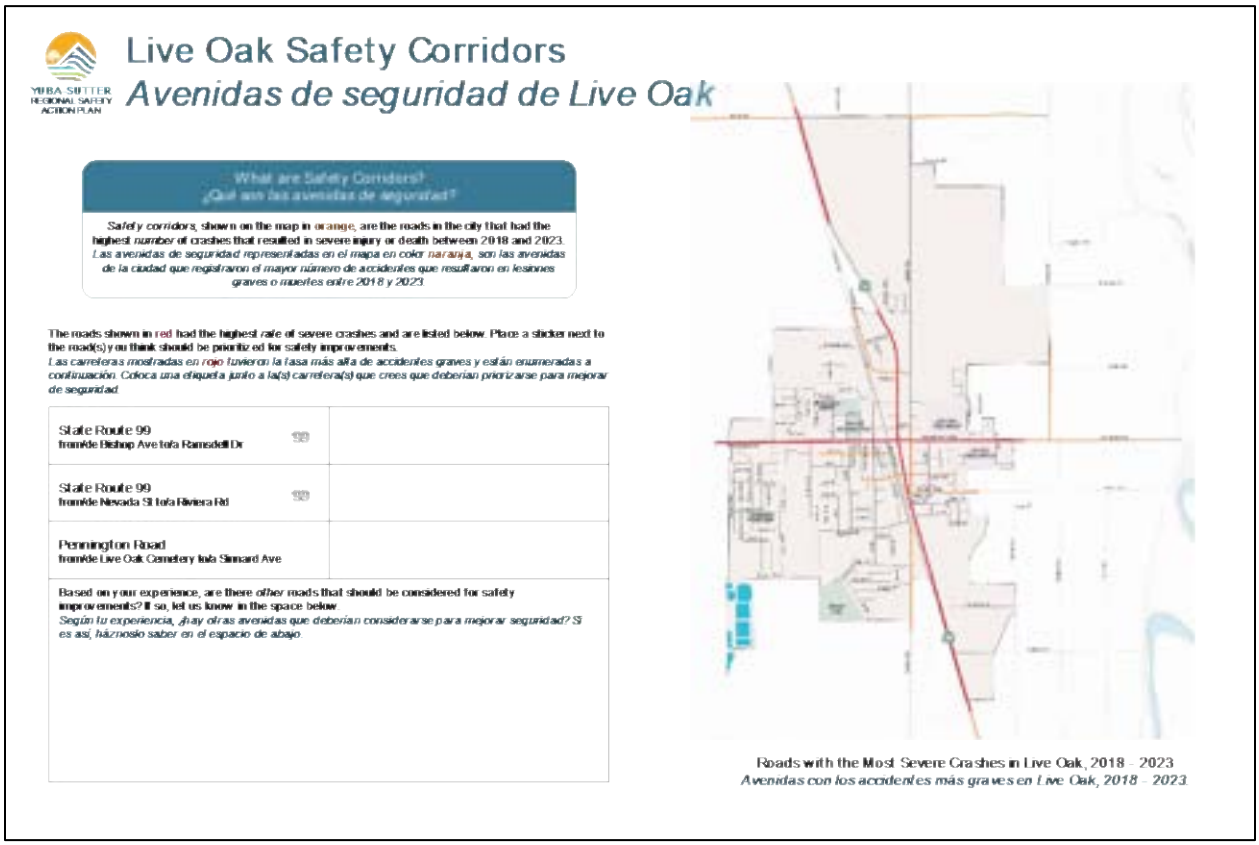


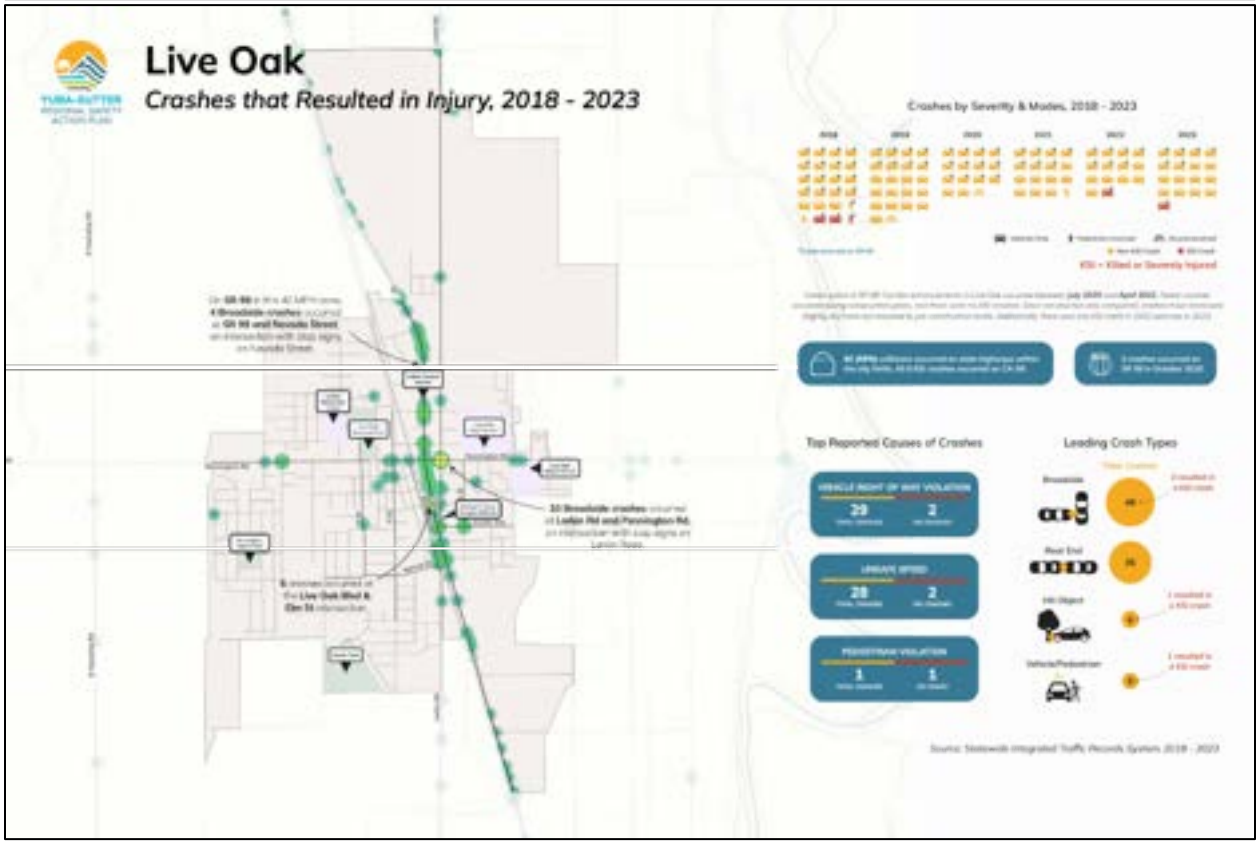
Yuba City Boards & Feedback:



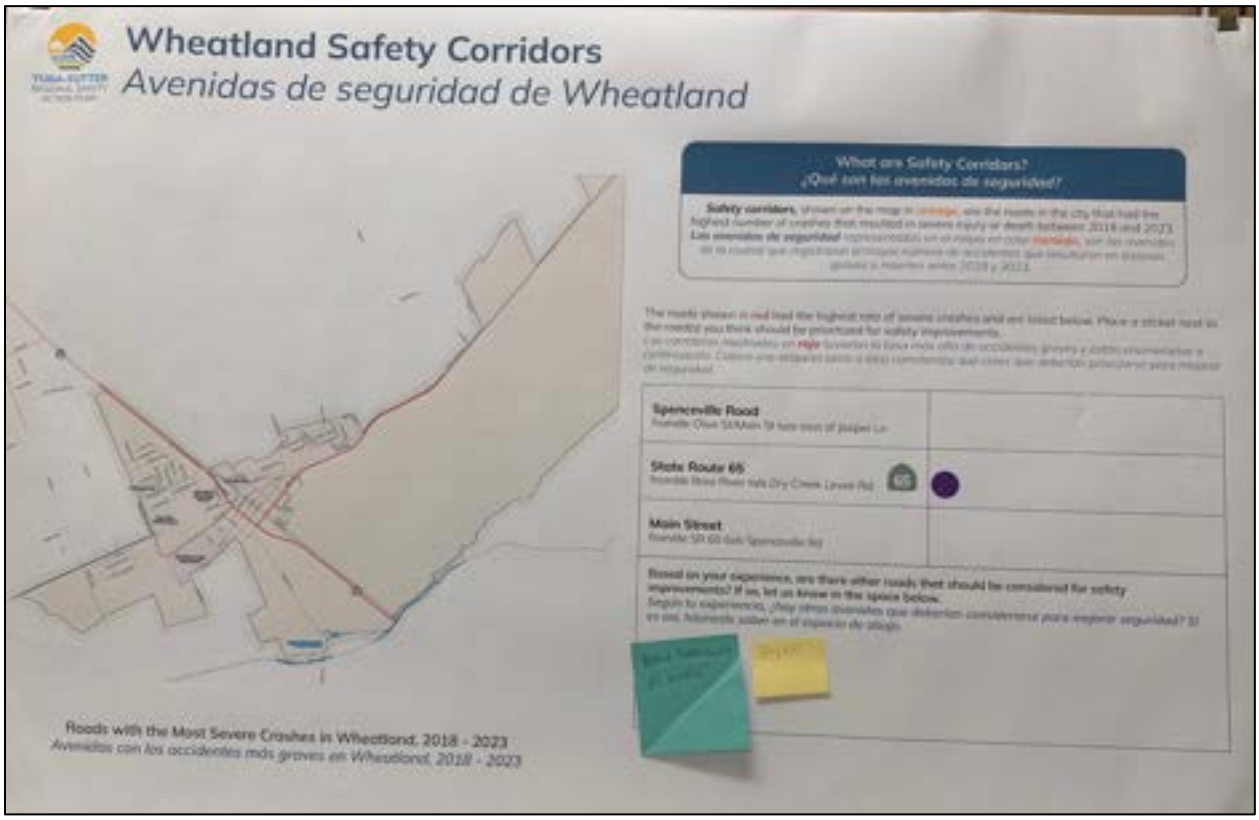


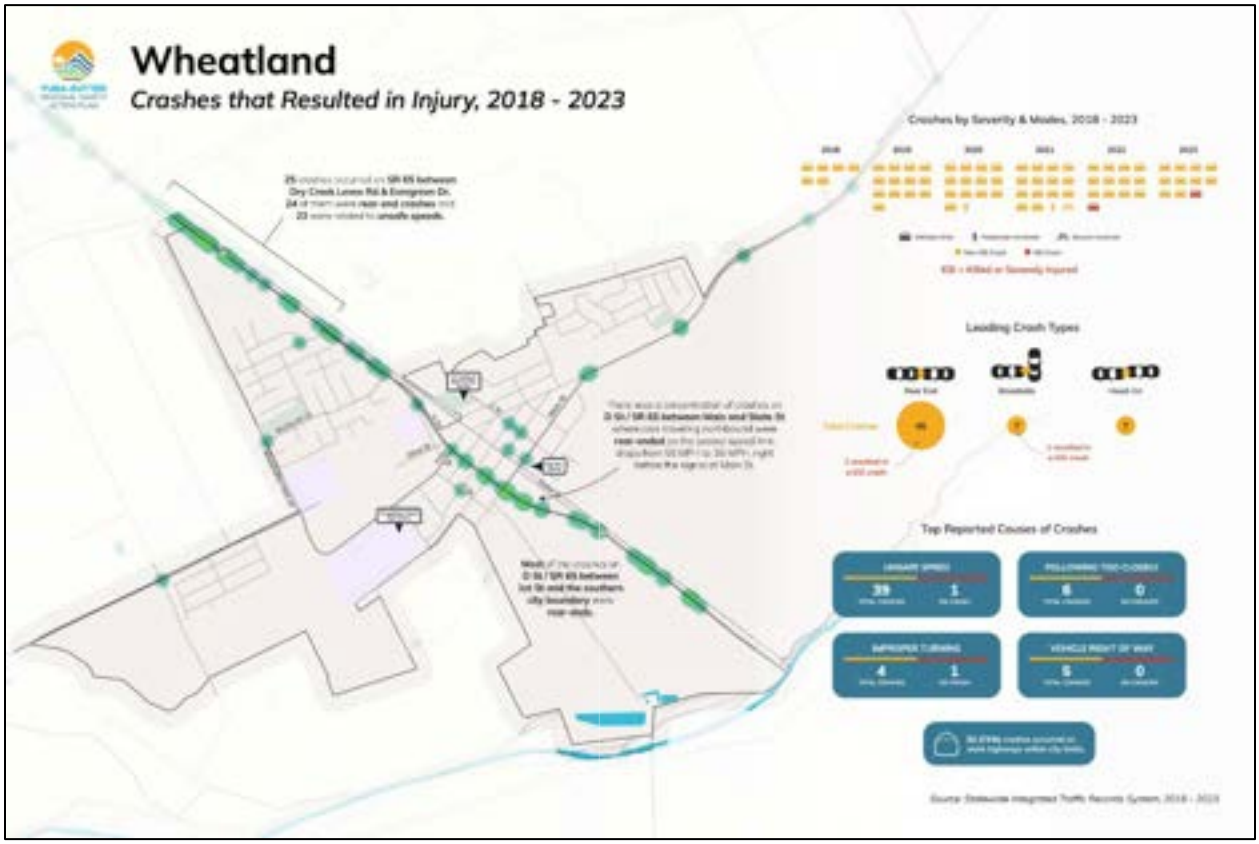
Live Oak Boards:



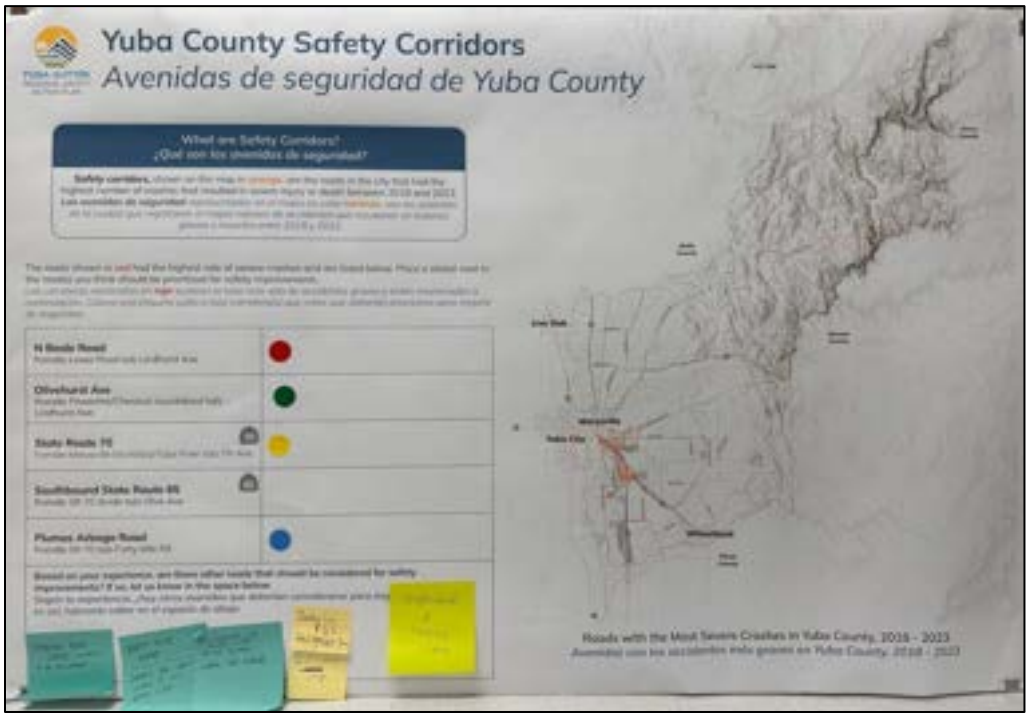


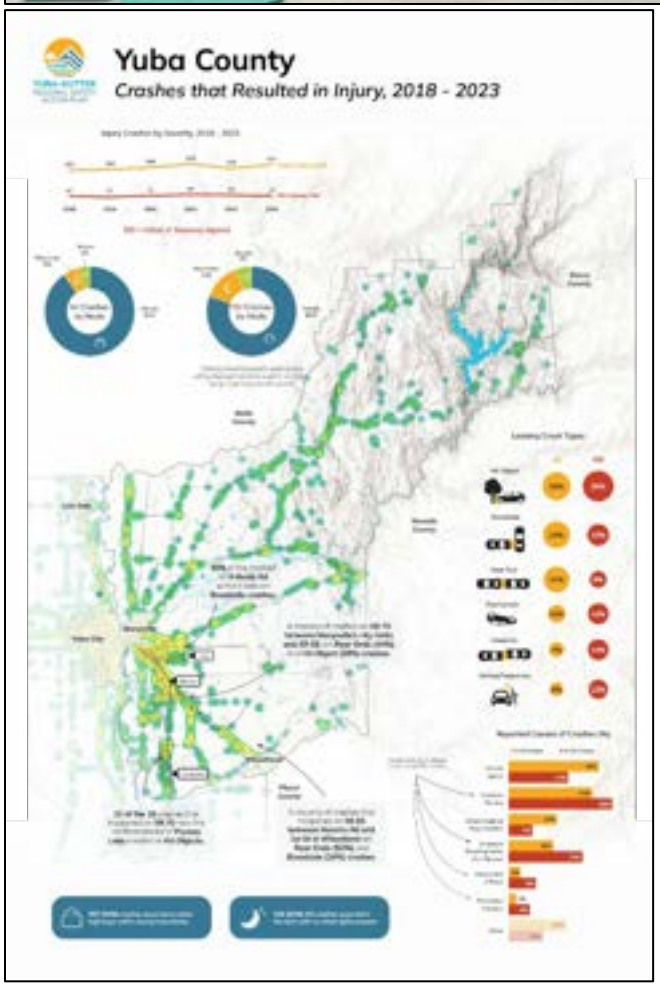
Wheatland Boards & Feedback:



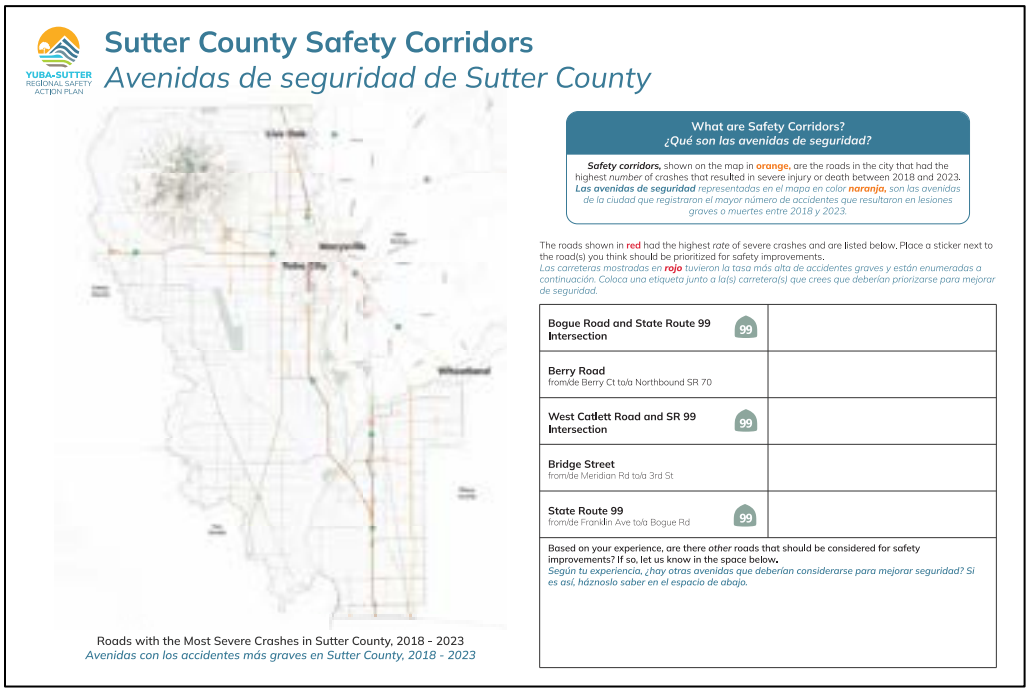


Yuba County Boards & Feedback:





Sutter County Boards & Feedback:



YUBA-SUTTER REGIONAL SAFETY ACTION PLAN

Sutter County Safety Corridors

Avenidas de seguridad de Sutter County

Roads with the Most Severe Crashes in Sutter County, 2018 - 2023
Avenidas con los accidentes más graves en Sutter County, 2018 - 2023

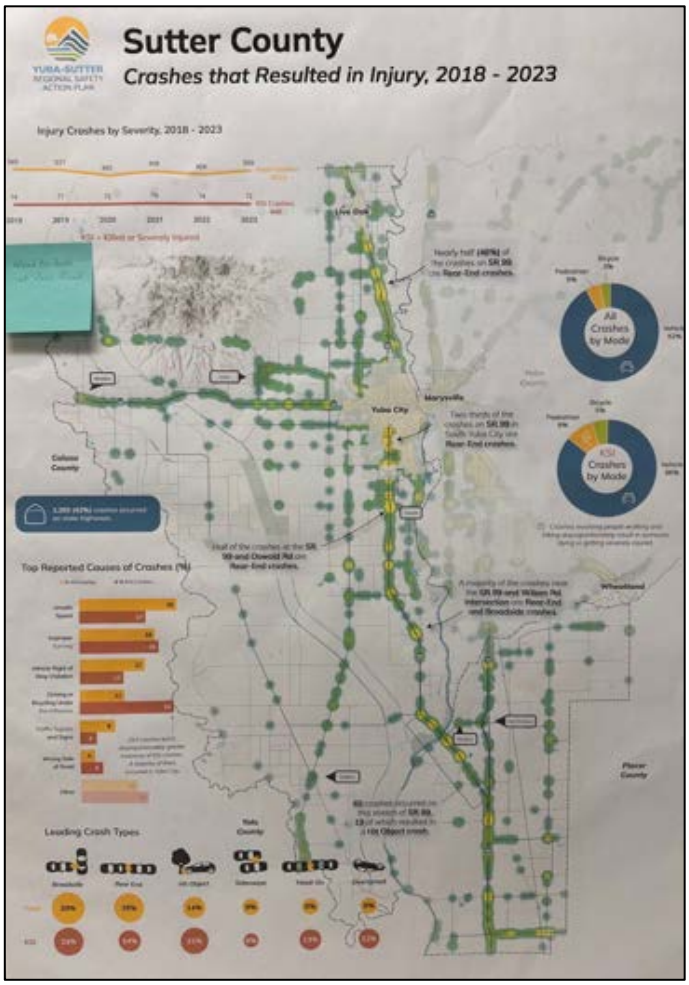
What are Safety Corridors?
¿Qué son las avenidas de seguridad?

Safety corridors, shown on the map in **orange**, are the roads in the city that had the highest *number* of crashes that resulted in severe injury or death between 2018 and 2023.
Las avenidas de seguridad *representadas en el mapa en color* ***naranja,*** *son las avenidas de la ciudad que registraron el mayor número de accidentes que resultaron en lesiones graves o muertes entre 2018 y 2023.*

The roads shown in **red** had the highest *rate* of severe crashes and are listed below. Place a sticker next to the road(s) you think should be prioritized for safety improvements.
Las carreteras mostradas en ***roja*** *tuvieron la tasa más alta de accidentes graves y están enumeradas a continuación. Coloca una etiqueta junto a la(s) carretera(s) que crees que deberían priorizarse para mejorar de seguridad.*

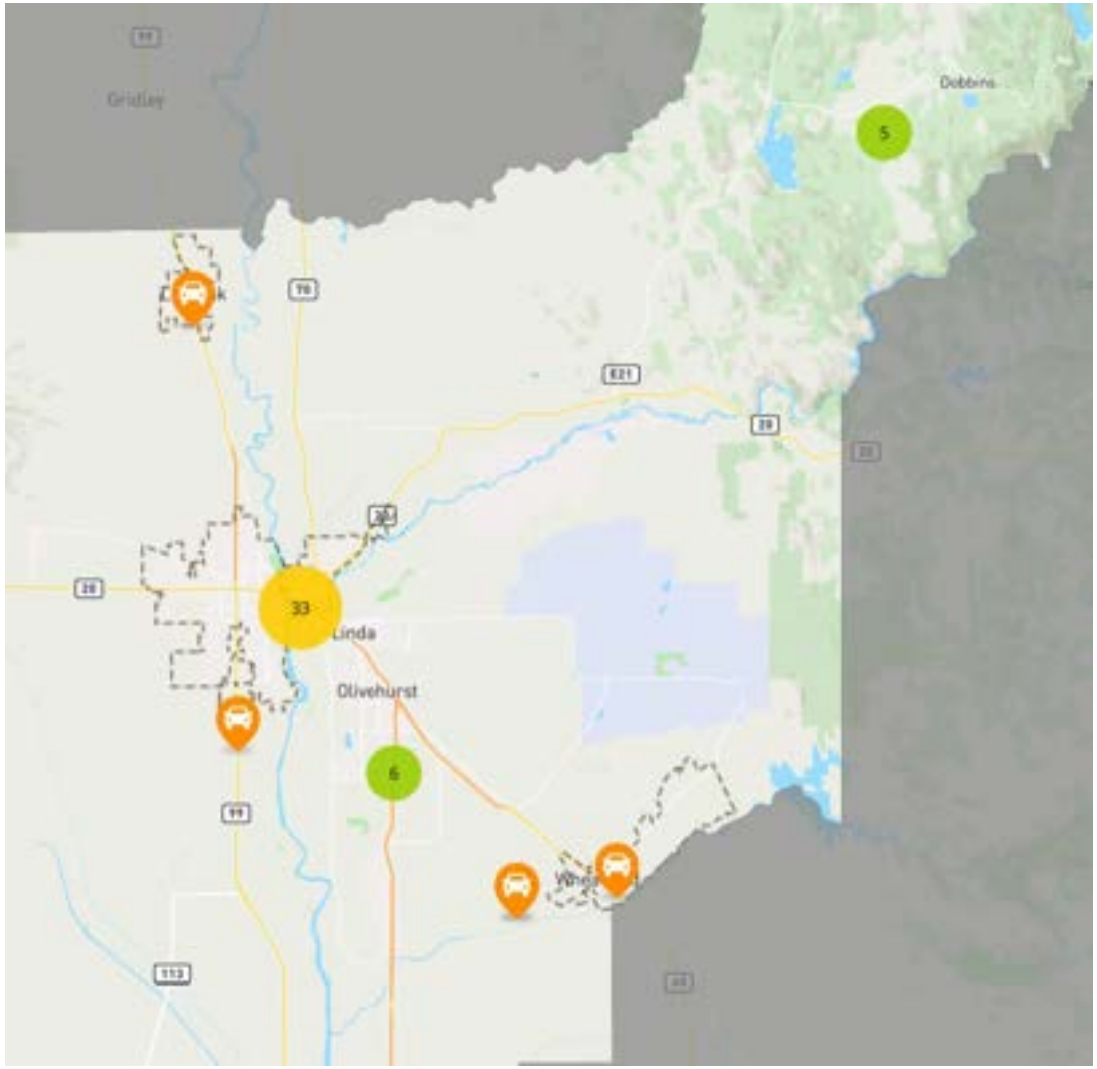
Bogue Road and State Route 99 Intersection 99	
Berry Road from/de Berry Ct to/a Northbound SR 70	
West Catlett Road and SR 99 Intersection 99	
Bridge Street from/de Meridian Rd to/a 3rd St	
State Route 99 from/de Franklin Ave to/a Bogue Rd 99	

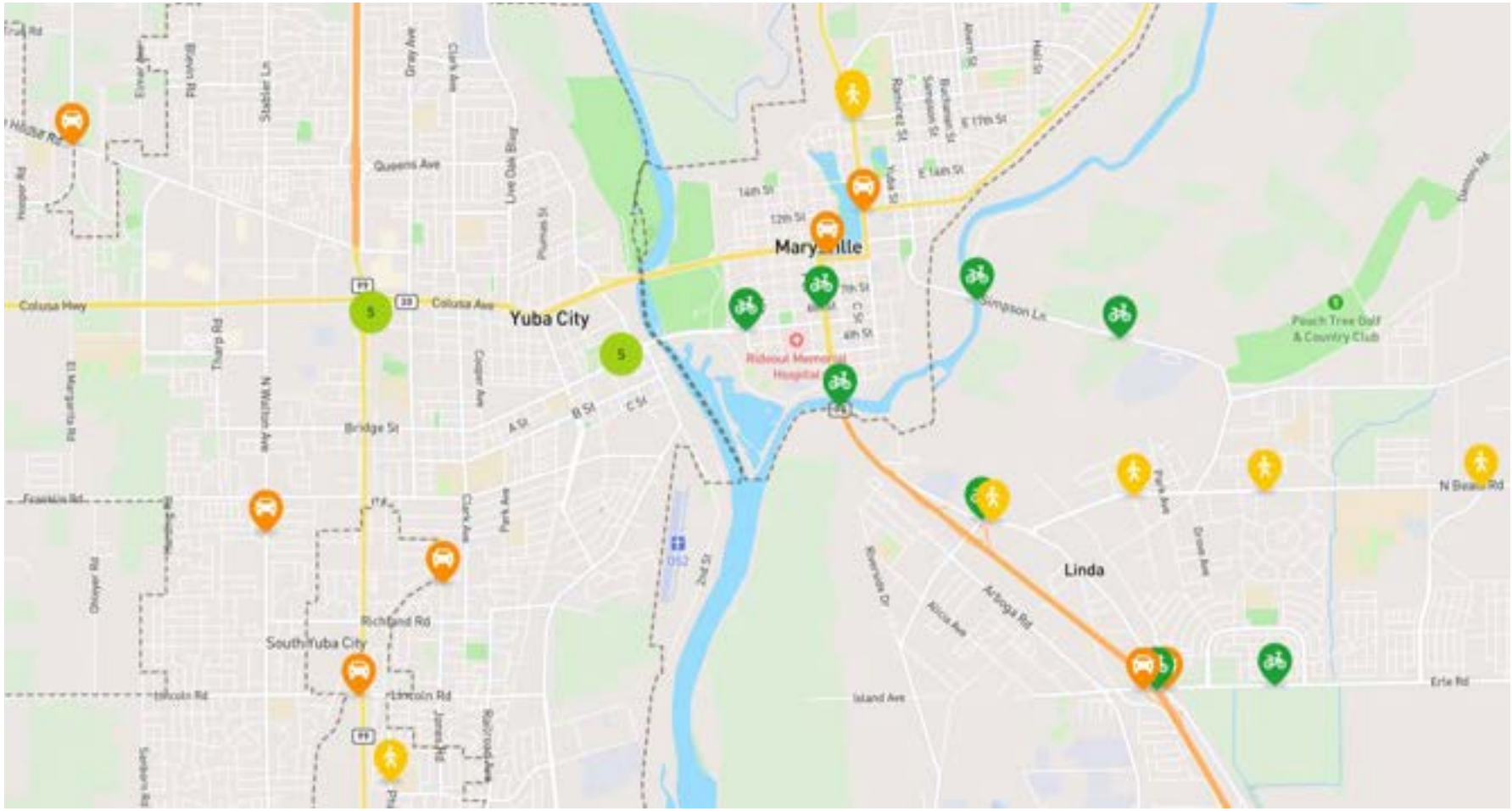
Based on your experience, are there *other* roads that should be considered for safety improvements? If so, let us know in the space below.
Según tu experiencia, ¿hay otras avenidas que deberían considerarse para mejorar seguridad? Si es así, háznoslo saber en el espacio de abajo.



Interactive Web Map

SOCIAL PINPOINT




Yuba City
Marysville
Linda
South Yuba City
Colusa Hwy
Colusa Ave
Queens Ave
Bridge St
Richland Rd
Lincoln Rd
Island Ave
Arboga Rd
Peach Tree Golf & Country Club
Rideout Memorial Hospital

Biking Safety Comments

Nearest Address	Comment	Screen name
1130 North Beale Road, Linda	This entire area is unsafe for bikes and peds. Bike infrastructure is unprotected and poorly delineated. Signal crossings are poorly marked, timed, poor lighting, and poor beg buttons. The traffic is heavy here and there needs to be much more signs, beacons, and protected intersections.	YABA
1800 Erle Road, Linda	Erle Road is unsafe for bicycles and pedestrians due to the 55mph+ speeds and commercial truck traffic traveling at 55mph+. There is no clear recovery zone for the established speed and the bike lane is undesignated and has no clear delineation, protection, or buffer zone.	YABA
1548 Erle Road, Linda	Bicycles traveling between the retail center near Walmart and the Edgewater subdivision along Erle Road face several problems and risks. Erle Road does not have bi-directional bike lanes but instead routes all bike traffic along the north side of the road. The speed limit on Elre Rd is 55+ mph and a designated commercial truck route. The bike lane has no delineation as a bike lane, no safety features such as barriers or buffers. It is actually a shoulder all the way to the Erle Rd overcrossing where it ends. Vehicles use the shoulder as a turn lane onto Lindhurst Avenue northbound. Coming Southbound from Lindhurst, cyclists must share the left turn lane with motorists to go eastbound on Erle Rd from the overcrossing. This keeps cyclists going with the flow of traffic but there are no bicycle delineations, markings, designated areas, or guidance to help motorists understand the road is shared.	YABA
1012 5th Street, Marysville	Bicycles traveling in both directions are forced onto the sidewalk here. This is unsafe for several reasons due to lack of markings, signs, space, and speed differentials. Eastbound cyclists are dumped into J Street going the wrong way off of a sidewalk into right turning southbound traffic, which results in collisions between right turning vehicles and eastbound bicycles.	YABA
468 Bridge Street, Yuba City	Eastbound and westbound traffic at Plumas St are traveling at a higher rate of speed than the 85th percentile because of the perceived speed of the facility over the 5th Street bridge. There have been KSI's at this intersection to include a serious (SI) of a minor child who was walking her bicycle. There is no traffic calming coming off the bridge.	YABA
248 Bridge Street, Yuba City	I was eastbound (against traffic) on my bike because this is the only bike lane connecting to an eastbound crossing of the 5th St bridge. At this curve I was nearly hit head-on by a Yuba City Fire Engine that was driving over the limit line in the bicycle lane. Had I not been paying attention and not moved to the curb I would have been (probably) fatally hit. The driver was not paying attention. The fire engine was not speeding or driving to an emergency. It was simply in the bike lane. There are no barriers for this bike lane but there should be.	
635 Sutter Street, Yuba City	Southbound Sutter St after coming off of the 5th Street Bridge is an unsafe merge into traffic without a bicycle lane on Sutter Street.	YABA

Nearest Address	Comment	Screen name
641 Sutter Street, Yuba City	This intersection is an unsafe cluster/diversion for cyclists after being routed off the bridge. Cyclists changing direction to northbound from an westbound crossing are forced to cross traffic on the wrong side, against the flow of vehicle traffic where there is no designated bike lane northbound on Sutter Street. To continue westbound, cyclists must transition to an unprotected bike lane on 5th street that ends at Shasta Street.	
639 Sutter Street, Yuba City	5th Street Bridge forces bicycles off of 5th Street and relegates them to one side of the bridge for both directions without a safe protected way to continue on 5th Street even though there is a designated bike lane.	YABA
1112 Simpson Lane, Linda	Simpson Lane overcrossing is the only "local (county)" connecting road to Marysville from Linda and the residential areas south of the Yuba River. The only other crossing is at E Street Bridge where Caltrans has provided no safe route. Simpson Lane is a high speed (55 mph +) two-lane commercial truck route facility with inadequate clear recovery, zero traffic controls, zero designated bike or ped facility, and zero lighting or passive speed control signs. This facility is dangerous for all users, especially bicycle and pedestrians trying to access Marysville services.	YABA
505 6th Street, Marysville	6th Street between Yuba Street and J Street is a designated bicycle boulevard. The entire road is shared with bicycles. There are not enough signs and sharrows telling motorists to slow down and to share this road.	YABA
California Highway 70, Linda	There is no designated bicycle lane into Marysville from Linda/Olivehurst. SR70 crossing is completely deficient in bike/ped facilities. Many many bike/ped crossings per day, including motorized wheelchairs within 1-2 feet proximity of high speed semi truck and vehicle traffic on one side and a 30" high rail barrier over the side of the bridge. No lighting, no connectivity for bike/ped/rolling users. No ADA, no signs, no beacons, no safety barriers. Bridge walkway is only 38" wide.	YABA
1277 Simpson Lane, Linda	Very unsafe due to high speed truck and vehicle traffic 60mph and no barrier protection in the clear recovery zone which serves as unofficial bike and ped lane, no lighting, no signs, no delineation, no beacons or traffic calming, no ped crossings, and highway speeds in very close proximity to bicycle traffic. Simpson Lane is the only river crossing into Marysville beside the State Highway at E Street. I ride Simpson Lane and have had several very close calls.	zerovmt
1222 Colusa Avenue, Yuba City	No hay suficiente espacio en las calles principales para bicicletas, hace falta un carril especifico para ciclistas.	Lisa

Walking Safety Comments

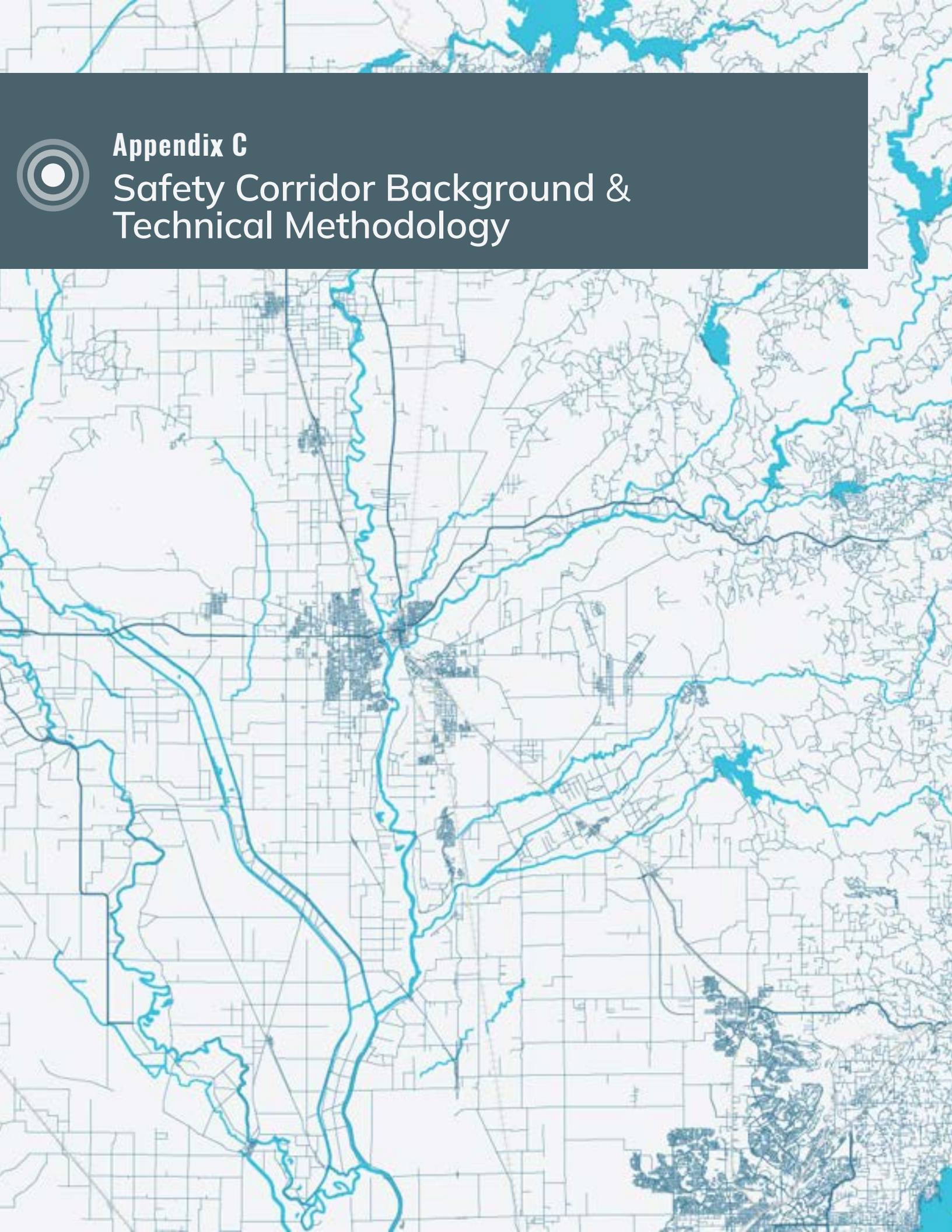
Nearest Address	Comment	Screen name
1526 Mcgowan Parkway, Arboga	I propose to build a sidewalk to be able to walk from the gas station to the Mac Gowan park so people who needs to take the public bus at the bus station can walk safely.	Walking safely
Arboga Road, Olivehurst	Speed Limit on Arboga Rd between McGowan Pkwy and Ella Ave is currently 55 mph. There is a stop sign at McGowan and a stop sign at Ella. There are six crosswalks and four left turn options in this stretch of road. Speed limit is excessive (but may have been appropriate in the past before housing developments were built). Many drivers seem to drive about 45 mph. Suggestion: reduce speed limit to 45 mph.	Michael Scully-Linder
1148 North Beale Road, Linda	Bike and Peds are at risk in this entire area. Poor lighting, poor signalized intersections, poor delineated markings, lack of signage and beaconized crossings, etc. Very high risk area.	YABA
1830 B Street, Marysville	There have been KSI's here involving students due to the amount and high speeds of state highway traffic. There are not enough traffic calming measures in the school zone. Caltrans Binny Junction project build alternative did not adequately address the KSI's and preventative measures. Caltrans proposes to increase the speed limit to 45mph here.	YABA
12913 Rices Crossing Road, Oregon House	I propose to build a sidewalk to be able to walk from the gas station to the Mac Gowan park so people who needs to take the public bus at the bus station can walk safely.	Walking safely
13857 Phoenix Ave, Oregon House	Concerning the section of Rices Crossing Road south of Rices Texas Hill Road: There is no pedestrian lane, nor space for pedestrians, on this section. Could there be better signage to warn drivers, and/or post a speed limit?	Rodney Carter
9872 Texas Hill Road, Oregon House	Need an oval walking track so the community has some where safe to walk. We have the space - 5 acres of community space available	Margaret Fowler
1429 Phillips Road, Yuba City	This is a public K-10 school it needs a well established walking path	Margaret Fowler
1830 B Street, Marysville	Crosswalk for children in front of elementary	Bshackle
1222 Colusa Avenue, Yuba City	Marysville Charter kids cross this intersection of a busy highway to go to the center across the street to use as a gym since their school does not have one. I worry how fast people drive on this highway that a kid may get hit. Is there anyway we can make this safer for kids who cross multiple times a day.	Sal
1830 North Beale Road, Linda	The neighborhood is not well lit at all. Very unsafe for walks in the evening. In addition there has been several car break in as well as thefts and with proper lighting some of these crimes would not occur as lighting would be a deterrent.	E.McKnight
1500 North Beale Road, Linda	A flashing beacon here will really help getting vehicles to stop and allow me to cross and get to nearby stores across the street.	JG

Nearest Address	Comment	Screen name
2371 North Beale Road, Marysville	I feel a flashing beacon here will help me and others cross N. Beale Rd from the apartments and other homes to the nearby plaza.	Resident X
3120 Forty Mile Road, Wheatland	The intersection of N. Beale Rd and Goldfields Pkwy is really dark. I feel unsafe walking when its dark out. I would like to suggest lighting at the intersection and along N. Beale Rd.	Resident X
1526 Mcgowan Parkway, Arboga	I have often seen pedestrians walking on the east side of Forty Mile Rd when there is a concert at the Toyota Amphitheatre. To avoid parking at the Amphitheatre, concert-goers will park at the Hard Rock Cafe and walk. After the concert seems really unsafe considering the lack of lighting.	Mr. W

Walking Safety Comments

Nearest Address	Comment	Screen name
9201c Larkin Road, Live Oak, California 95953, United States	Cars often drive dangerously beyond the 35 speed limit here, especially when coming northbound into Live Oak on Larkin. There is a speed limit change from 55 to 35mph a little before the River Valley nursing home, but most are going over 55 and continue to go that speed past the nursing home. There is a lot of traffic coming in and out of the nursing home parking lot and speeding on Larkin makes this area very dangerous. I have also seen wreckless speeders crash into the backs of cars that have slowed down or stopped on the road waiting to turn into the homes on Larkin. There are a couple of speed change warning signs and a radar warning, but it seems nobody cares. Maybe a slight speed bump and flashing lights could help?	
1764 Tierra Buena Road, Yuba City	Drivers do a rolling stop or at times not stop at all.	
California Highway 65, Wheatland	The bottlenecked traffic that has to get through Wheatland is a safety concern. All of the new homes/apartments =more traffic. In the event of an emergency there is NO way to safely get out. There's not even passing lanes. Stop being greedy and find a way to re-route the 65 or add lanes.	A concerned Wheatland citizen
126 12th Street, Marysville	There is heavy traffic congestion in this area between 07:20 am – 07:45 am. Typically, most people turning left onto B ST, from 12th ST, also need to quickly merge for the upcoming turn on 9th ST. There are merging issues and this contributes to the growing traffic on B ST.	Brittney
3986 Wheatland Road, Wheatland	Big dip in the road. This has gotten worse and worse over the last couple years. Even traveling at posted speed limit this dip is cause for concern. Please look into repairing it.	Darren
985 Hillcrest Avenue, Yuba City	Yuba City Hwy 20 at Shasta St intersection, median divide the visibility is extremely poor and very low height.	Jo
1222 Colusa Avenue, Yuba City	Queens Ave overpass, 2 stoplights cause bottleneck traffic during peak commute hours. This endangers traffic on northbound West Onstott Rd and also the kids E-Learning access On Queens Ave	Jo
425 9th Street, Marysville	Speed bumps need reflective because they are hard to see	Mark Hubble
13623 Rices Crossing Road, Oregon House	There have been several crashes at the intersection of Marysville Road and Rices Crossing Road, some fatal. I was involved in one of them. Visibility is poor on both approaches to the intersection. The traffic can be heavy. Some drivers approach the intersection at speeds in excess of 55 miles per hour. The speed limit isn't posted there, so drivers can assume it is still 55 miles per hour, as it is on both approaches to the intersection. A few seconds of inattention can therefore result in a violent collision at the intersection. Such collisions have occurred a number of times.	Henry Knapp
231 South Walton Avenue, Yuba City	There needs to be a turn lane here. Traffic backs up excessively when drivers try to make a left turn into the Berkshire neighborhood. Often times its a full stop in traffic nearly causing collisions.	Anonymous

Nearest Address	Comment	Screen name
1289 Lincoln Road, Yuba City	Left turn lane is not long enough. Cars often miss the signal due to access to the turn lane being blocked. This has resulted in cars using the oncoming traffic lane as a way to bypass traffic that is going straight. I have seen collisions happen here because of this.	Anonymous
Pasado Road, Olivehurst	Need to add traffic lights, its almost impossible to turn left on Erle Rd. due to ongoing traffic..	
Plumas Arboga Road, Arboga	So many accidents at this intersection. Needs a light or lighted stop signs immediately	
3992 Wheatland Road, Wheatland	Seems like a pipe or culvert is broke and the road has settled. Big drop in the road that has continually gotten worse.	Ashley Ferreira
1649 Broadway Road, Arboga	Trying to navigate through this area during school drop offs & pickup times. The road gets blocked in several directions. Many local residents can not even leave their homes during school hours.	carrway
12510 Rices Crossing Road, Oregon House	"Rices Crossing is narrow in places, and people have run off the side of the road. The biggest concern, however, is emergency egress in case of a wildfire. As a Director of the Dobbins/Oregon House Fire Protection District, I anticipate that emergency egress issues will severely impact the ability of the Fire district to respond to an emergency. See this link for a compilation of letters sent to Yuba County about Rices Crossing Road: https://foothillwatercoalition.org/records/links/24-12-30_wf_letters.html	Charles Sharp
1222 Colusa Avenue, Yuba City	Hay demaciados carros en esta pequeña ciudad. Deberia haber mas transporte publico	Hilda
1548 Erle Road, Linda	North bound cars here often make their own lane to make a right turn on to Erle Rd. New striping is necessary also see a lot of kids on bikes on the road on Lindhurst Ave	Private
1222 Colusa Avenue, Yuba City	Recorrer la pequeña ciudad de Yuba es todo un reto y toma demaciado tiempo. Hay demaciados semaforos, las glorietas creo pueden ser mejor opcion para las calles principales en vez de tanta luz. De igual manera en zonas residenciales puede funcionar mejor Stop signs y detectores de velocidad en diferentes zonas.	Lisa
1311 Oswald Road, Yuba City	I have seen many many crash's and also have been a victim of a crash right in the section of the road. People travel way to fast and many have been killed her due to traffic accidents. They're should be a light here.	
1991 Mcgowan Parkway, Olivehurst	Crash happened on December 25, 2024. unknown cause however it was a two car collision. This is a four way stop intersection and can sometimes be challenging when school ends for the day and traffic piles up with kids walking home after school.	Olivehurst Resident



Appendix C
Safety Corridor Background & Technical Methodology

Appendix C: Safety Corridor Background and Technical Methodology

This section discusses the methodology used for the identification of safety corridors, the roads that had the highest number and risk of crashes resulting in severe injury or death.

Policy Background: Assembly Bill 43

Assembly Bill (AB) 43 is state traffic safety legislation aimed at reducing road fatalities by giving local governments more flexibility in setting speed limits. AB 43 enables cities to consider pedestrian and cyclist safety, school zones, and accident history when setting speed limits. If a jurisdiction, after completing an engineering and traffic survey, finds that the speed limit on a roadway segment is higher than reasonable or safe, they may declare a default speed limit that has been reduced an additional five miles per hour if that segment is designated as a safety corridor. A safety corridor is a roadway segment within an overall roadway network where the highest number of serious injury and fatality crashes occur.

The Safety Corridor Definition Requirements from the California Traffic Control Devices Committee (CTCDC) proposes the following factors to influence collision weighting:

- Crash severity
- Crash mode
- Disadvantaged Community status
- Vulnerable populations: Seniors (age 65+) and youth (under age 15)
- School proximity (within 0.25 miles)

Additionally, the AB 43 legislation language states that "a local authority shall not deem more than one-fifth of their streets as Safety Corridors." Safety Corridors should account for at least 25% of KSI collisions. While the Safety Corridors definition can now be used for identifying AB 43 posted speed reduction locations, the State will likely expand use of this definition to additional safety-related programs, policies, and funding sources.

More information is available here: https://dot.ca.gov/-/media/dot-media/programs/safety-programs/documents/ctcdc/ctcdc-agenda-item-21-16-020223-a11y.pdf

Safety Corridors Data

Collision Data

The Safety Corridor/High-Injury Network was developed using the **6**-year collision dataset for 2018-2023 from the SWITRS database. This dataset only included injury collisions (i.e. excluding Property Damage Only collisions, where an injury was not reported) and included collisions on surface streets, state facilities, at freeway ramp intersections, and on freeways.

Contextual Data

In addition to collision data, the Safety Corridor methodology used the following contextual datasets:

- Yuba County and Sutter County centerline files merged
- USDOT Equitable Transportation Community (ETC)
- Transit stops locations
- Big data representing observed vehicle speed, aggregated to the segment level, from Wejo

Collision Severity Weighting

Collision weights are derived based on 2022 California Local Road Safety Manual (LRSM) crash costs for each collision severity. This method is similar to the Highway Safety Manual (HSM) Equivalent Property Damage Only (EPDO) weighting method but uses the "Complaint of Pain" severity level as its baseline, because Property Damage Only (PDO) collisions are not included in the Safety Corridor Network.

Cost assumptions from the 2022 Caltrans LRSM are based on costs included in the HSM First Edition, with costs adjusted to 2022 dollars. The HSM uses "comprehensive" or "societal" crash costs to associate costs with each crash severity level. Comprehensive costs include both economic costs and monetized pain and suffering costs. Economic costs are monetary costs associated with emergency services deployment, medical services, productivity loss due to victim injury, insurance and legal costs, costs as a result of congestion impacts as a result of the collision, and property damage costs. Monetized pain and suffering costs are an assumption of the costs associated with lost quality-of-life (or Quality-Adjusted Life Years [QALY]), accounting for reductions in life expectancy and quality of life changes as a result of a crash.

For this analysis, the square root of the cost assumption was used to lower the collision severity weight to give more weight to the contextual factors.

This methodology uses **all injury collisions** in Safety Corridor development (as opposed to KSI only).

Table 1: Collision Weights

Severity	Crash Cost	Weight
Fatal and Severe Injury (KSI)	$2,363,666.67*	5.1
Evident Injury – Other Visible	$159,900	1.4
Possible Injury – Complaint of Pain	$90,900	1

*The fatal and severe injury (KSI) collision cost is an average of the location type costs (signalized intersections, non-signalized intersections, roadway).
**Rounded to nearest whole number.

Safety Corridors Development Methodology

Risk Factor Methodology

This methodology uses a systemic safety analysis methodology to build a network of Safety Corridors that incorporates a proactive approach, rather than relying only on collision history to identify priority locations. Known roadway and contextual risk factors were also scored for both segment and intersection locations, regardless of that location's history of injury collisions. Risk factors are based on recommendations within one or more of the following resources:

- *Prioritization of Highway Safety Manual (HSM) Data Variables Using Random Forest Algorithm*, TRB, 2014
- *Systemic Pedestrian Safety Analysis*, NCHRP, 2018
- *Guide for Quantitative Approaches to Systemic Safety Analysis*, NCHRP, 2020
- *Recommendations for California Statewide Guidance: High Injury Networks*, California Strategic Highway Safety Plan Bicycle and Pedestrian Challenge Area, 2021

Location factors were applied to the segment or intersection, rather than the collision. Under this option, the cumulative score for a single collision can range from 1 to 11.1. The cumulative score for a single intersection or segment, independent of collisions, can range from 0 to 18. Cumulative scores for collisions and locations were summed when collisions are aggregated to segments and intersections (see following section for more detail). A segment with all location-based risk factors and no injury collision history would score a total of 15. **Table 2** presents the variables and their associated scores.

Associating Collisions to Corridors

The following section outlines the major steps of the methodology for associating collisions with roadway segments and intersections.

1) **Associating Collisions to Roadway Segments:** Collisions were associated to roadway segments using a 45-foot roadway segment buffer. Collisions within 45' of multiple roadway segments (e.g. at an intersection) were assigned to each segment and were double counted.
2) **Calculate Safety Corridor Index:** A score for each roadway and/or intersection (known as the Safety Corridor Index) was calculated by aggregating the weighted collision and risk factor sums, which was joined to the network in the previous step.
3) **Corridor Building:** The top 90th percentile scoring segments were identified and connected to form the network of Safety Corridors. Quarter-mile segments are dissolved together based on proximity. If the distance between 95th percentile scoring segments is a half mile or less and segments have the same roadway name, they were connected. Additionally, if the distance between a 90th percentile scoring segment and the end of the roadway is a half mile or less, the segment was be extended to the end of the roadway. Safety corridors were 0.5 miles and longer as a result of this process.
4) **Corridor Check and Refinement:** Verify that the Safety Corridor accurately incorporates the 95th percentile scoring segment gap threshold into the final Safety Corridors.

Table 2: Safety Corridors Scoring

Variable	Value	Score
Collision Factors		
Collision Severity (factors are mutually exclusive)* – applied to collision		
Fatal and Severe Injury (KSI)	0 or 1	5.1
Evident Injury – Other Visible	0 or 1	1.4
Possible Injury – Complaint of Pain	0 or 1	1
Additional Factors (factors not mutually exclusive) – applied to collision		
Mode: involves bicyclist or pedestrian	0 or 1	3
Vulnerable population: Injury and fatality victims age 65+ or 17 and under	0 or 1	3
Contextual Factors		
Location Factors (factors not mutually exclusive) – applied to segment		
USDOT Equitable Transportation Community (ETC) Disadvantaged Communities Index Percentile Rank	0^{th} to 65^{th}	0
	65^{th} to 80^{th}	1
	>80^{th} percentile	2
Within 1,000' of a school (public or private)	0 or 1	2
Presence of transit stop (within 500')	0 or 1	2
Roadway Risk Factors (factors not mutually exclusive) – applied to segment		
High ADT (segments with 30,000+ ADT)**	0 – 9,000	0
	9,001 – 14,999	1
	15,000 – 29,999	2
	+30,000	3
Observed Speeds***	0 – 20 MPH	0
	20 – 30 MPH	1
	30 – 40 MPH	2
	>40 MPH	3
Roadway Classification Multiplier for Roadway Risk Factors*		
Roadway Classification Multiplier	Local	2
	Collector	1.5
	Arterial	1
	Expressway	1

*Scores based on square root of ratios of crash cost.
** Data source: SACSIM Model Volumes
***Data source: 2022 Wejo connected vehicle data
****Multiply the combined score of the volume and speed roadway risk factors by its roadway classification. This is used to identify discrepancies or differences between roadway classifications/design and the actual volume or speed of the facility.
****All roadways with no ADT were assigned ADT based on local expertise and roadway engineering judgment.

Appendix D

Safety Countermeasure Toolbox

This appendix presents a toolbox of safety countermeasures that can be deployed to address crash trends and the systemic factors behind them. Systemic improvements, both engineering and programmatic/non-engineering related, were identified for implementation.

What Are Engineering Countermeasures?

Engineering countermeasures are physical, infrastructure-based improvements that can be made to roadways to reduce likelihood of crashes.

Example: Rectangular Rapid Flashing Beacon

What Are Programmatic/Non-engineering Countermeasures?

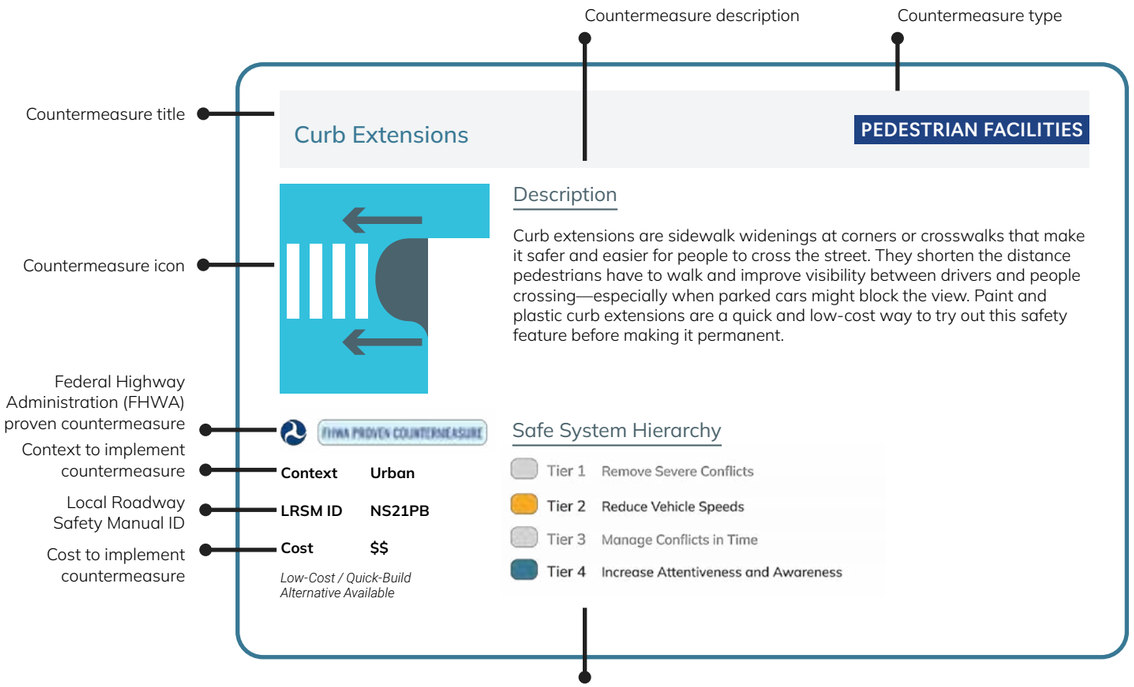
Programmatic/Non-engineering countermeasures introduce education, enforcement, and other policy instruments as means of encouraging safer roadways through user behavior, and they can be used to tackle traffic safety problems such as alcohol and drug impaired driving, distracted driving, speeding, and pedestrian and bicyclist safety.

Example: OTS Go Safely California campaign resources

Engineering Countermeasures

The purpose of this Engineering Countermeasure Toolbox is to establish a shared understanding of key strategies available to address roadway safety issues in the Yuba-Sutter Region that align with the Safe System Approach. The Toolbox describes a variety of countermeasures and how they can be applied to improve safety. It also includes general information about each tool's application, typical placement contexts, estimated costs, and tiers within the FHWA Safety System Hierarchy.

The countermeasure toolbox includes:



Engineering Countermeasure Toolbox List

A. Bikeways

Bicycle Crossing (Solid Green Paint)
Bicycle Ramp
Bicycle Signal/Exclusive Bike Phase
Bicycles May Use Full Lane Sign
Bike Box
Bike Detection
Bike Lane
Bike-Friendly Grate
Buffered Bike Lane
Door Zone Markings
Extend Green Time For Bikes
Floating Transit Island or Bus Boarding Island
Green Conflict Striping
Mixing Zone
Separated Bikeway
Shared-Use Path
Through Bike Lane at Intersection
Two-Stage Turn Queue Bike Box

B. Pedestrian Facilities

Add Sidewalk
Audible Push Button Upgrade
Co-Locate Bus Stops and Pedestrian Crossings
Curb Extensions
Extend Time Push Button
High-Visibility Crosswalk
Install/Upgrade Pedestrian Crossing at Uncontrolled Locations (Signs and Markings Only)
Landscape Buffer
Leading Pedestrian Interval and Pedestrian Recall
Pedestrian Countdown Timer
Pedestrian Detection
Pedestrian Hybrid Beacon
Rectangular Rapid Flashing Beacon
Remove Crossing Prohibition
Restripe Crosswalk
Upgrade Curb Ramp
Widen Sidewalk

C. Intersections & Roadways

All-Way Stop Control
Centerline Hardening
Close Slip Lane
Directional Median Openings to Restrict Left Turns
Guardrail
Improved Pavement Friction
Intersection Lighting
Intersection Reconstruction and Tightening
Lane Narrowing
Median Barrier
Median Guardrail
Neighborhood Traffic Circle
Partial Closure/Diverter
Protected Intersection
Raised Crosswalk
Raised Intersection
Raised Median
Reduced Left-Turn Conflict Intersection
Refuge Island
Road Diet
Roundabout
Rumble Strips
Safety Edge
Slow Turn Wedge
Speed Hump or Speed Table
Splitter Island
Straighten Crosswalk
Superelevation at Horizontal Curve Locations
Traffic Signal
Widen/Pave Shoulder

D. Signals

Advanced Dilemma Zone Detection
All-Red Signal Time
Extend Pedestrian Crossing Time
Flashing Yellow Turn Phase
Pedestrian Scramble
Prohibit Left Turn
Prohibit Right-Turn-on-Red
Prohibit Turns During Pedestrian Phase (Blank-out Signs)
Protected Left Turns
Retroreflective Tape on Signals
Separate Right-Turn Phasing
Shorten Cycle Length
Signal Interconnectivity and Coordination / Green Wave
Speed Sensitive Rest in Red Signal
Supplemental Signal Heads
Upgrade Signal Head

E. Signing & Striping

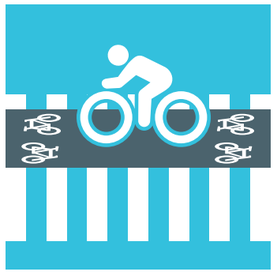
Advance Stop Bar
Chevron Signs on Horizontal Curves
Curve Advance Warning Sign
Flashing Beacon as Advance Warning
LED-Enhanced Sign
Painted Centerline and Raised Pavement Markers at Curves on Residential Streets
Speed Feedback Sign
Speed Legends on Pavement at Neighborhood Entries
Striping Through Intersection
Time-Based Turn Restriction
Upgrade Intersection Pavement Markings
Upgrade Signs with Fluorescent Sheeting
Upgrade Striping
Upgrade to Larger Warning Signs
Wayfinding
Yield Markings
Yield To Pedestrians Sign

F. Others

Back-In Angled Parking
Driveway Consolidation
Street Lighting
Clear Zone
Curbside Management
Far-Side Bus Stop
Delineators, Reflectors, and/or Object Markers
Impact Attenuators
Speed Limit Reduction
Relocate Hazardous Utility Poles
Remove Obstructions For Sightlines
Upgrade Lighting to LED
Red Light Camera
Traffic Camera/Closed Circut TV Camera

Bicycle Crossing (Dashed Green Paint)

BIKEWAYS



Description

Dashed green paint across an intersection that signifies the bicycle crossing. Increases the visibility of bicyclists' anticipated path of travel.

FHWA PROVEN COUNTERMEASURE

Context Urban

LRSM ID N/A

Cost $

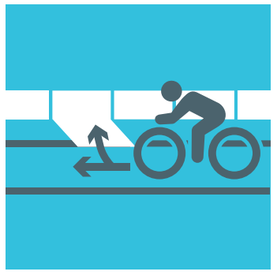
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Bicycle Ramp

BIKEWAYS



Description

A ramp, typically at intersections, that connects on-street bike lanes to a shared-use path or sidewalk-level separated bikeway.

Context Urban/Rural

LRSM ID N/A

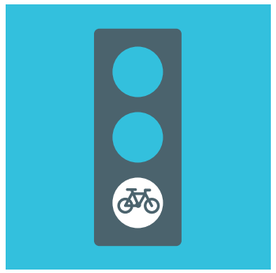
Cost $

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Bicycle Signal/Exclusive Bike Phase

BIKEWAYS



Description

A traffic signal that directs bicycle traffic across an intersection. Separates bicycle movements in time from conflicting motor vehicle, transit, or pedestrian movements. Most applicable for separated bikeway facilities or shared-use paths.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $$$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Bicycles May Use Full Lane Sign

BIKEWAYS

Description

A sign placed on roadways categorized as bike routes to indicate that bicyclists may occupy the full travel lane. Intended to encourage motorists to slow and yield to bicyclists until it is safe to pass. Also encourages bicyclists not to ride within the door zone if on-street parking is present.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $

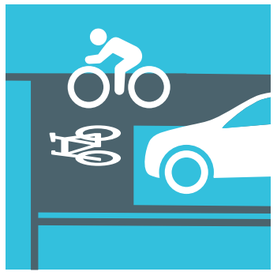
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Bike Box

BIKEWAYS



Description

A bike box is a designated area (often painted green) between the crosswalk and vehicle stop bar at a signalized intersection where bicyclists can wait during a red signal phase. The bike box places bicyclists in a location where they are more visible to motorists and is typically used to facilitate left turn movements.

FHWA PROVEN COUNTERMEASURE

Context **Urban**

LRSM ID **S20PB**

Cost **$**

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Bike Detection

BIKEWAYS

Description

Bike detection is technology used at signalized intersections—in the form of of push buttons, in-pavement loops, or video/infrared cameras—to initiate a green light for bicyclists and reduce delay for bicycle travel. Discourages bicyclists from running red lights and increases the convenience of bicycling.

FHWA PROVEN COUNTERMEASURE

Context **Urban/Rural**

LRSM ID **N/A**

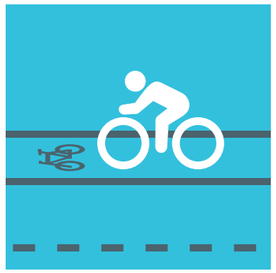
Cost **$$**

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Bike Lane

BIKEWAYS



Description

Bike lanes designate an exclusive space for bicyclists using pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and flows in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge, or parking lane.

FHWA PROVEN COUNTERMEASURE

Context **Urban/Rural**

LRSM ID **R32PB**

Cost **$$**

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Bike-Friendly Grate

BIKEWAYS

Description

Bike-friendly grates are drainage inlets that have transverse or gridded grates to prevent bike tires from falling through the grate and causing a crash.

FHWA PROVEN COUNTERMEASURE

Context **Urban/Rural**

LRSM ID **N/A**

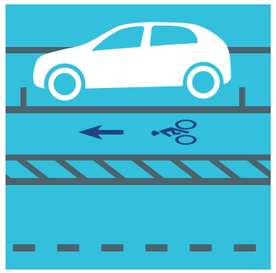
Cost **$$**

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Buffered Bike Lane

BIKEWAYS



Description

Buffered bike lanes have a designated painted buffer space, creating addtional horizontal distance from the adjacent motor vehicle travel lane and/or parking lane. Buffers provide greater space for bicycling without making the bike lane appear so wide that it might be mistaken for a travel lane.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID R32PB

Cost $$

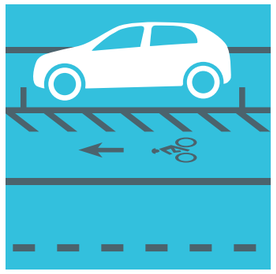
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Door Zone Markings

BIKEWAYS



Description

These pavement markings denote the door zone of parked vehicles, to raise awareness for both bicyclists and motorists of the conflict area—in which an open car door could obstruct the path of a passing bicyclist.

Context Urban

LRSM ID N/A

Cost $

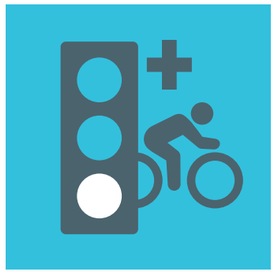
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Extend Green Time For Bikes

BIKEWAYS



Description

A longer green phase when bicyclists are present provides additional time for bicyclists to clear the intersection. It can occur automatically in the signal phasing, or be prompted with bicycle detection. Topography should be considered in clearance time.

Context Urban/Rural

LRSM ID S03

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Floating Transit Island or Bus Boarding Island

BIKEWAYS

Description

Transit/boarding islands allow bicycles to pass between the sidewalk and transit boarding area, thereby avoiding bus-bike conflicts at the transit stop. Can be used in combination with a bike lane, buffered bike lane, or separated bikeway. The treatment can also reduce vehicle speeds, as the island itself visually narrows the roadway and can have a traffic calming effect with in-lane bus stops.

Context Urban

LRSM ID N/A

Cost $$

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- **Tier 2 Reduce Vehicle Speeds**
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Green Conflict Striping

BIKEWAYS

Description

Conflict striping is green pavement markings in a dashed pattern that extend across bike lanes, specifically when approaching an intersection and/or going through an intersection or major driveway. Improves awareness bicycle-car conflict points.

FHWA PROVEN COUNTERMEASURE

Context **Urban/Rural**

LRSM ID **N/A**

Cost **$**

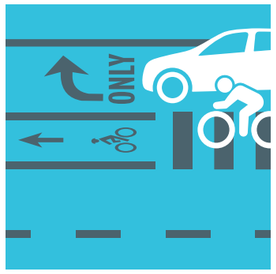
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Mixing Zone

BIKEWAYS



Description

A mixing zone is a designated area in an intersection where bicyclists and motorists share the same space, often due to a bike lane transitioning into a shared lane. Lane markings increase awareness for bicyclists and motorists, indicating the intended shared lane.

Context **Urban**

LRSM ID **N/A**

Cost **$**

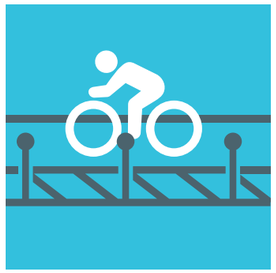
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Separated Bikeway

BIKEWAYS



Description

A separated bikeway, also called protected bike lanes or cycletrack, provides dedicated street space for bicyclists, typically adjacent to outer vehicle travel lanes, with physical separation from vehicle traffic, designated lane markings and signage. Physical separation may consist of plastic posts, parked vehicles, raised median, or a curb (if the separated bike lane is raised to sidewalk level). The separation reduces the risk of severe conflicts between bicycles and vehicles on the road, and also reduces conflicts between people biking and walking as compared to a shared-use path.

FHWA PROVEN COUNTERMEASURE

Context **Urban/Rural**

LRSM ID **R33PB**

Cost **$$$**

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Shared-Use Path

BIKEWAYS

Description

Shared-use paths or trails are off-street facilities that provide exclusive use for nonmotorized travel, including bicyclists and pedestrians. They can be located alongside a roadway (referred to as a Side Path), or exist in a separate right-of-way.

FHWA PROVEN COUNTERMEASURE

Context **Urban/Rural**

LRSM ID **N/A**

Cost **$$$**

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Through Bike Lane at Intersection

BIKEWAYS

Description

A through bike lane is a striping layout for intersections with a dedicated right-turn pocket, designed to allow for space for bicyclists to travel to the left side of right-turning vehicles.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Two-Stage Turn Queue Bike Box

BIKEWAYS

Description

This type of bike box is a designated area painted on the ground on the far side of an intersection. It provides bicyclists with a way to make a left turn at a multi-lane signalized intersection from a bike lane or separated bikeway on the far right side of the roadway. In this way, bicyclists are given the option of not having to mix with left-turning vehicles.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Add Sidewalk

PEDESTRIAN FACILITIES

Description

Sidewalks provide a separated facility for pedestrians, that follows along the roadway but is outside of the traveled way or shoulder.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID R34PB

Cost $$$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Audible Push Button Upgrade

PEDESTRIAN FACILITIES

Description

Pedestrian push buttons at crosswalks must follow accessibility standards set by the Americans with Disabilities Act (ADA) and the Public Rights of Way Accessibility Guidelines (PROWAG). These buttons should be easy to both see and reach for all pedestrians, including those using wheelchairs or with limited mobility. To support people who are blind or have low vision, accessible pedestrian signals (APS) include features like audible tones, speech messages, and vibrating arrows that indicate when it's safe to cross. These features help make crossing streets safer and more inclusive for everyone

Context Urban/Rural

LRSM ID N/A

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Co-Locate Bus Stops and Pedestrian Crossings

PEDESTRIAN FACILITIES

Description

Bus stops should be placed near safe pedestrian crossings so that people using transit can easily and safely cross the street. When crossings are well-designed and close to bus stops, it makes travel more convenient and reduces the risk of crashes involving pedestrians.

Context Urban/Rural

LRSM ID N/A

Cost $

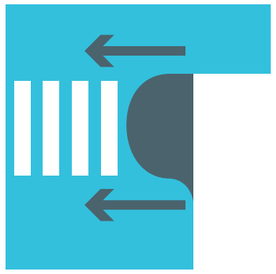
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Curb Extensions

PEDESTRIAN FACILITIES



Description

Curb extensions are sidewalk widenings at corners or crosswalks that make it safer and easier for people to cross the street. They shorten the distance pedestrians have to walk and improve visibility between drivers and people crossing—especially when parked cars might block the view. Paint and plastic curb extensions are a quick and low-cost way to try out this safety feature before making it permanent.

FHWA PROVEN COUNTERMEASURE

Context Urban

LRSM ID NS21PB

Cost $$

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- **Tier 2 Reduce Vehicle Speeds**
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Extend Time Push Button

PEDESTRIAN FACILITIES

Description

Some crosswalks have a special push button that lets people request extra time to cross the street. This is especially helpful for older adults or anyone who may need a bit more time. These buttons are often placed near places like senior centers, medical offices, or assisted living communities.

Context Urban

LRSM ID N/A

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

High-Visibility Crosswalk

PEDESTRIAN FACILITIES

Description

High-visibility crosswalks use bold, striped patterns—often called “ladder markings”—made from durable, reflective materials like thermoplastic instead of traffic paint. These markings make crosswalks easier for drivers to see, especially at night or in bad weather, and serve as a clear signal that pedestrians may be present crossing the street.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID S18/NS20

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Install/Upgrade Pedestrian Crossing at Uncontrolled Locations (Signs and Markings Only)

PEDESTRIAN FACILITIES

Description

Marked pedestrian crossings at intersections or along streets give people a clear, designated place to cross. This helps reduce the risk of crashes by making it more likely that drivers will expect and see pedestrians. Features like crosswalk striping and signs alert drivers to slow down and watch for people crossing.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID R35PB

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Landscape Buffer

PEDESTRIAN FACILITIES

Description

Adding a landscaped buffer between the road, sidewalks, and/or bikeways creates more space between drivers and people walking or biking. This separation not only makes everyone feel safer, but it also encourages drivers to slow down, which helps reduce the severity of crashes.

Context Urban/Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Leading Pedestrian Interval and Pedestrian Recall

PEDESTRIAN FACILITIES

Description

At busy intersections with lots of turning vehicles and pedestrian activity, a leading pedestrian interval (LPI) gives people walking a 3–7 second head start to begin crossing before cars get a green light. This helps pedestrians become more visible in the crosswalk. Pedestrian recall automatically activates the walk signal during every light cycle so pedestrians don't have to press a button to get a walk signal.

FHWA PROVEN COUNTERMEASURE

Context Urban

LRSM ID S21PB

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Pedestrian Countdown Timer

PEDESTRIAN FACILITIES

Description

Countdown pedestrian signals show how many seconds are left to finish crossing the street. These timers help people walking make safer decisions about when to cross. These timers are now required on all new traffic signals that include signalized pedestrian crossings.

Context Urban

LRSM ID S17PB

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- **Tier 4 Increase Attentiveness and Awareness**

Pedestrian Detection

PEDESTRIAN FACILITIES

Description

These sensors can detect when a person is at an intersection waiting to cross, then automatically trigger the "WALK" signal without the person needing to press a button. This helps reduce unsafe crossings and ensures that pedestrians get enough time to cross the street safely.

Context Urban

LRSM ID N/A

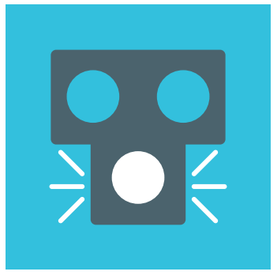
Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Pedestrian Hybrid Beacon

PEDESTRIAN FACILITIES



Description

A Pedestrian Hybrid Beacon (PHB) is a special type of crossing signal used on roadways with higher volumes and speeds at mid-block crosswalks or unsignalized intersections. It stays off (dark) until a person presses a button or is detected waiting to cross. Then, it lights up with a sequence of yellow and red lights to alert drivers to stop and let the pedestrian cross safely.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID NS23PB

Cost $$$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- **Tier 4 Increase Attentiveness and Awareness**

Rectangular Rapid Flashing Beacon

PEDESTRIAN FACILITIES

Description

A Rectangular Rapid Flashing Beacon (RRFB) is a special flashing light that pedestrians can activate when they want to cross the street. It's paired with signs to alert drivers that someone is crossing. The bright, flashing lights make the crosswalk more visible and remind drivers to yield to people walking.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID NS22PB

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- **Tier 4 Increase Attentiveness and Awareness**

Remove Crossing Prohibition

PEDESTRIAN FACILITIES

Description

Removing crossing restrictions and adding marked crosswalks makes it easier and safer for people to cross the street. Instead of forcing pedestrians to take longer, less direct routes—or cross during unsafe traffic movements—this approach provides clear, designated places to cross.

Context Urban

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- **Tier 4 Increase Attentiveness and Awareness**

Restripe Crosswalk

PEDESTRIAN FACILITIES

Description

Crosswalks need to be repainted regularly to stay visible to drivers and pedestrians. Over time, markings can fade due to weather and traffic. When repainting, using high-visibility designs—like ladder markings—can make crosswalks easier to see and help improve safety for everyone.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $

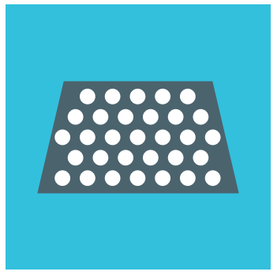
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Upgrade Curb Ramp

PEDESTRIAN FACILITIES



Description

Tactile warning surfaces and properly designed curb ramps are essential for helping people who are blind, have low vision, or are using a mobility device safely navigate street crossings. Curb ramps must meet national standards like the Public Rights-of-Way Accessibility Guidelines (PROWAG) and follow local design rules to ensure they are safe and accessible for everyone.

Context Urban/Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Widen Sidewalk

PEDESTRIAN FACILITIES

Description

Widening sidewalks creates more comfortable and safer spaces for people walking, especially in busy areas. It also provides enough room for people using wheelchairs or other mobility devices. By giving pedestrians more space, it reduces the chance that they'll need to walk in the street, which helps prevent crashes with vehicles.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

All-Way Stop Control

INTERSECTIONS & ROADWAYS

Description

An all-way stop-controlled intesection requires all vehicles to stop before crossing an intersection. This reduces the risk of severe conflicts by eliminating high speed movements through an intersection. The MUTCD (Manual on Uniform Traffic Control Devices) includes information on when and how to implement "All-Way" Or "Multi-Way" stop control intersections.

Context Urban/Rural

LRSM ID N/A

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Centerline Hardening

INTERSECTIONS & ROADWAYS

Description

Centerline hardening involves placing plastic bollards and/or rubber curbs along a roadway's centerline. When used at intersections, they can be effective at requiring motorists to make left-turn movements at angles closer to 90-degrees, thereby slowing vehicle turning speeds and improving motorists' visibility of the crosswalks. When used along a roadway segment, they can be effective access control preventing undesirable left-turns and/or U-turns between intersections.

Context Urban/Rural

LRSM ID N/A

Cost $

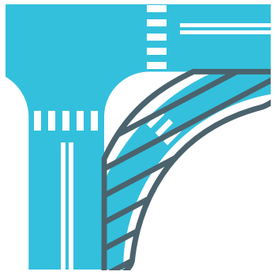
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Close Slip Lane

INTERSECTIONS & ROADWAYS



Description

A close slip lane modifies the corner of an intersection to remove the sweeping right turn lane for vehicles. This results in shorter crossings for pedestrians, reduced speed for turning vehicles, and better sight lines.

Context Urban/Rural

LRSM ID N/A

Cost $$$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- **Tier 2 Reduce Vehicle Speeds**
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Directional Median Openings to Restrict Left Turns

INTERSECTIONS & ROADWAYS

Description

A directional median opening restricts specific turning movements, such as allowing a left-turn from a major street but not from a minor street. This improves safety by reducing the number of conflict points.

Context Urban/Rural

LRSM ID N/A

Cost $$

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Guardrail

INTERSECTIONS & ROADWAYS

Description

A guardrail redirects a vehicle away from embankment slopes or fixed objects and dissipates the energy of an errant vehicle. Guardrails are installed to reduce the severity of lane departure crashes when the crash severity of striking the guardrail is less severe than going down an embankment.

Context Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Improved Pavement Friction

INTERSECTIONS & ROADWAYS

Description

High-friction surface treatments improve a vehicle's ability to stay on the roadway, as well as to stop over a shorter distance. These treatments can be used to help address roadway departure crashes and/or crashes on approaches to unsignalized intersections.

Context Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Intersection Lighting

INTERSECTIONS & ROADWAYS

Description

Extra lighting at intersections and crosswalks makes it easier for drivers to see people walking, biking, or driving—especially at night or in dim conditions. However, it's important to design the lighting carefully. If it creates glare or lights up pedestrians from behind, it can actually make them harder for drivers to see.

Context Urban/Rural

LRSM ID N/A

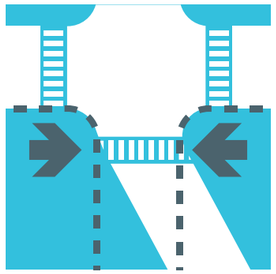
Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Intersection Reconstruction and Tightening

INTERSECTIONS & ROADWAYS



Description

Skewed intersections have a greater likelihood of collisions due to restricted sight lines and high speed turn movements. "Squaring up" the intersection as close to 90 degrees as possible helps reduce the likelihood of collisions. The process requires intersection reconstruction and approach realignment to provide better visibility for all road users. It also reduces high speed turns, reduces length exposure for vehicles and/or bikes passing through the intersection, and reduces pedestrian crossing length.

Context Urban/Rural

LRSM ID N/A

Cost $$$

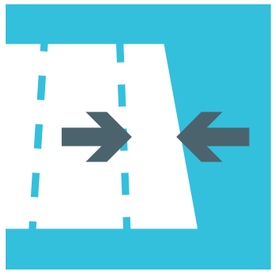
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Lane Narrowing

INTERSECTIONS & ROADWAYS



Description

Lane narrowing reduces the width of the marked vehicle lanes to encourage motorists to travel at slower speeds. Lane narrowing can also help reallocate existing roadway space to other road users.

Context Urban

LRSM ID N/A

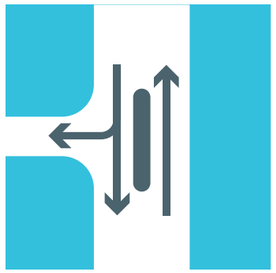
Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Median Barrier

INTERSECTIONS & ROADWAYS



Description

A median barrier in the center of the roadway physically separates opposing vehicular traffic. Median barriers can also help control access to and from side streets and driveways, reducing the number of conflict points.

Context Rural

LRSM ID N/A

Cost $$$

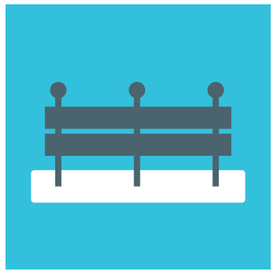
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Median Guardrail

INTERSECTIONS & ROADWAYS



Description

Median guardrails are safety concrete barriers placed in the middle of roadways. While they might not stop all crashes caused by vehicles leaving the roadway, they can help prevent those crashes from turning into dangerous head-on collisions by keeping vehicles from crossing into oncoming traffic.

Context Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Neighborhood Traffic Circle

INTERSECTIONS & ROADWAYS

Description

Neighborhood traffic circles are similar to roundabouts, but are stop-controlled on some or all approaches. Typically, they supplement existing stop-controlled intersections with a circular island in the center that is designed to slow traffic and reduce conflict points (such as conflicting left-turn movements).

Context Urban

LRSM ID N/A

Cost $

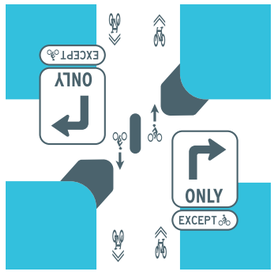
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Partial Closure/Diverter

INTERSECTIONS & ROADWAYS



Description

A partial closure or diverter restricts vehicle through movements, while still allowing bicyclists and pedestrians to proceed through an intersection in all directions.

Context Urban

LRSM ID N/A

Cost $

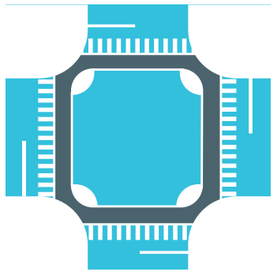
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Protected Intersection

INTERSECTIONS & ROADWAYS



Description

Protected intersections use corner islands, curb extensions, and colored paint to delineate bicycle and pedestrian movements, and physically separate bicycles from pedestrians and moving vehicles. The delineations/ separations reduce the likelihood of conflicts, reduce driving speeds and shorten crossing distances for pedestrians.

FHWA PROVEN COUNTERMEASURE

Context	**Urban/Rural**
LRSM ID	**N/A**
Cost	**$$$**

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Raised Crosswalk

INTERSECTIONS & ROADWAYS

Description

A raised pedestrian crosswalk is elevated above the road, either by a few inches, or at sidewalk level. This type of crosswalk and increases pedestrian visibility and slows motorists.

Context	**Urban/Rural**
LRSM ID	**N/A**
Cost	**$$**

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Raised Intersection

INTERSECTIONS & ROADWAYS

Description

A raised intersection bring vehicles up to the sidewalk level. This serves as a traffic calming measure by slowing drivers and increasing awarenss of the pedestrian activity.

Context	**Urban**
LRSM ID	**N/A**
Cost	**$$$**

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Raised Median

INTERSECTIONS & ROADWAYS

Description

Raised medians are curbed sections in the center of the roadway that create physical separation between opposing vehicular traffic. They can also help control access to and from side streets and driveways, reducing conflict points.

FHWA PROVEN COUNTERMEASURE

Context	**Urban/Rural**
LRSM ID	**N/A**
Cost	**$$**

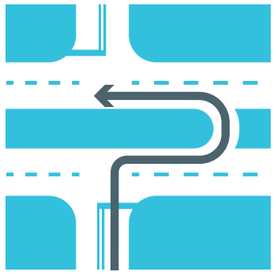
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Reduced Left-Turn Conflict Intersection

INTERSECTIONS & ROADWAYS



Description

These are geometric designs that alter how left-turn movements occur. They can simplify decisions and minimize the potential for left-turn related crashes. Two designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT) intersections. Both designs require some out-of-direction travel for vehicles.

Context	**Urban/Rural**
LRSM ID	**N/A**
Cost	**$$$**

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Refuge Island

INTERSECTIONS & ROADWAYS

Description

A refuge island is a raised, curbed median in the center of the roadway that provides a place for pedestrians to wait until there is a gap in traffic to finish crossing the intersection. This reduces pedestrians' exposure to traffic by allowing them to cross the intersection in multiple stages. Pedestrian refuge areas constructed from paint and plastic may be implemented as part of a low-cost/quick build project.

FHWA PROVEN COUNTERMEASURE

Context	**Urban/Rural**
LRSM ID	**NS19PB**
Cost	**$$**

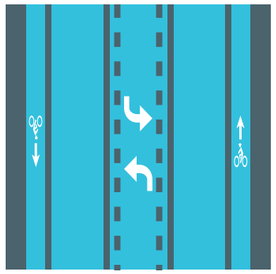
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Road Diet

INTERSECTIONS & ROADWAYS



Description

A road diet reconfigures roadway space originally dedicated to vehicle travel lanes and creates room for bicycle facilities, wider sidewalks, and/or center turn lanes. This reduces vehicle speeds and creates designated space for all road users.

FHWA PROVEN COUNTERMEASURE

Context	**Urban**
LRSM ID	**R14**
Cost	**$$**

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Roundabout

INTERSECTIONS & ROADWAYS

Description

A roundabout is a circular intersection where traffic flows in one direction around a central island, and vehicles must yield at entrance lanes. Unlike conventional intersections, roundabouts eliminate severe conflicts from crossing and left-turn movements. The design of a roundabout forces drivers to slow down, which narrows the range of vehicle speeds and reduces the severity of crashes. Additionally, pedestrians only need to cross one direction of traffic at a time, minimizing their exposure to vehicles.

FHWA PROVEN COUNTERMEASURE

Context	**Urban/Rural**
LRSM ID	**S16/NS04**
Cost	**$$$**

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Rumble Strips

INTERSECTIONS & ROADWAYS

Description

Rumble strips are grooves added to the roadway surface that produce noise and vibrations inside a vehicle, alerting drivers when they cross the centerline or edge line. Helps drivers stay in their lane, especially if they are distracted or drowsy. Also warns drivers of lane boundaries in poor visibility conditions like rain, fog, snow, or dust.

Context Rural

LRSM ID R30/R31

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Safety Edge

INTERSECTIONS & ROADWAYS

Description

A safety edge slopes the shoulder pavement edge at a 30-35 degree angle, making it easier for drivers to reenter the roadway after leaving the paved roadway. It's designed to reduce the severity of crashes when a vehicle veers off the road and encounters a pavement-shoulder drop-off. This treatment can be incorporated as a standard practice in overlay or resurfacing projects.

Context Rural

LRSM ID N/A

Cost $

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Slow Turn Wedge

INTERSECTIONS & ROADWAYS

Description

A slow turn wedge uses paint and delineators to extend the curb at intersections. This helps slow turns by restricting the turning radii of turning vehicles, expanding the field of vision for drivers, and increasing the visibility of pedestrians.

Context Urban

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- **Tier 2 Reduce Vehicle Speeds**
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Speed Hump or Speed Table

INTERSECTIONS & ROADWAYS

Description

A speed hump or speed table is a raised area of pavement designed to slow down vehicles. Typically, speed humps and speed tables are wider and less abrupt than speed bumps, providing a gentler way to reduce vehicle speeds in residential areas or near schools. They help improve safety by encouraging drivers to maintain lower speeds.

Context Urban

LRSM ID N/A

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- **Tier 2 Reduce Vehicle Speeds**
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Splitter Island

INTERSECTIONS & ROADWAYS

Description

A splitter island is a raised area that separates the two directions of travel on the minor street approach at an unsignalized intersection or roundabout. It helps channelize traffic in opposing directions and improves the visibility of the intersection for approaching drivers. Additionally, it provides a refuge for pedestrians crossing the street.

Context Urban/Rural

LRSM ID N/A

Cost $$

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Straighten Crosswalk

INTERSECTIONS & ROADWAYS

Description

Straightening crosswalks improves sight lines, making pedestrians more visible to oncoming drivers. It can also shorten the crossing distance, reducing the time pedestrians need to cross an intersection.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Superelevation at Horizontal Curve Locations

INTERSECTIONS & ROADWAYS

Description

Superelevation is the banking, or angling, of pavement on the approach to and through a horizontal curve, designed to help drivers negotiate the curve by counteracting lateral forces. However, this design can also inadvertently encourage higher speeds. When selecting appropriate superelevation, consider the target or desired speed for the roadway and relevant design guidance.

Context Rural

LRSM ID N/A

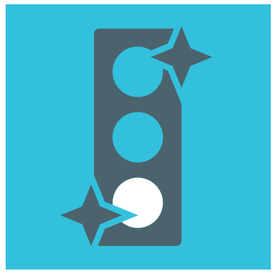
Cost $$

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Traffic Signal

INTERSECTIONS & ROADWAYS



Description

Traffic signals at intersections manage traffic flow by assigning right-of-way to different movements at specific times. For instance, protected left-turn signal phasing is more effective at preventing severe left-turn collisions compared to permitted left-turn signal phasing. Additionally, traffic signals significantly enhance safety for pedestrians crossing large intersections.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $$$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Widen/Pave Shoulder

INTERSECTIONS & ROADWAYS

Description

Widened and paved shoulders create space for pedestrians and bicyclists, allow drivers to safely recover from lane departures, and provide room for inoperable vehicles to pull out of the travel lane. Adding a paved shoulder to an existing road can help reduce run-off-road crashes. This improvement is beneficial for high-risk rural roads without paved shoulders.

Context Rural

LRSM ID N/A

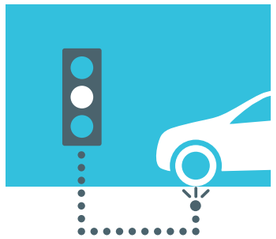
Cost $$

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Advanced Dilemma Zone Detection

SIGNALS



Description

The Advanced Dilemma-Zone Detection system helps make intersections safer by adjusting when the yellow light turns on. It detects where cars are and how fast they're going. Then, the signal controller decides whether to activate or delay the yellow light. This helps drivers avoid the tricky situation where they're not sure if they should stop or keep going when the light changes. The goal is to reduce broadside collisions at signalized intersections.

Context Urban/Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

All-Red Signal Time

SIGNALS

Description

Including a phase of all-red signals gives drivers and bicyclists a few extra seconds to safely get through an intersection before other traffic is allowed to move. This added time at the end of a signal phase helps reduce the risk of collisions, especially for people who are already in the intersection when the light changes.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Extend Pedestrian Crossing Time

SIGNALS

Description

Extending the pedestrian walk signal time beyond the minimum required by national guidelines gives people more time to cross the street. This is especially helpful for vulnerable groups, like children, older adults, and people with disabilities, who may need extra time to cross safely.

Context Urban

LRSM ID N/A

Cost $

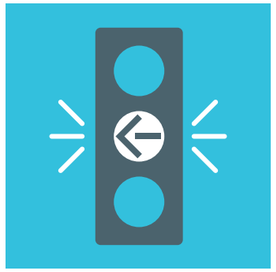
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Flashing Yellow Turn Phase

SIGNALS



Description

A flashing yellow turn arrow tells drivers they can make a permissive turn. They must wait for a clear gap in oncoming traffic before turning. This signal is used only when no pedestrians are crossing. When pedestrians are present, the signal should use a protected-only turn phase, where turning vehicles must wait for a green arrow to ensure pedestrian safety.

Context Urban

LRSM ID N/A

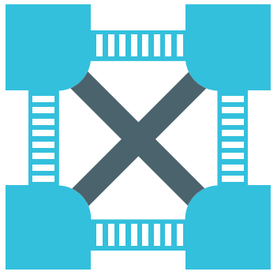
Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Pedestrian Scramble

SIGNALS



Description

A pedestrian “WALK” phase, called a pedestrian scramble or all-way walk, stops all vehicle traffic at an intersection. This gives pedestrians the chance to cross in any direction, including diagonally, all at once. It removes conflicts by completely separating turning cars from crossing pedestrians in time. It can be especially effective in busy areas with lots of foot traffic.

Context Urban

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Prohibit Left Turn

SIGNALS

Description

Left turns may be restricted at certain intersections to improve safety. This is especially important where turning vehicles might conflict with pedestrians in the crosswalk or where there’s heavy oncoming traffic. These restrictions can be enforced using signs or raised center medians that physically prevent the turn.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Prohibit Right-Turn-on-Red

SIGNALS

Description

Prohibiting right turns on red should be considered at locations with unusual layouts, such as skewed intersections, or where there are pedestrian scrambles or leading pedestrian intervals (LPIs). Preventing right turns on red in these situations can reduce the risk of crashes between turning vehicles and pedestrians, as well as crashes with vehicles traveling through the intersection from the cross street.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Prohibit Turns During Pedestrian Phase (Blank-out Signs)

SIGNALS

Description

Prohibiting left and right turns while pedestrians are crossing helps prevent conflicts between turning vehicles and people in the crosswalk. These turn restrictions are often shown using special electronic signs, called blank-out signs, which light up only when the restriction is active.

Context Urban

LRSM ID N/A

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Protected Left Turns

SIGNALS

Description

Adding protected left-turn phases at intersections reduces broadside crashes and pedestrian crashes. These signals give drivers a dedicated green arrow so they don't have to wait for a gap in oncoming traffic, or worry about people crossing the street at the same time.

Context Urban/Rural

LRSM ID N/A

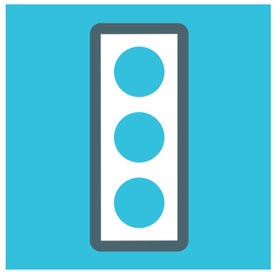
Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Retroreflective Tape on Signals

SIGNALS



Description

Retroreflective borders are bright, reflective outlines added around traffic signals to make them easier to see—especially for older drivers or those with color vision difficulties. These borders help drivers quickly recognize which light is on. They're also useful during power outages, because they reflect headlights and make the signal visible even when it's not working.

Context Urban/Rural

LRSM ID N/A

Cost $

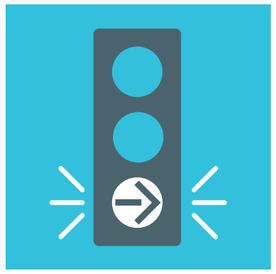
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Separate Right-Turn Phasing

SIGNALS



Description

A green arrow for right turns phase helps prevent conflicts with pedestrians and bicyclists who may be crossing the street on the right side of the intersection.

Context Urban

LRSM ID N/A

Cost $$$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Shorten Cycle Length

SIGNALS

Description

The traffic signal cycle length—how long it takes to go through all the green, yellow, and red lights—can greatly affect how easy and pleasant it is to walk, bike, drive, or take transit. When signals stay red for too long, especially at several intersections in a row, it can make even short trips feel slow and frustrating. Shorter signal cycles, ideally between 60 and 90 seconds, are better for urban areas because they help keep people moving and make streets more welcoming for everyone.

Context Urban

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Signal Interconnectivity and Coordination / Green Wave

SIGNALS

Description

Improving how traffic signals are timed can make streets safer. One approach is called a “green wave,” where signals are coordinated to let people driving and people on bikes move smoothly through several intersections without stopping at a set desired speed, typically lower than the speed limit and in line with typical bicycle travel speeds. The slow green wave can be accompanied by signs that alert the drivers and help slow down cars, which can reduce the risk of severe collisions.

Context Urban

LRSM ID S03

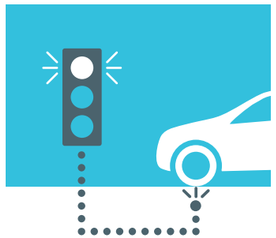
Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- **Tier 2 Reduce Vehicle Speeds**
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Speed Sensitive Rest in Red Signal

SIGNALS



Description

At certain times—like late at night—some traffic signals stay red until a vehicle approaches. These signals are designed to reward drivers who follow the speed limit. If a car is going too fast, the light stays red until the driver comes to a stop. But if the car is going at or below the speed limit, the light turns green before the car arrives, allowing it to pass through smoothly. This encourages safe driving and can be combined with electronic speed signs that warn drivers if they’re going too fast.

Context Urban/Rural

LRSM ID R26

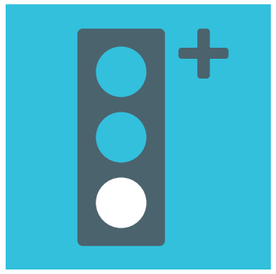
Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- **Tier 2 Reduce Vehicle Speeds**
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Supplemental Signal Heads

SIGNALS



Description

Supplemental signal heads are extra traffic lights placed in addition to the main signal. They help drivers see the signal more clearly, especially when the intersection is hard to see—like when it’s hidden behind vertical curve or around a horizontal curve.

Context Urban/Rural

LRSM ID S02

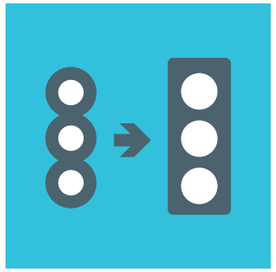
Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Upgrade Signal Head

SIGNALS



Description

Upgrading signal heads means replacing smaller 8-inch traffic lights with larger 12-inch ones, as recommended by California's MUTCD. The larger signal heads are easier for drivers to see, especially from a distance. This helps drivers notice intersections sooner and respond more safely to traffic signals.

Context Urban/Rural

LRSM ID S02

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Advance Stop Bar

SIGNING & STRIPING

Description

An advanced stop bar is a transverse pavement marking placed upstream of a crosswalk to indicate the required vehicle stop location. It minimizes crosswalk encroachment and can be widened or set further back at locations with frequent violations.

Context Urban/Rural

LRSM ID S20PB

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Chevron Signs on Horizontal Curves

SIGNING & STRIPING

Description

Post-mounted chevrons are traffic signs placed along curves to provide continuous visual guidance. They enhance curve visibility, alert drivers to the change in alignment, and help maintain proper lane tracking through the curve.

Context Rural

LRSM ID R23

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Curve Advance Warning Sign

SIGNING & STRIPING

Description

A curve advance warning sign alerts drivers to an upcoming horizontal curve and may include an advisory speed plaque. It provides advance notice to reduce speed and improve curve navigation. For enhanced effectiveness, it is often paired with chevrons, delineators, or flashing beacons to increase driver awareness and guidance through the curve.

Context Rural

LRSM ID R24

Cost $

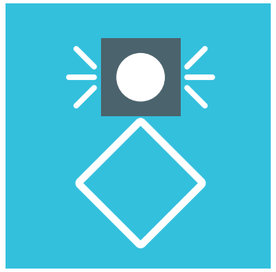
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Flashing Beacon as Advance Warning

SIGNING & STRIPING



Description

A flashing beacon is a blinking light paired with signage used as advanced warning to alert drivers to an upcoming intersection or crosswalk. This tool increases driver awareness and provides additional time to slow down or yield to pedestrians, enhancing safety at conflict points.

Context Rural

LRSM ID S10

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

LED-Enhanced Sign

SIGNING & STRIPING

Description

An LED-enhanced sign integrates flashing or steady LED lights into the sign's border or message to improve visibility. These signs are especially effective at locations with limited sight distance or a history of driver non-compliance, such as at STOP signs. The enhanced visibility helps draw driver attention and improve compliance with traffic control devices.

Context Urban or Rural

LRSM ID NS08

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Painted Centerline and Raised Pavement Markers at Curves on Residential Streets

SIGNING & STRIPING

Description

Installing a centerline with raised pavement markers on curves along residential streets enhances lane guidance and helps reduce the risk of head-on collisions. The tactile and visual feedback from the markers improves driver awareness, especially at night or in low-visibility conditions.

Context Urban

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Speed Feedback Sign

SIGNING & STRIPING

Description

A speed feedback sign displays a driver's current speed alongside the posted speed limit, encouraging voluntary speed reduction. It serves as a real-time visual cue to promote speed awareness and compliance, particularly in areas with speeding concerns.

FHWA PROVEN COUNTERMEASURE

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Speed Legends on Pavement at Neighborhood Entries

SIGNING & STRIPING

Description

Speed legends are numerals painted directly on the roadway surface to indicate the posted speed limit. Typically placed near speed limit signs, they reinforce speed awareness and improve compliance, especially at transistions to slower streets.

Context Urban

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Striping Through Intersection

SIGNING & STRIPING

Description

Clear pavement markings within complex intersections help guide motorists through lane assignments and turning movements. This treatment is especially effective at locations where lane designations are unclear due to horizontal offsets or multiple turning lanes.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Time-Based Turn Restriction

SIGNING & STRIPING

Description

Restricts left turns or right turns during certain time periods when there may be increased potential for conflict (e.g., peak periods, school hours).

Context Urban

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- **Tier 3 Manage Conflicts in Time**
- Tier 4 Increase Attentiveness and Awareness

Upgrade Intersection Pavement Markings

SIGNING & STRIPING

Description

Upgrading intersection pavement markings, such as stop ahead markings, centerlines, and stop bars, improves visibility for drivers approaching and entering intersections.

Context Urban/Rural

LRSM ID N/A

Cost $

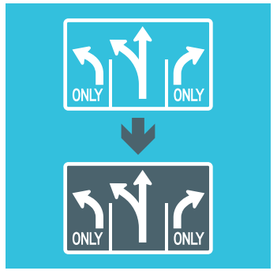
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Upgrade Signs with Fluorescent Sheeting

SIGNING & STRIPING



Description

Upgrading signs with fluorescent sheeting enhances nighttime visibility by reflecting headlight beams more effectively, making warnings clearer for drivers.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Upgrade Striping

SIGNING & STRIPING

Description

Restriping lanes with reflective materials such as thermoplastic and pavement markers improves visibility and helps clarify lane assignments, especially where lane configurations change.

Context Urban/Rural

LRSM ID N/A

Cost $

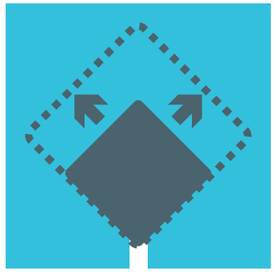
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Upgrade to Larger Warning Signs

SIGNING & STRIPING



Description

Upgrading to larger warning signs improves visibility and makes information easier to read—especially for older drivers.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Wayfinding

SIGNING & STRIPING

Description

A network of directional signs highlighting nearby destinations and pedestrian or bicycle facilities can reduce erratic driving and guide users away from crossings with poor visibility or limited safety features.

Context Urban/Rural

LRSM ID N/A

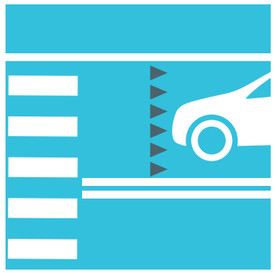
Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Yield Markings

SIGNING & STRIPING



Description

Yield lines, also known as shark's teeth, are pavement markings placed 20 to 50 feet before multi-lane pedestrian crossings. They improve pedestrian visibility and help reduce the risk of multiple-threat crashes, where one vehicle stops for a pedestrian but another in an adjacent lane does not.

Context Urban/Rural

LRSM ID N/A

Cost $

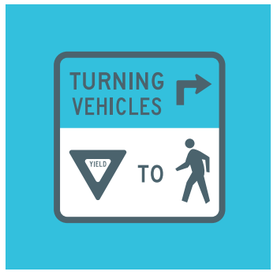
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Yield To Pedestrians Sign

SIGNING & STRIPING



Description

"Yield Here to Pedestrians" signs alert drivers to pedestrian crossings and are required when advance yield lines are used. Additional smaller, flexible, warning signs can also be placed on the roadway centerline to enhance visibility.

Context Urban/Rural

LRSM ID N/A

Cost $

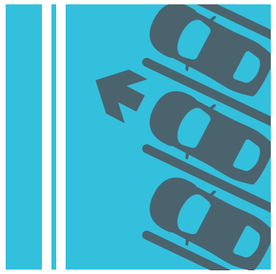
Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Back-In Angled Parking

OTHER



Description

Back-in angled parking requires motorists to reverse into an angled on-street parking spot and drive forward when exiting. This method increases the visibility of passing bicyclists and vehicles when exiting a spot. Additionally, it allows trunk unloading to occur on the curb rather than in the street, reducing exposure.

Context Urban/Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Clear Zone

OTHER

Description

A clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway. The width of the clear zone is informed by roadway context, desired vehicle speeds, and agency design standards.

Context Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Curbside Management

OTHER

Description

Curbside management helps prioritize and align different uses of the space along curbs that would otherwise be in conflict with one another. This includes the location of bus stops, bicycle infrastructure, space for freight deliveries, passenger pick-ups/drop-offs, green stormwater infrastructure, public spaces, and parking spaces.

Context Urban

LRSM ID N/A

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Delineators, Reflectors, and/or Object Markers

OTHER

Description

Delineators, reflectors, and object markers are visual cues installed in a roadway, intended to warn drivers of an approaching curve or fixed object that cannot easily be removed. They are generally less costly than signage.

Context Rural

LRSM ID N/A

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- **Tier 4 Increase Attentiveness and Awareness**

Driveway Consolidation

OTHER

Description

Consolidating driveways reduces conflict points between vehicles entering/exiting the roadway and pedestrians, bicyclists, and vehicles traveling along the roadway. Particular attention should be considered to driveways within 250 feet of intersections.

Context Urban/Rural

LRSM ID N/A

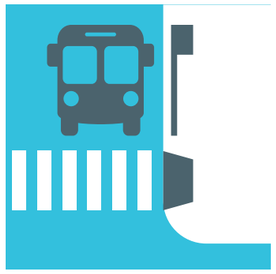
Cost $$

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Far-Side Bus Stop

OTHER



Description

Far-side bus stops are placed just after an intersection, so the bus crosses the street before picking up or dropping off passengers. This setup helps in a few ways: it keeps traffic moving more smoothly, makes it easier for pedestrians to be seen by drivers when crossing the street, and can help buses stay on schedule. It also encourages people to cross behind the bus, which is usually safer.

Context Urban/Rural

LRSM ID N/A

Cost $

Safe System Hierarchy

- **Tier 1 Remove Severe Conflicts**
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Impact Attenuators

OTHER

Description

Impact attenuators are safety devices placed on roads to help stop or slow down vehicles that accidentally leave their lane. Instead of crashing into something hard like a concrete wall or a bridge pillar, the vehicle hits the attenuator, which absorbs the impact and reduces the damage. These devices are often used in places where it's not possible to remove the dangerous object, so they act as a protective crash cushion.

Context Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Red Light Camera

OTHER

Description

Red light cameras help enforce traffic laws by taking a photo of any vehicle that drives through an intersection after the light has turned red. These cameras work automatically, and the photos they take are used by authorities to issue tickets to drivers who run red lights.

Context Urban

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Relocate Hazardous Utility Poles

OTHER

Description

Removing utility poles from the roadside can help reduce the risk of serious crashes. If it's not possible to remove the poles completely, it can still help to move them farther away from the road's edge, or away from outside of curves where vehicles may be more likely to depart the roadway.

Context Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Remove Obstructions For Sightlines

OTHER

Description

Removing visual obstacles near intersections helps drivers and pedestrians see each other more easily. This might include painting red curbs to stop cars from parking too close to corners (a practice known as "daylighting"), trimming overgrown trees or bushes, or moving signs or other objects that may block the view.

Context Urban/Rural

LRSM ID NS11

Cost $

Low-Cost / Quick-Build Alternative Available

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Speed Limit Reduction

OTHER

Description

Lower speeds help reduce the risk and severity of crashes. New industry standards for speed limits consider factors like roadway characteristics, adjacent land use context, as well as the presence of people walking and biking.

Context Urban/Rural

LRSM ID N/A

Cost $

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Upgrade Lighting to LED

OTHER

Description

LED street lights are brighter and more effictient than olderr high-pressure sodium lights. Upgrading street lights improves visibility—especially at crosswalks—by providing better color contrast and lighting a wider area. As a result, it becomes easier for drivers to see people walking.

Context Urban

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Street Lighting

OTHER

Description

Adding street lighting helps drivers see better at night or in low-light conditions, and makes it easier to spot other people, vehicles, or objects on the road.

Context Urban

LRSM ID R01

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Traffic Camera/Closed Circut TV Camera

OTHER

Description

Real-time traffic cameras enable live monitoring and integration with law enforcement and emergency service systems for faster rescue and investigation.

Context Urban/Rural

LRSM ID N/A

Cost $$

Safe System Hierarchy

- Tier 1 Remove Severe Conflicts
- Tier 2 Reduce Vehicle Speeds
- Tier 3 Manage Conflicts in Time
- Tier 4 Increase Attentiveness and Awareness

Rail Crossing Engineering Countermeasures

The Yuba-Sutter region is traversed by several active and historical rail lines, primarily operated by Union Pacific Railroad. These lines run through key communities such as Marysville, Wheatland, Yuba City, Olivehurst, and Plumas Lake. These communities and others experience safety concerns related to railroad crossings with local roads, particularly in rural locations with less safety infrastructure. The following countermeasure suggestions could separate users in time and/or enhance awareness of these sensitive crossings.

Uncontrolled Railroad Crossings

For uncontrolled railroad crossings, consider these countermeasures:

Install Active Warning Systems

Automatic gates and flashing lights are proven to significantly reduce crash frequency at crossings by alerting drivers and preventing crossing when trains approach.

Pavement markings and advanced warning

Advance pavement markings and signage improve driver awareness.

Relocate/clear roadside features

Remove or relocate roadside hazards near crossings to improve sight lines.

Consider grade separation

Where feasible, build overpasses or underpasses.

Controlled Railroad Crossings

For controlled railroad crossings, consider these countermeasures:

Install gates

Consistent with engineering requirements, install gates and ensure functionality of warning systems.

Improve lighting and pavement markings

Use brighter, reflective pavement markings and lighting to enhance nighttime visibility.

Preemption of Traffic Signals

Integrate railroad crossing signals with adjacent traffic signals to clear queues before a train arrives.

Pedestrian Gates or Swing Gates

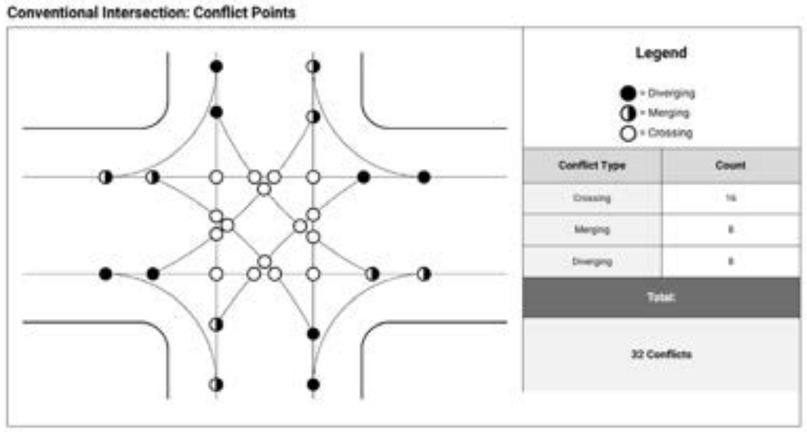
In areas with higher foot traffic, install pedestrian gates prior to railroad crossing to prevent pedestrians from entering the track area during train approaches.

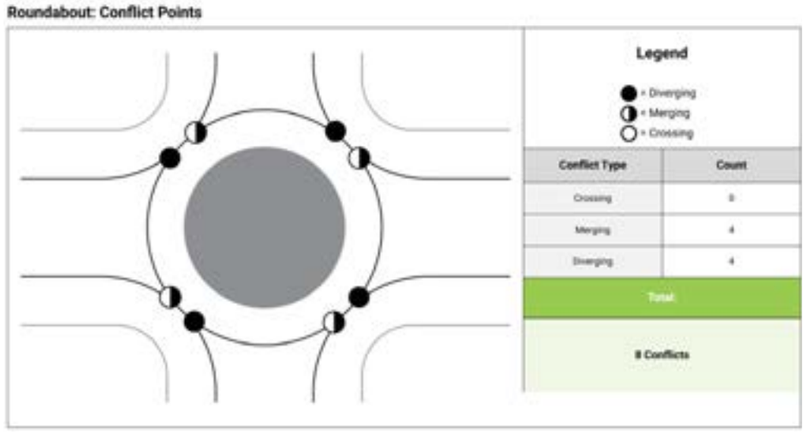
Roundabout Countermeasure

Roundabouts have been increasing in popularity in the U.S. for decades due to their safety and operational benefits. Several concerns and benefits of roundabouts are provided below.

Safety

Roundabouts reduce the number of intersection crossing conflict points compared to typical intersections, reducing the likelihood of crashes, as shown below. By creating a curved movement in the intersection, roundabouts slow down the speed of vehicles, which lessens both the likelihood and severity of crashes when they do occur. Additionally, the types of crashes that occur in a roundabout (e.g., sideswipes) are typically less severe than those of typical intersections (e.g., broadside/T-bone crashes) because the different crash angles reduce the kinetic energy involved in a crash.





Source: Virginia Department of Transportation

Operations and Costs

Although roundabouts have higher upfront costs compared to traffic signals, they are cheaper to maintain over their usable lifetime. Unlike traffic signals, which create stop-and-go traffic patterns, roundabouts allow continuous movement, reducing congestion, delay, and idling time.

In rural areas, where visibility and road conditions can be compromised by nearby canals and agricultural activity, roundabouts can help manage traffic more predictably and safely than stop signs or signals.

Driver Familiarity

U.S. drivers are typically accustomed to traditional traffic signals so the transition to roundabouts may initially cause confusion. However, experiences from around California show that adaptation can be quick given proper education and roundabout design. Once drivers adapt, roundabouts can significantly reduce delays and improve traffic flow.

Space Constraints

If available right-of-way is limited, traffic signals do typically require less space than roundabouts. However, compact roundabout designs tailored to fit tighter intersections can be implemented and still provide safety benefits compared to traditional signals

In rural areas in Yuba and Sutter County, a common concern is the ability of roundabouts to accommodate heavy vehicles like semi-trucks, farm tractors, and trailers. However, modern roundabout designs can include truck aprons and a wider turning radius to allow such vehicles to pass through at manageable speeds with minor issues.

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Trucks in Roundabout

Space Constraints

Busy intersections near schools, parks, and shopping centers raise concerns about pedestrian and cyclist safety in roundabouts. Roundabouts have been shown to reduce crash likelihood and severity for people walking and biking by slowing vehicle speeds and reducing conflict points. Features like splitter islands and clearly marked crosswalks allow pedestrians to cross one direction of traffic at a time, reducing exposure and improving visibility. Cyclists benefit from lower vehicle speeds and the option to either merge with traffic or use designated bike paths around the roundabout.

Programmatic Countermeasures

Programmatic countermeasures include education, enforcement, and other strategies that influence crash likelihood and severity. *Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices, 11th Edition*, published by the National Highway Traffic Safety Administration (NHTSA) in 2023, served as a resource for the programmatic countermeasures presented in this section. Below is the effectiveness ratings based on NHTSA.

- ★★★★★ **Demonstrated to be effective** by several high-quality evaluations with consistent results
- ★★★★☆ **Demonstrated to be effective in certain situations**
- ★★★☆☆ **Likely to be effective** based on balance of evidence from high-quality evaluations or other sources
- ★★☆☆☆ **Effectiveness still undetermined** as different methods of implementation produce different results
- ★☆☆☆☆ **Limited or no high-quality evaluation evidence**

Public Health Partnerships on DUI Prevention

Description
Prevention and education policies focus on mobilizing and educating the community and intervening before driving under the influence takes place. According to NHTSA research, alcohol problem assessment and treatment programs, as well as alcohol intervention in settings such as a doctor's office, are highly effective strategies for improving safety outcomes. Health departments could partner with partner agency police and sheriff departments to share information and conduct screenings.

Resources
Behavior Change Campaigns to Improve Traffic Safety Toolkit

Countermeasures that Work, 11th Edition

★★★★★ **Cost: Varies**

Crash History-Based Enforcement

Description
Called an Enforcement Priorities Mandate, use crash history and emphasis area corridors to direct enforcement efforts, with a focus on driving under the influence, distracted driving, and dangerous driving. This may require additional funding for California Highway Patrol, County Sheriff, and Local Police Departments.

Resources
Evidence-Based Behavior Change Campaigns to Improve Traffic Safety Toolkit (AAA Foundation, https://aaafoundation.org/evidence-based-behavior-change-campaigns-to-improve-traffic-safety-toolkit/)

Countermeasures that Work, 11th Edition

Effectiveness and cost information is not available for this countermeasure

Education & Public Awareness Campaigns Targeted at Speeding, Driving Under the Influence, and Increasing Awareness of People Walking and Biking

Description
Coordinating with public communications staff/public information officers from each jurisdiction to use existing social media accounts (e.g. Facebook, NextDoor, Twitter, etc.) can help establish an ongoing public education campaign focused on safe and responsible driving, discouraging drinking and driving, and increasing awareness of pedestrians and bicyclists. Campaigns could also involve collaborating with local radio station to disseminate safety messages in English, Spanish, and Punjabi.

Continue existing safety education campaign targeting safe speeds. This could include yard signs, wall boards/posters along high-injury corridors and neighborhoods, ads on bus exteriors, radio ads, etc. Safe Speeds is also applicable to those who bike and scooter.
Potential partners include local Health Departments, community-based organizations like Blue Zones, local media outlets, and OTS Go Safely California Campaign.

Resources
The OTS Go Safely California campaign has free resources for local agencies to use in implementing public awareness campaigns.

★★☆☆☆ **Cost: $$$**

Pair Education with Engineering Countermeasures

Description
Educational materials can be used to teach people how to use new and unfamiliar safety countermeasures, such as roundabouts or protected bikeways. These materials can consist of informational signs or demonstration videos, and should be presented in multiple languages, including English, Spanish, and Punjabi. The California Office of Traffic (OTS) has grants to support these educational campaigns.

Resources
City of Sacramento Bicycling videos:
The City of Sacramento has used demonstration videos to engage residents in bicycling safety procedures. The videos feature a series of safety improvements such as protected bike lanes, bike boxes, and bike signals, and inform residents how to use these new roadway features, both as a bicyclist and a driver.

Effectiveness and cost information is not available for this countermeasure

OTS Go Safely California campaign resources

High-Visibility Enforcement for DUI

Description

Deterrence policies, such as high visibility enforcement, focus on raising the actual and perceived risk of high-risk behaviors. County sheriffs and local police departments should implement high visibility enforcement for DUIs to deter and increase awareness of the risks of this behavior.

High visibility enforcement for driving under the influence, such as publicized sobriety checkpoints and saturation patrols, has been found to be effective to improve safety outcomes. Officers can focus their efforts along corridors with a history of speeding-related crashes since they must observe driving behavior on the road.

Integrated enforcement would include coordination with Public Awareness Campaigns. For example, widespread dissemination of multi-lingual educational messaging and promotion of safe rides home opportunities in advance of major DUI enforcement efforts.

Resources

Massachusetts Saving Lives – Enforcement Strategies, https://solutions.edc.org/solutions/prevention-solutions

This program combines community engagement events, high-visibility enforcement including sobriety checkpoints, and media communication to discourage DUI.

★★★★☆ **Cost: $$**

High-Visibility Enforcement for Other Key Issues

Description

In the High-Visibility enforcement model, law enforcement targets high-crash or high-violation locations for enhanced enforcement, and publicizes the enforcement widely to maximize general deterrence of key issues including speeding, cell phone use, and lack of yielding at pedestrian crossings. If done well, such a campaign should be perceived as fair, as drivers are being put on notice that the enforcement is occurring, and that it is being done to improve safety. The objective is to convince the driving public that speeding is likely to be detected and therefore not worth the risk of receiving fines, points, or other punishment. Enforcement actions for violations should be consistent with local and State statutes, and taken in the interest of preventing traffic crashes.

Effective communications and outreach have long been deemed an essential part of successful enforcement programs. Key objectives of these communications are to provide information about the program and expected safety benefits, to incorporate public input, and to increase community support.

★★★★☆ **Cost: $$$**

Safe Ride Home Program

Description

Develop partnerships between the partner agencies' public works and police departments, Transportation Network Company (TNC) operators, and local businesses to offer promotional codes for free or discounted rides home from establishments or events throughout the reservation to reduce the potential for DUI, drowsy driving, or distracted driving. This program could be especially important during weekends, holidays, and other special events.

Resources

Portland Bureau of Transportation Safe Ride Home Program, https://www.portlandoregon.gov/transportation/76611

PBOT partnered with the Portland Police Bureau, TriMet, Old Town Hospitality Group, and Portland cab companies Radio Cab, Broadway Cab, New Rose City Cab and United Independent Cab, as well as transportation network companies Lyft and Uber to provide promo codes for discounted rides. The program is funded by a 50-cent fee charged for every taxi and TNC ride in Portland.

★★★☆☆ **Cost: $$**

Safe Route to School Program

Description

Safe Routes to School (SRTS) programs aim to create safer, more accessible options for children to walk and bike to school. Per the US Department of Transportation, 10% to 14% of all car trips during the morning rush hour nationwide are for school-related traffic, emphasizing the need for safer travel environments. Beyond safety, encouraging active travel supports healthier lifestyles and can contribute to better student well-being and academic performance.

SRTS programs achieve these outcomes through a combination of infrastructure and programmatic strategies. Infrastructure improvements, such as sidewalks, crosswalks, and traffic calming, reduce collision risk and make walking and biking more comfortable. Complementary education, enforcement, and encouragement activities promote safe travel behaviors and build community support.

Resources

Countermeasures that Work, 11th Edition
Yuba City Safe Routes to School Plan
FHWA Safe Routes to School Online Guide, http://guide.saferoutesinfo.org/

★★★☆☆ **Cost: $$**

Speed Limit Modification

Description

California Assembly Bill (AB) 43 was passed in 2021 to provide a means to lower speed limits on corridors that meet certain criteria. AB 43 focused on giving local jurisdictions more flexibility in setting speed limits, especially regarding vulnerable road users:

- Speed Limit Reduction: Reduction of additional 5 mph based on several factors, including designation of Safety Corridors, as described in Chapter 3
- Prima Facie Speed Limits: Options for 15 and 25 mph in certain areas such as school zones depending on context
- Business Activity Districts: Option for 20 or 25 mph speed limits

★★★★★ **Cost: $**

Automated Enforcement

Description

Automated enforcement, such as red-light cameras or speed cameras, target the specific drivers who are behaving dangerously. Such enforcement is already allowed in all of or at least in several cities in California. Automated speed detection devices can identify speeding violations and provide citations. Such enforcement is currently allowed on a pilot basis in six cities in California and may be allowed to be implemented in all cities in the future.

A strictly data-driven approach to automated enforcement might place red-light or speed cameras in locations with the highest number of crashes. However, given that many low-income neighborhoods have historically received fewer infrastructure investments, which often results in a higher rate of crashes, this approach could lead to a disproportionate burden of enforcement. Therefore, automated enforcement should be implemented evenly across a jurisdiction at problem locations.

★★★★★ **Cost: Varies**