San Bernardino County Local Roadway Safety Plan

2022 FINAL





FEHR PEERS

Statement of Protection of Data from Discovery and Admissions

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

This study applies a systemic safety approach that identifies certain features on particular roadways that are correlated with specific collision types and frequencies. This broad approach is necessitated by the inherent nature of covering an entire agency's facilities in one study and the limited scope/budget available to prepare Local Road 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.

Acknowledgments

The 2022 San Bernardino County Local Roadway Safety Plan was funded through a Local Roadway Safety Plan (LRSP) grant provided by the California Department of Transportation (Caltrans). Input was sought from an advisory group consisting of staff from San Bernardino County, partner public agencies, and local stakeholders. Fehr & Peers assisted San Bernardino County in preparing the plan.

This report is dedicated to the more than 230 people who lost their lives on unincorporated San Bernardino County roadways over the past seven years. Their loss reminds us that every life is precious and inspires us all to continue our efforts toward the vision of zero traffic deaths.

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ADVISORY GROUP MEMBERS

Christopher Porter

San Bernardino County Board of Supervisors Staff, District 1

Ken Hunt

San Bernardino County Board of Supervisors Staff, District 2

Steve Reves

San Bernardino County Board of Supervisors Staff, District 3

Jose Zamora-Quintero

San Bernardino County
Board of Supervisors Staff, District 5

Chuck Bell

Lucerne Valley Economic Development Association

Lieutenant Garret Morris Lieutenant Napoleon Salais Lieutenant Royal Johnson Lieutenant Mario Lucio Lieutenant Eric Lee Sergeant Jeff O'Brien

Arrowhead Area Victorville Area San Bernardino Area Morongo Basin Area California Highway Patrol

Scott Tuttle

San Bernardino County Fire Protection
District

Beahta Davis Ryan Isom Director of Regional Parks

Albert Vergel De Dios Caltrans District 8

SAN BERNARDINO COUNTY PROJECT MANAGEMENT

Noel Castillo, PE Assistant Director

Jeremy Johnson, PE Engineering Manager

Stephen Martinez

Supervising Transportation Analyst

Ryan Hunsicker PLS, GISP Survey Division Chief

Jeff Guyer

Accident Reconstruction Specialist

Steven Sablan Transportation Analyst

Jinghui Bradley
Supervising Engineer

FEHR & PEERS TEAM

Matt Benjamin, RSP1 Emily Finkel, RSP1 Diwu Zhou, PE, RSP1 Erin Ferguson, PE, RSP1 Claude Strayer, PE Sean Reseigh Alex Melaragno Melody Wu, AICP

Glossary

(A)ADT (annual) average daily traffic

AB Assembly Bill

ADA Americans with Disabilities Act

AHSC Affordable Housing and Sustainable Communities

ATP Active Transportation Program

AV Autonomous Vehicle

AWSC All-way strop controlled

B/C Benefit/Cost

BTA Bicycle Transportation Account

BUILD Better Utilizing Investments to Leverage Development

CEQA California Environmental Quality Act

CHP California Highway Patrol

CIP Capital Improvement Plan

CRF Crash Reduction Factor

CTP Countywide Transportation Plan

DPH San Benardino Department of Public Health

DPW San Bernardino County Department of Public Works

DUI Driving Under the Influence

EMS Emergency Medical Services

ET&S Engineering & Traffic Survey

FHWA Federal Highway Administration

HSIP Highway Safety Improvement Program

ITE Institute of Transportation Engineers

KSI Killed or Severely Injured

LED Light-emitting Diode

LPI Leading Pedestrian Interval

LPP Local Partnership Program

LRSM Local Roadway Safety Manual

LRSP Local Roadway Safety Plan

LSRP Local Streets and Roads Program

LTF Local Transportation Fund

MAIT Major Accident Investigation Team

MUTCD Manual on Uniform Traffic Control Devices

NHTSA National Highway Traffic Safety Administration

NMTP Non-Motorized Transportation Plan

OTS Office of Traffic Safety

PHB Pedestrian Hybrid Beacon

PIPP Points of Interest Pedestrian Plan

RAISE Rebuilding American
Infrastructure with Sustainability and
Equity

RRFB Rectangular Rapid Flashing Beacon

RTP/SCS Regional Transportation Plan/ Sustainable Communities Strategy

SBCoFD San Bernardino County Fire Protection District

SBCTA San Bernardino County Transportation Authority

SCAG Southern California Association of Governments

SCCP Solution for Congested Corridors Program

SHSP Strategic Highway Safety Plan

SRTS Safe Routes to School

SS4A Safe Streets and Roads for All

STIP State Transportation Improvement Program

SWITRS Statewide Integrated Traffic Records System

TPA Transportation Alternatives Program

TCC Transportation Climate Communities

TDA Transit Development Act

TIGER Transportation Investment Generating Economic Recovery

TIMS Transportation Injury Mapping System

TNC Transportation Network Company

USDOT United States Department of Transportation

V2I Vehicle-to-infrastructure

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Chapter 1

Introduction

San Bernardino County is committed to prioritizing safety and eliminating traffic related deaths and serious injuries on County-maintained roadways. This Local Road Safety Plan (LRSP) proactively identifies and evaluates hot spots and systemic risk factors throughout unincorporated San Bernardino County and identifies proven countermeasures that can be implemented through roadway design changes and partnerships with stakeholders. This plan applies a Safe System approach, an international best practice framework that provides the foundation for this LRSP.

Local Road Safety Plan Background

A Local Road Safety Plan is a means for providing unincorporated San Bernardino County with an opportunity to address unique roadway safety needs while contributing to the success of the California Strategic Highway Safety Plan and statewide safety goals. The process of preparing an LRSP creates a framework to systemically identify and analyze safety problems and recommend safety improvements. Preparing an LRSP facilitates the development of local agency partnerships and collaboration, resulting in a prioritized list of improvements and actions that can demonstrate a defined need and contribute to the statewide plan. The LRSP offers a proactive approach to addressing safety needs and demonstrates San Bernardino County's responsiveness to safety challenges.

This will be the first comprehensive safety plan for San Bernardino County. This LRSP builds on the County's prior roadway safety efforts and will serve as a resource for the County when it applies for future safety infrastructure funding. Cycle 11 of the Highway Safety Improvement Program (HSIP) in 2022 requires an LRSP for an agency to be eligible to apply for funds.



ITE Safe System Framework: Focus on Safe Speeds

The ITE Safe System framework provides important context for the focus on safe speeds within a Safe System approach. For vulnerable users speed is a determining factor in survivability - a human's chance of surviving being struck by a vehicle increases from 20% at 40 miles per hour to 60% at 30 miles per hour to 90% at 20 miles per hour. Reducing speed in the presence of vulnerable users is a key Safe System strategy. Approaches include:

- Physical roadway designs (width, horizontal alignment) to limit free flow speeds,
- Traffic calming treatments that induce slower speeds,
- Traffic signal timing that minimizes high speed flow,
- Traditional or automated enforcement that discourages speeding.

What is the Safe System approach?

The Safe System approach aims to eliminate fatal and serious injuries for all road users by keeping impacts on the human body at tolerable levels and accommodating human mistakes. Embedded in this approach is a Vision Zero goal, with the creation of a Safe System as the method to achieve that goal. Making a commitment to zero deaths means addressing every aspect of crash risks through the five elements of the Safe System and promoting a holistic approach to safety across the entire roadway system.

Each day, people are killed and seriously injured on our roads. Crashes can irreversibly change the course of human lives, touching victims, their families and loved ones, and society as a whole. A Safe System acknowledges the vulnerability of the human body—in terms of the amount of kinetic energy transfer a body can withstand—when designing and operating a transportation network to minimize serious consequences of crashes. 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 no one should be killed or seriously injured on the road system. 2,3 It is founded on the principle that people make mistakes, and that the road system should be adapted to anticipate and accommodate human mistakes and the physiological and psychological limitations of humans. 4 Countries that have adopted the Safe System approach have had significant success reducing highway fatalities, with reductions in fatalities between 50 and 70%. 5

The Institute of Transportation Engineers (ITE) and the Road to Zero Coalition's Safe Systems Explanation and Framework articulate that to anticipate human mistakes, a Safe System seeks to:

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

Creating a Safe System means shifting a major share of the responsibility from road users to those who design the road transport system. "Individual road users have the responsibility to abide by laws and regulations" 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. In a Safe System, roadway system designers and operators take on the highest level of ethical responsibility.

The Safe System approach is the foundation for the National Safety Strategy released by the United States Department of Transportation (USDOT) in 2022. The new federal Safe Streets and Roads for All (SS4A) grant program takes steps to formalize the Safe System approach in local safety planning documents through its Comprehensive Safety Action Plan requirements. The Safe System approach is also the foundation for the Caltrans Strategic Highway Safety Plan (SHSP), and the California Department of Transportation (Caltrans) has adopted a Vision Zero goal for California.

The Safe System approach addresses the five elements of a safe transportation system – safe road users, safe vehicles, safe speeds, safe roads, and post-crash care – in an integrated manner, through a wide range of interventions.

Safe Roads

Prioritize roadway design changes throughout unincorporated San Bernardino County that address the factors contributing to severe injury and fatal collisions, including improvements that separate modes in time and space, and reduce severity if collisions do occur.

Safe Road Users

Focus on human vulnerability when planning and implementing street safety strategies, with an emphasis on people who travel by foot, bicycle or wheelchair, children, and seniors. Prioritize equitable strategies that will best serve the unincorporated San Bernardino County community. Identify funding opportunities to support local law enforcement efforts and establish metrics for tracking success.

Safe Speeds

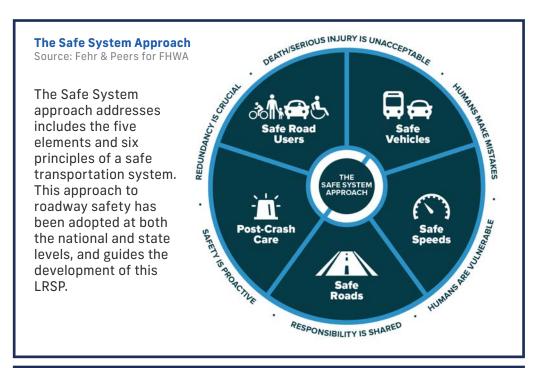
Use a multidisciplinary approach - roadway design, policy, education, and enforcement strategies - that induces drivers to travel at safe speeds that will reduce injuries even when human error inevitably leads to collisions.

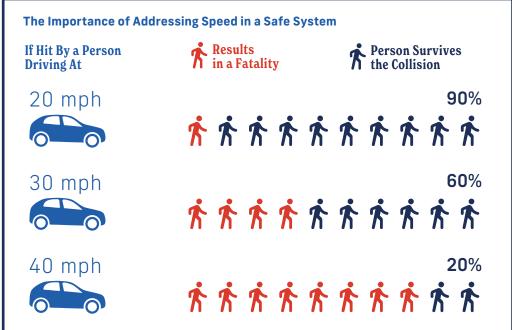
Safe Vehicles

Proactively plan for a connected and autonomous vehicle fleet, accounting for related safety considerations, prioritizing investments in advanced signal infrastructure and other ITS projects.

Post-Crash Care

Partner with law enforcement and emergency response to identify strategic investments in areas such as collision response, collision site assessment, and collision reporting and database management practices.





What is Vision Zero?

Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. First implemented in Sweden in the 1990s, Vision Zero has proved successful across Europe — and now it's gaining momentum in major American cities.

Vision Zero is a significant departure from the status quo in two major ways:

- Vision Zero recognizes that people will sometimes make mistakes, so the road system and related policies should be designed to ensure those inevitable mistakes do not result in severe injuries or fatalities.
- Vision Zero is a multidisciplinary approach, bringing together diverse and necessary stakeholders to address this complex problem.

A Vision Zero goal requires committing to the elimination of roadway fatalities and severe injuries. A Vision Zero goal is a key component of implementing the Safe System approach.

This plan includes a Vision Zero goal and timeline for achieving that goal, which aligns with the recently adopted Caltrans 2050 Vision Zero goal.

About San Bernardino County

San Bernardino County is home to approximately 2.2 million people, and approximately 310,000 people reside within unincorporated San Bernardino County.8 County-maintained roadways provide connections between many of the incorporated areas and are used by residents in both incorporated and unincorporated San Bernardino County. The following demographic statistics are reflective of the county as a whole unless otherwise specified.

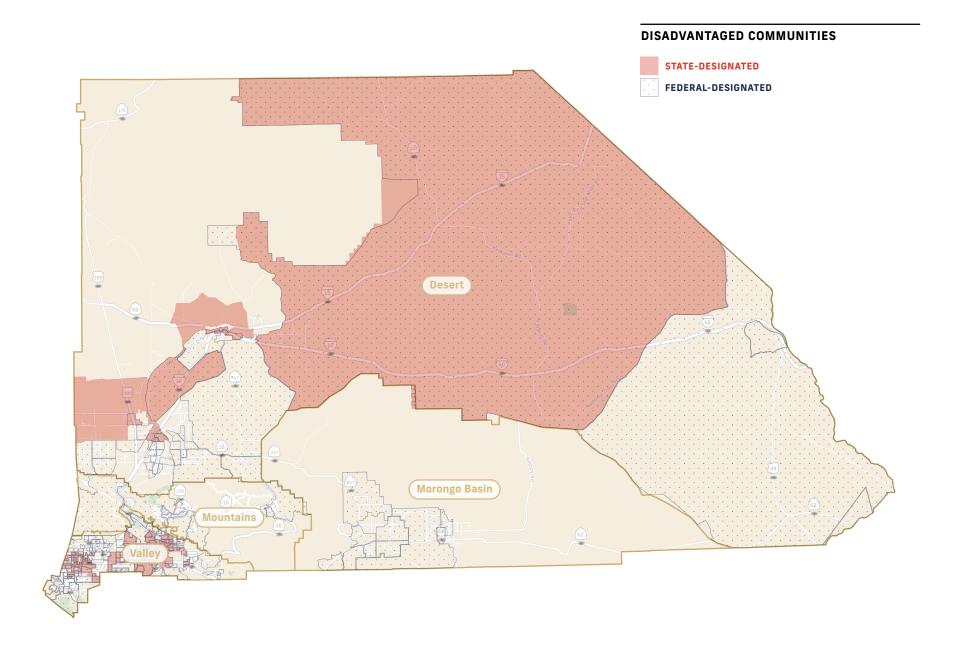
San Bernardino County's population is 54% Hispanic, 26% non-Hispanic white, 8% Black, 7% Asian, and 1% American Indian. 42% of residents speak a language other than English at home. In comparison, unincorporated San Bernardino's population is 45% Hispanic, 46% non-Hispanic white, 4% Black, 3% Asian, and 1% American Indian. In Indian.

Approximately 15% of San Bernardino County residents are living in poverty, and approximately 11% live with a disability. About 90% of workers in San Bernardino County commute to work via car, about 2% walk, and about 1% take public transportation. In comparison, 97% of workers in unincorporated San Bernardino commute to work via car. 10

Forty of the census tracts within the County fall within the State of California's definition of Disadvantaged Communities, based on health, economic and environmental factors.¹¹ Many of these areas often experience disproportionate burden in roadway safety outcomes. This LRSP incorporates equity through stakeholder engagement with local residents including homeless populations, the identification of disadvantaged and underserved communities based on State of California and Federal designation, and project prioritization.

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Chapter 2

Vision & Priorities

San Bernardino County's Vision Statement

San Bernardino County takes a proactive approach to create safer roads for all people across all modes of travel.

Vision Zero Goal

San Bernardino County will eliminate fatalities and serious injuries on our unincorporated County roadways by 2050.

GUIDING PRINCIPLES

- Safety is the highest priority in decisions about our roadways. When considered against tradeoffs related to vehicle throughput, traffic speed, and dedicated roadway space for vehicles, safety comes first.
- San Bernardino County is committed to creating a Safe System, incorporating considerations for safer roads, road users, speeds, vehicles, and post-crash care.
- San Bernardino County will take an equitable approach to roadway safety, with a focus on investment in underserved communities and reducing disparities in roadway safety outcomes.
- We acknowledge that speed kills and will proactively implement strategies for safer vehicle speeds.
- San Bernardino County will continue collaboration with a multi-disciplinary group, including emergency response, law enforcement, public health, and education partners, to achieve roadway safety goals.



Chapter 3

Task Force

Through the development of a multidisciplinary task force, we received valuable input from the staff of each of these agencies and local stakeholders to address the unique traffic safety concerns in San Bernardino County. This group was responsible for the plan's development, and will oversee implementation and monitoring.

San Bernardino County Public Works (DPW)

As the purveyors of public infrastructure throughout the County, DPW is invested in the planning, funding, and delivery of safety projects. DPW is leading the development of this LRSP and will be the primary advocate for its successful implementation.

San Bernardino County Board of Supervisors

Elected officials serve as a nexus between their constituents and the County's safety-related infrastructure and program investment. As invested community members of their respective districts, the Supervisors are essential stakeholders in the implementation of LRSP goals and recommendations. The Board of Supervisors staff serve as an important linkage between the County's staff and the Supervisors for the implementation of projects and programs and affect safety outcomes. District Supervisor representatives from every part of unincorporated San Bernardino County were a part of the task force.

Equity Considerations

Equity considerations are an important component of analyzing and improving roadway safety through the Safe System approach. Lowincome communities and communities of color have experienced decades of disinvestment in transportation infrastrcuture, resulting in inequitable roadway safety outcomes and disproportionate burden from enforcement. Vulnerability to injury on the roadway varies from person to person, and is influenced by travel mode, age, ability and location.

The process for developing the LRSP took equity into consideration through data analysis, stakeholder engagement, selection of priority locations and projects, and recommendations for implementation of programs and evaluation. The following items are documented in this plan:

- Data analysis included Disadvantaged Communities, race/ethnicity, gender
- Outreach included with community representatives and people experiencing homelessness
- Plan priorities include focus on underserved communities
- Non-engineering strategy recommendations include equity considerations for community engagement and enforcement activities
- Priority projects within Disadvantaged Communities are identified
- Evaluation metrics include recommendations for reporting demographics related to collisions

San Bernardino County Sheriff's Department & California Highway Patrol (CHP)

Sworn officers provide valuable input on trends they observe on the roads and are important partners in focusing enforcement resources on behaviors that are most closely associated with injuries and fatalities. CHP is responsible for traffic law enforcement on stateowned facilities such as interstates and state routes and the Sheriff's Department is responsible for traffic law enforcement on all other local unincorporated roadways. The Sheriff's Department and CHP can also be important partners in a multi-disciplinary approach to fatal and severe injury crash response, collision reporting, and education or engagement activities with the community.

Caltrans

As the state-level transportation agency, Caltrans is a vital partner in San Bernardino County, where state facilities, like Interstate 15 and State Route 18, have an outsized impact on traffic safety outcomes and connect to and from the County-maintained road system. We also welcome Caltrans involvement as the funder of this LRSP and a key partner of forthcoming safety efforts like Safe Routes to School.

San Bernardino County Department of Public Health (DPH)

Public health departments often run or are involved in safety programs that are essential to roadway safety education and engagement efforts. DPH operates several programs that are related to or include road safety elements, including Car Seat Safety, Friday Night Live, and Healthy Communities.

San Bernardino County Fire Protection District (SBCoFD)

SBCoFD operates emergency medical services (EMS) that are essential to the Post-Crash Care Element of the Safe System approach. EMS response is a key factor in the survivability of victims involved in severe collisions, making SBCoFD a key stakeholder in the implementation of LRSP goals.

SBCoFD's ongoing educational campaign 'Turn Around, Don't Drown" brings awareness to flood-related roadway hazards.

San Bernardino County Regional Parks

The Regional Parks Department provides recreational opportunities to residents and visitors, many of which use the County-maintained road system to access these lands. As the operators of these major destinations, Regional Parks is an essential

stakeholder in the development and implementation of LRSP goals.

Stakeholder Meetings

Two stakeholder meetings were held over the course of the project, and included representatives from DPW, the Board of Supervisors, CHP, Caltrans, and Regional Parks. Additional stakeholder outreach was conducted with stakeholders who were not able to attend either of the two stakeholder meetings, such as DPH and SBcoFD. Meeting topics included an interactive survey of plan priorities, discussion of data analysis results, and stakeholder feedback on proposed projects.

Feedback from stakeholders and community members was incorporated into the development of this plan, as well as the identification of priority projects for emphasis areas.

Field Visits

In May of 2022, Fehr & Peers engineering and planning staff spent two days in the field alongside staff from DPW, observing existing conditions and traffic patterns at high priority locations throughout the County. These field visits also included engagement and discussion with representatives from the Lucerne Valley Economic Development Authority as well as business owners and unhoused community members in Muscoy, regarding their traffic safety concerns.



Photos from Field Visits
National Trails Highway, Camp Rock
Road, and Phelan Road May 2022









Chapter 4

Existing Safety Efforts

San Bernardino County has made investments in roadway safety through project and program implementation, traffic education and enforcement. pursuing funding through grant applications, roadway maintenance, and adoption of planning documents that identify transportation safety priorities and future projects. Planning documents that have specific safety-related goals, policies, projects, and recommendations were reviewed to set the foundation for the LRSP. This summary organizes San Bernardino County's existing roadway safety efforts into the five categories of a Safe System, as defined by FHWA: safe roads. safe road users, safe speeds, safe vehicles, and post-crash care.

The documents reviewed include:

- > San Bernardino County's Code of Ordinances (Accessed June 2022)
- > San Bernardino County Policy Plan (General Plan), Transportation and Mobility Element (2020)
- > San Bernardino County Implementation Plan, Transportation and Mobility Element (2020)
- > San Bernardino County Community Indicators Traffic Safety and Transportation Infrastructure Investment Profiles (2020)
- > San Bernardino County Transportation Authority (SBCTA) Countywide Transportation Plan (Interim 2021 Update)
- SBCTA Capital Improvement Plan (2021)
- > SBCTA Comprehensive Pedestrian Sidewalk Inventory Plan ADA Transition Plan (2020)
- > SBCTA Inland Empire Comprehensive Multimodal Corridor Plan (2020)
- > SBCTA Points of Interest Pedestrian Plan (2019)
- > SBCTA San Bernardino County Non-Motorized Transportation Plan (2011, Revised 2018)
- > SBCTA Regional Safe Routes to School Plan (2017)
- > SBCTA Mountain Area Transportation Study (2017)
- Southern California Council of Governments (SCAG) Regional Transportation Plan & Sustainable Communities Strategy (2022 Update)
- > Barstow Active Transportation Plan (2020)
- Morongo Basin Active Transportation Plan (2020)
- > Rim of the World Recreation and Park District Rim of the World Active Transportation Plan (2017)

Safe Roads

The Safe Roads Element of the Safe System Approach involves the physical design of roadways, including the separation of users in time and space, and whether designs are accommodating to human mistakes and injury tolerance levels. This subsection highlights a few of the County's planned projects with a focus on safety enhancements.

Completed or Planned Improvements (As of June 2022)

- > Sidewalks and Curb Ramps:
 SBCTA is leading an inventory
 of sidewalk accessibility
 improvements in high priority
 areas within the County's 25
 jurisdictions and unincorporated
 areas. The final product will
 support regional pedestrian
 planning efforts and Americans
 with Disability Act (ADA)
 transition planning. County-led
 efforts include:
 - Baldwin Lane in Sugarloaf is set to receive new sidewalks and ADA-compliant curb ramps.
 - Rosena Ranch Road in Devore is set to receive ADAcompliant ramp upgrades and a pavement mill and overlay.

- Pedestrian Crossing Improvements: The County has recently installed a number of rectangular rapid flashing beacons and high visibility crossings in locations across unincorporated areas.
 - Rectangular rapid flashing beacons, ADA-compliant curb ramps, and a high visibility crosswalk were recently constructed at the intersection of Valley Boulevard and Larch Avenue.
- Intersection Modifications: The County plans to construct a singlelane roundabout at the intersection of Stanfield Cutoff and North Shore Drive (SR-38).
- Roadway Improvements: There are a number of roadways planned for widening and resurfacing, many of which will include safety features such as turn-pockets and medians, and/or widened shoulders or sidewalks for pedestrians.
 - In 2018, San Bernardino County successfully received grant funding for interim improvements on Phelan Road, including the widening, resurfacing, and construction of turn pockets at Sonora Road, Tumbleweed Road, Sunny Vista Road, and Arrowhead Road. Phelan Road will be widened to its full width in 2025.
 - The Ranchero Road widening is currently under construction and will include new turn-pockets, concrete sidewalks, and widened shoulders for pedestrians along the corridor.

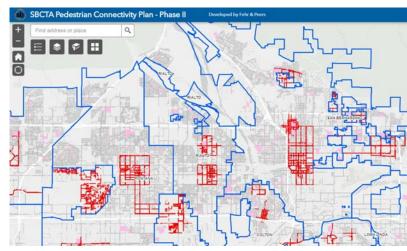
- Safety upgrades are programmed on National Trails Highway in the 2020/2045 Southern California Council of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategy (RTP/ SCS).
- > Grade Separation: The County is evaluating replacing and widening the existing grade separation and underpass on National Trails Highway near Oro Grande.

Adopted Plans

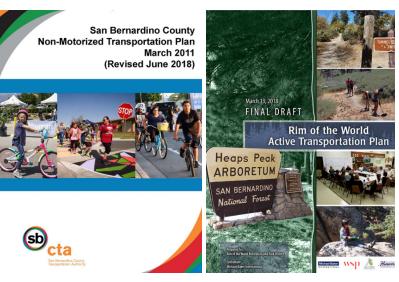
Adopted plans include policies and goals for future infrastructure improvements. While SBCTA oversees transportation throughout all municipalities in San Bernardino County, many of the agency's safetyrelated plans involve improvements along County-maintained roads.

- > Transportation and Mobility **Element:** The Transportation and Mobility Element establishes goals for roadways design and safe bicycle and pedestrian circulation throughout the County. For example, the Transportation and Mobility Element recommends closing gaps in bicvcle and sidewalk connectivity and improving ADA compliance at curb ramps and crosswalks.
- > SBCTA Countywide Transportation Plan (CTP): Provides guidance on transportation investment throughout the SBCTA jurisdictions ahead of the 2022 major update. The CTP outlines

- long-term challenges and strategies, including safety-related items, such as complete streets opportunities and rural highway improvements.
- > SBCTA Comprehensive Pedestrian **Sidewalk Inventory and Plans** (Ongoing): Phase I provided a countywide sidewalk inventory with basic information such as sidewalk locations and widths. Phase II includes the collection of detailed accessibility data using sophisticated sidewalk and curb ramp profiling equipment in high priority areas for each of the County's 25 jurisdictions, including unincorporated areas. The final product will support regional pedestrian planning efforts and ADA transition planning.
- > SBCTA Inland Empire Comprehensive Multimodal Corridor Plan: An analysis of transportation issues and strategies that address regional multimodal mobility. This plan includes both analysis of region-wide safety factors and high-level safety improvement recommendations for several County-maintained roadways, such as Reche Canyon Road and Riverside Avenue.
- > SBCTA Points of Interest Pedestrian Plan (PIPP): Serves as an inventory of important locations for active transportation improvements in the County. The PIPP is a supplement to the Non-Motorized Transportation Plan and SBCTA Complete Streets Strategy. For unincorporated San Bernardino County, the PIPP includes the Lake Drive Corridor



SBCTA Pedestrian Connectivity Plan



San Bernardino County Non-Motorized Rim of the World Transportation Plan

Active Transportation Plan

- in Crestline as a priority point of interest. Recommendations for this corridor include midblock crosswalks, pedestrian crossing signage, and painted intersection tightening.
- Notorized Transportation Plan (NMTP): Includes goals, policies, analysis of existing conditions, and recommendations for design and implementation of infrastructure for active modes across the County. The plan also features design guidelines for a countywide bikeway system, as well as prioritization guidance for delivering projects, including proposed improvements specifically in unincorporated areas of the County.
- Regional Safe Routes to School Plan: The plan recommends a range of engineering countermeasures and strategies, primarily pedestrianfocused, for schools throughout the County. Schools featured in the plan from unincorporated areas include Joshua Tree Elementary, Vermont Elementary, Muscoy Elementary, Mary B. Lewis Elementary, and Gerald A. Smith Elementary.
- Transportation Study: Focuses primarily on congestion and vehicle operations in the Mountain Sub-Area of the County, though the study addresses several safety concerns, including pedestrian or bicycle conflicts and provides a few recommendations with safety benefits. Such recommendations

- include "Share the Road" signage for bicycle safety, center turn lanes, and slow vehicle turnouts.
- Barstow Active Transportation Plan: Primarily focuses on pedestrian and bicycle improvements for the City of Barstow, though includes several recommendations for County-maintained roads in the unincorporated areas surrounding the City. Recommendations in this plan include restriping school pavement markings, speed feedback signs, bulb-outs, yield signage and striping, and rapid rectangular flashing beacons.
- Morongo Basin Active Transportation Plan: Features recommendations for the cities of Yucca Valley and Twentynine Palms, as well as unincorporated areas in the Basin. Safe Roads recommendations on County-maintained roads include ADA curb ramp upgrades, pavement markings, speed feedback signs, pedestrian refuge islands, bulb-outs, flashing beacons, and yield signage.
- ransportation Plan: Prepared for the Rim of the World Recreation and Park District. The Plan evaluates the pedestrian and bicycle safety for the Rim of the World communities and provides focused active transportation improvements for each mountain community. Recommended infrastructure improvements range from bike lanes and sidewalks to bicycle signal heads.

Grant Funded Projects

San Bernardino County received funding for projects in the past through Active Transportation Program (ATP) and Highway Safety Improvement Program (HSIP) grants:

- ATP Grant Funding: San Bernardino County received ATP funding in Cycle 2, 3, 4, and 5. Prior grant funds were used to construct the Santa Ana River Trail, Sunburst Avenue Class II bicycle lanes, and Muscoy area Safe Routes to School pedestrian improvement projects.
- > HSIP Grant Funding: San Bernardino
 County received HSIP funding in Cycle
 1, 3, 4, and 9. Prior grant funds were
 used to install radar speed feedback
 signs, raised medians, pedestrian
 crossing enhancements, turnpockets and two-way left-turn lanes,
 and traffic signal enhancements such
 as advanced dilemma zone detection,
 protected left-turn phasing, and
 pedestrian countdown heads.

Maintenance Programs

Pavement Management Division: The Pavement Management Division evaluates pavement conditions throughout the city and presents budget scenarios for maintaining or improving overall pavement conditions. Recommendations range from light maintenance to full reconstruction, the latter of which presents opportunities for bundling maintenance with safety improvements, such as centerline and edgeline rumble strips.

See Click Fix: The County is accepting non-emergency requests and reports through the SeeClickFix mobile application and web tool. Requests and reports cover a wide range of topics, such as potholes, guardrail and curb damage, sidewalk issues, and are routed to the relevant department.

Safe Road Users

The Safe Road Users element of the Safe System Approach addresses safety from a behavioral perspective by focusing on education, engagement, and enforcement.

Education & Engagement

Many of the Active Transportation plans, including the Safe Routes to School Plan highlight in-person participation and engagement efforts. For example, the San Bernardino County NMTP features a description of safety and education programs in unincorporated areas of the County at the time of the plan's development. This includes safe walking and biking encouragement at elementary schools conducted in partnership between San Bernardino County Public Works and the San Bernardino County Department of Public Health. The

SBCTA Regional Safe Routes to School Plan notes several ongoing educational efforts for the five unincorporatedarea elementary schools in the plan, including Bicycle Rodeos, Walk to School Days, temporary road closures, and increased crossing guard enforcement.

Enforcement

Enforcement measures, both traditional and innovative, to equitably serve the goal of Safe Road Users have been highlighted in plans such as the Rim of the World Active Transportation Plan. Such recommendations include enforcement, education and encouragement, and evaluation and equity programs, largely based on Safe Routes to School and Safe Routes to Transit.

The San Bernardino County Sheriff's Department partners with County agencies on programs and resources. Programs include the Homeless Outreach and Proactive Enforcement program, which provides resources for the homeless population who are often over-represented in pedestrian and bicycle fatalities, and the Safe Return program, which ensures that community members with disabilities have a safe return home.

In unincorporated San Bernardino County the California Highway Patrol plays an important role in enforcement on both state facilities and County maintained roads. The





Safe Routes to School Outreach Activities



See Click Fix Reporting System

California Highway Patrol has programs highlighting motorcyclist safety, child safety seats, impaired driving enforcement, and commercial vehicle safety.

Safe Speeds

The Safe Speeds element of the Safe Systems Approach focuses on infrastructure and policy changes that specifically target speed as a major factor in collisions and collision severity.

Speed is a major concern for active transportation safety in San Bernardino County and is highlighted in the Community Indicators Report Traffic Safety Profile. The Inland Empire Comprehensive Multimodal Corridor Plan includes an analysis of factors influencing safety on study area arterials and documents unsafe speed as the most common factor among injury-causing collisions. The SBCTA PIPP cites unsafe speed as the second most common collision factor in the needs analysis section, behind pedestrian or right of way violations.

Some adopted plans provide infrastructure and program recommendations that support Safe Speed efforts. These include traffic calming programs in design guidelines, including bulb-outs, narrow lanes, and traffic circles (NMTP), speed awareness signs around schools (Safe Routes to School Plan), and increased speed enforcement (Rim of the World Active Transportation Plan).

Safe Vehicles

The Safe Vehicles Element calls for vehicles to be designed and regulated to minimize the occurrence and severity of collisions using safety measures that incorporate the latest technology. At the federal level, the safety of motor vehicles and related equipment and technology is regulated by the National Highway Traffic Safety Administration (NHTSA). Vehicle safety features, such as seat belts and airbags, were mandated in 1968 and 1998, respectively, and more recently in 2018, all new light-weight vehicles in the United States are required to come equipped with backup cameras.

Some on-board vehicle technologies require investments in public infrastructure in order to function properly. For example, lane departure warning technology that is becoming increasingly common on newer vehicles requires regular maintenance of roadway striping and the use of highly retroreflective materials to maximize effectiveness. Emerging Vehicle-to-Infrastructure (V2I) technologies, referring to a wireless exchange of data between vehicles and roadway infrastructure, will likely require integration with existing infrastructure systems. San Bernardino County has made significant investments in roadway maintenance and in updating traffic signal detection systems, providing a strong foundation in support of safe vehicles.

The Safe Vehicles element also includes policies to encourage or regulate vehicle size, as larger vehicles are more likely to cause severe injuries during a collision. In San Bernardino County, the County's Code of Ordinances provides weight, parking, and routing restrictions for commercial vehicles on local roads.

Post-Crash Care

While much of the Safe System Approach centers on collision prevention, the Post-Crash Care Element focuses on reducing fatalities or life-changing complications when collisions do occur. Within road design, Post-Crash Care involves the balance of prioritizing access for active transportation modes while considering emergency vehicle access needs.

The Transportation and Mobility Element of the San Bernardino County Policy Plan (formally known as the General Plan) contains a list of policies that prioritize emergency responder vehicle access, including the consideration of emergency access routes along with capacity expansions for new roadway improvement proposals and limiting on-street parking areas to serve emergency services.

In 2018, the San Bernardino County Sheriff's Department hosted a training for deputies on Major Accident Investigation Team (MAIT) Protocols, which informed officers on best practices in documenting severe collisions. Investigation of these severe collisions is an important piece of data gathering for improving road safety in the County.



Chapter 5

Safety Analysis

This section summarizes the collision analysis for local roadways in unincorporated San Bernardino County. Collisions on roadways owned by Caltrans, such as interstates and state highways are not included in the analysis unless they occur at an intersection with a County-maintained local roadway.

This analysis identified several collision trends and risk factors in San Bernardino County, including:

- The total number of collisions fell between 2016 and 2020, but collisions became more severe over that time period
- 35% of severe and fatal collisions involve someone walking or traveling via motorcycle; collisions involving these modes are much more likely to result in a fatality or severe injury
- Nearly 30% of severe and fatal collisions involve a hit object

- When drivers are under the influence, collisions are more likely to result in a fatality or severe injury
- Nearly 60% of pedestrian collisions occur at night, almost all without lighting nearby
- 85% of fatal and severe pedestrian collisions occur when the pedestrian was walking along the road or crossing outside of a marked crosswalk
- Nearly 60% of collisions occur at an unsignalized intersection
- Over 60% of severe and fatal collisions occur on roadways with 40+ mph posted speeds, though those account for just 19% of the network
- Nearly half of fatal and severe injury collisions occured on Major Highways, which account for just 11% of the network
- Collisions in **Disadvantaged**Communities occur disproportionately, accounting for 45% of all collisions

Comparison with Neighboring Counties

According to the California Office of Traffic Safety 2019 statewide data, San Bernardino County ranks 15th out of 58 for total number traffic fatalities and injuries among California counties (a rank of 1 out of 58 is the worst). Compared with neighboring counties, San Bernardino ranks 3rd in total fatal and injury victims per capita on local roadways.

& Injury ns per Capita	Rank
.0092	1
.0088	2
.0074	3
.0064	4
.0062	5
.0056	6
	.0056

Contextual Data Overview

To better understand systemic collision patterns in San Bernardino County, several contextual factors were analyzed in conjunction with collision characteristics. Key contextual factors include proximity to:

- > Bicycle facilities
- > Transit stops
- > Schools
- Signalized intersections
- CalEnviroScreen Disadvantaged Communities

Collisions were also matched with the characteristics of a roadway on which they occurred, including posted speed limit, Average Annual Daily Traffic (AADT), and roadway classification. Additionally, connected vehicle data from data collection firm Wejo was collected as measured events and used to determine locations with hard breaking, hard acceleration, and excessive speeding. Locations with excessive speeding events were defined as locations where the 85th percentile speed exceeded the posted speed by 10 miles per hour.

The proximity to each contextual factor varied based on its area of influence (e.g., a school has a much larger area of influence than a bus stop). The distances for each factor are summarized in the following table.

Contextual Factors

Roadway Elements	Distance
Streetlghts	50'
Sidewalk Gaps	100'
Bicycle Facilities	100'
Bus Stop	250'
Land Use Type	
Schools	1000'
Parks	1000'
Disadvantaged Communities	250'
Roadway Characteristics	
Posted Roadway Speed	100'
Average Annual Daily Traffic	100'
Roadway Classification	100'
Intersections	250'

Collision Data Overview

The collision analysis examines injury collisions acquired from the Transportation Injury Mapping System (TIMS) from 2016 through 2020, for County-maintained roads. Collisions resulting in property-damage-only (PDO) are not included in the analysis. Collision databases have been found to have certain reporting biases, including:

- Collisions involving people walking, bicycling, or on motorcycles are less likely to be reported than collisions only involving people driving
- > Younger people are less likely to report collisions
- > Alcohol-involved collisions may be under-reported

Race, income, immigration status, and English proficiency may also impact reporting, but there is limited research on these factors.

COLLISIONS BY YEAR

From 2016 to 2020, there were **5,664** total injury collisions, **847** (or **15 percent**) of which included victims who were killed or severely injured (KSI).

On average, **46** people are killed each year on local roadways in unincorporated San Bernardino County by traffic violence.

Killed or Severely Injured (KSI)

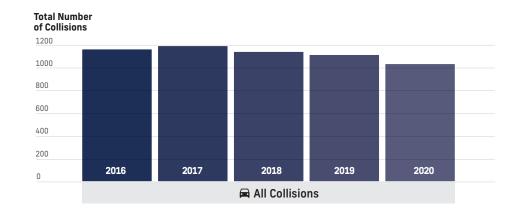
Severe injuries resulting from a traffic collision can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

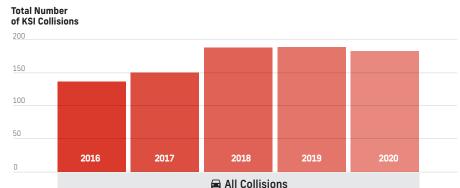
- > Broken or fractured bones
- › Dislocated or distorted limbs

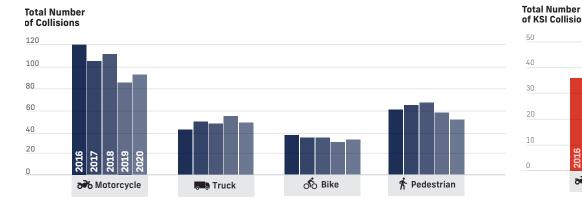
- > Severe lacerations
- > Severe burns
- > Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

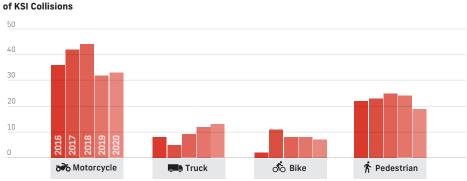
Throughout this plan, the acronym KSI is used to denote collisions where someone was killed or severely injured.

COLLISIONS BY YEAR, 2016-2020







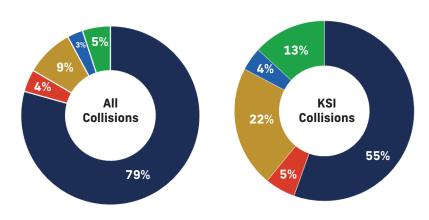


COLLISIONS BY MODE

People walking and biking are involved in **8 percent** of all collisions in unincorporated San Bernardino County, but are disproportionality involved in **17 percent** of all KSI collisions. Motorcyclists are particularly overrepresented in KSI collisions, as they are involved in **9 percent** of all collisions but **22 percent** of all KSI collisions.





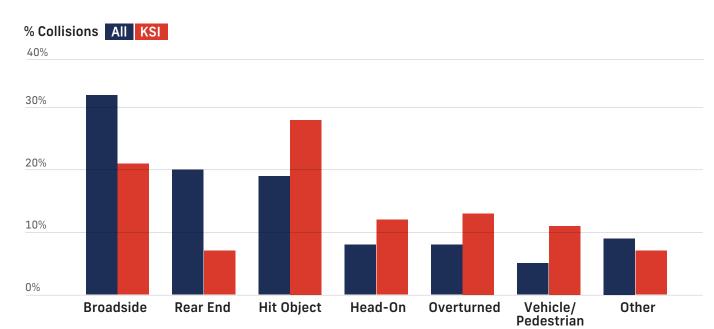


COLLISIONS BY TYPE

The four most common collision types in unincorporated San Bernardino County are Broadside (32 percent), Rear End (20 percent), and Hit Object (19 percent) collisions.

For KSI collisions, Hit Object collisions account for the largest share of collision types (28 percent), followed by Broadside (21 percent), and Overturned (13 percent).

COLLISION TYPE, 2016-2020



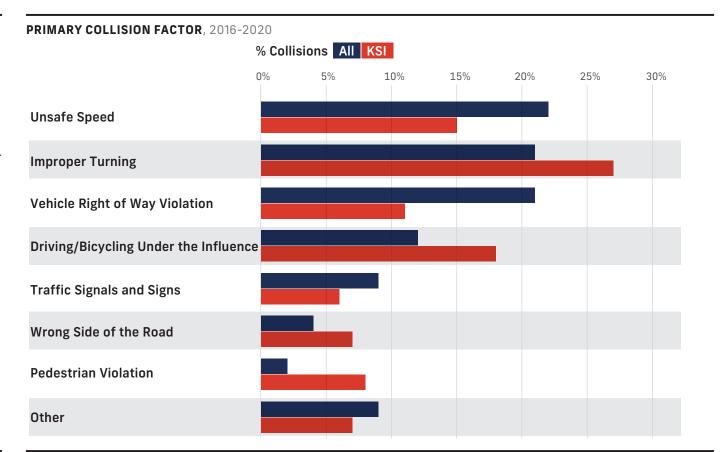
PRIMARY COLLISION FACTOR

In unincorporated San Bernardino County, the most common primary collision factors are Unsafe Speed (22 percent), Improper Turning, commonly referred to as Unsafe Lane Change (21 percent), Vehicle Right-of-Way (21 percent), and Driving or Bicycling Under the Influence (12 percent).

For KSI collisions, the most common primary collision factors are Improper Turning (27 percent), Driving or Bicycling Under the Influence (18 percent), Unsafe Speed (15 percent), and Vehicle Right-of-Way (11 percent). The Vehicle Right-of-Way Violation covers a party of any mode not yielding to the driver's right-of-way or the driver observing his or her right-of-way improperly, depending on which party is listed at fault.

DRIVING UNDER THE INFLUENCE

A driver under the influence of alcohol and/or drugs increases the likelihood of a collision resulting in a severe injury or a fatality. From 2016 to 2020, 13 percent of collisions involved a driver under the influence. The percentage significantly increases to 20 percent for KSI collisions.



DRIVING UNDER THE INFLUENCE, 2016-2020

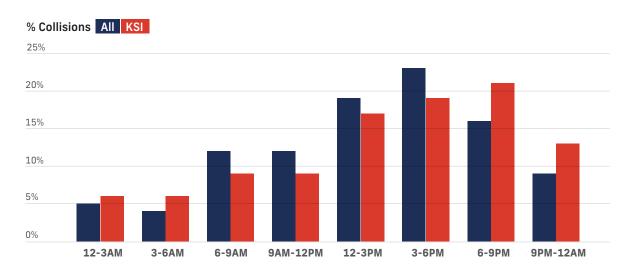


TIME OF DAY

Studying the timing of collisions can provide context about the surrounding traffic and lighting conditions, which informs the selection of countermeasures. The largest share of collisions occurred in the evening between 3 PM and 6 PM (23 percent), which is when many people are returning from work and school. Collisions occurring between 3 PM and 6 PM may also be affected by seasonal changes, such as Daylight Savings Time, which can influence visibility during sunset.

The largest share of KSI collisions occurred in the evening or overnight between 6 PM and 9 PM (21 percent). This pattern indicates that there are night-related issues, such as visibility, DUI, and speeding when fewer cars are on the road.

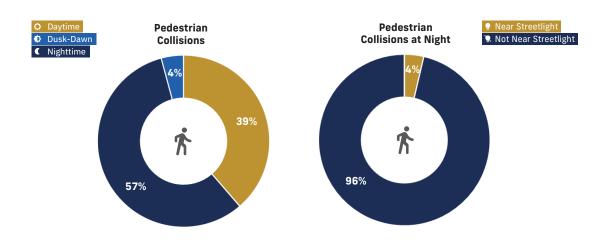




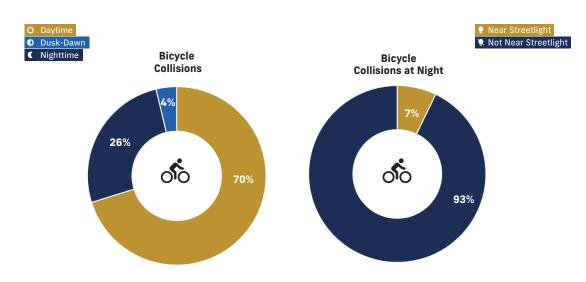
LIGHTING CONDITIONS

Roadway lighting conditions can influence the visibility of roadway users, especially pedestrians and bicyclists. **57 percent** of pedestrian collisions and **26 percent** of bicycle collisions occurred at night. Of the pedestrian and bicycle collisions that occurred at night, **over 90 percent** occurred in locations not near a streetlight.

LIGHTING CONDITIONS FOR PEDESTRIAN COLLISIONS, 2016-2020



LIGHTING CONDITIONS FOR BICYCLE COLLISIONS, 2016-2020



PEDESTRIAN MOVEMENT

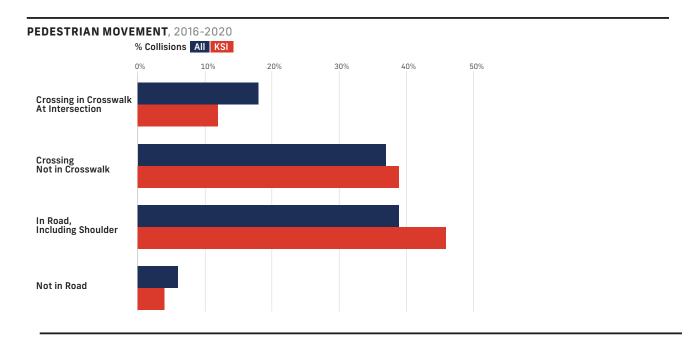
Most pedestrian collisions (76 percent) occurred when pedestrians were not in a marked crosswalk or dedicated pedestrian facility, which include pedestrians walking in the road or along the shoulder (39 percent), and pedestrians crossing at mid-block locations without marked crosswalks (37 percent). For KSI collisions, pedestrians walking in the road or along the shoulder (46 percent) and pedestrians crossing outside of a crosswalk (39 percent) experienced a higher percentage share than they did in comparison to all pedestrian collisions. Pedestrians crossing the street outside of crosswalk and walking in the road may indicate priority locations to evaluate for new crosswalks and sidewalks.

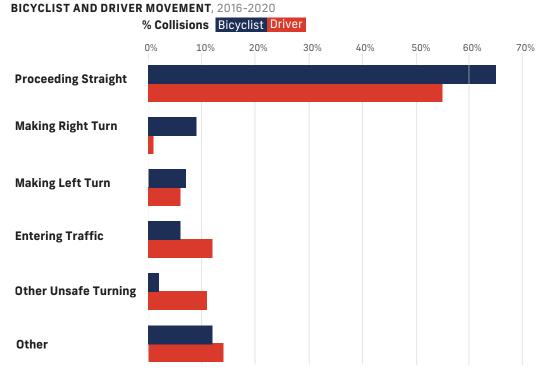
BICYCLIST AND DRIVER MOVEMENT

Bicycle movement preceding a collision can influence the severity of the collision due to conflicting movements with other modes of transportation.

Bicyclists proceeding straight or making right turns account for 73 percent of all collisions, but only 56 percent of movements of drivers. Most bicyclist collision types are Broadside (29 percent), or T-bone collisions between a party proceeding straight and the other party making a turn.

96 percent of all bicycle collisions occurred in locations without dedicated bicycle facilities.



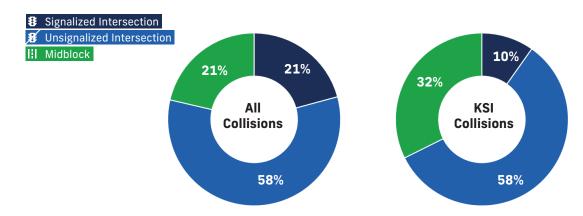


LOCATION TYPE

Most collisions take place intersections, with the largest share at unsignalized intersections (58 percent of all collisions). Collisions at signalized intersections account for the smallest share of collisions because there are very few traffic signals in unincorporated San Bernardino County.

Collisions are more likely to occur at intersections than midblock because people walking, biking, and driving are interacting with others, changing directions, and making decisions.

LOCATION TYPE, 2016-2020



PROXIMITY TO BUS STOPS

Bus stops typically have high pedestrian and bicyclist activity as people are traveling to and from transit. **6 percent** of all collisions occurred within 250 feet of a bus stop.

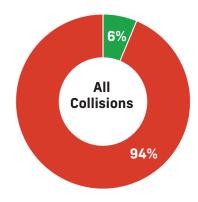
Compared to the distribution of all collisions, a similar share of KSI collisions (6 percent) occurred within 250 feet of a bus stop. 10 percent of collisions near bus stops were with pedestrians and bicyclists.

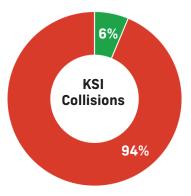
Many bus stops in unincorporated San Bernardino County lack surrounding pedestrian infrastructure; 60 percent of pedestrians hit near bus stops were not in a marked crosswalk or dedicated pedestrian facility.

PROXIMITY TO BUS STOPS, 2016-2020

Near Bus Stops?







PROXIMITY TO SCHOOLS

Schools are areas of concentrated activity during arrival and dismissal times.

6 percent of all collisions occurred within 1,000 feet of a school. Compared to the distribution of all collisions, a smaller share of KSI collisions (**5 percent**) occurred within 1,000 feet of a school.

Most collision types near schools are Broadside (39 percent), followed by Rear End (19 percent), Hit Object (13 percent), and Vehicle/Pedestrian (9 percent).

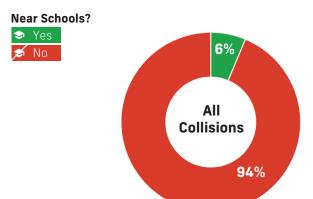
PROXIMITY TO PARKS

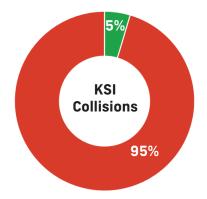
Parks are another destination with high pedestrian and bicyclist activity. 6 percent of all collisions occurred within 1,000 feet of a park.

Compared to the distribution of all collisions, a similar share of KSI collisions (6 percent) occurred within 1,000 feet of a park. 17 percent of collisions near parks were with pedestrians and bicyclists.

Many parks in unincorporated San Bernardino County also lack surrounding pedestrian infrastructure; 68 percent of pedestrians hit near parks were not in a marked crosswalk or dedicated pedestrian facility.

PROXIMITY TO SCHOOLS, 2016-2020

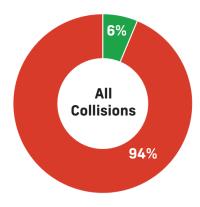


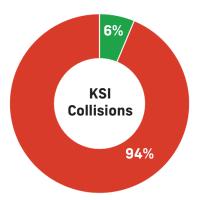


PROXIMITY TO PARKS, 2016-2020

Near Parks?



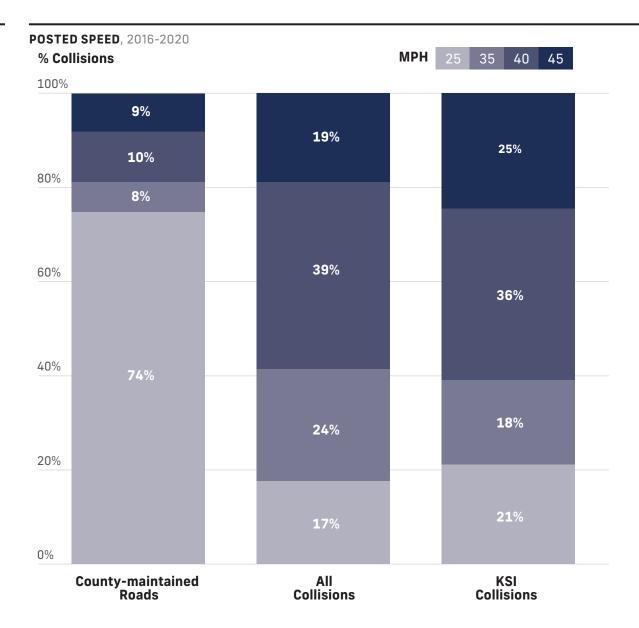




POSTED SPEED

Speed is the primary factor in determining the severity of a collision. Approximately **58 percent** of all collisions and **61 percent** of KSI collisions occurred on roadways with posted speeds 40 miles per hour or greater.

Roadways with posted speed limits of 40 miles per hour or greater make up only 19 percent of County-maintained roadways.



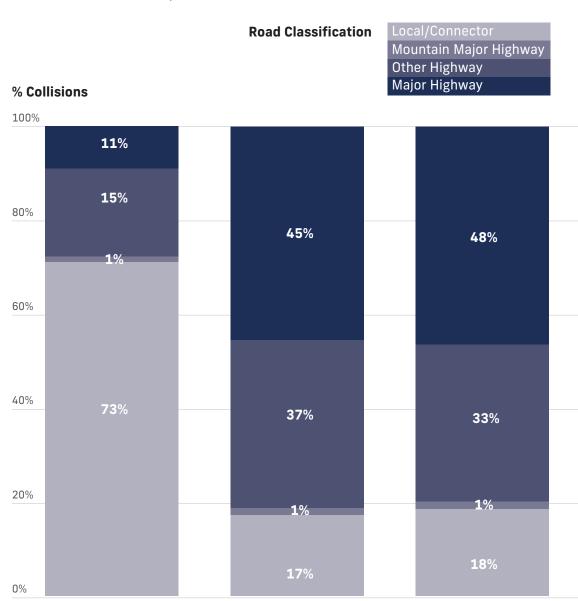
ROADWAY CLASSIFICATION

Roadway classification can impact the frequency and severity of collisions. Roadway classifications vary by topography, functionality, access, and posted speed limit.

While major highways make up 11 percent of County-maintained roadways, these roads disproportionately comprise 45 percent of all collisions and 48 percent of KSI collisions.

ROADWAY CLASSIFICATION, 2016-2020

County-maintained Roads



All

Collisions

KSI

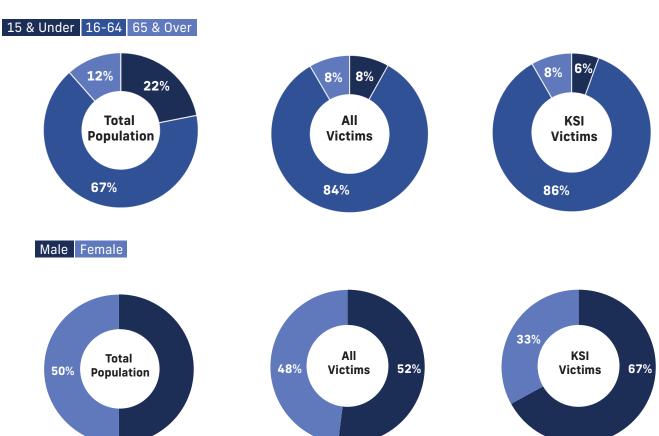
Collisions

VICTIM PROFILE BY AGE & GENDER

Vulnerable age groups (i.e., younger children and older adults) have not experienced a disproportionate share of collisions in San Bernardino County. People under the age of 15 represent 22 percent of the San Bernardino County's (incorporated and unincorporated) population but represent only 8 percent of all injury victims and 6 percent of all KSI victims. People 65 years and older comprise 12 percent of the City's population but represent 8 percent of all injury victims and 8 percent of all KSI victims.

Gender breakdown is roughly evenly distributed for all injury victims with 52 percent male and 48 percent female victims. In KSI collisions, however, male victims are overrepresented and account for 67 percent of victims.

VICTIM PROFILE BY AGE & GENDER, 2016-2020



VICTIM PROFILE BY RACE

Victim race is determined at the discretion of the reporting officer and is only reported at the party level. This means that if people of multiple races are present in a vehicle, only the driver's race will be reported.

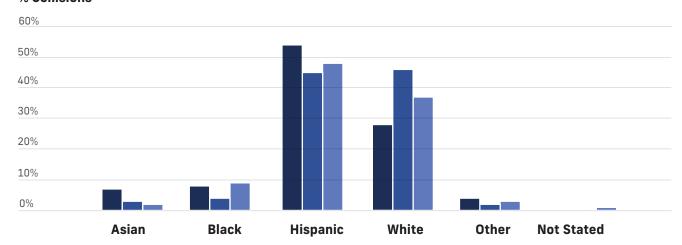
People identified as Black are overrepresented as collision victims, representing **9 percent** of victims, and **4 percent** of the population of unincorporated San Bernardino County. People identified as Asian are underrepresented as collision victims, representing **2 percent** of victims, and **3 percent** of the population of unincorporated San Bernardino County.

People identified as Hispanic, White, or Other represent 48 percent, 37 percent, and 3 percent of victims, respectively. These percentages fall within the range of people who identified as Hispanic, White, or Other in San Bernardino County as a whole, and in unincorporated San Bernardino County.

VICTIM PROFILE BY RACE, 2016-2020



% Collisions

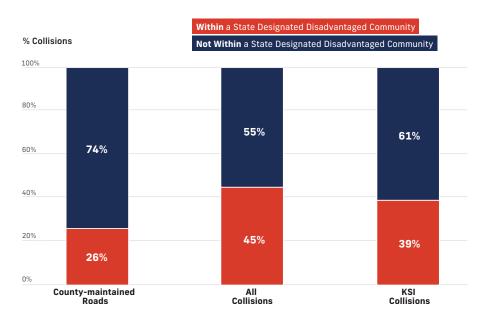


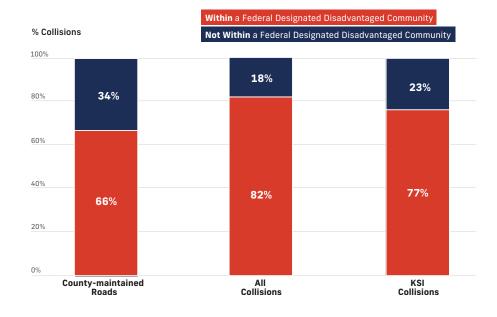
DISADVANTAGED COMMUNITIES

In the State of California, disadvantaged communities refers to census tracts which most suffer from a combination of economic, health, and environmental burdens. These burdens include poverty, high unemployment, air and water pollution, presence of hazardous wastes as well as high incidence of asthma and heart disease. Environmental and social justice seeks to come to terms with, and remedy, a history of unfair treatment of communities, predominantly communities of people of color and/ or low-income residents. 26 percent of County-maintained roadways are located within a state designated disadvantaged community, however state designated disadvantaged communities disproportionately represent 45 percent of all collisions and 39 percent of KSI collisions.

At the federal level, disadvantaged communities refers to census tracts that exceed the 50th percentile (75th for resilience) across at least four of the following six transportation disadvantaged indicators, 1) Transportation Access, 2) Health, 3) Environmental, 4) Economic, 5) Resilience, and 6) Equity. 66 percent of County-maintained roadways are located within a federally designated disadvantaged community, however federally designated disadvantaged community disproportionately represent 82 percent of all collisions and 77 percent of KSI collisions.

STATE AND FEDERAL DESIGNATED DISADVANTAGED COMMUNITIES, 2016-2020







Chapter 6

Countermeasure **Toolbox**

This toolbox presents safety countermeasures covering safe road users, safe vehicles, safe speeds, safe roads, and post-crash care that address the collision trends identified through the comprehensive collision analysis. This toolbox furthers the work that the San Bernardino County has done over the past several years to prioritize safer roadway design through efforts such as project implementation, grant applications, maintenance activities, and adoption of planning documents that identify priorities and future projects. This plan's focus on the elements of the Safe System approach and an emphasis on equity helps to provide alignment with current LRSP guidelines, but also sets the San Bernardino County up for success in recognition of emerging safety best practices.

SAFE SYSTEM ELEMENTS

Making a commitment to zero deaths means addressing every aspect of crash risks through the five elements of a Safe System, shown below. These layers of protection and shared responsibility promote a holistic approach to safety across the entire transportation system. The key focus of the Safe System approach is to reduce death and serious injuries through design that accommodates human mistakes and injury tolerances.



Users

other modes.

Safe Road



Safe **Vehicles**

incorporate the

latest technology.

The Safe System Vehicles are approach addresses designed and the safety of all road regulated to users, including minimize the those who walk. occurrence and bike, drive, ride severity of collisions transit, and travel by using safety measures that



Safe **Speeds**

Humans are unlikely to survive high-speed crashes. Reducing speeds can accommodate human iniury tolerances in three ways: reducing impact forces, providing additional time for drivers to stop, and improving visibility.



Safe Roads

Designing to accommodate human mistakes and injury tolerances can greatly reduce the severity of crashes that do occur. Examples include physically separating people traveling at different speeds. providing dedicated times for different users to move through a space, and alerting users to hazards and other road users.



Post-Crash Care

When a person is injured in a collision, they rely on emergency first responders to quickly locate them, stabilize their injury, and transport them to medical facilities. Post-crash care also includes forensic analysis at the crash site, traffic incident management, and other activities.

Source: Fehr & Peers for FHWA

Summary of Engineering Countermeasures

Local Road Safety Manual (LRSM) Countermeasure

Many of these countermeasures are recommended for the hot spots and collision profiles included in this report. Most of the countermeasures are included in the 2020 Caltrans Local Roadway Safety Manual (LRSM) and can be advantageous for use in Caltrans Highway Safety Improvement Program (HSIP) grant funding applications. The toolbox identifies a Caltrans-approved Crash Reduction Factor (CRF), the expected life of the project, the federal funding eligibility, the systemic opportunity for countermeasure implementation, and applicable collision type (e.g., all modes, bicycle and pedestrian collisions only, etc.) as outlined in the LRSM. The higher the CRF, the greater the expected reduction in collisions. There are many effective safety countermeasures beyond those listed in the LRSM, and several are included in this toolbox.

LIGHTING

Intersection Lighting •

Segment Lighting ♥

CONTROL

All-Way Stop Control ♥

Install Roundabout 🧇

Install Signal 🔮

SIGNAL MODIFICATION

Retroreflective Signal Backplates ♥

Extend Yellow and All Red Time 🗸

Advanced Dilemma Zone Detection ♥

Emergency Vehicle Preemption ♥

Protected Left Turns ♥

Traffic Signal Confirmation Light

Red Light Camera

SHIELD OBSTACLES

Guardrails •

Impact Attenuators ♥

GEOMETRIC

Minor Road Splitter Islands ♥

Raised Median 🔮

Widen Median

Right-Turn Lane ♥

Left-Turn Lane ♥

Two-Way Left-Turn Lane ♥

Widen Shoulder 🔮

Improve Pavement Friction ♥

Install Acceleration/Deceleration Lanes ●

OPERATION/WARNING

Larger or Additional Stop Signs or Other Warning Signs ♥

Upgrade Intersection Pavement Markings ♥

LED-Enhanced Stop Sign ♥

Flashing Beacon as Advance Warning 🔮

Chevron Signs on Horizontal Curves 🔮

Curve Advance Warning Signs ♥

Speed Monitoring and Feedback

Delineators, Reflectors, and/or Object Markers ♥

Transverse Rumble Strips ♥

Edgelines and Centerlines •

Edgeline and Centerline Rumble Strips ♥

Bike Lane 🔮

Sidewalk or Pathway ♥

High-Visibility Crosswalk ♥

Advanced Stop Bar 🛛

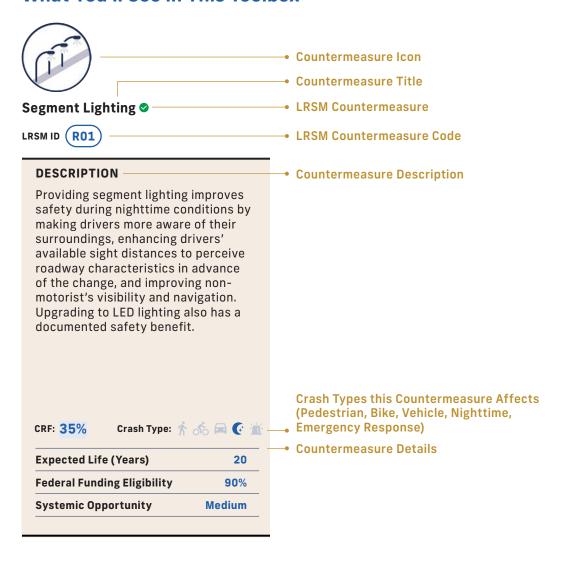
Advanced Yield Markings ♥

Rectangular Rapid Flashing Beacon ♥

Pedestrian Hybrid Beacon ♥

Raised Median/Refuge Island 🔮

What You'll See in This Toolbox



LIGHTING



Intersection Lighting •

LRSM ID (NS01, S01)

DESCRIPTION

Adding **lighting** at an intersection, and on its approaches, improves safety during nighttime conditions by (1) making drivers more aware of their surroundings at an intersection (2) enhancing drivers' available sight distances, and (3) improving the visibility of non-motorists. Intersection lighting is also beneficial to non-motorized users by helping them navigate the intersection. Upgrading to LED lighting also has a documented safety benefit.

CRF: 40% Crash Type: •

Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Opportunity	Medium



Segment Lighting

LRSM ID RO1

ODE OF

DESCRIPTION

Providing **segment lighting** improves safety during nighttime conditions by making drivers more aware of their surroundings, enhancing drivers' available sight distances to perceive roadway characteristics in advance of the change, and improving nonmotorist's visibility and navigation. Upgrading to LED lighting also has a documented safety benefit.

CRF: 35%	Crash Type:	
Expected Life	e (Years)	20
Federal Fund	ding Eligibility	90%
Systemic Op	portunity	Medium

CONTROL



All-Way Stop Control ♥

LRSM ID (NS02)

DESCRIPTION

An all-way stop-controlled (AWSC) intersection requires all vehicles to stop before crossing the intersection. An AWSC intersection improves safety by removing the need for road users on a side-street stop-controlled intersection to cross free-flowing lanes of traffic, which reduces the risk of collision. An "ALL WAY" sign should be placed under the octagonal stop sign at AWSC intersections as required by the California Manual on Uniform Traffic Control Devices, Establishing All Way Stop Controls require that the intersection meet certain conditions specified by the manual.

CRF: 50% Crash Type: 🏌 🔥 🚍		i 🚍
Expected Lif	e (Years)	10
Federal Fund	ling Eligibility	90%
Systemic Opportunity		High



Install Roundabout

LRSM ID (NS04, NS05, S16)

DESCRIPTION

A **roundabout** is a type of circular intersection in which road traffic is permitted to flow in one direction around a central island, and priority is typically given to traffic already in the junction. The types of conflicts that occur at roundabouts are different from those occurring at conventional intersections; namely, conflicts from crossing and left-turn movements are not present in a roundabout. The geometry of a roundabout keeps the range of vehicle speed narrow, which helps reduce the severity of crashes when they do occur. Pedestrians only have to cross one direction of traffic at a time at roundabouts, thus reducing their potential for conflicts. See CA MUTCD Chapter 3C for details.

Expected Life (Years)	20
Federal Funding Eligibili	ty 90%

CDE. Varios Crach Type & &



Install Signal •

LRSM ID NS03

DESCRIPTION

Traffic signals at intersections control the flow of traffic. Traffic signals have the potential to reduce the most severe type crashes but will likely cause an increase in rear-end collisions. A reduction in overall injury severity is likely the largest benefit of traffic signal installation.

CRF: 30%	Crash Type: 🤺 👌	
Expected Li	fe (Years)	20
Federal Fun	ding Eligibility	90%
Systemic Opportunity		Low

SIGNAL MODIFICATION



Retroreflective Signal Backplates

LRSM ID (S02)

DESCRIPTION

Retroreflective borders and backplates enhance the visibility of traffic signals for aging and colorvision-impaired drivers, enabling them to understand which signal indication is illuminated. Retroreflective borders may also alert drivers to signalized intersections during periods of power outages when the signals would otherwise be dark, and nonreflective signal heads and backplates would not be visible. Signal heads that have backplates equipped with retroreflective borders are also more visible and conspicuous during nighttime conditions.

CRF: 15% Crash Type: 🏌 🖧		· 66 届
Expected Lif	e (Years)	10
Federal Fund	ding Eligibility	90%
Systemic Op	portunity	Very High



Extend Yellow and All Red Time

LRSM ID SO3

DESCRIPTION

Extending yellow and all red time increases the time allotted for the yellow and red lights during a signal phase. This improves safety by allowing drivers and bicyclists to safely cross through an intersection before conflicting traffic movements are permitted to enter the intersection. See CA MUTCD Section 4D.26 for more details.





Advanced Dilemma Zone Detection

LRSM ID S04

DESCRIPTION

An advanced dilemma zone detection system minimizes the number of vehicles the intersection traffic control signal system exposes to an intersection-approach dilemma zone. This is accomplished by adjusting the start time of the yellow-signal phase either earlier or later, based on observed vehicle locations and speeds. The advanced dilemma zone detection system is not eligible for HSIP Cycle 11 funding, but in previous cycles, this countermeasure had a crash reduction factor of 40%.

CRF: 40% Crash Type: 🏌 🔥 🚍		r 66 🛱
Expected Lif	e (Years)	10
Federal Fund	ling Eligibility	Not Eligible
Systemic Op	portunity	High

SIGNAL MODIFICATION



Emergency Vehicle Preemption



DESCRIPTION

Providing emergency vehicle preemption capability at a signal or along a corridor provides two major safety benefits. First, preemption may decrease the potential for a collision to occur as emergency vehicles try to navigate through intersections. Second, a signal preemption system can decrease emergency vehicle response times, therefore decreasing the time for victims to receive medical attention, which is a critical concept of the Post Crash Care element of the Safe Systems Approach. An agency may consider combining emergency vehicle preemption into a comprehensive signal improvement project.

CRF: 70% Crash Type: 🏌 C		is 🖨 🤄 🛣
Expected Li	fe (Years)	10
Federal Fund	ding Eligibility	90%
Systemic Opportunity		High



Protected Left Turns

LRSM ID (\$06, \$07)

DESCRIPTION

A protected left turn can be implemented at signalized intersections (with existing left turn pockets) that currently have a permissive left-turn or no left-turn protection and a high frequency of angle crashes involving left turning movements. Left turns are widely recognized as the highestrisk movements at signalized intersections. Providing protected left-turn phases significantly improves the safety for left-turn maneuvers by removing the need for the drivers to navigate through gaps in oncoming through vehicles.





Traffic Signal Confirmation Light

DESCRIPTION

A traffic signal confirmation light is a small blue light that is placed on the top, rear, or bottom of a signal and turns on when the traffic signal turns red. The confirmation light allows law enforcement officers to observe vehicles that enter the intersection on a red light and enforce red light violations.

SIGNAL MODIFICATION



Red Light Camera

DESCRIPTION

A **red light camera** enforces traffic signal compliance by capturing the image of a vehicle that has entered an intersection in spite of the traffic signal indicating red. The automatic photographic evidence is used by authorities to enforce traffic laws and issue traffic violation tickets.

SHIELD OBSTACLES



Guardrails

LRSM ID RO4

DESCRIPTION

Guardrails are installed to reduce the severity of lane departure crashes. However, guardrail can reduce crash severity only for those conditions where striking the guardrail is less severe than going down an embankment or striking a fixed object. Guardrail should only be installed where it is clear that crash severity will be reduced, or there is a history of run-off-the-road crashes at a given location that have resulted in severe crashes.



Expected Life (Years) 20
Federal Funding Eligibility 90%
Systemic Opportunity High



Impact Attenuators

LRSM ID (RO5)

DESCRIPTION

Impact attenuators are typically used to shield rigid roadside objects such as concrete barrier ends, steel guardrail ends and bridge pillars from oncoming automobiles. Attenuators should only be installed where it is impractical for the objects to be removed.

CRF: 25% Crash Type: 🏌 🖧

Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Opportunity	High

GEOMETRIC



Minor Road Splitter Islands ♥

LRSM ID (NS13)

DESCRIPTION

The installation of **minor road splitter islands** allows for the addition of a stop sign in the median to make the intersection more conspicuous. Additionally, the splitter island on the minor road reduces turning speeds and provides for a positive separation between turning vehicles on the through road and vehicles stopped on the minor road approach.





Raised Median 🔮

LRSM ID (\$12, N\$14)

DESCRIPTION

Raised medians with left-turn lanes at intersections offer a cost-effective means for reducing crashes and improving operations at higher volume intersections. The raised medians also prohibit left turns into and out of driveways that may be located too close to the functional area of the intersection.





Widen Median

DESCRIPTION

Widening the center median on highspeed roadways creates a horizontal buffer for cars in opposing directions to mistakenly drift, run over the centerline and then space to recover without crossing into opposing lane of traffic. This countermeasure can be paired with auditory centerline rumble strips to reduce head-on collisions.

GEOMETRIC

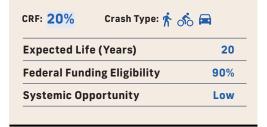


Right-Turn Lane

LRSM ID (NS17)

DESCRIPTION

Adding right-turn lanes can reduce the frequency of rear-end collisions resulting from conflicts between vehicles turning right and following vehicles, and vehicles turning right and through vehicles coming from the left on the cross street. Right-turn lanes also remove slow vehicles that are decelerating to turn right from the through-traffic stream, thus reducing the potential for rear-end collisions.



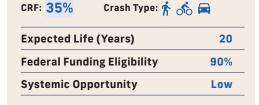


Left-Turn Lane

LRSM ID NS18

DESCRIPTION

Adding left-turn lanes removes vehicles waiting to turn left from the through-traffic stream, thus reducing the potential for rear-end collisions. Because they provide a sheltered location for drivers to wait for a gap in opposing traffic, left-turn lanes may encourage drivers to be more selective in choosing a gap to complete the left-turn maneuver. This strategy may reduce the potential for collisions between left-turn and opposing through vehicles.





Two-Way Left-Turn Lane ♥

LRSM ID (R13)

DESCRIPTION

Two-way left-turn lanes provide a buffer between opposing directions of travel and separate left turning traffic from through traffic. They can also help to allow vehicles to begin to accelerate before entering the through-traffic lanes. They reduce the disruption of flow of through-traffic and reducing rear-end and sideswipe collisions.

CRF: 30% Crash Type: 📌		် ၀် 🚍
Expected Lif	e (Years)	20
Federal Fund	ling Eligibility	90%
Systemic Opportunity		Medium

GEOMETRIC



Widen Shoulder

LRSM ID R15

DESCRIPTION

Adding a shoulder or widening an existing shoulder provides a greater area to regain control of a vehicle, as well as lateral clearance to roadside objects such as guardrails, signs, and poles. They may also provide space for disabled vehicles to stop or drive slowly, provide increased sight distance for through vehicles and for vehicles entering the roadway, and in some cases reduce passing conflicts between motor vehicles and bicyclists and pedestrians.

CRF: 30% Crash Type: 🏌		ර් 🚍
Expected Lif	e (Years)	20
Federal Fund	ling Eligibility	90%
Systemic Opportunity		Medium



Improved Pavement Friction ♥

LRSM ID (NS12, S11, R21)

DESCRIPTION

A roadway must have an appropriate level of pavement friction to ensure that drivers are able to keep their vehicles safely in the lane. Poor pavement conditions, especially wet pavement which reduces friction and may lead to hydroplaning, have been identified as one of the major contributing factors in roadway departure crashes. Traditional friction courses or high friction surface treatments should be considered for curves with numerous wet weather crashes or severe curves with higher operating speeds.

CRF: 55% Crash Type: 🏌	
e (Years)	10
ling Eligibility	90%
portunity	Medium/High
	Crash Type: 1 e (Years) ling Eligibility portunity



Install Acceleration/Deceleration Lanes ©

LRSM ID (R11)

DESCRIPTION

A lane that does not provide enough deceleration length and storage space for turning traffic may cause the turn queue to back up into the adjacent through lane. This can contribute to rear-end and sideswipe crashes. An acceleration lane is an auxiliary or speed-change lane that allows vehicles to accelerate to highway speeds (high speed roadways) before entering the through-traffic lanes of a highway. Additionally, if acceleration by entering traffic takes place directly on the traveled way, it may disrupt the flow of through-traffic and cause rear end and sideswipe collisions.

CRF: 25% Crash Type: 🖒 🔾		io 🚍
Expected Lif	e (Years)	20
Federal Funding Eligibility		90%
Systemic Opportunity		Low



Larger or Additional Stop Signs or Other Warning Signs ♥

LRSM ID (NSO6)

DESCRIPTION

The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by installing larger regulatory and warning signs at or prior to intersections. A key to success in applying this strategy is to select a combination of regulatory and warning sign techniques appropriate for the conditions on a particular unsignalized intersection approach.

CRF: 15% Crash Type: 🖒 💪 🖃

Expected Life (Years) 10

Federal Funding Eligibility 90%

Systemic Opportunity Very High

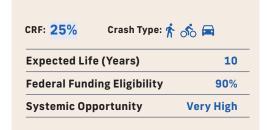


Upgrade Intersection Pavement Markings ♥

LRSM ID NS07

DESCRIPTION

Upgrading intersection pavement markings can include "Stop Ahead" markings and the addition of centerlines and stop bars. These markings can improve safety by increasing the visibility of intersections for drivers.





LED-Enhanced Stop Sign ♥

LRSM ID (NSO8)

DESCRIPTION

An **LED-enhanced sign** has LED lights embedded in the sign to outline the sign itself or the words and symbols on the sign. The LEDs may be set to flash or operate in a steady mode. An LED-enhanced sign improves safety by improving the visibility of signs at locations with visibility limitations or with a documented history of drivers failing to see or obey the sign (e.g. at STOP signs).

Expected Life	e (Years)	10
Fodoval Fundi	in a Fliaibilit.	000/
Federal Fund	ing Eligibility	90%
Systemic Opportunity		High



Flashing Beacon as Advance Warning •

LRSM ID (NS09, S10)

DESCRIPTION

A flashing beacon as advanced warning is a blinking light with signage to notify motorists of an upcoming intersection or crosswalk. A flashing beacon improves safety by providing motorists more time to become aware of and slow down for an intersection or yield to pedestrians crossing at a crosswalk.





Chevron Signs on Horizontal Curves

LRSM ID (R23)

DESCRIPTION

Post-mounted chevrons are intended to warn drivers of an approaching curve and provide tracking information and guidance to the drivers. While they are intended to act as a warning, it should also be remembered that the posts, placed along the roadside, represent a possible object with which an errant vehicle can crash.





Curve Advance Warning Signs ⋄

LRSM ID (R24, R25)

DESCRIPTION

This strategy primarily addresses problem curves and serves as an advance warning of an unexpected or sharp curve. It provides advance information and gives drivers a visual warning that their added attention is needed.

Expected Lif	e (Years)	10
Federal Fund	ing Eligibility	90%
Systemic Opportunity		Very High



Speed Monitoring and Feedback

DESCRIPTION

Video or radar roadside sensors are used to monitor individual vehicle speeds. With **speed monitoring** and feedback, signs can notify motorists of excessive speed through a combination of dynamic roadside signage and vehicle-to-infrastructure (V2I) messaging. By notifying motorists of their speed, feedback signs may promote slower speeds and safer driver behavior.





Delineators, Reflectors, and/or Object Markers ♥

LRSM ID R27

DESCRIPTION

Delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed. They are generally less costly than chevron signs as they don't require posts to place along the roadside, avoiding an additional object with which an errant vehicle can crash.





Transverse Rumble Strips ♥

LRSM ID (NS10)

DESCRIPTION

Transverse rumble strips are installed in the travel lane for the purposes of providing an auditory and tactile sensation for each motorist approaching the intersection. They can be used at any stop or yield approach intersection, often in combination with advance signing to warn of the intersection ahead. When motorists are traveling along the roadway, they are sometimes unaware they are approaching an intersection. This is especially true on rural roads, as there may be fewer clues indicating an intersection ahead.

CRF: 20%	Crash Type: 🏌 👌	6 🚍
Expected Lif	e (Years)	10
Federal Fund	ling Eligibility	90%
Systemic Opportunity		High



Edgelines and Centerlines

LRSM ID (R28)

DESCRIPTION

Installing edge-lines and centerlines where none exists or making significant upgrades to existing lines (paint to thermoplastic, adding audible disks/bumps in the thermoplastic stripes, or adding RPMs) are intended/ designed to help drivers who might leave the roadway because of their inability to see the edge of the roadway along the horizontal edge of the pavement or cross-over the centerline of the roadway into oncoming traffic. New pavement marking products tend to be more durable, are all-weather, more visible, and have a higher retroreflectivity than traditional pavement markings.

Evported Lif	o (Voors)	10
Expected Life (Years)		10
Federal Funding Eligibility		90%
Systemic Opportunity		Very High



Edgeline and Centerline Rumble Strips ②

LRSM ID (R30, R31)

DESCRIPTION

Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line. Additionally, rumble stripes (pavement marking in the rumble itself) provide an enhanced marking, especially in wet dark conditions.

CRF: 15%-20% Crash Type: 🏌 🖒 🚘

Expected Life (Years)	10
Federal Funding Eligibility	90%
Systemic Opportunity	High



Bike Lane

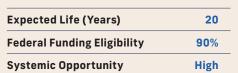
LRSM ID (R32PB)

DESCRIPTION

A **bike lane** provides dedicated street space, typically adjacent to outer vehicle travel lanes, with designated striping, pavement markings, and signage. Bike lanes improve safety by reducing conflicts between bicycles and vehicles on the road and by creating a road-narrowing effect with buffers or vertical barriers, which may reduce vehicle speeds.

CRF: 35%

Crash Type: 🏌 🔥



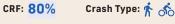


Sidewalk or Pathway ♥

LRSM ID R34PB

DESCRIPTION

Adding sidewalks or pathways provides a separated and continuous facility for people to walk along the roadway. Adding sidewalks or pathways also improves safety by minimizing the risk of vehicle and bicycle collisions with pedestrians.







HIgh-Visibility Crosswalk ♥

LRSM ID (NS20PB, NS21PB, S18PB, R35PB)

DESCRIPTION

A high-visibility crosswalk has a striped pattern with markings made of high-visibility material, such as thermoplastic tape, instead of paint. A high-visibility crosswalk improves safety with a clearly marked pedestrian crossing so motorists exercise caution and yield to pedestrians. The crash reduction factor noted here only applies to locations currently without a marked crosswalk, but highvisibility crosswalk upgrades can be implemented at existing marked crosswalks. See Section 3B.18 of the CA MUTCD for more details.

CRF: 25%-35% Crash Type: 🏌 🔥

Expected Life (Years)	10-20
Federal Funding Eligibility	90%
Systemic Opportunity	Medium



Advanced Stop Bar ♥

LRSM ID (NS20PB, NS21PB, S18PB, R35PB)

DESCRIPTION

An **advanced stop bar** is a horizontal stripe painted ahead of the crosswalk at stop signs and signals to indicate where drivers should stop. An advanced stop bar improves safety by reducing instances of vehicles encroaching on the crosswalk. Creating a wider stop bar or setting the stop bar further back from the crosswalk may be appro-priate for locations with known crosswalk encroachment issues. See CA MUTCD Section 3B.16 for more information. Current detection loops may need to be adjusted to accommodate advanced stop bars.

CRF: 25%-35% Crash Type: 🏌 🔥

Expected Life (Years)	10-20
Federal Funding Eligibility	90%
Systemic Opportunity	Medium



Advanced Yield Markings ♥

LRSM ID (NS20PB, NS21PB, S18PB, R35PB)

DESCRIPTION

Yield markings are placed 20 to 50 feet in advance of pedestrian crossings to alert drivers of an upcoming pedestrian crossing. Yield markings indicate where drivers should stop when pedestrians are crossing at the crosswalk.

CRF: 25%-35% Crash Type: 🏌 💍

Expected Life (Years)	10-20
Federal Funding Eligibility	90%
Systemic Opportunity	Medium



Rectangular Rapid Flashing Beacon ♥

LRSM ID (NS22PB, R37PB)

DESCRIPTION

A rectangular rapid flashing beacon (RRFB) is a pedestrian-activated flashing light with additional signage to alert motorists of a pedestrian crossing. An RRFB improves safety by increasing the visibility of marked crosswalks.

CRF: 35% Crash Type: 💏	OiO
Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Opportunity	Medium



Pedestrian Hybrid Beacon ♥

LRSM ID (N23PB)

DESCRIPTION

Pedestrian hybrid beacon (PHB), also known as a HAWK (High intensity Activated CrossWalK), is a flashing light that is activated by a pedestrian pushing a button or some other form of detection. A PHB is used at unsignalized intersections or midblock crosswalks to notify oncoming motorists to stop with a series of red and yellow lights. Unlike a traffic signal, the PHB rests in dark until a pedestrian activates it via pushbutton or other form of detection. See CA MUTCD Section 4F for more detail.

CRF: **55**%

Crash Type: 🏌 🔥

Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Opportunity	Low



Raised Median/Refuge Island ♥

LRSM ID (NS19PB)

DESCRIPTION

A raised median/refuge island, is raised curb in the center of the roadway that can restrict certain turning movements and provide a place for pedestrians to wait if they are unable to finish crossing the intersection. A Raised Median can improve safety by reducing the number of potential conflict points with designated zones for vehicles to turn, and a pedestrian refuge island improves safety by reducing the exposure time for pedestrians crossing the intersection.

CRF: 45% Cr



Expected Life (Years)	20
Federal Funding Eligibility	90%
Systemic Opportunity	Medium

Summary of Non-Engineering Countermeasures

SAFE ROADS

Placemaking in Traffic Safety Initiatives

Regular Countywide Traffic Safety Coordination Meetings

SAFE ROAD USERS

Education & Public Awareness Campaigns Targeted at Specific Behaviors

Pair Education with Engineering Countermeasures

Safe Routes to School

Safe Ride Home

DUI Prevention

High-Visibility Enforcement for DUI

Pedestrian/Bicycle Safety and Homeless Services

SAFE SPEEDS

Safe Speeds Education Campaign

Speed Limit Modification

Automated Enforcement

POST-CRASH CARE

Rapid Response Safety Communication Protocol & Multi-Disciplinary Team

SAFE VEHICLES

Emerging Technology

CTW Effectiveness Rating

Countermeasures That Work, National Highway Traffic Safety Administration, 2017



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 highquality evaluations or other sources



Effectiveness still undetermined; different methods of implementing this countermeasure produce different results



Limited or no highquality evaluation evidence

SAFE ROADS

Placemaking in Traffic Safety Initiatives

DESCRIPTION

Launch a county-wide initiative to treat streets as places by incorporating permanent placemaking efforts (public art, green infrastructure, and neighborhood amenities) into traffic safety initiatives. Such amenities can activate streetscapes and encourage lower speeds and better awareness of non-vehicle users. Prioritize areas with high numbers of vulnerable users.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

Community-Based Organizations (e.g., Lucerne Valley Economic Development Association) San Bernardino County Transportation Authority

Neighboring Cities Public Works Departments

FUNDING SOURCES

County Funds User Fees

Public/Private Partnerships SCAG Go Human Grant

EFFECTIVENESS: N/A

Initial studies indicate art-based placemaking efforts have a strong positive correlation with improve safety benefits, but further studies are recommended to cover a wider variety of roadway and land use contexts to inform development of a crash modification factor.

CONTEXT

Areas throughout the County with high volumes of vulnerable users



Source: City of Richmond Hill, Georgia

Community engagement is not a one-size-fits-all model. By developing culturally-relevant engagement strategies, all participants are invited into conversations about safety. Culturally-relevant engagement strategies can help education and programming around traffic safety reach a larger audience and be more impactful. In San Bernardino County, culturally-relevant community engagement may include dissemination of materials and presentation of information in multiple

languages, including English and Spanish. Hosting safetyrelated engagement events and local parks or businesses, may provide better accessibility and comfort for residents to receive information and provide feedback. Additionally, the creation of a Street Safety **Ambassador Program can** also help to build awareness within specific communities around roadway safety issues. **Culturally-relevant community** engagement should be included during the implementation of all countermeasures.

SAFE ROADS

Regular Countywide Traffic Safety Coordination Meetings

DESCRIPTION

Given that residents and visitors often pass back and forth between the different jurisdictions with regularity, coordination and updates on roadway safety best practices and observations across the region can create a unified approach to traffic safety. Information sharing could improve efficiencies in traffic safety management, including policies that are working and those that require improvement. The meetings could be held monthly or semi-annually.

In August 2019, SCAG hosted a series of traffic safety workshops entitled Go Human with representatives from each of the counties and many jurisdictions within the SCAG region. Presenters from the region spoke on a number of projects within their region including multi-lingual pedestrian safety campaigns, open streets projects, safe routes to school, and others. This allowed members from cities within the SCAG region to hear about best practices, successes, and challenges from their counterparts and enhance their understanding of roadway safety.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

Neighboring Cities Public Works Departments

FUNDING SOURCES

County Funds

EFFECTIVENESS: N/A

CONTEXT

Countywide

SAFE ROAD USERS

Education & Public Awareness Campaigns Targeted at Specific Behaviors

DESCRIPTION

Coordinate the County's communication efforts to use existing social media accounts to establish an ongoing public education campaign on safe and responsible driving, discouraging drinking and driving, along with encouraging increased awareness of pedestrians and bicyclists. Another application of this countermeasure would be collaborating with local radio stations to disseminate safety messages.

The SCAG Go Human campaign and the OTS Go Safely California campaign both have free resources for local agencies to use in implementing public awareness campaigns.



Source: San Francisco Municipal Transportation Agency

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

San Bernardino County Communications
Department
San Bernardino County Sheriff's Department
California Highway Patrol
San Bernardino Public Health Department
Caltrans District 8

San Bernardino County Transportation Authority Local Media Outlets SCAG Go Human Campaign OTS Go Safely California Campaign

FUNDING SOURCES

California Office of Traffic Safety (OTS) Grants

SCAG Go Human Grants

EFFECTIVENESS:

*** Mass Media Campaigns on DUI

CONTEXT

Countywide

Pair Education with Key Engineering Countermeasures

DESCRIPTION

Educational materials can be used to teach people how to use new and unfamiliar safety countermeasures, such as pedestrian hybrid beacons (PHB), roundabouts, or protected bikeways. These materials can consist of informational signs or demonstration videos, and should be presented in multiple languages, including English and Spanish.



Source: Ohio Department of Transportation

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

San Bernardino County Communications Department

Community-Based Organizations

FUNDING SOURCES

California Office of Traffic Safety (OTS) Grants

County Funds

EFFECTIVENESS: N/A

CONTEXT

Countywide, focused on areas with new infrastructure projects

SAFE ROAD USERS

Safe Routes to School

DESCRIPTION

Safe Routes to School programs aim to make it safer for students to walk and bike to school and encourage more walking and biking where safety is not a barrier. Transportation, public health and planning professionals, school communities, law enforcement officers, community groups and families all have roles to play using education, encouragement, engineering, and enforcement to meet a local community's needs.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

School District California Highway Patrol

School Resource Officers

Community-Based Organizations

San Bernardino Public Health

Department

FUNDING SOURCES

Active Transportation Program (ATP) Grants

Safe Streets For All Grants

EFFECTIVENESS:

*** Safe Routes to School

CONTEXT

Areas adjacent to Schools

Safe Ride Home

DESCRIPTION

Develop partnerships between the County, the Sheriff's Department, Transportation Network Company (TNC) operators, SBCTA, and local businesses to offer promotional codes for free or discounted rides home from establishments or events in the County to reduce the potential for DUI, drowsy driving, or distracted driving. This program may be focused on particular holidays or event days or applied more broadly to weekend nights.

DESCRIPTION

SAFE ROAD USERS

DUI Prevention

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.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

TNC Operators (Lyft, Uber, Taxis, etc.)

San Bernardino County Transportation Authority California Highway Patrol

Local businesses

LEAD AGENCY

San Bernardino County Public Health Department

PARTNER AGENCIES

Community-Based Organizations (medical offices/organizations)

California Highway Patrol

FUNDING SOURCES

User Fees (e.g., taxi and TNC fee)

EFFECTIVENESS:

★★★ Alternative Transportation

CONTEXT

Countywide

FUNDING SOURCES

California Office of Traffic Safety (OTS) Grants

EFFECTIVENESS:

**** Alcohol Screening & Brief Intervention

CONTEXT

Countywide, focused on areas with DUI collision trends

High Visibility Enforcement for DUIs

DESCRIPTION

The County Sheriff's Department should continue their use of high visibility enforcement for DUIs. Deterrence policies focus on raising the actual and perceived risk of detection of driving under the influence. These policies should be highly visible to increase awareness of the risks of driving under the influence. Publicized sobriety checkpoints, saturation patrol, and other forms of high visibility enforcement are effective for safety outcomes.

Integrated enforcement would include coordination with Public Awareness Campaigns. Deterrence policies focus on raising the actual and perceived risk of detection of driving under the influence. These policies should be highly visible to increase awareness of the risks of driving under the influence. For example, widespread dissemination of multi-lingual educational messaging and promotion of safe rides home programs in advance of major enforcement efforts will help to mitigate equity concerns about disproportionate impacts of fines/fees on lower income residents.

LEAD AGENCY

San Bernardino County Sheriff's Department

California Highway Patrol

PARTNER AGENCIES

California Office of Traffic Safety (OTS)

FUNDING SOURCES

California Office of Traffic Safety (OTS) Grants

EFFECTIVENESS:

**** Publicized Sobriety Checkpoints

★★★ Integrated Enforcement

*** High-Visibility Saturation Patrols

CONTEXT

Countywide, focused on areas with DUI collision trends

Enforcement of traffic laws is a common strategy to increase street safety, but historical enforcement techniques and strategies have raised concerns about racial profiling, police violence, and the impacts of policing on communities of color.

According to the US Department of Justice, Black and Hispanic people are more likely than white people to experience use of force when they are stopped by police.

To ensure that efforts to improve safety recognize that all people have the right to move about their communities safely, cities have shifted to equity-based strategies that target specific reckless behaviors that pose the highest safety risk while working to mitigate potential inequities in enforcement.

Equity considerations can be considered in a range of enforcement strategies, including enacting progressive fine structures, analyzing demographic data in traffic citations.

Pedestrian/Bicycle Safety and Homeless Services

DESCRIPTION

Homeless services provide temporary residence for homeless individuals and families. In jurisdictions with a large unsheltered population, unsheltered people are often disproportionately represented in pedestrian collisions. Unsheltered people have a relatively high level of traffic exposure as they may stand in medians, cross roadways outside of designated pedestrian crossings, and/or spend time in parking lots.

San Bernardino County's Department of Behavioral Health has deployed the Homeless Outreach Support Team (HOST) to help connect members of the homeless population with resources that may help them transition from homelessness.

LEAD AGENCY

San Bernardino Department of Behavioral Health

PARTNER AGENCIES

San Bernardino County Sheriff's

Housing Organizations

Department

San Bernardino County Public Works

California Highway Patrol

FUNDING SOURCES

County Funds

Public/Private Partnerships

EFFECTIVENESS:

★★★★★ Publicized Sobriety Checkpoints



*** High-Visibility Saturation Patrols

CONTEXT

Countywide, focused on areas with high homeless populations (e.g., Muscoy)

SAFE SPEEDS

Safe Speeds Education Campaign

DESCRIPTION

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. To maximize effectiveness. this should be an ongoing program.

The SCAG Go Human campaign and the OTS Go Safely California campaign both have free resources for local agencies to use in implementing public awareness campaigns.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

San Bernardino County **Communications Department**

San Bernardino County Sheriff's

Department

California Highway Patrol

San Bernardino Public Health

Department

Caltrans District 8

San Bernardino County Transportation

Authority

Local Media Outlets

SCAG Go Human Campaign

OTS Go Safely California Campaign

FUNDING SOURCES

County Funds

California Office of Traffic Safety (OTS) Grants

EFFECTIVENESS:

*** Communications and Outreach on Speeding

CONTEXT

Countywide, focused on areas with Unsafe Speed collision trends

SAFE SPEEDS

Speed Limit Modification

DESCRIPTION

Utilize California Assembly Bill (AB) 43 methodology to lower speed limits on additional corridors. AB 43 features the following five major components, focused on providing local jurisdictions more flexibility in setting speed limits, especially regarding vulnerable road users:

- Engineering & Traffic Survey (E&TS)
- Post E&TS
- Speed Limit Reduction
- Prima Facie Speed Limits
- Business Activity Districts

AB 43 sets speed limits on roads without posted signs in residential and business districts to 25 miles per hour. AB 43 also allows local authorities to forgo engineering and traffic surveys to lower the speed limit on portions of highway near to schools and school grounds. The legislation also provides for flexibility in lowering speed limits in senior zones and business districts.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

Community-Based Organizations

California Highway Patrol

FUNDING SOURCES

California Office of Traffic Safety (OTS) Grants

County Road Funds

EFFECTIVENESS:

**** Speed Limits

CONTEXT

Countywide, focused on "safety corridors", business activity districts, and school zones

SAFE SPEEDS

Automated Enforcement

DESCRIPTION

Automated enforcement, such as red-light cameras or speed cameras, target the specific drivers who are behaving dangerously. Automated speed detection devices can identify speeding violations and provide citations. California is currently considering legislation to allow this type of enforcement.

A strictly data-driven approach to automated enforcement might place red-light or speed cameras in locations with the highest number of collisions. However, given that many low-income neighborhoods have historically received fewer infrastructure investments, which often results in a higher rate of collisions, a strictly data-driven approach could lead to a disproportionate burden of enforcement. Therefore, automated enforcement should be implemented evenly across a jurisdiction at problem locations. In addition, jurisdictions should pair automated enforcement with updated fine structures so that low-income communities don't bear a disproportionate burden of traffic fines.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

Community-Based Organizations

California Highway Patrol

San Bernardino County Sheriff's Department

FUNDING SOURCES

County Road Funds

Citations

EFFECTIVENESS:

**** Automated Enforcement

CONTEXT

Countywide, focused on areas with Traffic Signs and Signal violations or Unsafe Speed collision trends

POST-CRASH CARE

Rapid Response Safety Communication Protocol & Multi-Disciplinary Team

DESCRIPTION

Employ an internal, multi-departmental communication strategy in response to severe and fatal collisions. The protocol should outline a path forward for Public Works staff to be a part of the immediate on-the ground-response to an investigation of severe and fatal collisions, ensuring a multi-disciplinary response team focused both on the behavioral and engineering elements of a collision. Development of this multi-disciplinary team can also support timely data sharing among County departments.

The development of an integrated database with law enforcement collision data and injury surveillance provides can also improve communication protocol. Data integration can help practitioners estimate actual injury costs and costs of treatments for future planning efforts.

LEAD AGENCY

San Bernardino County Sheriff's

Department

San Bernardino Public Health

Department

California Highway Patrol San Bernardino Fire Department

PARTNER AGENCIES

San Bernardino County Public Works

FUNDING SOURCES

California Office of Traffic Safety (OTS) Grants

County Funds

EFFECTIVENESS: N/A

CONTEXT

Countywide

SAFE VEHICLES

Emerging Technology

DESCRIPTION

Recent advancements in transportation technology have not only introduced new transportation modes and travel patterns but have also presented opportunities to better understand travel behavior and encourage safe behavior. The summary on the facing page describes how emerging technology and data sources were incorporated into the safety analysis and development of recommendations for this plan.

The following represents a summary of emerging technology trends related to safety.

Intelligent Transportation Systems

Some existing and emerging on-board vehicle technologies require investments in public infrastructure in order to function properly. For example, lane departure warning technology common on newer vehicles requires regular maintenance of roadway striping and the use of highly retroreflective materials to maximize effectiveness. Emerging Vehicle-to- Infrastructure (V2I) technologies will likely require integration with existing infrastructure. The County's ITS Master Plan and Capital Improvement Plan can facilitate the effectiveness of safe vehicle technology with traffic signal and detection upgrades and systematic resurfacing projects to ensure roadway striping is easily visible.

Near Miss Data

Near miss collisions have historically been difficult to study in practical safety applications due to an overall lack of reported information. In the absence of sufficient crash data, near miss data is an important indicator for guiding crash prevention. Video data and incident data from connected vehicles are emerging data sources that can provide key safety insights regarding near misses.

Autonomous Vehicle Readiness Planning

Having strategies prepared to meet and address the oncoming challenges posed by autonomous vehicle (AV) technology will be crucial in advancing road safety. Fully automated vehicles have the potential to transform travel behavior and safety outcomes given that AVs are ultimately designed to operate without any human intervention. Some strategies for preparation include educating the public on current and future safety features and limitations, developing signing and striping standards, and conducting reviews of equity implications. Without appropriate research and guidance, AVs could widen accessibility and safety gaps for vulnerable communities.

LEAD AGENCY

San Bernardino County Public Works

PARTNER AGENCIES

Vehicle Manufacturers

Data Vendors

FUNDING SOURCES

Caltrans Highway Safety Improvement Program

California Office of Traffic Safety (OTS) Grants

County Funds

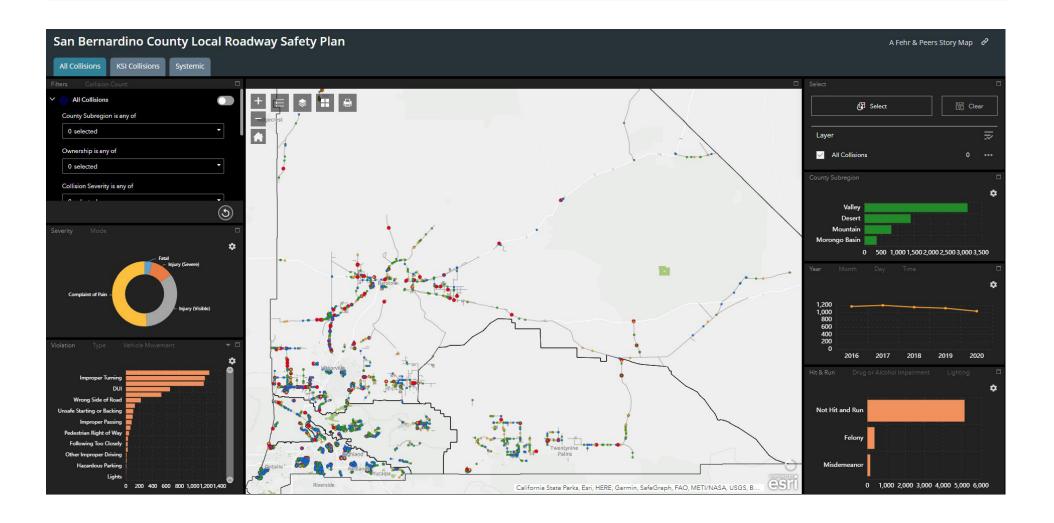
CONTEXT

Countywide

Role of Technology and Data in Development of this Plan

Technology and new big data sources were used in the identification of safety trends and recommendations in several ways throughout this plan:

- > **Data Dashboard:** An interactive data-dashboard was created to allow San Bernardino staff and the project team to explore dynamic maps and charts of more than 20 factors related to collision and roadways characteristic data, and the relationship between these factors.
- > In-Vehicle Incident Data: This analysis includes the analysis of incident data collected from connected vehicles through a data vendor called Wejo. With this data, we were able to summarize hot spot locations for hard braking and acceleration incidents, as well as identifying speeding location hot spots, where observed speeds exceeded posted speeds. These hot spots were compared against collision history.





Chapter 7

Systemic Trends and Strategies

This chapter outlines the ten collision profiles selected for project development. Each collision profile represents a systemic trend, or combinations of factors that contributed to highest quantity of severe injury or fatal collisions. Countermeasures proposed to address systemic trends are also presented.

Systemic Analysis and Project Prioritization

Systemic analysis is a proactive safety approach that focuses on evaluating an entire roadway network using a defined set of criteria. It looks at collision history on an aggregate basis to identify high-risk roadway characteristics in addition to looking at high-collision locations. By merging roadway and intersection features with collision data, relationships can be uncovered between contextual factors and the risk of frequent and severe collisions.

Collision data (2016-2020) in unincorporated San Bernardino County was paired with geographic roadway and other contextual data to develop collision types. Outputs from this analysis were used to populate a set of matrices that allow us to look at crosstabs - collision data in rows and geographic data in columns, for collisions across unincorporated San Bernardino County and each of its four County Subregion: 1) Desert, 2) Morongo Basin, 3) Mountain, and 4) Valley.

The matrices allowed for identification of the combinations of factors that contributed to highest quantity of collisions resulting in severe injury or fatalities, and combinations that led to the highest Weighted Collision Score. The Weighted Collision Score represents the equivalent numbers of property-damage only collisions that occur for relative comparison between collision profiles.

Collision Profiles

Each collision profile highlights key locations throughout the County and a set of recommended countermeasures aimed at reducing the number and severity of collisions. For each collision profile, safety strategies are separated into primary and secondary countermeasures. Primary countermeasures are best suited for competitive HSIP grant applications. Secondary countermeasures are additional recommended strategies based on existing infrastructure, field observations, and stakeholder input.

Coll	ision Profiles	Most Applicable Region
1	Hit Object Collisions on Major Highways at locations with Excessive Speeding	Countywide
2	Broadside Collisions on Major Highways at Unsignalized Intersections	Countywide
3	Head-On Collisions on Roadways with a Posted Speed Limit of 40 mph or greater	Countywide
4	Collisions caused by Unsafe Speeds	Mountain
5	Collisions at Signalized Intersections with Unprotected Left-Turns	Valley & Desert
6	Vehicle-Pedestrian Collisions along roadways with Sidewalk Gaps and Not Near Streetlights	Valley & Desert
7	Collisions at Unsignalized Intersections with Pedestrians Not in a Marked Crosswalk	Valley & Desert
8	Broadside Collisions at Unsignalized Intersections with Bicycles	Valley & Mountain
9	Overturned Collisions near Unsignalized Intersections with Motorcycles	Countywide
10	Overnight collisions involving Driving Under the Influence	Countywide

Hit Object Collisions on Major Highways at Locations with Excessive Speeding

KEY STATISTICS

Total Collisions

224

4% of all collisions

KSI Collisions

62

7% of KSI collisions

KEY LOCATIONS

Near intersections:

- Greenspot Road (State Hwy 38) & Baldwin Lane
- > State Highway 38 & Valley of the Falls Drive
- > Cajon Boulevard & Kendall Drive
- Baker Boulevard & Death Valley Road (State Hwy 127)
- Amboy Road & National Chloride Co-America Driveway
- > State Street & Nolan Street
- > Pioneertown Road & Sandy Way

Along roadway segments:

- Arrowhead Lake Road between
 Havenhurst Road & Whitehaven Street
- > Amboy Road along Unnamed Wash
- Amboy Road North and South of Pipe Line Road
- Rock Springs Road between Glendale Avenue & the Mojave River
- > Sheep Creek Road south of Rancho Road
- › Wilson Ranch Road between Sunset Road & Goss Road
- Santa Fe Avenue between Summerset
 Road & Mountain View Road
- National Trails Highway between
 Martino Drive & Pioneer Road

MOST APPLICABLE REGION

Countywide

KEY TRENDS		
Top Violations		
▲ Improper Turning	54%	
▲ Driving Under the Influence	23%	
Time of Day		
▲ Occurred At Night	42%	
Location		
▲ Occurred Near Intersections	63%	

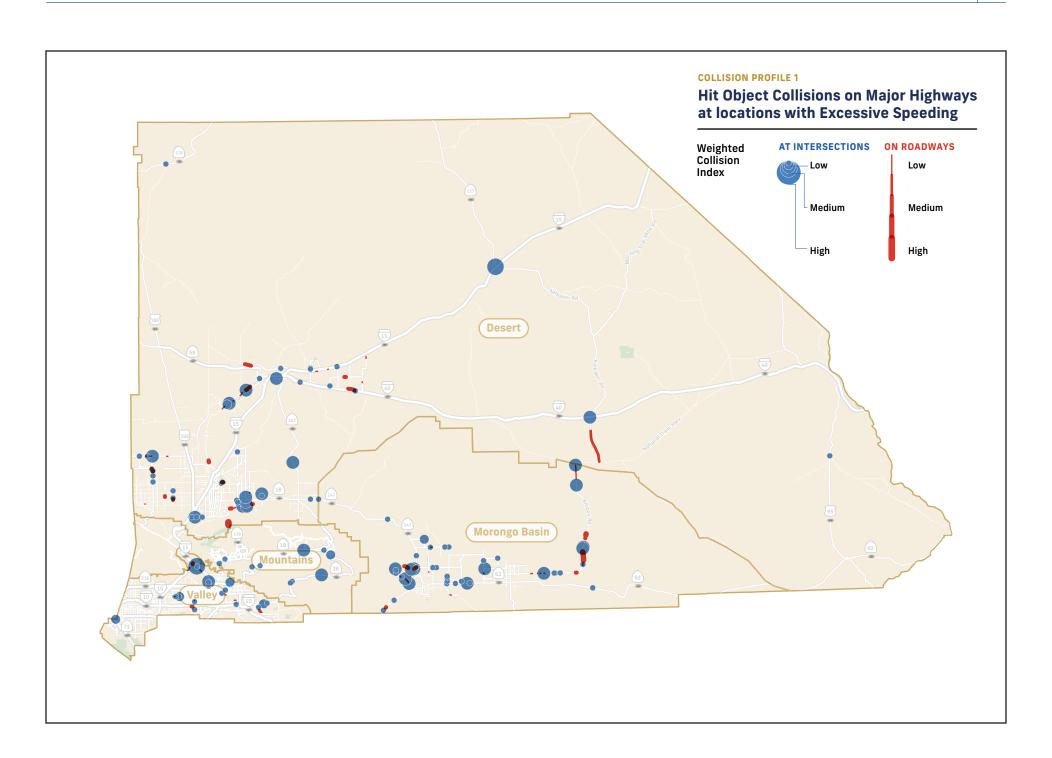
TIMELINE FOR IMPLEMENTATION

Short-term (HSIP Cycle 11 application)

PRIMARY COUNTERMEASURES

Countermeasure	Crash Reduction Factor	
Install pavement reflectors (raised pavement markers) along centerline and edgeline	25%	
Install centerline rumble stripes	20%	
Install edgeline rumble stripes	15%	
Widen unpaved shoulder	30%	

- Install object markers and roadside delineators
- > Install speed limit signs more frequently
- > Install speed feedback signs
- Automated Speed Enforcement
- > Speed Limit Modification
- > Safe Speeds Education Campaign



Broadside Collisions on Major Highways at Unsignalized Intersections

KEY STATISTICS

Total Collisions

488

9% of all collisions

KSI Collisions

66

8% of KSI collisions

KEY LOCATIONS

- > Indian Trail & Lear Avenue
- North Shore Drive (State Hwy 38) & Division Drive
- > Agua Mansa Road & El Rivino Road
- > Dale Evans Parkway & Stoddard Wells Road
- North Shore Drive (State Hwy 18) & Green Way Drive
- Old Woman Springs Road (State Hwy 247) & Lincoln Road
- > Indian Trail & Morongo Road
- > State Highway 18 & High Road

- > Arrow Boulevard & Almond Avenue
- › Baseline Street & Dwight Way
- > Crafton Avenue & Nice Avenue
- > State Highway 138 & Summit Valley Road
- > Dale Evans Parkway & Quarry Road
- > 40th Street & F Street
- > Arrow Boulevard & Mulberry Avenue
- > Arrow Boulevard & Ilex Street
- > Valley Boulevard & Larch Avenue
- > State Street & Mallory Street

MOST APPLICABLE REGION

Countywide)

KEY TRENDS	
Top Violations	
▲ Right-of-Way	66%
▲ Traffic Signals and Signs	17 %
Turn Conflict	
▲ Left Turn	45%
Time of Day	
▲ Occurred At Night	21%

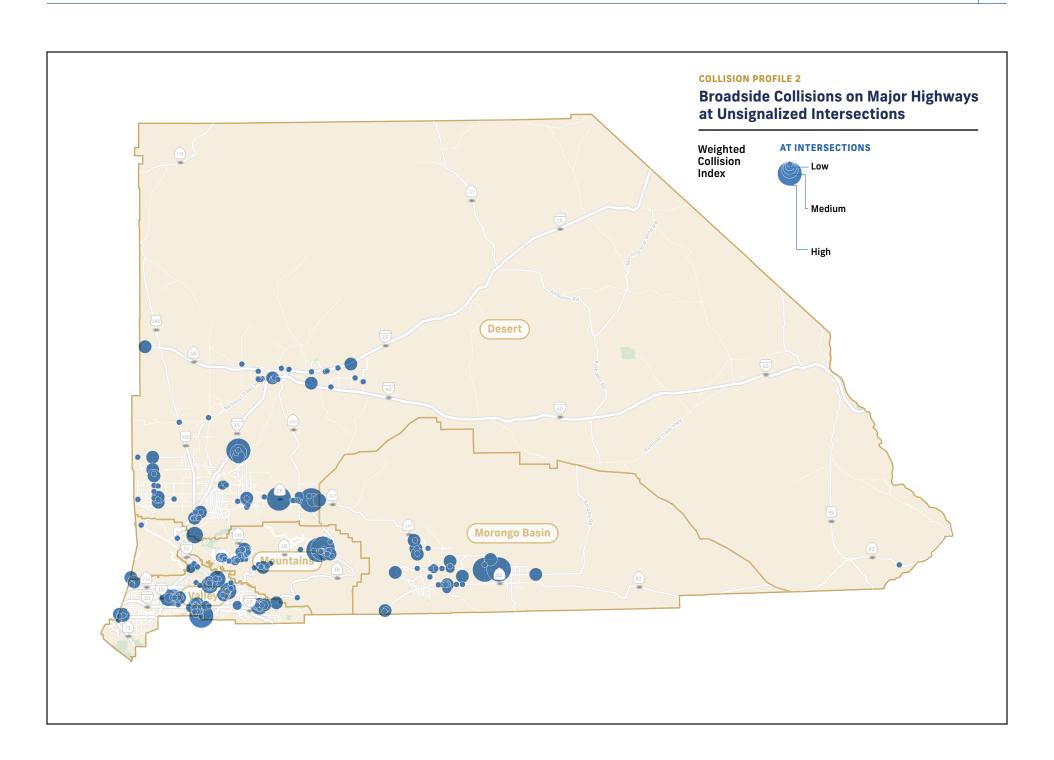
TIMELINE FOR IMPLEMENTATION

Short-term (HSIP Cycle 11 application)

PRIMARY COUNTERMEASURES

Countermeasure Crash Reduction Fact	
Install intersection warning signs	15%
Install flashing beacon on stop-controlled approach	15%
Install transverse rumble strips on stop-controlled approach	20%
Install splitter islands on the minor road approaches	40%

- Narrow lane width on Major Road approaches using painted medians (See FHWA publication, Two Low-Cost Safety Concepts for Two-Way Stop-Controlled, Rural Intersections on High-Speed Two-Lane, Two-Way Roadways)
- Investigate alternative control strategies (i.e., roundabout, all-way stop, signal)



Head-On Collisions on roadways with a Posted Speed Limit of 40 mph or greater

KEY STATISTICS

Total Collisions

408

7% of all collisions

KSI Collisions

63

7% of KSI collisions

KEY LOCATIONS

Near intersections:

- > Riverside Drive & Towne Avenue
- > Del Rosa Avenue & Date Street
- > Valley Bouleyard & Rancho Avenue
- > State Highway 173 & North Bay Road
- Valley Boulevard & Linden Avenue
- > Palmdale Road (State Hwy 18) & Sheep Creek Road
- > Phelan Road & Zing Drive

Along roadway segments:

- Cajon Boulevard between Cleghorn Road and Kenwood Avenue
- Rock Springs Road between Glendale Avenue & the Mojave River
- City Creek Road (State Hwy 330) east of Live Oak Drive
- > Mountain Avenue south of Joatngna Trailhead
- > Lytle Creek Road west of Lytle Creek Ranger Station
- 5th Street between Cooley Street & San Bernardino City Community Day School
- National Trails Highway between Bryman Road & Turner Road
- Monte Vista Avenue between Francis Avenue & Orange Blossom Lane
- Old State Highway 58 between Ramierz Road & Unnamed Driveway

- Phelan Road between Smith Road & Acanthus Street
- Phelan Road between Johnson Road & Monte Vista Road
- Cherry Avenue between Rosemary Drive & Hunter Street
- Amboy Road between Chadwick Road & Bauman Drive
- Old State Highway 48 between Lassen Avenue & Desert Road
- Indian Trail between Desert Heights Drive & Knoll Drive
- > Oak Glen Road east of Chagall Road
- National Trails Highway between Shallow Springs Road & Markham Road
- National Trails Highway north of CalPortland Driveway
- > Fort Irwin Road north of Old Yermo Cutoff
- Stoddard Wells Road between Slash X Ranch Road & Clendon Road
- National Trails Highway between Saltus Road & Kelbaker Road
- Needles Highway between Soto Ranch Road & Aha Macav Parkway
- > National Trails Highway south of La Delta
- National Trails Highway between Corral Road & Frontier Road
- > National Trails Frontage Road west of Frontier Road

MOST APPLICABLE REGION

Countywide)

KEY TRENDS	
Top Violations	
▲ Right-of-Way	26%
▲ Wrong Side of Road	12%
A Driving Under the Influence	7 %
Turn Conflict	
▲ Left Turn	45%
Time of Day	
▲ Occurred At Night	24%

SECONDARY COUNTERMEASURES

- Create 4-foot-wide painted median*
- Install flexible posts in the median where passing is not permitted

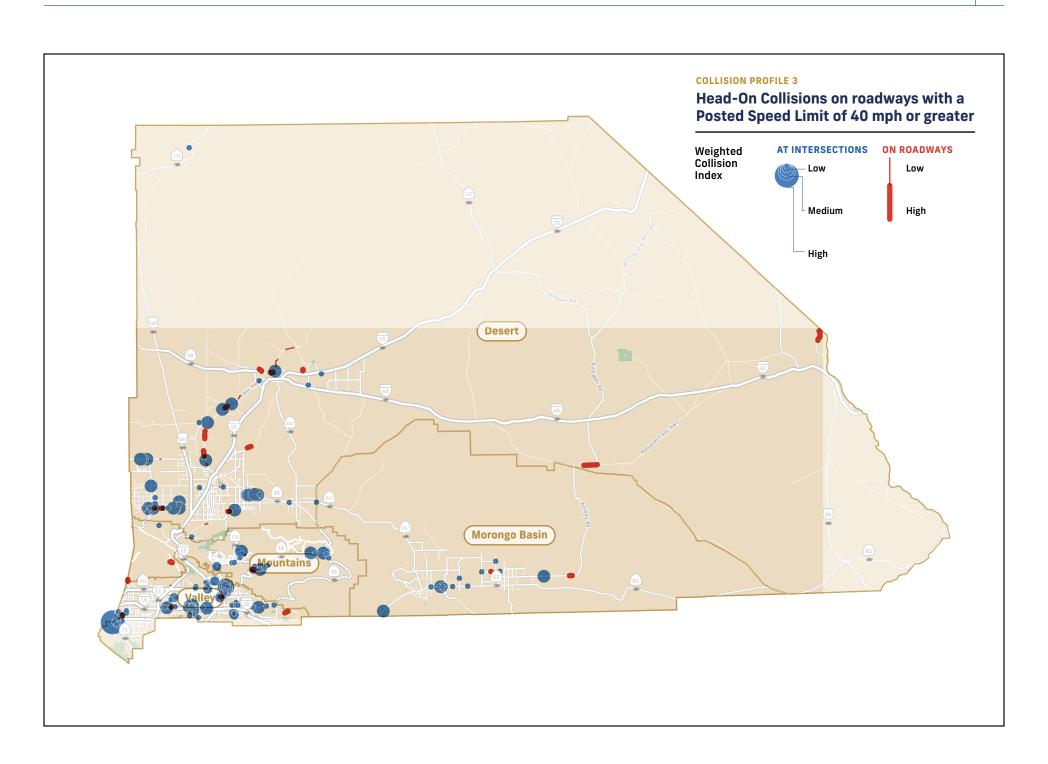
*The centerline edge lines would go on each edge of the painted median, creating a horizontal buffer for cars in opposing directions to mistakenly drift, run over the centerline and then space to recover without crossing into opposing lane of traffic.

TIMELINE FOR IMPLEMENTATION

Short-term (HSIP Cycle 11 application)

PRIMARY COUNTERMEASURES

Countermeasure	Crash Reduction Factor	
Install pavement reflectors (raised pavement markers) along centerline	25%	
Install centerline rumble stripes	20%	



Collisions caused by Unsafe Speeds

KEY STATISTICS

Total Collisions

218

27% of all collisions in the Mountain Subregion

KSI Collisions

35

27% of KSI collisions in the <u>Mountain</u> Subregion

KEY LOCATIONS

Near intersections:

- > State Highway 138 & Cajon Boulevard
- › Big Bear Boulevard (State Hwy18) & Rosehill Drive
- > State Highway 173 & Rainbow Drive
- > Lytle Creek Road & Middle Fork Road
- > Lake Drive & Pioneer Camp Road
- State Highway 18 & Lake Gregory
 Drive (State Hwy 189)

Along roadway segments:

- Lytle Creek Road between Penstock
 Ridge & Big Tree Cucamonga
- City Creek Road (State Hwy 330)
 east of Live Oak Drive
- North Shore Drive (State Hwy 38) between Mound Street & Van Dusen Canyon Road

- Glass Road between State
 Highway 38 & Hill Ranch
- Mountain Avenue south of Joatngna Trailhead
- Birchwood Drive between Cottonwood Lane & Pinewood Drive
- Lone Pine Canyon Road south of Mojave Scenic Drive
- Saint Bernard Lane between Matterhorn Drive & Polar Drive
- Lone Pine Canyon Road between Swarthout Canyon Road & State Highway 138
- Lytle Creek Road between
 Penstock Ridge & Old CC Spur
- > Lytle Creek Road west of Sycamore Drive
- State Highway 173 between Rainbow Drive & Crest Estates Drive
- > State Highway 18 north of Nob Hill Drive

MOST APPLICABLE REGION

(Mountain Subregion)

KEY TRENDS	
Top Crash Types	
A Rear End	38%
A Hit Object	28%
Top KSI Crash Types	
A Hit Object	43%
▲ Overturned	31%
Location	
▲ Unsignalized Intersection	71 %
▲ Curved Roadway	N/A

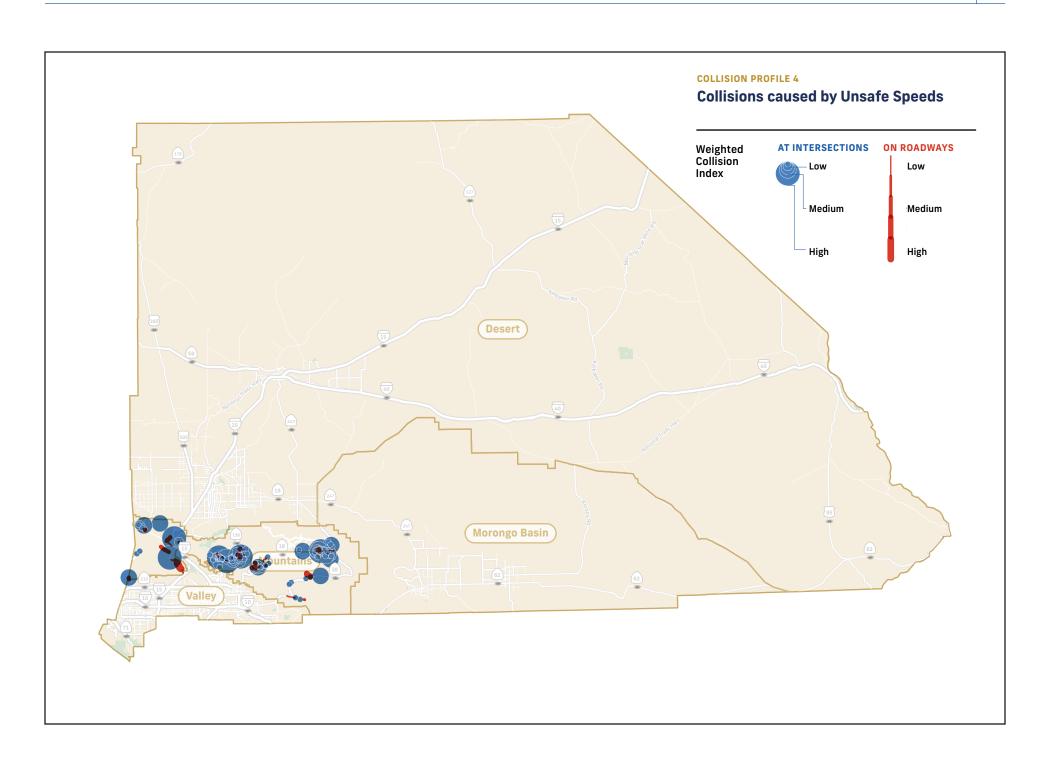
TIMELINE FOR IMPLEMENTATION

Short-term (HSIP Cycle 11 application)

PRIMARY COUNTERMEASURES

Countermeasure	Crash Reduction Factor	
High friction surface treatment along curved roadway segments	55%	
Install chevron signs on horizontal curves	40%	
Install impact attenuators as guardrail end treatments	25%	

- Restripe edge-Lines and centerlines with 6" retroreflective lane markings
- Install curve advance warning signs with advisory speed
- > Install speed limit signs more frequently
- > Install speed feedback signs
- > Automated Speed Enforcement
- > Speed Limit Modification
- Safe Speeds Education Campaign



Collisions at Signalized Intersections with Unprotected Left-Turns

KEY STATISTICS

Total Collisions

630

14% of all collisions in the Valley & Desert Subregion

KSI Collisions

42

7% of KSI collisions in the <u>Valley &</u> <u>Desert Subregion</u>

KEY LOCATIONS

- > Riverside Drive & Towne Avenue
- > Valley Boulevard & Linden Avenue
- > Arrow Boulevard & Beech Avenue
- > Del Rosa Avenue & Date Street
- > Del Rosa Avenue & Lynwood Drive
- > 5th Street & Tippecanoe Avenue
- > Valley Boulevard & Redwood Avenue
- > Wilson Avenue & San Sevaine Road
- > Waterman Avenue & 3rd Street
- > Waterman Avenue & 5th Street

- > Highland Avenue & California Street
- > Valley Boulevard & Alder Avenue
- > Valley Boulevard & Locust Avenue
- > Cedar Avenue & Orange Street
- > Rancho Avenue & Olive Street
- > Mission Boulevard & Benson Avenue
- > Foothill Boulevard & Hemlock Avenue
- > 40th Street & E Street
- > California Street & Almond Avenue
- > Rock Springs Road & Deep Creek Road

Crash Reduction Factor

MOST APPLICABLE REGION

Valley & Desert Subregions)

KEY TRENDS	
Top Crash Types	
A Broadside	46%
A Rear End	24%
Top KSI Crash Types	
▲ Broadside	36%
▲ Vehicle/Pedestrian	29%
Top Violations	
▲ Right-Of-Way	30%
▲ Traffic Signal and Signs	23%
▲ Unsafe Speed	19%
Top KSI Violations	
▲ Right-Of-Way	21%
▲ Improper Turning	19%
▲ Driving Under the Influence	19%

TIMELINE FOR IMPLEMENTATION

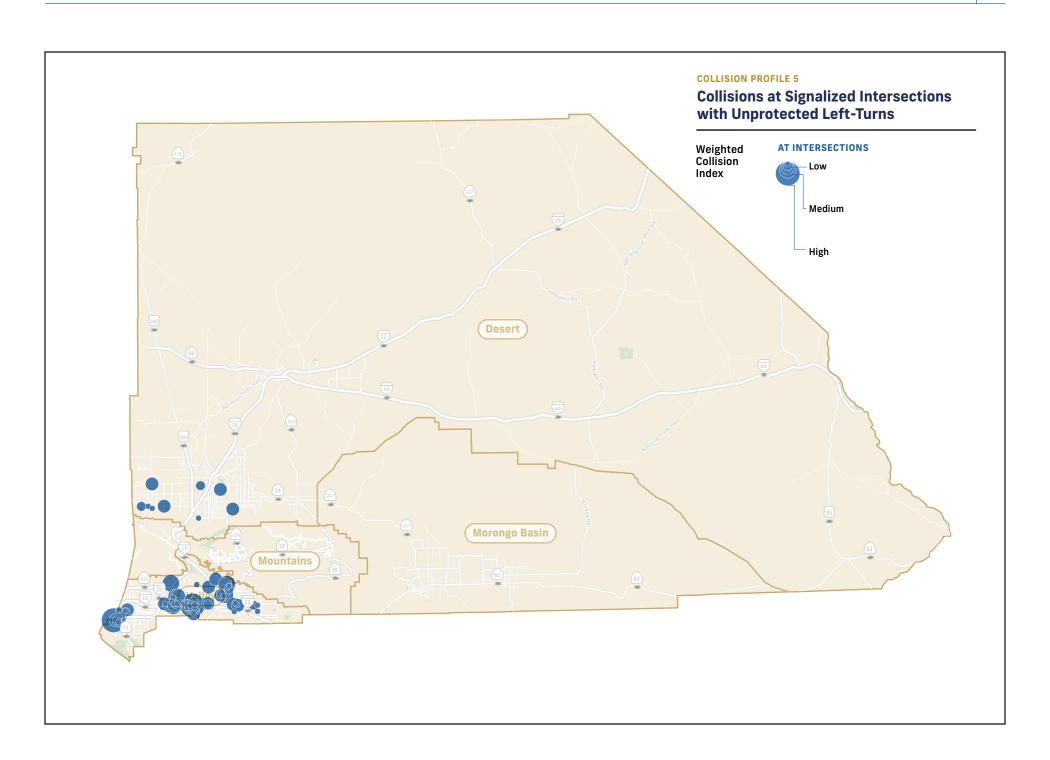
Long-term

Countermeasure

PRIMARY COUNTERMEASURES

	ordon Reddetion ractor
Install left-turn lane and provide protected turn phasing	55%
Provide protected left turn phasing	30%
Extend yellow and all red time	15%
Retroreflective backplates on signals	15%

- > Advanced Dilemma Zone detection
- Red Light Camera
- > Traffic Signal Confirmation Light



Vehicle-Pedestrian Collisions along roadways with Sidewalk Gaps and Not Near Streetlights

KEY STATISTICS

Total Collisions

75

31% of pedestrian collisions

in the <u>Valley &</u>
<u>Desert Subregion</u>

KSI Collisions

38

KSI collisions in the <u>Valley &</u> Desert Subregion

38% of pedestrian

KEY LOCATIONS

- 5th Street between Waterman
 Avenue and Tippecanoe Avenue
- National Trails Highway between Mountain
 View Road & Unnamed Driveway
- > Nolan Street west of California Street
- > Trona Road west of Main Street

- 41st Street between 3rd Avenue & Mountain Drive
- National Trails Highway south of Peso Court
- Cajon Boulevard between Applewhite Road & Perdew Canyon
- > Oak Glen Road east of Potato Canyon Road

MOST APPLICABLE REGION

Valley & Desert Subregions

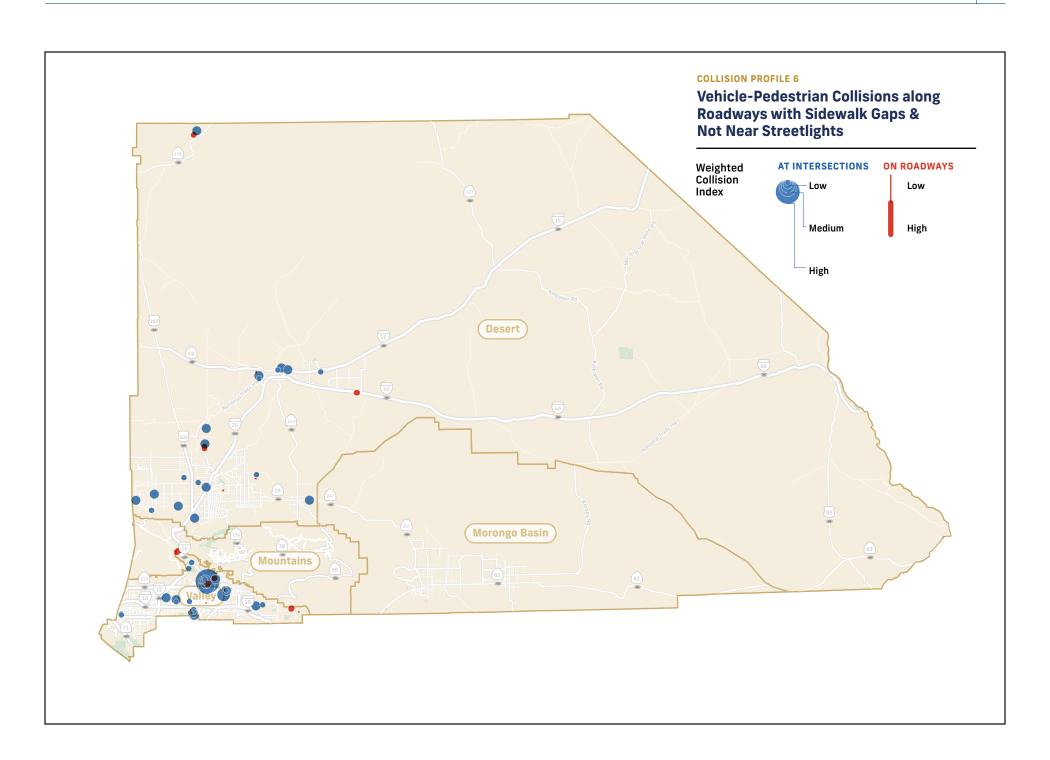
KEY TRENDS	
Action During Collision	
▲ Walking in Road or Along Shoulder	60%
▲ Crossing Mid-Block Without Marked Crosswalk	35%
Time of Day	
▲ Occurred At Night (All Pedestrian Collisions)	32%

TIMELINE FOR IMPLEMENTATION

Long-term

PRIMARY COUNTERMEASURES Countermeasure Crash Reduction Factor Add roadway segment lighting 35% Install sidewalks or paved shoulder 80%

- Safe Routes to School Program
- Pedestrian/Bicycle Safety and Homeless Services



Collisions at Unsignalized Intersections with Pedestrians Not in a Marked Crosswalk

KEY STATISTICS

Total Collisions

55

23% of pedestrian collisions

in the <u>Valley &</u> <u>Desert Subregion</u>

KSI Collisions

24

KSI collisions in the <u>Valley &</u> Desert Subregion

24% of pedestrian

KEY LOCATIONS

- > Cajon Boulevard & Kern Street
- > Macy Street & Porter Street
- > Cedar Avenue & Cedar Place
- > Arrow Boulevard & Ilex Street
- > Ranchero Road & Mesa Linda Street
- > Phelan Road & Beaver Avenue
- > Merrill Avenue & Beech Avenue
- > Vermont Street & 1st Avenue
- > Mentone Boulevard & Chrysolite Avenue
- > Arrow Boulevard & Almond Avenue

- > State Street & Darby Street
- > Cedar Avenue & Grove Place
- > Mentone Boulevard & Opal Avenue
- > Mentone Boulevard & Agate Avenue
- > Nice Avenue & Turquoise Avenue
- > Linden Avenue & Montrose Street
- > Del Rosa Avenue & Pacific Street
- > Highland Avenue & Monte Vista Drive
- > Highland Avenue & Merito Place
- > Phelan Road & Clovis Road

MOST APPLICABLE REGION

Valley & Desert Subregions)

KEY TRENDS	
Action During Collision	
▲ Not in Marked Crosswalk (All & KSI Pedestrian Collisions)	40%
Time of Day	
▲ Occurred At Night (All Pedestrian Collisions)	58%
• Occurred At Night (KSI Pedestrian Collisions)	68%
Location	
▲ On a Local or Collector Roadway	25%

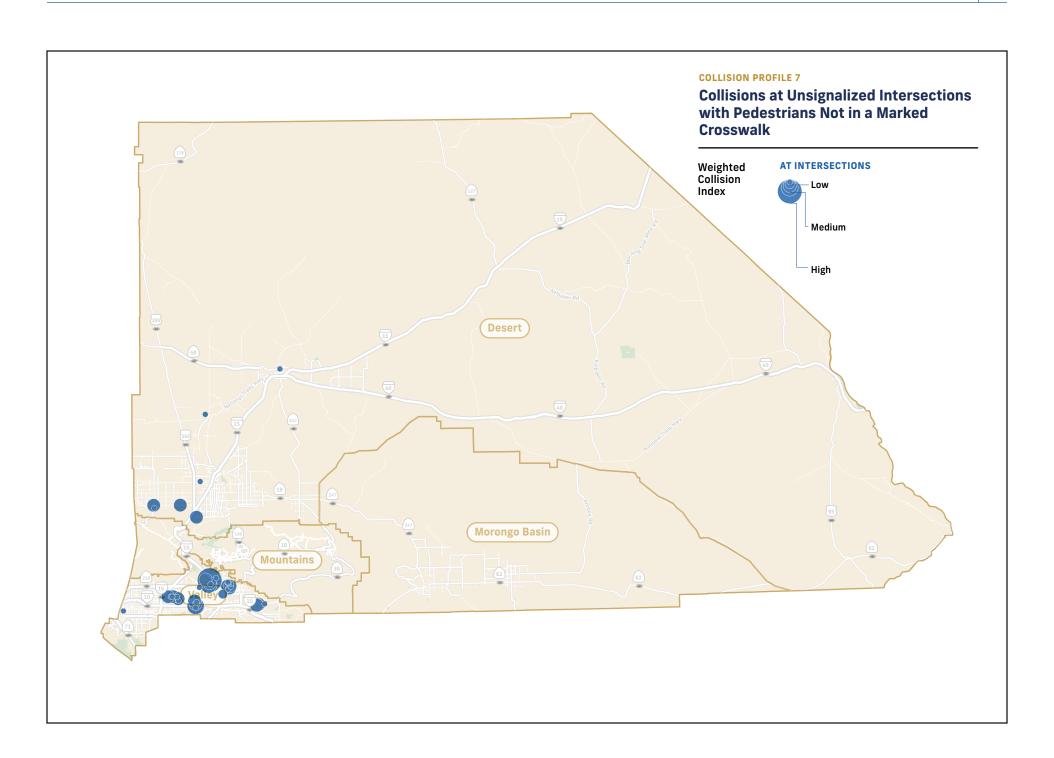
TIMELINE FOR IMPLEMENTATION

Long-term

PRIMARY COUNTERMEASURES

Countermeasure	Crash Reduction Factor
Add intersection lighting	40%
Enhanced safety feature for pedestrian crossing (e.g., flashing beacons, curb extensions, advanced yield markings)	35%
New pedestrian crossing	25%

- High visibility crosswalks at unsignalized intersections
- Rectangular Rapid Flashing Beacons
- › Pedestrian Hybrid Beacons
- Refresh pavement markings
- > Safe Routes to School Program
- Pedestrian/Bicycle Safety and Homeless Services



Broadside Collisions at Unsignalized Intersections with Bicycles

KEY STATISTICS

Total Collisions

29

21% of bicycle collisions in the Valley & Mountain Subregion

KSI Collisions

11

38% of bicycle KSI collisions in the <u>Valley</u> & <u>Mountain</u> Subregion

KEY LOCATIONS

- North Shore Drive (State Hwy 18) & Green Way Drive
- > State Highway 173 & North Bay Road
- > Valley Boulevard & Cherry Avenue
- > Francis Avenue & East End Avenue
- > Arrow Boulevard & Lime Avenue

- > Mountain Avenue & 25th Street
- > Merrill Avenue & Robina Street
- > Ada Avenue & State Street
- > Brentwood Drive & San Benito Lane
- Hook Creek Road & Lake View Drive

MOST APPLICABLE REGION

(Valley & Mountain Subregions)

KEY TRENDS	
Top Violations	
▲ Right-Of-Way	48%
▲ Traffic Signal and Signs	21%
Vehicle Action During Collision	
▲ Proceeding Straight	62%
▲ Making a Left Turn	21%
▲ Making a Right Turn	10%
▲ Other Vehicle Movements	7 %

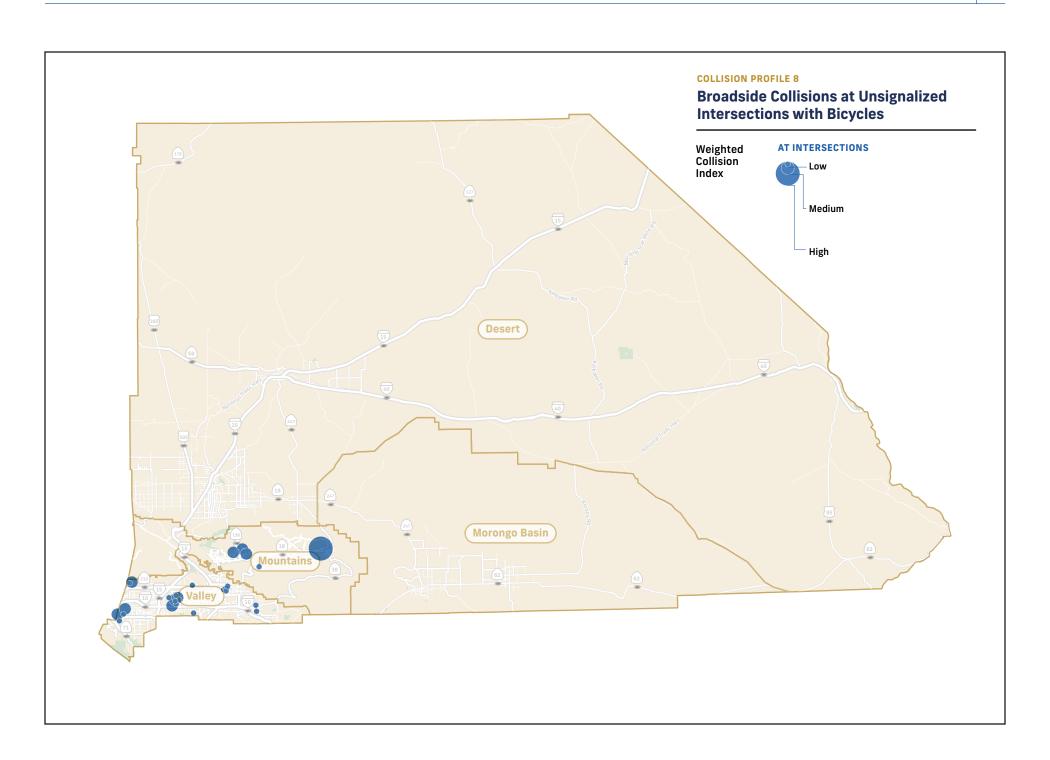
TIMELINE FOR IMPLEMENTATION

Long-term

PRIMARY COUNTERMEASURES

Countermeasure	Crash Reduction Factor
Add intersection lighting	40%
Install splitter islands on the minor road approaches	40%
Enhanced safety feature for crossing (e.g., flashing beacons, curb extensions, advanced yield markings)	35%
New pedestrian/bicycle crossing	25%

- High visibility crosswalks at unsignalized intersections
- Rectangular Rapid Flashing Beacons
- > Pedestrian Hybrid Beacons
- Refresh pavement markings
- > Safe Routes to School Program
- Pedestrian/Bicycle Safety and Homeless Services



Overturned Collisions near Unsignalized Intersections with Motorcycles

KEY STATISTICS

Total Collisions

89

18% of motorcycle collisions

KSI Collisions

18

10% of KSI motorcycle collisions

KEY LOCATIONS

Near intersections:

- City Creek Drive (State Hwy 330) & City Creek Road
- › Oak Glen Road & Potato Canyon Road
- > State Highway 138 & Cajon Boulevard
- > State Highway 173 & Rainbow Drive
- > Lytle Creek Road & Middle Fork Road
- Angeles Crest Highway (State Hwy2) & Wright Mountain Road
- Twentynine-Palms Highway & West Drive/Mountain View Drive
- Mentone Boulevard (State Hwy 38) & Sapphire Avenue

- > Marshall Boulevard & Sterling Avenue
- > Pole Line Road & Decker Avenue
- > Camarillo Avenue & Lorelli Drive
- Newberry Road & Aleppo Lane
- > Ranchero Street & Bandicoot Trail
- > Jobs Peak Road & Church Street
- Big Bear Boulevard (State Hwy 18) & Dawn Drive
- > West Village Lane & N Village Lane
- Malachite Avenue & Brighton Alley
- > Oak Glen Road & Los Rios Rancho Driveway

MOST APPLICABLE REGION

(Countywide)

KEY TRENDS	
Top Violations	
▲ Improper Turning	43%
▲ Unsafe Speed	36%
Action During Collision	
A Proceeding Straight	39%
▲ Making a Left Turn	11%
▲ Making a Right Turn	3%
▲ Other Vehicle Movements	47 %

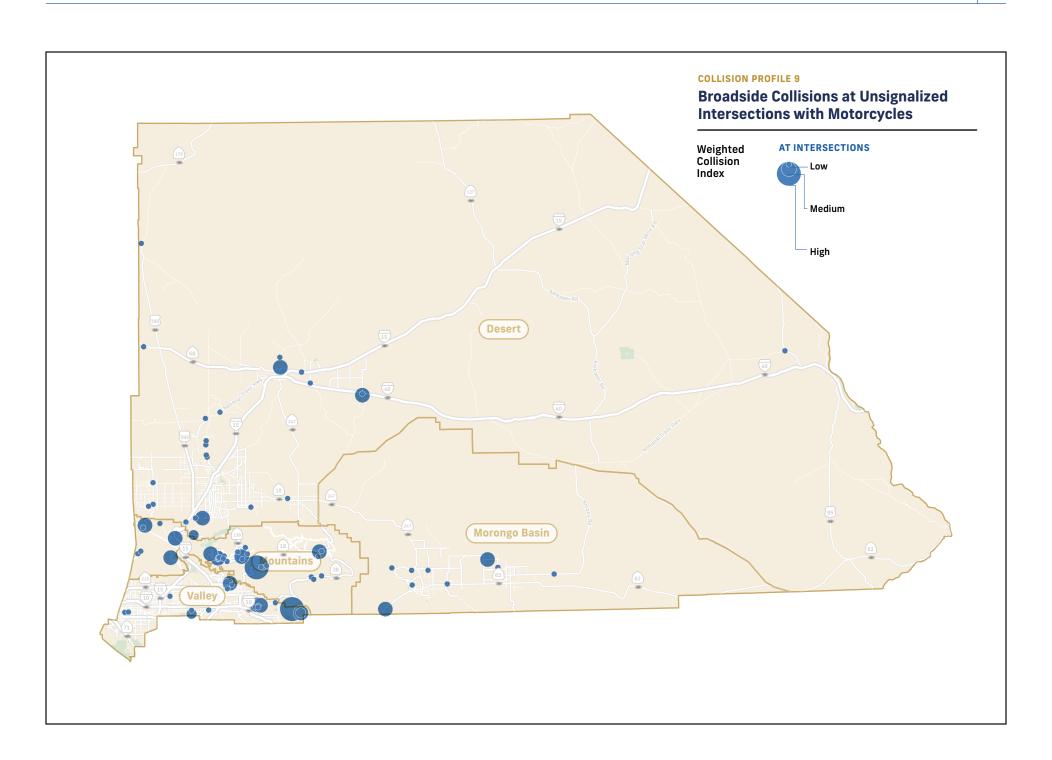
TIMELINE FOR IMPLEMENTATION

Long-term

PRIMARY COUNTERMEASURES

Countermeasure	Crash Reduction Factor
Add intersection lighting	40%
High friction surface treatment at intersection	55%
Install splitter islands on the minor road approaches	40%
Install raised median on major road approaches	25%

- Install right-turn and left-turn pockets
- > Install "No Passing Zone" (W14-3) signs



Overnight Collisions involving Driving Under the Influence

KEY STATISTICS

Total Collisions

397

7% of all collisions

KSI Collisions

90

11% of KSI collisions

KEY LOCATIONS

Near intersections:

- > National Trails Highway & Oak Grove Road
- > Mill Creek Road (State Hwy 38) & Garnet Street
- > 7th Street/Armstrong Road & Locust Avenue
- > Valley Boulevard & Cherry Avenue
- > Valley Boulevard & Linden Avenue
- Alabama Street & River Bluff Avenue
- > Valley Boulevard & Commerce Drive
- Arrow Boulevard & Cherry Avenue
- > Del Rosa Drive & Fisher Street

Along roadway segments:

- Rock Springs Road between Glendale Avenue & the Mojave River
- > Parker Dam Road west of Bluewater
- Ogden Street between Bronson Street & Vermont Street
- Arrowhead Lake Road south of Whitehaven Street

MOST APPLICABLE REGION

Countywide

KEY TRENDS	
Top Crash Types	
A Hit Object	49%
A Rear End	14%
Top KSI Crash Types	
A Hit Object	46%
▲ Overturned	16%
Speed	
▲ On Roadways with Posted Speed Limits of 40 mph or more	50%

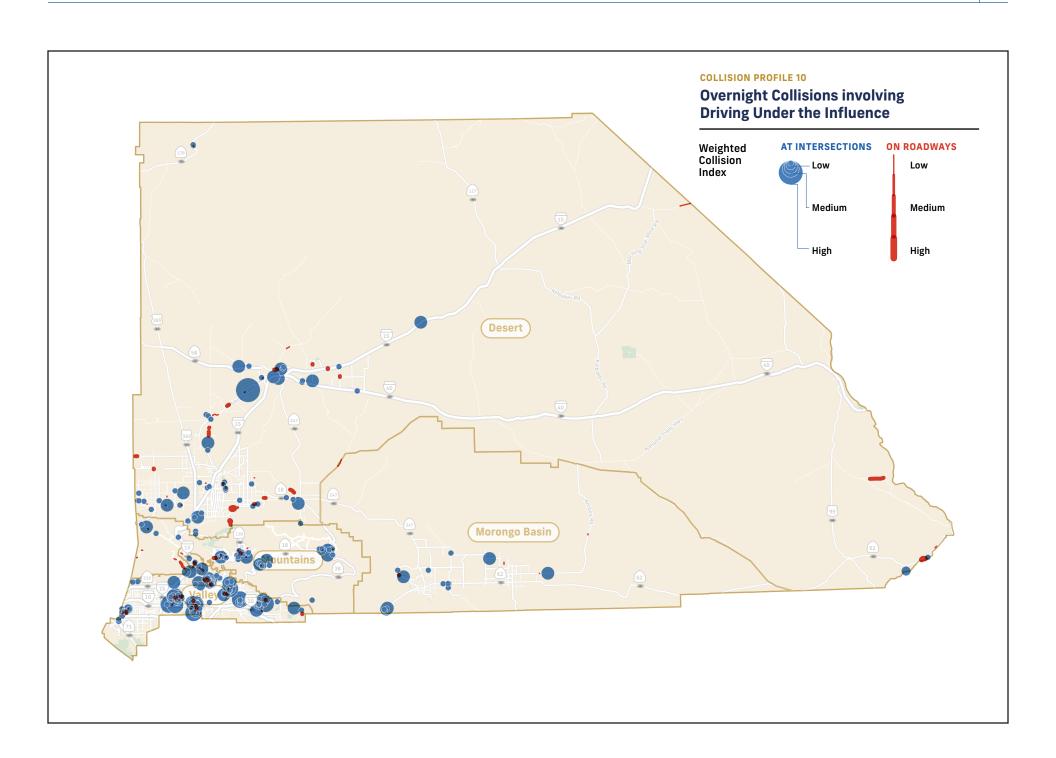
TIMELINE FOR IMPLEMENTATION

Long-term

PRIMARY COUNTERMEASURES

Countermeasure	Crash Reduction Facto	
Install pavement reflectors (raised pavement markers) along centerline and edgeline	25%	
Install centerline rumble stripes	20%	
Install edgeline rumble stripes	15%	
Widen unpaved shoulder	30%	

- Education and Public Awareness
 Campaign Targeted at DUI
- > Publicized Sobriety Checkpoints
- > High-Visibility Enforcement
- > Safe Ride Home
- > Traffic Signal Confirmation Light





Chapter 8

Hot Spots and Strategies

This chapter outlines the ten hot spots selected for project development. Collision trends for each hot spot are summarized along with countermeasures proposed to address safety trends.

Hot Spot Analysis and Project Prioritization

Hot spot analysis is a traditional safety approach that identifies high-risk locations based on collision history. The top intersections and roadway segments that account for a disproportionate share of collisions were identified as hot spots. Collisions were categorized as intersection collisions if they occurred within a 250foot radius of an intersection: all other collisions were classified as a roadway segment collision.

Collision data (2016-2020)

in unincorporated San Bernardino County was disaggregated by roadway segment and intersection to determine hot spot locations with the highest quantity of collisions resulting in severe injury or fatalities, and locations with the highest Weighted Collision Score, The **Weighted Collision Score** represents the equivalent numbers of property-damage only collisions that occur for relative comparison between hot spot locations. Hot spots adjacent to one another were grouped as corridors if applicable. The full list of intersection and roadway segment hot spots can be found in the appendix.

Collision Hot Spots

The top ten hot spot locations are listed on the corresponding table. Hot spot locations located within a state-designated or federally-designated disadvantaged community are noted.

Collision Hot Spot Locations		Subregion Leng	Length	Collisions			Disadv.		
COI	Comston not Spot Locations Subregi		Subregion (mi.) To		KSI	Bike	Ped	Community	
1	Arrow Route Between Hickory Avenue and Almeria Avenue	Valley	3.1	131	18	3	8	♥ Federal ♥ State	
2	Oak Glen Road West of the City of Yucaipa (Generally between Chagall Road and Pisgah Peak-Oak Glen Road)	Valley	7.3	34	10	0	1	⊗ Federal ⊗ State	
3	Cajon Boulevard Between June Street and California Street	Valley	1.5	29	10	1	7	● Federal ● State	
4	Cajon Boulevard Between Cleghorn Road and Kenwood Avenue	Valley/ Mountain	6.3	78	19	1	1	● Federal ● State	
5	Intersection of SR-330 & SR-18 (Hilltop Boulevard)/Hunsaker Drive	Mountain	-	7	4	0	1	⊘ Federal ⊗ State	
5	Intersection of SR-38 (Greenspot Boulevard) & Baldwin Lane	Mountain	-	4	4	0	0	♥ Federal ⊗ State	
6	Phelan Road Between SR-138 and Los Banos Avenue	Desert	12.1	139	23	1	5	♥ Federal ⊗ State	
7	Ranchero Road Between Mariposa Road and Topaz Avenue	Desert	3.2	53	13	1	3	⊗ Federal ⊗ State	
8	National Trails Highway Between the Mohave River Bridge and Amarylis Avenue	Desert	25.2	95	31	3	3	© Federal © State	
9	Camp Rock Road* Between Rodeo Road and SR-249 (Old Woman Springs Road)	Desert	1.5	7	3	0	1	⊘ Federal ⊗ State	
10	Indian Trail Between Indian Cove Road and Mesquite Springs Road	Morongo Basin	4.8	16	8	0	1	⊘ Federal ⊗ State	

^{*}Note: Collision data is representative of injury collisions occurring between 2016-2020 with exception of **Hot Spot location 9, Camp Rock Road**. Collision data for Camp Rock Road is inclusive of a recent fatality that occurred in 2021 and is representative of injury collisions occurring between 2017-2021.

Arrow Route

Between Hickory Avenue and Almeria Avenue



Subregion Valley

Length
3.1 miles

Classification Major highway

Number of lanes 2

Posted speed 45 MPH

Average annual daily traffic 14,000-16,000

Within Disadvantaged Community?

Federal

State

TIMELINE FOR IMPLEMENTATION

Short-term (HSIP Cycle 11 application)

DESCRIPTION

This segment of Arrow Route is part of an east-west corridor that extends between the cities of Rancho Cucamonga and Fontana. This stretch includes both residential and industrial uses, such as warehouses and automotive facilities; the cross-sectional width of the roadway varies due to piecemeal development of parcels along the corridor.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

131

18

KEY TRENDS, 2016-2020

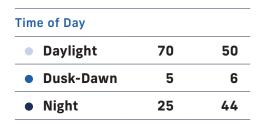
A Broadside collisions represent 40-50% of all and KSI collisions, occurring mostly at side-street stop-controlled intersections and signalized intersections with unprotected left-turn phasing.

A Vehicle/pedestrian collisions

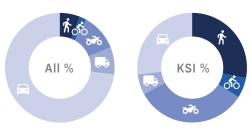
represent 6% of all collisions, and disproportionately represent 28% of KSI collisions. 80% of KSI collisions involving pedestrians occurred in the evening or overnight.

COLLISIONS, 2016-2020		
Top Collisions	All (%)	KSI (%)
1 Broadside	48	44
2 Rear end	27	11
3 Vehicle/Pedestrian	6	28
Primary Collision Factors		
Vehicle right of way violation	28	22
2 Unsafe speed	22	11
3 Driving/bicycling under the influence of alcohol/drugs	8	33

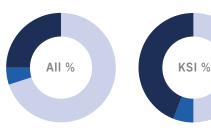
Collisions by Mode	AII (%)	KSI (%)
∱ Pedestrian	6	28
က် Bicycle	2	6
™ Motorcycle	11	33
Truck	8	6
Vehicle	73	28



Collisions by Mode







Arrow Route

ENG	ENGINEERING COUNTERMEASURES *Crash Reduction Factor						
		Countermeasures	Applicability	Addresses	CRF*		
1		Install left-turn lane and provide protected turn phasing	Arrow Route & Redwood Avenue	BroadsideNear Schools	55 %		
2	B	Provide protected left turn phasing	Arrow Route & Beech Avenue	• Broadside	30%		
3		Add roadway segment lighting	Entire Corridor	NighttimeVehicle/Pedestrian	35%		
4		Convert to three-lane cross-section, one vehicle lane per direction with two-way left-turn lane	Entire Corridor	Broadside Rear End	30%		
5		Install pavement reflectors (raised pavement markers)	Entire Corridor: Along Centerline and Edgeline	• Nighttime	25%		
6		Install edgelines	Entire Corridor	 Vehicle Right-of-Way Violation Nighttime	25%		
7		Install buffered bike lanes	Entire Corridor	• Bicycle	15%		
8		Install sidewalk	Entire Corridor	 Vehicle/Pedestrian Bicycle	80%		

Arrow Route

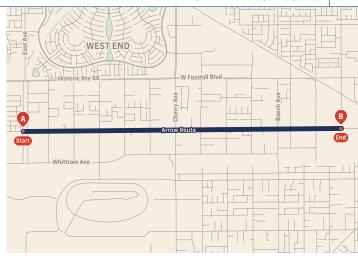
ENG	*Crash Reduction Factor						
		Countermeasures	Applicability	Addresses	CRF*		
9		Repaint pavement markings	Entire Corridor	• Vehicle Right-of-Way Violation	-		
10	(8)	Install retroreflective signal backplates	Signalized Intersections	• Nighttime	15%		
11		Install rectangular rapid flashing beacon	Arrow Route & Almond Avenue	• Vehicle/Pedestrian; Bicycle	35%		

Arrow Route

Location-Specific Countermeasures Shown on Map

- 1 Install left-turn lane and provide protected turn phasing
- 2 Provide protected left turn phasing

- Add roadway segment lighting
- · Convert to three-lane cross-section
- Install pavement reflectors
- Install edgelines
- Install buffered bike lanes
- Install sidewalk
- Repaint pavement markings
- Install retroreflective signal backplates





Oak Glen Road

● West of the City of Yucaipa, generally between Chagall Road and Pisgah Peak-Oak Glen Road



Subregion Valley

Length 7.2 miles

Classification Secondary highway

Number of lanes 2

Posted speed 45-50 MPH

Average annual daily traffic 2,000-4,000

Within Disadvantaged Community?

Federal

⊗ State

TIMELINE FOR IMPLEMENTATION

Long-term

DESCRIPTION

Oak Glen Road is a winding scenic loop that provides access to a small agricultural community located in the foothills of the San **Bernardino Mountains. The** agricultural community, known as Oak Glen, is most well-known for the production of Oak Glen apples and apple products.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

34

KEY TRENDS. 2016-2020

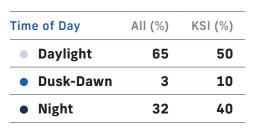
Motorcycle collisions represent 38% of all collisions, and disproportionately represent 70% of KSI collisions.

▲ The lack of roadway advisory signs and roadway topography may contribute to the quantity of hit object and overturned collisions.

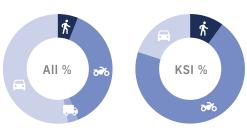
C	0	L	LI	S	I	וכ	N	S	,	2	0	1	6	-2	2	0	2	0	

Top Collisions	AII (%)	KSI (%)
1 Hit object	47	30
2 Overturned	26	50
3 Head on	9	10
Primary Collision Factors		
1 Improper turning	41	40
2 Unsafe speed	24	20
3 Driving/bicycling under the influence of alcohol/drugs	15	20

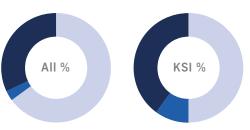
All (%)	KSI (%)
6	10
-	-
38	70
3	-
53	20
	38



Collisions by Mode



Time of Day



Oak Glen Road

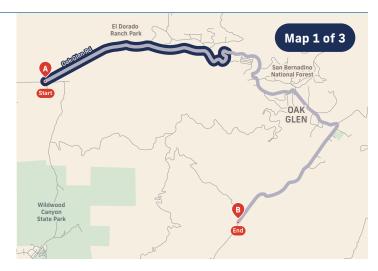
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
L		High friction surface treatments	Entire Corridor: Along Curved Roadway Segments	Hit ObjectOverturnedMotorcycle	55%
		Install chevron signs on horizontal curves	Entire Corridor: Along Curved Roadway Segments	Hit ObjectOverturnedMotorcycle	40%
	(ASIR	Install curve advance warning signs with advisory speed	Entire Corridor: Along Curved Roadway Segments	• Unsafe Speed	25%
		Install pavement reflectors (raised pavement markers)	Entire Corridor: Along Curved Roadway Segments	• Nighttime	25%
1		Install centerline rumble strips	Entire Corridor	Head-onDUI Collisions	20%
	Hilling	Install edgeline rumble strips	Entire Corridor	Hit ObjectDUI Collisions	15%
		Restripe edge-lines and centerlines with 6" retroreflective lane markings	Entire Corridor	 Hit Object Head-on Improper Turning	-
	SPEED LIMIT 40	Install speed limit signs	Select Locations	• Unsafe Speed	-
	(-)	Widen unpaved shoulder	Entire Corridor	• Hit Object	30%

Oak Glen Road

Location-Specific Countermeasures Shown on Map

- 2 Install chevron signs on horizontal curves
- 3 Install curve advance warning signs with advisory speed
- 8 Install speed limit signs

- Install centerline rumble strips
- Install edgeline rumble strips
- Restripe edge-lines and centerlines
- Widen unpaved shoulder
- High friction surface treatments



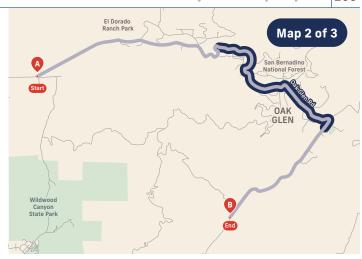


Oak Glen Road

Location-Specific Countermeasures Shown on Map

- 2 Install chevron signs on horizontal curves
- 3 Install curve advance warning signs with advisory speed
- 8 Install speed limit signs

- Install centerline rumble strips
- Install edgeline rumble strips
- Restripe edge-lines and centerlines
- Widen unpaved shoulder
- High friction surface treatments





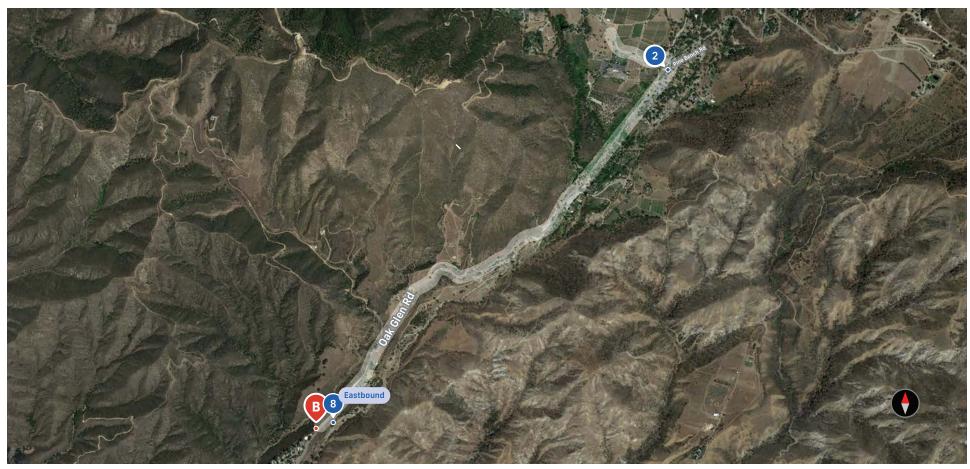
Oak Glen Road

Location-Specific Countermeasures Shown on Map

- 2 Install chevron signs on horizontal curves
- 3 Install curve advance warning signs with advisory speed
- 8 Install speed limit signs

- Install centerline rumble strips
- Install edgeline rumble strips
- Restripe edge-lines and centerlines
- Widen unpaved shoulder
- High friction surface treatments





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Cajon Boulevard

Between June Street and California Street



Subregion Valley

Length 1.5 miles

Classification Major highway

Number of lanes 2

Posted speed **55 MPH**

Average annual daily traffic 9,500-15,000

Within Disadvantaged Community?

Federal

State

TIMELINE FOR IMPLEMENTATION

Short-term (HSIP Cycle 11 application)

DESCRIPTION

Also known as Historic Route 66. this segment of Cajon Boulevard is located in the community of Muscoy. This segment runs parallel to railroad tracks and uses along the corridor range from residential to industrial, with several regional distribution centers nearby. Some pedestrians cross Cajon **Boulevard and the railroad tracks** to bypass the State Street/ **University Parkway overcrossing.**

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

29

KEY TRENDS, 2016-2020

A Vehicle/pedestrian collisions

represent 24% of all collisions, and disproportionately represent 60% of KSI collisions. All of the vehicle/pedestrian collisions occurred in the evening or overnight and 71% of pedestrians were crossing Cajon Boulevard to bypass the State Street/University Parkway overcrossing.

▲ Most collisions occur in the evening or overnight representing 55% of all collisions and 90% of KSI collisions.

COLLISIONS, 2016-2020		
Top Collisions	AII (%)	KSI (%)
1 Broadside	28	0
2 Rear end	24	60
3 Vehicle/Pedestrian	24	30
Primary Collision Factors		
Vehicle right of way violation	34	40
Unsafe speed	21	0
Driving/bicycling under the influence of alcohol/drugs	14	40

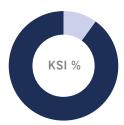
Vehicle	72	30
Truck	-	-
Motorcycle	-	-
ổ Bicycle	3	10
🏌 Pedestrian	24	60
Collisions by Mode	AII (%)	KSI (%)

AII (%)	KSI (%)
41	10
3	-
55	90
	41









Cajon Boulevard

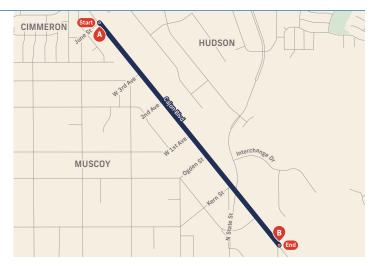
ENG	GINEERING CO	DUNTERMEASURES			
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
1		Add roadway segment lighting	Entire Corridor	NighttimeVehicle/ Pedestrian	35%
2		Install edgelines	Entire Corridor	Vehicle Right-of- Way ViolationNighttime	25%
3		Install centerline rumble strips	Entire Corridor	• Improper Turning	20%
4	HIHITIAN	Install edgeline rumble strips	Entire Corridor	• Hit Object	15%
5		Install sidewalk	Entire Corridor	• Vehicle/ Pedestrian	80%
6		Install reflective flexible posts along edgeline	Cajon Boulevard and Kern Street	• Vehicle/ Pedestrian	25%
7		Install pedestrian fence along State Street/University Parkway	State Street/University Parkway and Interchange Drive	• Vehicle/ Pedestrian	-
8		Install stairs to enhance pedestrian accessibility	Cajon Boulevard at State Street/ University Parkway Over-crossing	• Vehicle/ Pedestrian	-
9		Install right-turn lane	Cajon Boulevard and June Street, 3rd Avenue, 2nd Avenue, 1st Avenue, Ogden Street, Kern Street, and California Street	• Rear-End	20%

Cajon Boulevard

Location-Specific Countermeasures Shown on Map

- 2 Install edgelines
- 6 Install reflective flexible posts
- 7 Install pedestrian fence
- 8 Install stairs
- 9 Install right-turn lane

- Add roadway segment lighting
- Install centerline rumble strips
- Install edgeline rumble strips
- Install sidewalk





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Cajon Boulevard

Between Cleghorn Road and Kenwood Avenue



Subregion Valley/Mountain

Length 6.2 miles

Classification **Mountain Secondary**

Number of lanes 2

Posted speed **55 MPH**

Average annual daily traffic 8.000-11.000

Within Disadvantaged Community?

Federal

State

TIMELINE FOR IMPLEMENTATION

Long-term

DESCRIPTION

Also known as Historic Route 66, this segment of Cajon **Boulevard runs parallel to Interstate 15. Cajon Boulevard** is often used to bypass heavy traffic on Interstate 15 during periods of congestion between the Desert and Valley subregions within San **Bernardino County. Access** to the Blue Cut Trail is also provided by Cajon Boulevard.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

78

KEY TRENDS, 2016-2020

A Head-on collisions represent 21 percent of all collisions, and disproportionately represent 53 percent of KSI collisions.

A Collisions due to vehicles being on the Wrong Side of Road represent 23 percent of all collisions, and disproportionately represent 47 percent of KSI collisions.

COLLISIONS, 2016-2020		
Top Collisions	AII (%)	KSI (%)
1 Head-on	21	53
2 Hit object	17	16
3 Sideswipe	15	16
Primary Collision Factors		
Improper turning	35	37
Wrong side of road	23	47
Unsafe speed	21	0

AII (%)	KSI (%)
1	5
1	0
8	5
9	16
81	74
	1 1 8 9

Time of Day	All (%)	KSI (%)
Daylight	67	79
Dusk-Dawn	0	0
Night	33	21









Cajon Boulevard

ENGINEERING COUNTERMEASURES

		Countermeasures	Applicability	Addresses	Crash Reduction Factor
1		Install flashing beacons on the stop sign ahead sign	Cajon Boulevard Approaching Kenwood Avenue	• Unsafe Speed	30%
2		Install pavement reflectors (raised pavement markers)	Entire Corridor: Along Centerline and Edgeline	• Nighttime	25%
4	Hilling	Install edgeline rumble strips	Entire Corridor	• Hit Object	15%
3		Install centerline rumble strips*	Entire Corridor	 Head-on Sideswipe Wrong Side of Road Improper Turning	20%
5	•	Create 4 foot wide painted median*	Entire Corridor	 Head-on Sideswipe Wrong Side of Road Improper Turning	-
6		Install flexible posts in the median where passing is not permitted	Entire Corridor	NighttimeHead-on	-
7		Widen unpaved shoulder	Entire Corridor	• Hit Object	30%
8		Install impact attenuators as guardrail end treatments are near fixed objects along the road	Select Locations	• Hit Object	25%

^{*}The centerline edge lines would go on each edge of that painted median. That creates the horizontal buffer for cars in opposing directions to mistakenly drift, run over the centerline rumble strip and then space to recover without crossing into opposing lane of traffic.

Cajon Boulevard

Location-Specific Countermeasures Shown on Map

- 1 Install flashing beacons
- 8 Install impact attenuators

Corridor-Wide Countermeasures

- Install pavement reflectors
- Install centerline rumble strips
- Install edgeline rumble strips
- Create 4 foot wide painted median
- Widen unpaved shoulder
- Install flexible posts in the median





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Mountain Subregion Intersections

◆ SR-330 & SR-18 (Hilltop Boulevard/Hunsaker Drive)



Subregion Mountain

Classification

Mountain Major Highway

Intersection control **Side-Street Stop**

Number of lanes 2

Posted speed 30-35 MPH

Average annual daily traffic

Major Street 12,800-14,900

Minor Street 2,200-5,600

Within Disadvantaged Community?



State

TIMELINE FOR IMPLEMENTATION

Long-term

DESCRIPTION

Located just east of the scenic Rim of the World Highway, the intersection of SR-330 and SR-18 provides regional access to the Mountain Subregion, and local access to the community of Running Springs.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

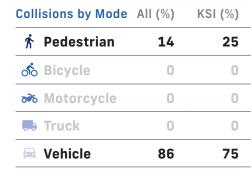
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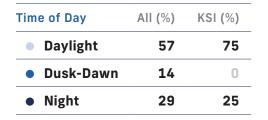
KEY TRENDS. 2016-2020

A Broadside collisions represent 57 percent of all collisions and 25 percent of KSI collisions at the intersection of SR-330 & SR-18 (Hilltop Boulevard)/ **Hunsaker Drive.**

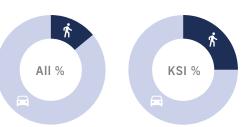
A Vehicle right-of-way violation is the most common collision factor, representing 43 percent of all collisions and 50 percent of KSI collisions.

COLLISIONS, 2016-2020		
Top Collisions	AII (%)	KSI (%)
1 Broadside	57	25
2 Head-on	14	25
3 Hit object	14	25
Primary Collision Factors		
Vehicle right of way violation	43	50
Improper turning	29	25
Pedestrian violation	14	25





Collisions by Mode

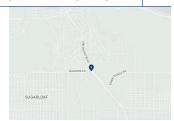


Time of Day



Mountain Subregion Intersections

• SR-38 (Greenspot Boulevard) & Baldwin Lane



Subregion **Mountain**

Length

Not applicable

Classification

Mountain Major Highway

Intersection control Side-Street Stop

Number of lanes 2

Posted speed 30-40 mph

Average annual daily traffic

Major Street **8,600-8,800**

Minor Street **3,300**

Within Disadvantaged Community?



State

DESCRIPTION

The intersection of SR-38 and Baldwin Lane is located near the communities of Big Bear City and Sugarloaf in the Mountain Subregion. This intersection provides access to Baldwin Lane Elementary School and Big Bear High School. It also experiences passthrough trips between the San Bernardino Valley and the mountain resort communities.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

4

4

KEY TRENDS, 2016-2020

A Hit object collisions represent 75 percent of all and KSI collisions at the intersection of SR-38 (Greenspot Boulevard) & Baldwin Lane.

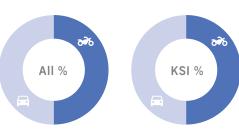
▲ Driving under the influence is the most common collision factor, representing 50 percent of all and KSI collisions.

COLLISIONS, 2016-2020				
Top Collisions	AII (%)	KSI (%)		
1 Hit object	75	75		
2 Broadside	25	25		
Primary Collision Factors				
Driving/bicycling under the influence of alcohol/drugs	50	50		
Unsafe speed	25	25		
Vehicle right of way violation	25	25		

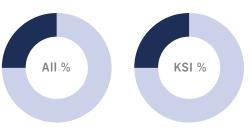
Coll	isions by Mode	AII (%)	KSI (%)
芹	Pedestrian	0	0
ৰ্ণত	Bicycle	0	0
∂• 6	Motorcycle	50	50
•	Truck	0	0
	Vehicle	50	50

Time of Day	AII (%)	KSI (%)
Daylight	75	75
Dusk-Dawn	0	0
Night	25	25

Collisions by Mode







Mountain Subregion Intersections

ENG	ENGINEERING COUNTERMEASURES				
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
1		Install acceleration lane	Northbound Right-Turn Departure at SR-330 & SR-18	 Sideswipe; Rear- End; Vehicle Right-Of-Way Violation 	25%
2	(STOP)	Install raised concrete island for wayfinding and stop sign	SR-330 & SR-18, Southeast Corner	• Hit Object	-
3		Install splitter-island on the minor road approach(es)	Northbound & Southbound Approaches at SR-330 & SR-18	• Broadside	40%
		approactites)	Eastbound Approach at SR-38 & Baldwin Lane		
4	STOP	Install additional stop signs in the proposed splitter-islands on the minor	Northbound & Southbound Approaches at SR-330 & SR-18	• Vehicle Right-of-	15%
•		road approaches	Eastbound Approach at SR-38 & Baldwin Lane	way Violation	20/8
		Install striped median to improve roadway	Eastbound Approach at SR-330 & SR-18	• Head-on	
5		align	Southbound Approach at SR-38 & Baldwin Lane	Improper TurningDUI	•

Mountain Subregion Intersections

Restripe approach to provide additional left-turn queue storage

		Countermeasures	Applicability	Addresses	Crash Reduction Factor
			Eastbound & Westbound Approaches at SR-330 & SR-18	• Head-on	
6		Install centerline rumble strips	Northbound & Southbound Approaches at SR-38 & Baldwin Lane	Improper TurningDUI	20%
	Install edgeline rumble strips	Eastbound & Westbound Approaches at SR-330 & SR-18	• Hit Object		
7			Northbound & Southbound Approaches at SR-38 & Baldwin Lane	Improper TurningDUI	15%

Westbound Approach at SR-330 & SR-18

Head-on

• Improper Turning

Mountain Subregion Intersections

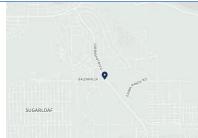
Location-Specific Countermeasures Shown on Map SR-330 & SR-18 (Hilltop Boulevard/Hunsaker Drive)

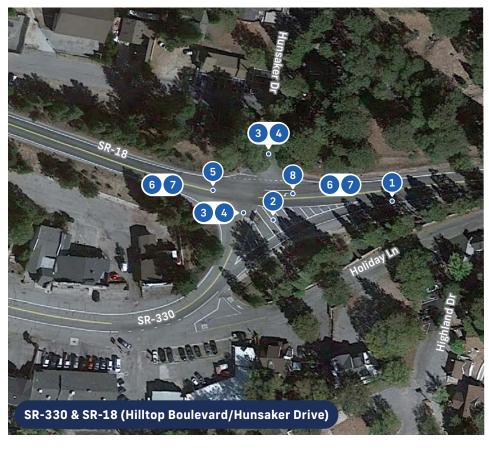
- 1 Install acceleration lane
- 2 Install raised concrete island
- 3 Install splitter-island
- 4 Install additional stop signs
- 5 Install striped median
- 6 Install centerline rumble strips
- 7 Install edgeline rumble strips
- 8 Restripe approach

Location-Specific Countermeasures Shown on Map SR-38 (Greenspot Boulevard) & Baldwin Lane

- 3 Install splitter-island
- 4 Install additional stop signs
- 5 Install striped median
- 6 Install centerline rumble strips
- 7 Install edgeline rumble strips









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Phelan Road

• Between SR-138 and Los Banos Avenue



Subregion **Desert**

Length
12.1 miles

Classification Major Arterial Highway

Number of lanes **2-4**

Posted speed **55 MPH**

Average annual daily traffic 7,000-18,000

Within Disadvantaged Community?



⊗ State

TIMELINE FOR IMPLEMENTATION

Short-term (HSIP Improvements Underway)

DESCRIPTION

Phelan Road is an eastwest corridor in the Desert Subregion communities of Phelan and Oak Hills. This segment connects SR-138 with US-395 and I-15, and features primarily residential uses, with some commercial stretches as well.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

139

23

KEY TRENDS, 2016-2020

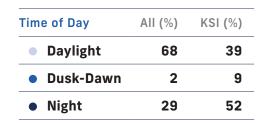
A Head-on collisions represent

12 percent of all collisions, and
disproportionately represent 39 percent
of KSI collisions.

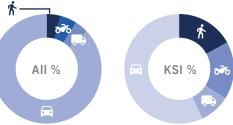
A Vehicle/pedestrian collisions represent 4 percent of all collisions, and disproportionately represent 17 percent of KSI collisions. 100% of KSI collisions involving pedestrians occurred in the evening or overnight.

COLLISIONS, 2016-2020		
Top Collisions	AII (%)	KSI (%)
1 Rear end	38	9
2 Broadside	29	17
3 Head-on	12	39
Primary Collision Factors		
Unsafe speed	36	9
Vehicle right of way violation	16	17
Wrong side of road	6	26

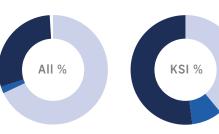
Collisions by Mo	de All (%)	KSI (%)
∱ Pedestriar	ո 4	17
6 Bicycle	0	0
™ Motorcycl	e 5	17
Truck	4	9
□ Vehicle	87	57







Time of Day



Phelan Road

ENG	ENGINEERING COUNTERMEASURES				
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
1	STOP	Upgrade/install larger stop signs	All Unsignalized Intersections	• Broadside	15%
2	STOP	Install flashing beacon at stop-controlled intersections	All Unsignalized Intersections	• Broadside	15%
3		Install splitter islands on the minor road approaches	All Unsignalized Intersections With Paved Minor Road Approaches	• Broadside	40%
•		Install right-turn lane	All Unsignalized Intersections With Paved Minor Road Approaches	• Rear End	20%
5		Install left-turn lane and provide protected turn phasing	Phelan Road & Beekley Road	• Broadside	55%
;		Install pedestrian hybrid beacon	Phelan Road between Sheep Creek Road and Riggins Road	• Vehicle/ Pedestrian	55%
,		Install pedestrian refuge island	Phelan Road between Sheep Creek Road and Riggins Road	• Vehicle/ Pedestrian	35%
3	RIGHT LANE ENDS	Install "Right Lane Ends" sign	Westbound Departure From Phelan Road & Johnson Road	Head-OnSide-Swipe	-
)		Repaint pavement markings	Entire Corridor	• Vehicle Right-of- Way Violation	25%

ENGINEERING COUNTERMEASURES

		Countermeasures	Applicability	Addresses	Crash Reduction Factor
10		High friction surface treatment	Eastbound and Westbound Approaches at All Controlled Intersections	• Broadside • Rear-End	55%
l 1	PASS WITH CARE	Install "Pass With Care" (R4-2) sign	At Start of Passing-Permitted Segments	• Head-On	-
. 2	DO NOT PASS	Install "Do Not Pass" (R4-1) sign	At Start of Passing-Prohibited Segments	• Head-On	-
.3	YOUR SPEED 2 E	Install speed feedback signs	After Reduced Speed Limit Locations	• Unsafe Speed	
L4		Install sidewalk	Entire Corridor	Vehicle/ PedestrianBicycle	80%
.5		Add roadway segment lighting	Entire Corridor	NighttimeVehicle/ Pedestrian	35%
.6		Add two-way-left-turn lane	Between SR-138 and Sheep Creek Road, and Between Valle Vista Road and Baldy Mesa Road	• Broadside • Rear End	30%
L7	SPEED LIMIT 40	Install speed limit signs	Select Locations	• Unsafe Speed	
.8	and the state of t	Install edgeline rumble strips	Entire Corridor	• Hit Object	15%

15%

• Nighttime

ENG	ENGINEERING COUNTERMEASURES					
		Countermeasures	Applicability	Addresses	Crash Reduction Factor	
19		Install centerline rumble strips	Entire Corridor	Head-onSideswipeWrong Side of RoadImproper Turning	20%	
20		Install pavement reflectors (raised pavement markers)	Entire Corridor – Along Centerline and Edgeline	• Nighttime	25%	

Signalized Intersections

Install retroreflective signal backplates

Phelan Road

Location-Specific Countermeasures Shown on Map

- 3 Install splitter-islands
- 5 Install left-turn lane
- 6 Install pedestrian hybrid beacon
- 7 Install pedestrian refuge island
- 8 Install "Right Lane Ends" sign
- 11 Install "Pass With Care" (R4-2) sign
- 12 Install "Do Not Pass" (R4-1) sign
- 13 Install speed feedback signs
- 17 Install speed limit signs

Corridor-Wide Countermeasures

- · Upgrade/install larger stop signs
- Install flashing beacon
- Install right-turn lane
- Repaint pavement markings
- High friction surface treatment
- Install sidewalk
- · Add roadway segment lighting
- · Add two-way-left-turn lane
- Install edgeline rumble strips
- Install centerline rumble strips
- · Install pavement reflectors
- · Install retroreflective signal backplates





Phelan Road

Location-Specific Countermeasures Shown on Map

- 3 Install splitter islands
- 5 Install left-turn lane
- 6 Install pedestrian hybrid beacon
- 7 Install pedestrian refuge island
- 8 Install "Right Lane Ends" sign
- 11 Install "Pass With Care" (R4-2) sign
- 12 Install "Do Not Pass" (R4-1) sign
- 13 Install speed feedback signs
- 17 Install speed limit signs

Corridor-Wide Countermeasures

- Upgrade/install larger stop signs
- Install flashing beacon
- Install right-turn lane
- Repaint pavement markings
- High friction surface treatment
- Install sidewalk
- Add roadway segment lighting
- · Add two-way-left-turn lane
- Install edgeline rumble strips
- Install centerline rumble strips
- Install pavement reflectors
- · Install retroreflective signal backplates





Ranchero Road

● Between Mariposa Road and Topaz Avenue



Subregion **Desert**

Length 3.2 miles

Classification Major Arterial Highway

Number of lanes **2-4**

Posted speed 45-55 mph

Average annual daily traffic 20,500-21,000

Within Disadvantaged Community?

(Federal

State

TIMELINE FOR IMPLEMENTATION

Short-term (Road widening under construction)

DESCRIPTION

Located between the City of Hesperia and I-15, this segment of Ranchero Road provides both local and freeway access. Land use along Ranchero Road is primarily residential, and the corridor is adjacent to Oak Hills High School.

KEY STATISTICS, 2016-2020

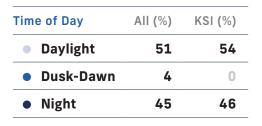
KEY TRENDS, 2016-2020

A Head-on collisions represent
17 percent of all collisions, and
disproportionately represent 89 percent
of KSI collisions.

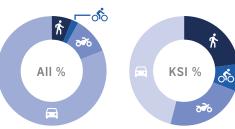
A Collisions with pedestrians and bicyclists represent 8 percent of all collisions, and disproportionately represent 31 percent of KSI collisions. 100% of KSI collisions involving pedestrians and bicyclists occurred in the evening or overnight.

COLLISIONS, 2016-2020	_	
Top Collisions	All (%)	KSI (%)
1 Rear end	32	15
2 Broadside	19	8
3 Head-on	17	38
Primary Collision Factors		
Unsafe speed	32	15
Driving/bicycling under the influence of alcohol/drugs	11	23
Wrong side of road	11	23

Collisions by Mode	AII (%)	KSI (%)	
∱ Pedestrian	6	23	
က် Bicycle	2	8	
ॐ Motorcycle	11	23	
Truck	0	0	
□ Vehicle	81	46	



Collisions by Mode



Time of Day



Ranchero Road

ENG	INEERING CO	DUNTERMEASURES			
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
1	STOP	Upgrade/install larger stop signs	All Unsignalized Intersections	• Broadside	15%
2		Install splitter islands on the minor road approaches	All Unsignalized Intersections With Paved Minor Road Approaches	• Broadside	40%
3		Install right-turn lane	All Unsignalized Intersections With Paved Minor Road Approaches	• Rear End	20%
		Provide protected left turn phasing	Ranchero Road & Escondido Avenue	• Broadside	30%
;	YOUR SPEED	Install speed feedback signs	Select Locations	• Unsafe Speed	
6		Install sidewalk	Entire Corridor	Vehicle/ PedestrianBicycle	80%
,		Add roadway segment lighting	Entire Corridor	NighttimeVehicle/ Pedestrian	35%
3		Add two-way-left-turn lane	Entire Corridor	• Broadside • Rear End	30%

Ranchero Road

ENG	ENGINEERING COUNTERMEASURES				
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
9	Hilling	Install edgeline rumble strips	Entire Corridor	• Hit Object • DUI	15%
10		Install centerline rumble strips	Entire Corridor	Head-onWrong Side of Road	20%
11		Install pavement reflectors (raised pavement markers)	Entire Corridor – Along Centerline and Edgeline	• Nighttime	25%
12	(1)	Install retroreflective signal backplates	Signalized Intersections	• Nighttime	15%

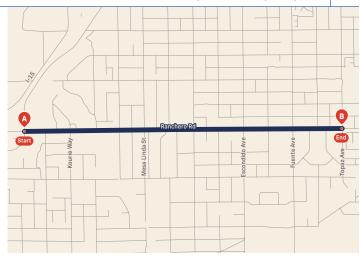
Ranchero Road

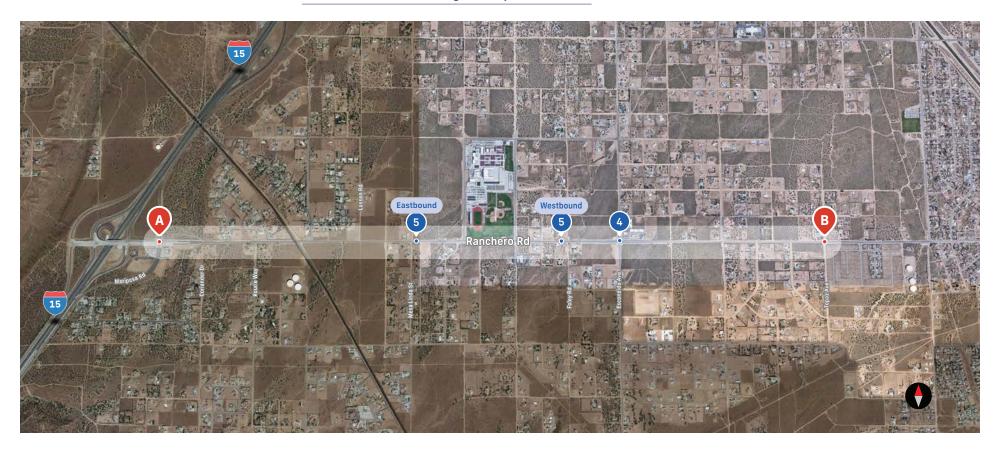
Location-Specific Countermeasures Shown on Map

- 4 Provide protected left turn phasing
- 5 Install speed feedback signs

Corridor-Wide Countermeasures

- Upgrade/install larger stop signs
- Install splitter islands
- Install right-turn lane
- Install sidewalk
- Add roadway segment lighting
- Add two-way-left-turn lane
- Install edgeline rumble strips
- Install centerline rumble strips
- Install pavement reflectors
- · Install retroreflective signal backplates





National Trails Highway

• Between the Mohave River Bridge and Amarylis Avenue



Subregion **Desert**

Length 25.2 miles

Classification Major Arterial Highway

Number of lanes 2

Posted speed 45-55 mph

Average annual daily traffic 3,500-11,000

Within Disadvantaged Community?

Federal

⊘ State

TIMELINE FOR IMPLEMENTATION

Long-term

DESCRIPTION

This segment of National Trails Highway is parallel to I-15 and passes through Oro Grande and Helendale in the Desert Subregion. The land uses surrounding National Trails Highway are mostly rural, with several residential cross-streets, a large aggregate plant, and mining activities.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

95

31

KEY TRENDS, 2016-2020

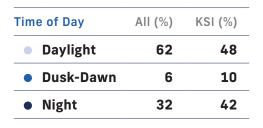
A Head-on collisions represent

13 percent of all collisions, and
disproportionately represent 29 percent
of KSI collisions.

⚠ The winding roadway typography may contribute to the quantity of hit object, overturned, and head-on collisions.

COLLISIONS, 2016-2020		
Top Collisions	All (%)	KSI (%)
1 Hit Object	33	26
2 Overturned	26	19
3 Head-on	13	29
Primary Collision Factors		
Improper turning	37	32
Driving/bicycling under the influence of alcohol/drugs	18	29
Wrong side of road	15	23

Collisions by Mode	All (%)	KSI (%)
🏄 Pedestrian	3	10
് Bicycle	3	0
™ Motorcycle	11	10
Truck	5	10
Vehicle	78	71







Time of Day



National Trails Highway

ENG	INEERING CO	DUNTERMEASURES			
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
L	STOP	Upgrade to larger stop signs	All Unsignalized Intersections	• Broadside	15%
}	\$10P	Install flashing beacon at stop-controlled intersections	All Unsignalized Intersections	• Broadside	15%
3		Install splitter islands on the minor road approaches	All Unsignalized Intersections With Paved Minor Road Approaches	• Broadside	40%
,		Install chevron signs on horizontal curves	Select Locations	 Hit Object Overturned Motorcycle	40%
,		High friction surface treatment	Entire Corridor - Along Curved Roadway Segments	 Hit Object Overturned Motorcycle	55%
;	SPEED LIMIT 40	Install speed limit signs	Select Locations	• Unsafe Speed	
,		Widen unpaved shoulder	Entire Corridor	Hit ObjectVehicle/ Pedestrian	30%
3	Intitute	Install edgeline rumble strips	Entire Corridor	• Hit Object • DUI	15%

National Trails Highway

		Countermeasures	Applicability	Addresses	Crash Reduction Factor
9		Install centerline rumble strips*	Entire Corridor	Head-onDUIWrong Side of Road	20%
10		Create 4' wide painted median*	Entire Corridor	Head-onSideswipeWrong Side of RoadImproper Turning	-
11	(iii)	Install flexible posts in the median where passing is not permitted	Entire Corridor	NighttimeHead-on	-
12		Restripe edge-lines and centerlines with 6" retroreflective lane markings	Entire Corridor	 Hit Object Head-on Improper Turning	-
13		Install pavement reflectors (raised pavement markers)	Entire Corridor – Along Centerline and Edgeline	• Nighttime	25%

^{*}The centerline edge lines would go on each edge of that painted median. That creates the horizontal buffer for cars in opposing directions to mistakenly drift, run over the centerline rumble strip and then space to recover without crossing into opposing lane of traffic.

National Trails Highway

Location-Specific Countermeasures Shown on Map

- 4 Install chevron signs on horizontal curves
- 6 Install speed limit signs

Corridor-Wide Countermeasures

- Upgrade to larger stop signs
- Install flashing beacon
- Install splitter islands
- High friction surface treatment
- Widen unpaved shoulder
- Install centerline rumble strips

- Install edgeline rumble strips
- Create 4' wide painted median
- Restripe edge-lines and centerlines
- Install pavement reflectors
- Install flexible posts in the median





National Trails Highway

Location-Specific Countermeasures Shown on Map

- 4 Install chevron signs on horizontal curves
- 6 Install speed limit signs

Corridor-Wide Countermeasures

- Upgrade to larger stop signs
- Install flashing beacon
- Install splitter islands
- High friction surface treatment
- Widen unpaved shoulder
- Install centerline rumble strips

- Install edgeline rumble strips
- Create 4' wide painted median
- Restripe edge-lines and centerlines
- Install pavement reflectors
- Install flexible posts in the median





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Camp Rock Road

● Between Rodeo Road and SR-249 (Old Woman Springs Road)



Subregion **Desert**

Length 1.5 miles

Classification Major Arterial Highway

Number of lanes 2

Posted speed No Posted Speed Limit

Average annual daily traffic 400-1,600

Within Disadvantaged Community?



State

TIMELINE FOR IMPLEMENTATION

Long-term

DESCRIPTION

Located in Lucerne Valley in the Desert Subregion, Camp Rock Road is a north-south corridor that provides access to several rural residences and ranches. Collision data for Camp Rock Road is inclusive of a recent fatality that occurred in 2021 and captures all injury collisions occurring between 2017-2021.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

7

3

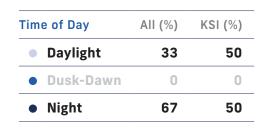
KEY TRENDS, 2016-2020

A Broadside collisions are most common along the corridor, representing 43 percent of all collisions and 67 percent of KSI collisions. All of the broadside collisions occurred at the intersection of Camp Rock Road and Old Woman Springs Road (SR-247).

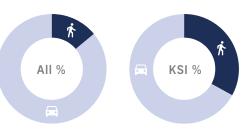
A The 2021 collision was a hit-and-run vehicle/pedestrian collision that involved a driver under the influence. The collision resulted in three pedestrian fatalities.

COLLISIONS, 2017-2021		
Top Collisions	All (%)	KSI (%)
1 Broadside	43	67
2 Vehicle/Pedestrian	14	33
3 Head-on	14	0
Primary Collision Factors		
Improper turning	43	33
Unsafe speed	29	33
Traffic signals and signs	14	33

□ Vehicle	86	67	
Truck	0	0	
™ Motorcycle	0	0	
So Bicycle	0	0	
🏄 Pedestrian	14	33	
Collisions by Mode	AII (%)	KSI (%)	



Collisions by Mode



Time of Day



Camp Rock Road

		Countermeasures	Applicability	Addresses	Crash Reduction Factor
1	•	Install red flashing beacons on "Stop Sign Ahead" (W3-1) sign	Southbound and Northbound Approaches to Camp Rock Road & Old Woman Springs Road	BroadsideTraffic Signals and Signs	30%
2	•	Install yellow flashing beacons on "Intersection Ahead" (W2-1) sign	Eastbound and Westbound Approaches to Camp Rock Road & Old Woman Springs Road	BroadsideTraffic Signals and Signs	30%
3	STOP	Upgrade to larger stop sign	Southbound and Northbound Approaches to Camp Rock Road & Old Woman Springs Road	BroadsideTraffic Signals and Signs	15%
•	STOP	Install flashing beacon at stop-controlled intersection	Southbound and Northbound Approaches to Camp Rock Road & Old Woman Springs Road	BroadsideTraffic Signals and Signs	15%
;		Install splitter islands on the minor road approaches	Southbound and Northbound Approaches to Camp Rock Road & Old Woman Springs Road	• Broadside	40%
ì		Install transverse rumble strips on the minor road approaches	Southbound and Northbound Approaches to Camp Rock Road & Old Woman Springs Road	Broadside Unsafe Speed	20%
,		Install left-turn lane	Eastbound and Westbound Approaches to Camp Rock Road & Old Woman Springs Road	• Broadside • Rear-End	35%

Camp Rock Road

ENGINEERING COUNTERMEASURES					
	Countermeasures	Applicability	Addresses	Crash Reduction Factor	
	Install centerline rumble strips	Entire Corridor	Head-onWrong Side of RoadImproper Turning	20%	
Intitutud	Install edgeline rumble strips	Entire Corridor	• Hit Object	15%	
SPEED LIMIT 40	Install speed limit signs	Select Locations	• Unsafe Speed		
	Widen unpaved shoulder	Entire Corridor	Hit ObjectVehicle/ Pedestrian	30%	
	Restripe edge-lines and centerlines with 6" retroreflective lane markings	Entire Corridor	 Hit Object Head-on Improper Turning	-	
	Install pavement reflectors (raised pavement markers)	Entire Corridor – Along Centerline and Edgeline	• Nighttime	25%	
	SPEED LIMIT	Install centerline rumble strips Install edgeline rumble strips Install speed limit signs Widen unpaved shoulder Restripe edge-lines and centerlines with 6" retroreflective lane markings Install pavement reflectors (raised	Countermeasures Install centerline rumble strips Entire Corridor Install edgeline rumble strips Entire Corridor Install speed limit signs Select Locations Widen unpaved shoulder Entire Corridor Restripe edge-lines and centerlines with 6" retroreflective lane markings Entire Corridor Entire Corridor Entire Corridor	Countermeasures Applicability Addresses Head-on Wrong Side of Road Improper Turning Install edgeline rumble strips Entire Corridor Install speed limit signs Select Locations - Hit Object - Vehicle/ Pedestrian Restripe edge-lines and centerlines with 6" retroreflective lane markings Entire Corridor - Hit Object - Vehicle/ Pedestrian - Hit Object - Hit Object - Vehicle/ Pedestrian - Hit Object - Hit Object - Head-on - Improper Turning - Nighttime	

Camp Rock Road

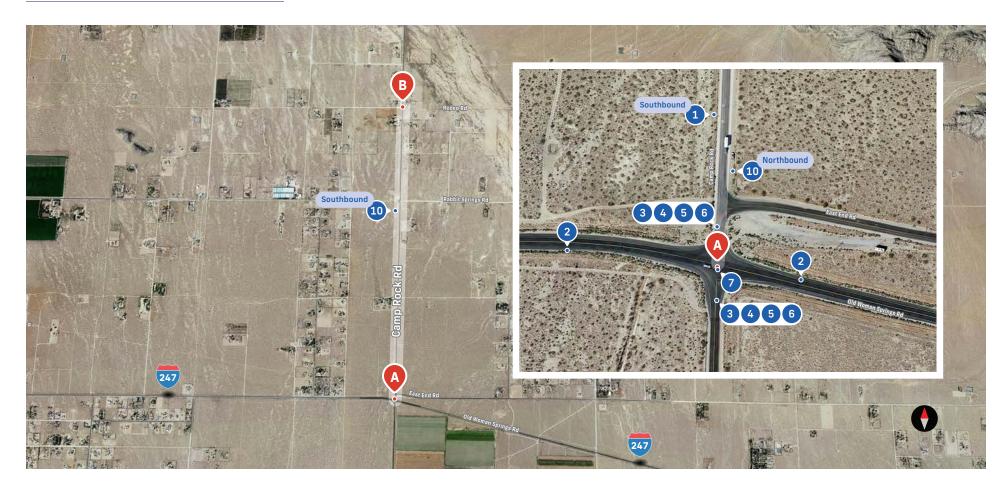
Location-Specific Countermeasures Shown on Map

- 1 Install red flashing beacons
- 2 Install yellow flashing beacons
- 3 Upgrade to larger stop sign
- 4 Install flashing beacon
- 5 Install splitter-islands
- 6 Install transverse rumble strips
- 7 Install left-turn lane
- 10 Install speed limit signs

Corridor-Wide Countermeasures

- Install centerline rumble strips
- Install edgeline rumble strips
- Widen unpaved shoulder
- Restripe edge-lines and centerlines
- Install pavement reflectors





Indian Trail

Between Indian Cove Road and Mesquite Springs Road



Subregion Morongo Basin

Length 4.8 miles

Classification Major Arterial Highway

Number of lanes 2

Posted speed 55 mph

Average annual daily traffic 1,600-4,800

Within Disadvantaged Community?



State

TIMELINE FOR IMPLEMENTATION

Long-term

DESCRIPTION

Indian Trail is an eastwest roadway in the Desert Heights community, northwest of the City of Twentynine Palms. This corridor primarily provides access to rural residences and residential crossstreets. This segment also includes a solar energy facility at the intersection with Morongo Road.

KEY STATISTICS, 2016-2020

Total Collisions

KSI Collisions

16

8

KEY TRENDS, 2016-2020

▲ Most of the intersections along the corridor are side-street stop-controlled, and broadside collisions are the most common collision type, representing 50 percent of all and KSI collisions.

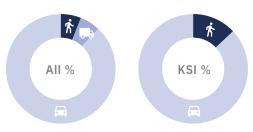
A Head-on and Hit object collisions are the second and third most frequent collision types, representing 32 percent of all collisions and 38 percent of KSI collisions.

COLLISIONS, 2016-2020		
Top Collisions	AII (%)	KSI (%)
1 Broadside	50	50
2 Head-on	19	13
3 Hit Object	13	25
Primary Collision Factors		
Vehicle Right of Way Violation	38	25
Improper Turning	31	38
Traffic Signals and Signs	19	25

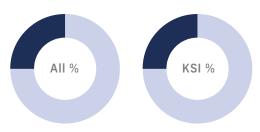
Collisions by Mode	isions by Mode All (%)	
† Pedestrian	6	13
ာ် Bicycle	0	0
™ Motorcycle	0	0
- Truck	6	0
Vehicle	88	88

Time of Day	AII (%)	KSI (%)
Daylight	75	75
• Dusk-Dawn	0	0
Night	25	25

Collisions by Mode



Time of Day



Indian Trail

ENG	NGINEERING COUNTERMEASURES				
		Countermeasures	Applicability	Addresses	Crash Reduction Factor
_	STOP	Install large stop sign	Eastbound and Westbound Approaches to Indian Trail & Indian Cove Road	BroadsideTraffic Signals and Signs	15%
2	STOP	Upgrade to larger stop signs	All Unsignalized Intersections	BroadsideTraffic Signals and Signs	15%
3	STOP	Install flashing beacon at stop-controlled intersection	Eastbound and Westbound Approaches to Indian Trail & Lear Road	Broadside Traffic Signals and Signs	15%
			Southbound Approach to Indian Trail & Morongo Roa	anu signs	
ı	(Install "Intersection Ahead" (W2-1) warning sign	Northbound and Southbound Approaches to Indian Trail & Lear Road	BroadsideTraffic Signals and Signs	15%
;		Install splitter islands on the minor road approaches	All Unsignalized Intersections With Paved Minor Road Approaches	• Broadside	40%
i		Widen unpaved shoulder	Entire Corridor	Hit ObjectVehicle/ Pedestrian	30%

Indian Trail

ENG	NGINEERING COUNTERMEASURES					
		Countermeasures	Applicability	Addresses	Crash Reduction Factor	
7	Intitutul	Install edgeline rumble strips	Entire Corridor	• Hit Object • DUI	15%	
3		Install centerline rumble strips*	Entire Corridor	Head-onDUI CollisionsWrong Side of RoadImproper Turning	20%	
9		Create 4' wide painted median*	Entire Corridor	Head-onSideswipeWrong Side of RoadImproper Turning	-	
LO		Repaint pavement markings	Entire Corridor	CollisionsVehicle Right-of- Way Violation	-	
11		Restripe edge-lines and centerlines with 6" retroreflective lane markings	Entire Corridor	 Hit Object Head-on Improper Turning	-	
12		Install pavement reflectors (raised pavement markers)	Entire Corridor – Along Centerline and Edgeline	• Nighttime	25%	

^{*}The centerline edge lines would go on each edge of that painted median. That creates the horizontal buffer for cars in opposing directions to mistakenly drift, run over the centerline rumble strip and then space to recover without crossing into opposing lane of traffic.

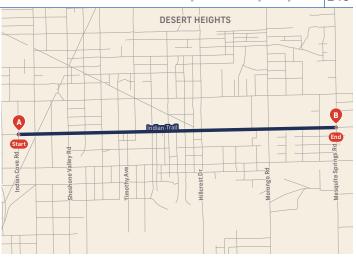
Indian Trail

Location-Specific Countermeasures Shown on Map

- 1 Install large stop sign
- 3 Install flashing beacon
- 4 Install "Intersection Ahead" sign

Corridor-Wide Countermeasures

- Upgrade to larger stop signs
- Install splitter islands
- Widen unpaved shoulder
- Install centerline rumble strips
- Install edgeline rumble strips
- Create 4' wide painted median
- Repaint pavement markings
- Restripe edge-lines and centerlines
- Install pavement reflectors







Chapter 9

Evaluation and Implementation

This chapter describes the process that can be used by the County to evaluate the success of the plan, ensure implementation, and identify funding sources for projects.

Implementation

Implementation of the LRSP is a vital step in the process where identified strategies and projects are executed. To successfully implement programs and projects, partnerships, trust, funding, and coordination need to be proactively managed. Successful implementation requires sustained and coordinated support from key stakeholders, elected officials, and County staff. Recommendations related to facilitating buy-in and support, and project delivery methods are included in this chapter.

Evaluation

Evaluation identifies possible opportunities to inform future decision-making and allows the County to understand how it is doing against the goal of reducing collisions and collision severity in each of its emphasis areas. Recommendations include how and when to update this plan and related public communications. Specific performance metrics are also included.

Implementation

Implementation Action	Description	Agencies or Partners	Example(s)
Facilitating Buy-In and S	Support		
Public Engagement	 Develop a one-page fact sheet about the LRSP, how it was developed, and what it will be used for Address citizen concerns about recently-implemented LRSP projects, their justification, and effectiveness Include a safety data reporting option in the "San Bernardino County Wellness" mobile app Incorporate community leaders into engagement event planning and outreach Leverage regional resources to receive free materials and borrow demonstration kits Connect with homeless services providers to incorporate pedestrian safety topics and resources in outreach 	SB County DPW SB County Sheriff's Department Community-Based Organizations Homeless Services Providers California Highway Patrol	Example issue reports in the SB County Wellness mobile app could include locations where residents encounter speeding, stop sign violations, or near misses Regional resources include the SCAG Go Human Campaign, which offers free County co- branded materials and lends demonstration kits for pop-up events
Engage Elected Officials	 Maintain ongoing regular meetings with elected officials on LRSP updates 	SB County Board of Supervisors	Fill in newly-appointed officials on LRSP goals and benefits Provide regular updates to Supervisors' offices

Implementation Action	Description	Agencies or Partners	Example(s)
Identify a Roadway Safety Champion	 The champion is the plan's main advocate and point- 	SB County DPW	Many safety stewards can fit the role, including public works
ouroty onampion	person for its development	SB County Sheriff's Department	officials, law enforcement officers, or elected officials
	and implementation	SB County Board of Supervisors	officers, of elected officials
	 They represent the County's safety efforts to other County agencies, the public, and surrounding jurisdictions 	California Highway Patrol	
Establish an LRSP Task Force	The task force supports the LRSP champion and is	SB County DPW	Continuation of the stakeholder group established for the LRSP
roice	the team responsible for	SB County Sheriff's Department	or a smaller group consisting
	implementing the multi-agency nature of the safety plan	SB County Board of Supervisors	primarily of County with a greate implementation and decision-
		SB County Regional Parks	making responsibility
		SB County Public Health	
		Emergency Response Services	
		Community Organizations	
		California Highway Patrol	
Engage Other County	› Facilitate support for LRSP goals		Host monthly meetings with othe
Agencies	with other County colleagues	SB County DPW	departments to check in on actio items
		SB County Sheriff's Department	
		SB County Aging Services	
		SB County Counsel	
		SB County Fire Protection District	
		SB County Fleet Management	
		SB County Regional Parks	
		SB County Public Health	

Implementation Action	Description	Agencies or Partners	Example(s)
Project Delivery Methods			
Project Bundling	 Bundle projects that are similar in scope This can reduce soft costs such as project administration, data collection, and conceptual and final design and increase the efficiency of public outreach and engagement compared to delivering multiple separate projects 	SB County DPW SB County Board of Supervisors	Signal improvements or pavement marking upgrades
Reallocate Funding or Modify Scope for CIP Projects	 Reevaluate currently-funded general road projects and potentially reallocate some of this money to prioritize high priority locations identified in the LRSP, adding safety improvements to project scopes The County Board of Supervisors and Public Works Department can also strategically develop future capital improvement plans to create opportunities for safety improvements with typical CIP projects 	SB County DPW SB County Board of Supervisors	Resurfacing projects can allow for integration of bike lanes or striping and pavement marking upgrades. Traffic signal modifications can be an opportunity for integration of pedestrian signal heads, leading pedestrian intervals, or protected left-turn phasing Focus future Intelligent Transportation System (ITS) investments on safety elements
Integrate Safety Projects into Public Works Department Regular Maintenance	 Create new standards for typical maintenance that reflect LRSP project goals 	SB County DPW	Striping standards, lighting standards, or crosswalk design guidelines Routine re-painting of crosswalks can introduce an ongoing opportunity to upgrade to high-visibility crosswalks

Implementation Action	Description	Agencies or Partners	Example(s)
Incorporate LRSP Goals into All Roadway Projects	 Consider prioritization of roadway projects based on locational or attribute collision history and potential to address safety risk factors 	SB County DPW	Prioritization of projects with a safety benefit over those with other operational benefits, such as congestion relief
Implement Pilot Projects to Gather Feedback	 Rolling out safety projects as pilots presents the opportunity for the County to gather valuable public and stakeholder feedback to make improvements and adjustments before moving on with similar projects A pilot typically consists of one or a few rollouts of a replicable safety improvement, where the engagement, construction, and impact of the improvement is evaluated for scalability 	SB County DPW	A systemic countermeasure, such as protected left-turn phasing, at a few locations A less capital-intensive strategy is pop-up demonstrations, which can be funded and supported through the SCAG Go Human campaign
Implement Interim Strategies	Not all of the LRSP recommended projects need to be implemented at once; some lower cost projects can be introduced first to get the safety benefits moving and gather public and elected official recognition or support	SB County DPW	Implementation of striping and plastic bollard curb extensions until funding for more capital-intensive concrete curb extensions is secured
Incorporate LRSP Goals into Countywide Traffic Impact Study	 Include multimodal level of service during development review and non-CEQA traffic impact analysis 	SB County DPW	Create San Bernardino County Multimodal Impact Analysis significance thresholds
Bundle Projects Across Agencies	 More cost-intensive LRSP projects that serve multiple communities can be bundled across multiple jurisdictions to minimize cost and pool resources 	SB County DPW	Partnership with cities' public works departments can serve as a bridge for engaging and coordinating with other local agencies

Funding Opportunities

While the primary purpose of this study is to prepare San Bernardino County to submit successful Highway Safety Improvement Program (HSIP) applications, safety projects can be funded through a wide range of additional sources at the regional, state, and federal levels, HSIP funds are largely awarded based on a benefit/cost analysis using a set of Caltrans-approved countermeasures with documented collision reduction factors and historic collision data. While many safety projects will perform well in the HSIP process, others may be successfully funded through other sources that consider additional factors, such as the Active Transportation Program (ATP). The sources in this chapter may be used to fund a broad scope of projects targeting air quality and sustainability, affordable housing, and transportation. Successful projects often entail creative solutions that address impact areas beyond transportation safety alone.

Local and Regional Sources

SCAG Sustainable Communities Program

Provides direct technical assistance to SCAG member jurisdictions to complete planning and policy efforts that enable implementation of the regional SCS. Grants are available in four categories: Civic Engagement, Equity & **Environmental Justice: Smart Cities** & Mobility Innovations; Housing & Sustainable Development; Active Transportation & Safety.

NEXT FUNDING OPPORTUNITY

Call for projects opening in Fall 2022 TBD for Civic Engagement, Equity & **Environmental Justice**

SCAG Community Streets Mini-Grant **Program**

Competitive community grant program that funds safety projects. Awards are made up to \$10,000. Projects aim to build street-level community resiliency and increase the safety of people most harmed by traffic injuries and fatalities. \$277,000 was awarded to 31 projects in 2021.

NEXT FUNDING OPPORTUNITY Call for applications TBD 2023

SBCTA TDA Article 3 Program

The Transportation Development Act (TDA) provides that 2 percent of the Local Transportation Funds (LTF) be made available to counties and cities for facilities for the exclusive use of pedestrians and bicyclists, known as TDA Article 3 Program. In August 1999 the SBCTA Board approved a policy that 80 percent would be available for

pedestrian and bicycle projects. The remaining 20 percent of the Article 3 program would be made available for projects that improve access to transit stops for pedestrians and persons with disabilities. There are additional set-asides for bicycle and pedestrian maintenance and small projects.

NEXT FUNDING OPPORTUNITY 2023

State Sources

Highway Safety Improvement Program (HSIP)

HSIP is a core federal-aid program to states for the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. California's local HSIP focuses on infrastructure projects with nationally recognized crash reduction factors (CRFs). This is the primary grant funding source to support roadway projects identified through the LRSP.

NEXT FUNDING OPPORTUNITY

Cycle 11 applications due September 2022

California Strategic Growth Council (SGC) **Transformative Climate Communities** (TCC) Program

The Transformative Climate Communities (TCC) Program empowers the communities most impacted by pollution to choose their own goals, strategies, and projects to reduce greenhouse gas emissions and local air pollution.

NEXT FUNDING OPPORTUNITY

Round 4 applications closed July 2022. Round 5 TBD

SGC Affordable Housing and Sustainable Communities (AHSC) Program

The Affordable Housing and Sustainable Communities (AHSC) Program makes it easier for Californians to drive less by making sure housing, jobs, and key destinations are accessible by walking, biking, and transit.

NEXT FUNDING OPPORTUNITY
Round 7 due February 2023

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 (SRTS), into a single program with a focus to make California a national leader in active transportation. The ATP administered by the Division of Local Assistance, Office of State Programs.

NEXT FUNDING OPPORTUNITY

Cycle 6 applications closed in June 2022. Cycle 7 TBD (likely 2023 or 2024)

SB 1 Local Streets and Roads Program (LSRP)

SB 1 dedicated approximately \$1.5 billion per year in new formula revenues apportioned by the State Controller to cities and counties for basic road

maintenance, rehabilitation, and critical safety projects on the local streets and roads system.

NEXT FUNDING OPPORTUNITY Expected Fall 2022

Caltrans Sustainable Communities Grants

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.

NEXT FUNDING OPPORTUNITY

Due October 2022

California Office of Traffic Safety (OTS) Grant Programs

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.

NEXT FUNDING OPPORTUNITY

Grant applications closed January
2022. Next cycle 2023

SB 1 Solutions for Congested Corridors Program (SCCP)

The Solutions for Congested Corridors Program funds projects designed to reduce congestion in highly traveled and highly congested corridors. This statewide, competitive program makes \$250 million available annually for projects that implement specific transportation performance improvements and are part of a comprehensive corridor plan by providing more transportation choices while preserving the character of local communities and creating opportunities for neighborhood enhancement.

NEXT FUNDING OPPORTUNITY 2023 TBD

SB1 Local Partnership Program (LPP)

The purpose of this program is to provide local and regional transportation agencies that have passed sales tax measures, developer fees, or other imposed transportation fees with a continuous appropriation of \$200 million annually from the Road Maintenance and Rehabilitation Account to fund road maintenance and rehabilitation, sound walls, and active transportation projects. There is also a competitive grant portion of this program.

NEXT FUNDING OPPORTUNITY 2023 TBD

SB 1 State Transportation Improvement Program (STIP)

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.

NEXT FUNDING OPPORTUNITY 2024 TBD

California Natural Resources Agency Urban Greening Program

This program supports projects that "use natural systems or systems that mimic natural systems to achieve multiple benefits." Eligible projects include "Non-motorized urban trails that provide safe routes for travel between residences, workplaces, commercial centers, and schools."

NEXT FUNDING OPPORTUNITY
2022 cycle closed, 2024 TBD

Federal Sources

RAISE Grants (formerly BUILD and TIGER)

The Rebuilding American Infrastructure with Sustainability and Equity, or RAISE Discretionary Grant program, provides a unique opportunity for the DOT to invest in road, rail, transit and port projects that promise to achieve national objectives. The program selection criteria this cycle encompass safety, environmental sustainability, quality of life, economic competitiveness, state of good repair, innovation, and partnerships with a broad range of stakeholders. The first round of RAISE grants awarded \$417m to bicycle and pedestrian projects, and \$30m for planning grants (eligible for the first time).

NEXT FUNDING OPPORTUNITY

TBD; Previous cycle closed April 2022

Safe Streets for All Grants

The recent federal infrastructure bill established the new Safe Streets for All program to provide \$5 billion in grant funding to develop and implement Vision Zero safety plans. Current legislation emphasizes funding of planning efforts, but the focus on implementation funding is expected to increase over the next few years.

NEXT FUNDING OPPORTUNITY

Applications due September 2022

Evaluation

Evaluation Action

Update Plan Regularly

Description

2000...

- Scheduling an update every two years could assist with organizing and directing evaluation efforts. As conditions within the County change, it will be necessary to update the LRSP in the future. Caltrans requires the LRSP be updated every 3-5 years.
- Completion of bi-annual plan updates should correspond with Caltrans HSIP calls-for-projects. Calls-for-projects are typically released in spring or early summer of even years (i.e. 2020, 2022, etc) and are due in the fall of the same year.

Agencies or Partners

SB County DPW

Caltrans

Example(s)

Vision Zero Annual Reports



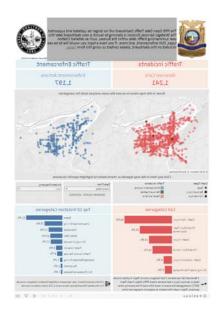
Presentation of Evaluation

- Annual presentations to local leaders on LRSP performance
- Opportunities for engaging with the public:
 - Create online dashboard showcasing safety metrics and recent projects
 - Release an annual publicly available "safety report card"
 - Train County employees on a standard approach to addressing the public and the media about LRSP performance
 - Market benefits of safety investments – how is funding being used and what are resulting safety outcomes?

SB County DPW

SB County Board of Supervisors

Portland Police Bureau Open Data Traffic Dashboard



Evaluation Performance Metrics

Performance Metric	Sub-Metrics
Number of Countermeasures Implemented	› Engineering countermeasures
	> Education, engagement, and enforcement campaigns or programs
Funding Secured for Future Countermeasures	› Infrastructure and programmatic grants
Collisions	KSI collisions:
	› Total KSI collisions
	> Percent of collisions resulting in KSI
	Pedestrian and bicycle collisions:
	 Total pedestrian and bicycle
	 Percent of pedestrian and bicycle collisions resulting in KSI
	Collisions within each emphasis area:
	 Number of collisions within each emphasis area
	› Percent of collisions in each emphasis area resulting in KSI
	Demographic data associated with collisions, to track disproportionate impacts on communities:
	 Percent of collisions involving victims aged under 19 or over 65
	 Percent of victims who are people of color
Before/After Studies for Projects and Programs that have been Implemented	Number of collisions in project influence area
	 Percent of collisions resulting in KSI in project influence area
Speeds and Speed Limit Compliance	› 85th percentile speeds
	 Number of segments where posted speed has been lowered, based on AB 43 policy
	Number of unsafe speed violation collisions
	Pedestrian and bicycle volumes in areas where
Perceptions of Safety and Community Feedback	safety projects have been implemented

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