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Contra Costa Countywide Transportation Safety Policy and Implementation Guide



FOR LOCAL AGENCIES

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Contra Costa Countywide Transportation Safety Policy and Implementation Guide

for Local Agencies



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Introduction

The increased rate of transportation-related fatalities and severe injuries has contributed to a preventable national epidemic and public health crisis. Each year, over 1.35 million lives are lost globally as a result of collisions, and in 2018, an average of more than 100 people lost their lives on US roads each day.¹ Between 2016 and 2019, the number of US roadway fatalities reached the highest levels since 2008, and preliminary data for 2020 suggests that despite a 13 percent decrease in vehicle miles traveled as a result of the COVID-19 pandemic, roadway deaths increased by eight percent between 2019 and 2020—representing the largest annual increase since collision data collection began 96 years ago.² In Contra Costa, fatal collisions increased 77 percent between 2019 and 2020, from 26 to 46 fatalities, based on preliminary California Highway Patrol (CHP) data.³

Further, the risk of transportation-related injuries and fatalities is not evenly distributed across modes of travel, age, race, and income.⁴ Nationwide, pedestrian fatalities increased 45 percent between 2010 and 2019, outpacing increases in total transportation-related fatalities for all modes of travel, and 2018 saw the highest number of pedestrian fatalities since 1990.⁵ In California, 22 percent of transportation-related fatalities between 2008 and the end of 2017 involved people walking, compared with 14 percent nationally over the same time period.⁶ In Contra Costa, 31 percent of all transportation-related fatalities from 2008 through 2017 involved people walking (see *Appendix C. Countywide Collision Analysis Summary and Common Bicycle and Pedestrian Collision Patterns* for more details). Older adults, people of color, and people walking in low-income communities are disproportionately represented in pedestrian collisions—both nationally and in Contra Costa. Public health concerns are further complicated by transportation-related air pollution, greenhouse gas emissions, and time spent traveling in sedentary positions; and vehicle-involved collisions often worsen traffic congestion due to distracted “rubber neck” onlookers slowing down to witness injuries or property damage.

Every person who drives also walks (or uses a personal assistive mobility device) for part of each trip. Vision Zero focuses attention on safety for all people and the shortcomings of the transportation system, including the built environment, policies, and technologies that influence behavior. The Safe System Approach (see page 8 for more information) acknowledges that responsibility for transportation safety outcomes is shared by road users, transportation and public health professionals, policymakers,

¹ World Health Organization (WHO) (2018). Global Status Report on Road Safety 2018. December 2018. Accessed at: https://www.who.int/violence_injury_prevention/road_safety_status/2018/en/; NHTSA (2020). Fatality Analysis Reporting System (FARS) Data Tables. Accessed at <https://www-fars.nhtsa.dot.gov/Main/index.aspx>

² Smart Growth America (2021). *Dangerous by Design*. Accessed at <https://smartgrowthamerica.org/dangerous-by-design/>; National Safety Council (2021). *Motor Vehicle Deaths in 2020 Estimated to be Highest in 13 Years, Despite Dramatic Drops in Miles Driven*. Accessed at <https://www.nsc.org/newsroom/motor-vehicle-deaths-2020-estimated-to-be-highest>

³ CCTA (2021). Innovate 680 Policy Advisory Committee (PAC) Meeting on February 20, 2021. Accessed at <https://www.youtube.com/watch?v=svFNZRwYSUM>

⁴ Smart Growth America (2021). *Dangerous by Design*. Accessed at <https://smartgrowthamerica.org/dangerous-by-design/>

⁵ NHTSA (2021). *Pedestrian Safety*. Accessed at <https://www.nhtsa.gov/road-safety/pedestrian-safety>

⁶ Caltrans (2020). “Rethinking Traffic Safety” - June 2020 Safety Briefing Presentation.



decision-makers, and traffic safety officials. Because human error is inevitable, the transportation system should be forgiving by design. A culture shift toward a Safe System approach is essential to avoid repeating historical trends using car-centric approaches and treatments. There is a demonstrated relationship between speed—which directly affects the amount of kinetic energy transferred during a collision—and collision frequency and severity. Higher speed (i.e., too fast for conditions or above the posted speed limit) is recognized as one of the fundamental factors influencing collision severity, and can be avoided with more appropriate design.⁷

The Contra Costa Transportation Authority (CCTA) is committed to assisting jurisdictions in preventing mobility- and transportation-related fatalities and severe injuries on public rights-of-way (such as streets, sidewalks, and trails), and privately owned driveways and parking facilities. Agencies responsible for project implementation, along with homeowners associations' commonly owned & operated private rights-of-way (e.g., walkways, bikeways, driveways, alleys, roadways), federal & state & regional parks, trails, and open space (e.g., Mount Diablo; John Muir National Historic Site), East Bay Municipal Water District (e.g., Lafayette Reservoir), private property owners, and (existing and new) commercial and residential land-use developers, need to serve as crucial partners to achieve this goal. The Safe System Approach integrating multimodal equity supports the Vision Zero goal of eliminating severe injuries and fatalities. This approach is especially critical for people using non-vehicular transportation modes who lack the physical protection provided to people traveling in multi-ton vehicles, which require compliance with carefully designed and regulated manufacturing requirements. CCTA launched their Vision Zero Framework & Systemic Safety Approach effort to serve as the basis for transportation planning, policy, design, construction, and funding throughout Contra Costa. To date, this effort has focused on countywide data collection and analysis, stakeholder engagement, and developing technical resources such as this Transportation Safety Policy and Implementation Guide (“the Guide”). Through this effort, CCTA establishing a countywide policy of intent to work with partner agencies to encourage each jurisdiction—cities, unincorporated communities within the county, BART, and trail owners/operators such as the East Bay Regional Parks District, water district & utility agencies, and California state agencies, in cooperation with professionals in public health, schools and childcare facilities (both in-home and in commercial buildings), advocacy groups (e.g., Bay Area Families for Safe Streets, Bike East Bay), insurance companies, emergency response, and law enforcement—to adopt and implement Vision Zero by committing to encourage and supports actions toward eliminating transportation-related fatalities and severe injuries⁸ using a collaborative, culturally sensitive, and multi-disciplinary approach. Vision Zero (e.g., two-year action plans) is encouraged to be integrated consistently countywide as standard practice in local and regional transportation planning and engineering. Having an adopted Vision Zero Action Plan, which can be part of a Local Road Safety Plan, increases the opportunities for jurisdictions to compete for federal, state, and regional funding.

⁷ Smart Growth America (2021). *Dangerous by Design*. Accessed at <https://smartgrowthamerica.org/dangerous-by-design/>

⁸ Model Minimum Uniform Crash Criteria (MMUCC) 4th Edition., defines severe injuries as incapacitating injuries. Accessed at: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811631>

Context

Developing a Contra Costa framework for Vision Zero is a key implementation recommendation of the 2018 Countywide Bicycle and Pedestrian Plan (2018 CBPP).⁹ The collision analysis and community outreach conducted as part of the 2018 CBPP highlights the need to address transportation safety issues throughout Contra Costa, particularly for vulnerable communities and people walking and bicycling.

Countywide collision patterns from 2008 through 2017 reveal high and disproportionate rates of injuries and fatalities involving people walking and bicycling as compared to people driving vehicles, which underscores the importance of Vision Zero efforts (see *Appendix C. Countywide Collision Analysis Summary and Common Bicycle and Pedestrian*

Collision Patterns for more details). The number of collisions that involve a person walking has increased 24 percent from approximately 200 in

2008 to over 250 in 2017. In addition to these collision trends, an increasing number of people are using personal powered mobility devices (e.g., wheelchairs, scooters, and bicycles), which has heightened the urgency of implementing safety improvements. Further, the COVID-19 pandemic has significantly changed travel patterns (e.g., routes, distribution, volume, frequency) and has resulted in a decrease in the rate of minor injury collisions per vehicle miles traveled (VMT), but an increase in the rate of fatal and severe injury collisions.¹⁰

Contra Costa Safety Context

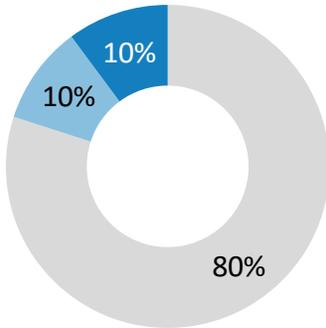
- On average, from 2008 through 2017, eight people walking or bicycling were involved in a collision on a Contra Costa road every week.
- People walking and biking account for 38% of injuries and fatalities on Contra Costa roads, even though they represent 20% of all collisions.

Source: Transportation Injury Mapping System (TIMS), 2008– 2017.

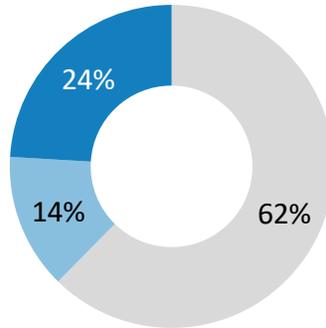
⁹ Countywide Bicycle and Pedestrian Plan Update, 2018, Contra Costa Transportation Authority, see *Implementation Action 1 “Develop a Vision Zero and Systematic Safety approach for Contra Costa.”* Pg. 68.

¹⁰ Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2020. “Provisional weekly police-reported injury crashes on state highways in California.” Accessed at <https://tims.berkeley.edu/covid19.php>

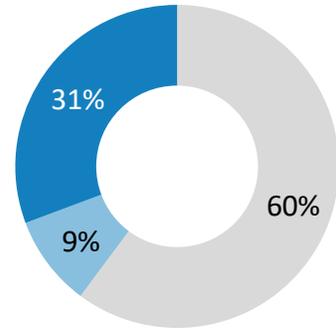
All Collisions



KSI* Collisions



Fatal Collisions

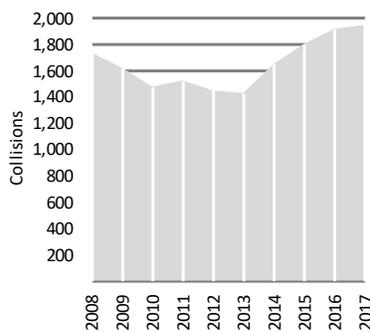


Collisions that involve:

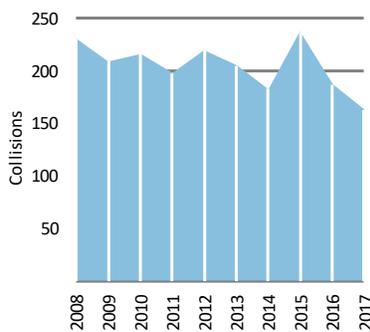
- pedestrians
- bicycles
- vehicles only

* Killed or severely injured

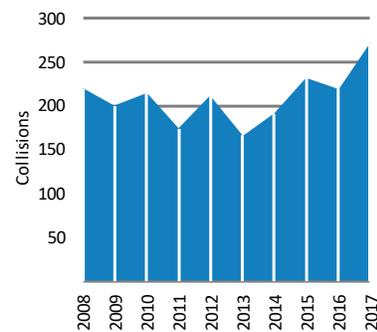
Auto Collisions up 12% from 2008 to 2017



Bicycle Collisions down 29% from 2008 to 2017



Pedestrian Collisions up 24% from 2008 to 2017



Collisions that involve:

- vehicles only
- bicycles
- pedestrians

Inset 1. Contra Costa Countywide Collision Summary

Source: Transportation Injury Mapping System (TIMS), 2008– 2017

Through this effort, CCTA acknowledges Contra Costa’s diverse populations and that low-income communities, people of color, and immigrants are disproportionately represented in fatal or severe injury collisions. Although Communities of Concern in Contra Costa—defined by the Metropolitan Transportation Commission (MTC) as census tracts having concentrations of both low-income and non-white populations—include 20 percent of the countywide population, they account for 28 percent of



collisions involving all transportation modes that result in a fatality or severe injury.¹¹ Improving equity is highlighted as a key goal in the 2018 CBPP and is an integral component of Vision Zero throughout planning and implementation.¹² Vision Zero is also integral to funding appropriation, when jurisdictions' budgets are more limited, and when projects are cost-engineered to reduce scope or change materials. Equity in risk-taking is also essential. People bicycling, walking, or using mobility devices should not be expected to take a disproportionate amount of risk compared to people traveling in vehicles. Equitable strategies—such as prioritizing safety improvements in areas that have been historically underserved, and leading robust engagement by including people who are most vulnerable and have not been historically included in regional and local planning processes—are fundamental to achieving Vision Zero.

Relevant Policies & Plans

This Transportation Safety Policy and Implementation Guide also addresses key considerations related to the following legislation and policy:

Local and Regional

[MTC Resolution No. 4400](#)—Regional Safety/Vision Zero Policy adopted by MTC on June 24, 2020 as the designated Metropolitan Planning Organization (MPO), to support achievement of safety targets. This Resolution establishes a region-wide policy of intent to work with MTC's local partner agencies to encourage and support actions toward eliminating traffic fatalities and severe injuries in the Bay Area by 2030. MTC is implementing a \$500,000 grant through Caltrans' Systemic Safety Analysis Report (SSAR) Program to develop a comprehensive regional safety data system and safety report within one year (with a provision to extend for two additional years).

[MTC Resolution 3765](#)—Regional "Complete Streets" Policy for *Accommodation of Bicycle and Pedestrian Facilities During Transportation Project Planning, Design, Funding and Construction* was passed in 2006 and informed MTC's "routine accommodation checklist," which is required for all MTC-funded projects.

- Contra Costa Local Plans and Studies—*Appendix B. Contra Costa Local Plan Review* presents recent, local safety-related plans and studies, including Contra Costa County's ongoing Vision Zero Action Plan and Iron Horse Corridor Active Transportation Study, San Pablo's SSAR, and Pittsburg's Railroad Avenue Complete Streets Study, among several other active transportation and corridor plans.
- Other ongoing studies, such as Contra Costa County's Climate Action Plan Update, recognize the importance of improving safety and facilities for people walking and biking as a key strategy to reduce greenhouse gas emissions while addressing equity in health outcomes. Recent

¹¹ MTC defines communities of concern as census tracts that have a concentration of both minority and low-income residents. See Plan Bay Area 2040 Appendix A for more information:
https://www.planbayarea.org/sites/default/files/pdf/Draft_Plan_Bay_Area/Appendices_to_Draft_Equity_Analysis_Report.pdf

¹² Countywide Bicycle and Pedestrian Plan Update, 2018, Contra Costa Transportation Authority, see Goal 5 "equitably serve all of Contra Costa's communities while ensuring that public investments are focused on projects with the greatest benefits." Pg 19.



community input (e.g., related to the county's General Plan Update), also emphasized the need for easier access to safer pedestrian and bicycle facilities.

State

Regional and statewide mandates for greenhouse gas (GHG) reductions and climate change adaptation policies and laws such as California State [Assembly Bill \(AB\) 32](#) and [Senate Bill \(SB\) 375](#).

California Complete Streets Act, [AB 1358](#), which requires jurisdictions to incorporate Complete Streets in General Plan Circulation Elements and Caltrans [DD-64-R2](#), which incorporates Complete Streets policy.

The transition replacing the level-of-service (LOS) method with vehicle miles traveled (VMT) in transportation analysis for California Environmental Quality Act (CEQA) compliance as part of [SB 743 implementation](#), which can result in more efficient urban development near transit and a higher prioritization of projects for people walking and bicycling, to avoid or mitigate VMT impacts after environmental review of transportation and land use projects and plans.

Interim safety review practitioners guidance as part of [Caltrans' Land Development and Intergovernmental Review](#) (LDIGR) process, first published in July 2020 and updated in December 2020, which incorporates safety impact analysis as part of the CEQA review process for transportation and land use development projects and plans.

Other funding opportunities for projects primarily for people walking and bicycling, including SB 1 (gas tax) and the California Air Resources Board (CARB) [Cap-and-Trade Program](#).

California [2020-2024 Strategic Highway Safety Plan \(SHSP\)](#), which summarizes current trends and challenge areas, and offers strategies to reduce roadway fatalities and severe injuries statewide.

New funding opportunities for jurisdictions in California to prepare [Local Road Safety Plans \(LRSPs\)](#), which are required to qualify for Federal Highway Administration (FHWA) [Highway Safety Improvement Program \(HSIP\)](#) funds appropriated by the California Transportation Commission (CTC).¹³

Opportunities for collaboration and efficiency within each jurisdiction (e.g., Planning and Public Works departments) and inter-agency combining of funds (e.g., County Health Services and local transportation agencies) for programs with shared goals, and varying metrics and indicators. For example, [SB 1000](#) requires environmental justice be addressed in each jurisdiction's General Plan, which could result in opportunities to simultaneously achieve safety-related equity and climate goals.

National

- [FHWA's Safe System Approach](#), including training and marketing materials (such as [this brochure](#)), as well as a best practice guide on updating the Highway Safety Improvement Program and Strategic Highway Safety Plan to be Safe System-consistent.
- The [Road to Zero Coalition](#), managed by the National Safety Council in partnership with the U.S. Department of Transportation, and dozens of other associations and interest groups, aims to eliminate traffic fatalities in the United States within 30 years, by 2050.

¹³ Note that Caltrans has indicated that the CCTA Vision Zero Framework would fulfill the LRSP HSIP requirement for CCTA jurisdictions.



Global

United Nations General Assembly [Resolution A/70/L.44](#) initiates Second Decade of Action for Improving Global Road Safety 2021-2030 with a goal to provide access to safe, affordable, accessible, and sustainable transportation systems for all by 2030.

Vision Zero and the Safe System Approach

CCTA encourages each jurisdiction to adopt and implement a Vision Zero Action Plan, with progress reported and priorities updated every two-to-five years. CCTA, in coordination with the County Health Services' Community Wellness & Prevention Program (CWPP), seeks to encourage and support actions toward eliminating transportation-related fatalities and severe injuries. This Vision Zero goal can be achieved while improving access to healthier and more equitable multimodal mobility for all people who share the road, as well as off-street private and public rights-of-way such as shared-use paths (e.g., Iron Horse, Contra Costa Canal, Delta De Anza, Ygnacio Canal, Ohlone Greenway, and Lafayette-Moraga trails), homeowners associations' commonly owned & operated private rights-of-way (e.g., walkways, bikeways, driveways, alleys, roadways), federal & state & regional parks, trails, and open space (e.g., Mount Diablo; John Muir National Historic Site), East Bay Municipal Water District (e.g., Lafayette Reservoir). The safety of people while they travel, and public health, should be prioritized in countywide and local transportation planning, policy, and design, instead of focusing first on minimizing vehicular travel time (speed) for convenience and maximizing throughput of vehicle volumes.

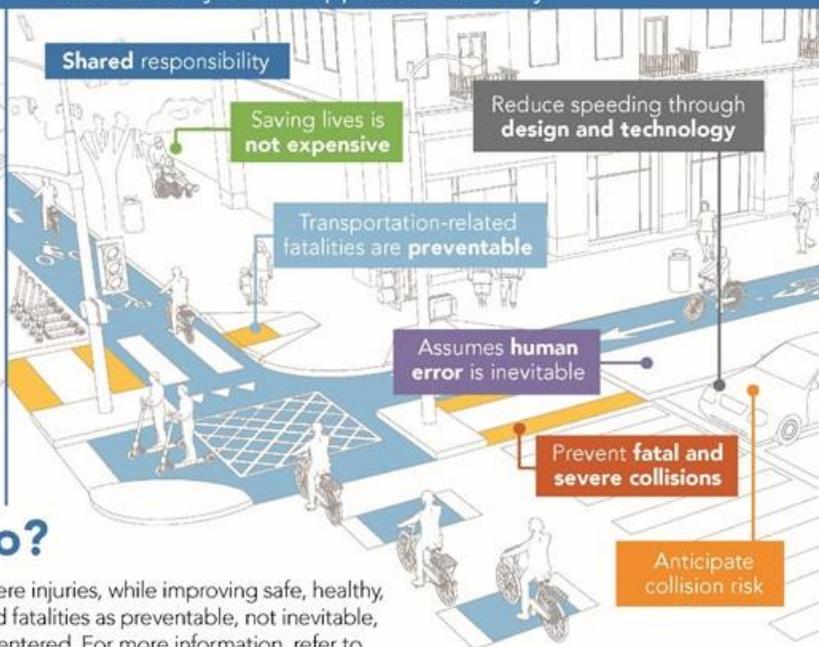
Vision Zero includes a collaborative and multi-disciplinary approach that brings together diverse stakeholders to address complex challenges. Vision Zero acknowledges that many factors such as infrastructure design, human behavior, policies, automated monitoring and enforcement, and technology contribute to safer mobility and set clear actions in support of achieving zero transportation-related fatalities and severe injuries.

Leveraging Vision Zero strategies can also support existing programs that promote safe active transportation, such as Safe Routes to School (SRTS) programs. Many Contra Costa jurisdictions and school districts have Safe Routes to School programs and have implemented projects to make it safer for students to walk and bike to school, and CCTA has funded several SRTS projects and technical assistance efforts.

Traditional Approach to Safety



Vision Zero Systemic Approach to Safety



What is Vision Zero?

Vision Zero is a strategy to eliminate all transportation-related fatalities and severe injuries, while improving safe, healthy, equitable mobility for all. The Vision Zero approach views transportation-related fatalities as preventable, not inevitable, and relies on multi-disciplinary collaboration and is data-informed and equity-centered. For more information, refer to the Vision Zero Core Elements at <https://visionzeronetWORK.org/resources/vision-zero-core-elements/>

*Source: Transportation Injury Mapping System (TIMS), 2008-2017.

Inset 2. Comparison of Traditional vs. Vision Zero Approach to Safety

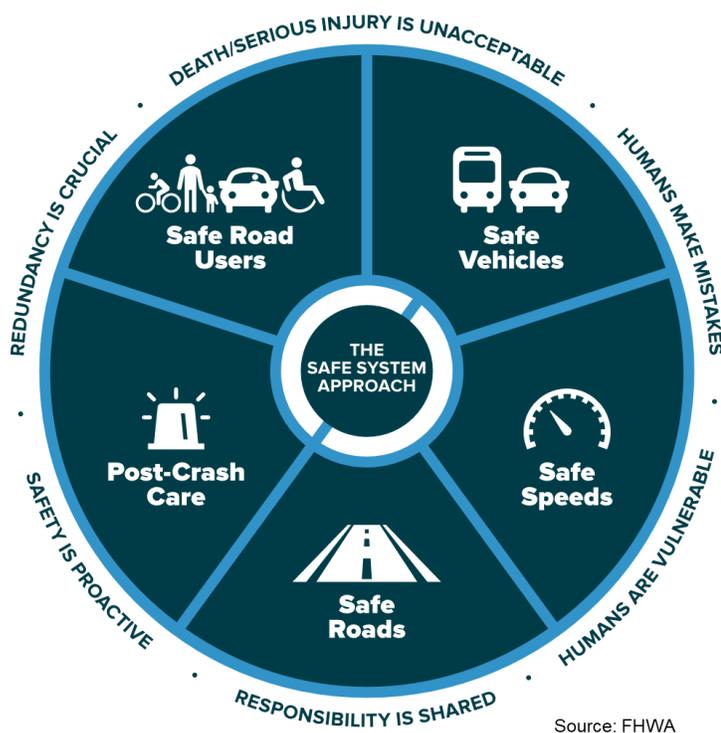
Source: Fehr & Peers and Convey

The Safe System Approach

The “Safe System” Approach outlines strategies to reach Vision Zero. This approach focuses on influencing system-wide practices, policies, and designs to lessen the severity of collisions, and has been employed effectively in countries such as Sweden, the Netherlands, Australia, and New Zealand for more than 30 years. These early adopters have seen at least a 50 percent reduction in transportation-related fatalities. Japan does not provide on-street vehicular parking in public places, as a strategy to enhance quality-of-life and reduce the probability and frequency of vehicular conflicts with people in public space (a vehicle purchase is only permitted after providing proof of an off-street parking space). The key principles and elements of a Safe System approach (as defined by the FHWA) are shown in **Inset 3**.¹⁴

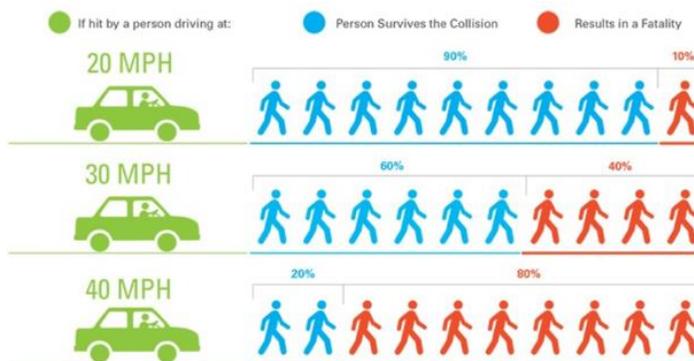
¹⁴ FHWA “Zero Deaths—Saving Lives through a Safety Culture and a Safe System.” https://safety.fhwa.dot.gov/zerodeaths/zero_deaths_vision.cfm

Encouraging safer, more context-appropriate travel speeds and building “safety nets” into the design of streets and crossings supports the goal of downgrading a fatal collision to a survivable collision, and a severe injury collision into a minor injury collision. This is important because one of the most significant factors influencing the frequency and severity of collisions is vehicle speed, which directly affects the amount of kinetic energy transferred during a collision, as shown in **Inset 4**.



Source: FHWA

Inset 3. Key Principles & Elements of a Safe System Approach
Source: FHWA



Inset 4. Vehicle Speed comparison to probability of Injury or Fatalities of People Walking
Source: San Francisco MTA Vision Zero Action Plan



Another way to approach Vision Zero and transportation safety focuses on three themes:¹⁵

Focus on what works—focus on design approaches that are proven to reduce potential multimodal conflicts, reduce speeds where collisions are more likely, improve laws, reform emphasis on enforcement, analyze emergency response and trauma care, and provide more safety education and outreach for all ages and abilities.

Accelerate Advanced Technology—leverage the application of and encourage automated driving systems ([ADS](#)) to improve safety performance through partnerships among the public sector, private sector, and public health and safety advocacy groups.

Culture shift—A safety culture can be nurtured through a Safe System approach: the view that people will occasionally, but inevitably, make mistakes and that the overall transportation system should be designed to eliminate fatalities and severe injuries. The occasional mistake should not result in a fatality or severe injury.

Introducing the Transportation Safety Policy and Implementation Guide

This guide is intended to be used by jurisdictions in Contra Costa to leverage industry best practices while implementing Vision Zero and transportation safety-related policies, programs, and projects. The Guide summarizes best practices and indicates the role of CCTA and jurisdictions for each core element. The Guide draws from the Institute of Transportation Engineers (ITE) and the Vision Zero Network's *Core Elements for Vision Zero Communities*,¹⁶ and is organized into the following chapters:

1. **Develop Vision Zero Leadership and Commitment.** This chapter focuses on the core elements of achieving public, high-level, and ongoing commitment, authentic community engagement, and strategic planning.
2. **Take a Data-Informed Approach.** This chapter focuses on the core elements of equity-focused analysis and programming, responsive and location-specific planning, proactive and systemic planning, and comprehensive monitoring and evaluation.
3. **Encourage Safer Speeds and Create Safer Routes.** This chapter focuses on the core elements related to complete streets for all, context-appropriate speeds on roadways and pathways, and project delivery.

The Guide includes information, resources, and data analysis conducted by CCTA as part of the Contra Costa Vision Zero & Systemic Safety Framework effort. As part of this effort, CCTA is leading elements that make sense to do at a countywide scale such as data collection, technical analysis, and technical assistance for jurisdictions. For example, CCTA developed a Vision Zero Database for use by jurisdictions, which includes collision data and built environment data, such as the location of

¹⁵ Rand's 2018 report *Road to Zero: A Vision for Achieving Zero Roadway Deaths by 2050*. Accessed at https://www.rand.org/pubs/research_reports/RR2333.html

¹⁶ ITE & Vision Zero Network. *Core Elements for Vision Zero Communities*. Accessed at <https://visionzeronetwork.org/resources/vision-zero-core-elements/>

crosswalks and channelized right turn lanes collected in partnership with Ecopia Tech.¹⁷ CCTA has used this database to develop the Countywide Safety Priority Locations Maps and Common Bicycle and Pedestrian Collision Patterns. CCTA, in coordination with MTC, can continue to provide local jurisdictions with resources and technical assistance, and advance local safety planning and project development. Local jurisdictions are commonly responsible for project implementation. This guide also includes the following research compilations and resources as appendices and additional resources to jurisdictions:

- Appendix A. Vision Zero Best Practices Review
- Appendix B. Contra Costa Local Plan Review
- Appendix C. Countywide Collision Analysis Summary and Common Bicycle and Pedestrian Collision Patterns
- Appendix D. Countywide Safety Priority Locations Maps—Collisions Involving All Modes, People Biking, and People Walking
- Appendix E. Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling
- Appendix F. Vision Zero Core Elements Resource Library
- Appendix G. List of CCTA Vision Zero Database Variables

¹⁷ Ecopia Tech uses artificial intelligence to analyze high-resolution aerial imagery to develop GIS inventories of built environment factors such as the location of sidewalks, crosswalks, channelized right turn lanes. For more details, visit <https://www.ecopiatech.com>



Develop Vision Zero Leadership & Commitment

Achieving a goal of zero fatalities and severe injuries requires inter-agency and intra-agency (inter-departmental) coordination across departments, and authentic public engagement during the planning and implementation process.

Public, High-Level and Ongoing Commitment

Successful Vision Zero planning efforts¹⁸ rely on having key elected officials and public agency leaders (especially from transportation planning, engineering, law enforcement, emergency services, and public health departments) commit to a goal of eliminating transportation-related fatalities and severe injuries within a specific timeframe. This commitment to Vision Zero sets a consistent tone and direction for funding decisions (e.g., related to programming and appropriation prioritization), policies, data collection and analysis, innovation, and institutional practices across all departments and agencies that address transportation safety issues. Building partnerships with private sector stakeholders, such as automobile manufactures and insurance companies, can help further Vision Zero and Safe System goals.

A commitment to Vision Zero should include:

- A policy statement adopted by the Town or City Council, and Board of Supervisors, committing to eliminate transportation-related severe injuries and fatalities within a specific timeframe
- Inter-departmental and inter-agency coordination to ensure consistency and accountability between internal departments and partner agencies (e.g., public works, planning, public health, emergency services)

The timeline and path toward Vision Zero can look different in each community, but an overall commitment should be consistent countywide. In some cases, such as in Berkeley, this commitment might be initiated by local grassroots groups advocating for Vision Zero. In other cases, such as Fremont, commitment can start with elected officials or city staff taking the lead and making first steps towards a Vision Zero commitment.

Suggested Next Steps for each Jurisdiction

Adopt a Vision Zero policy statement, e.g., as part of a City Council Resolution, committing to zero transportation-related severe injuries and fatalities within a specified timeframe, and reflecting best

¹⁸ Vision Zero Network. *Vision Zero NYC 2-Year Progress Report (2016) & Vision Zero Seattle 2-Year Progress Report (2017)*. Accessed at <http://www.nyc.gov/html/visionzero/assets/downloads/pdf/vision-zero-year-two-report.pdf> and http://www.seattle.gov/Documents/Departments/beSuperSafe/VZ_2017_Progress_Report.pdf



practices for street design elements and programs to mitigate human error. All planning, design, construction, operation, and maintenance of projects should reflect the Safe System approach.

Facilitate discussions and share materials to educate elected officials, agency leadership, and staff on Vision Zero and the Safe System approach, including potential trade-offs related to more traditional approaches to traffic operations. Stakeholder education and discussions can also:

- a. Frame Vision Zero as a multifaceted strategy that is not only a transportation concern, but also a public health, economic development, equity, and environmental concern. For example, Bike East Bay has synthesized several recent studies that show how improving facilities for people walking and biking in commercial districts can result in increased retail sales.¹⁹ The City of Edmonton in Alberta Canada outlined the broad societal benefits of Safe Mobility in their 2021–2025 Safe Mobility Strategy.²⁰ These resources provide examples on framing Vision Zero and transportation safety through different lenses that may be more relevant to policymakers, residents, or broader stakeholders.
- b. Humanize the issue by supplementing collision data with compelling stories of lived experiences by organizing a forum to remember those killed in a collision or discussing how specific collisions could have been prevented and how to prevent them through a Safe System approach.

Encourage inter-departmental and/or inter-agency coordination by establishing a task force, working group, or repurposing an existing group with broad representation (e.g., public works, planning, safety, public health, and emergency services) to coordinate, collaborate, and hold each other accountable for Vision Zero goals. This group could establish action items, provide updates on progress, share and update local data for countywide analysis and prioritization, evaluate projects, distribute educational material, and provide outreach and awareness strategies.

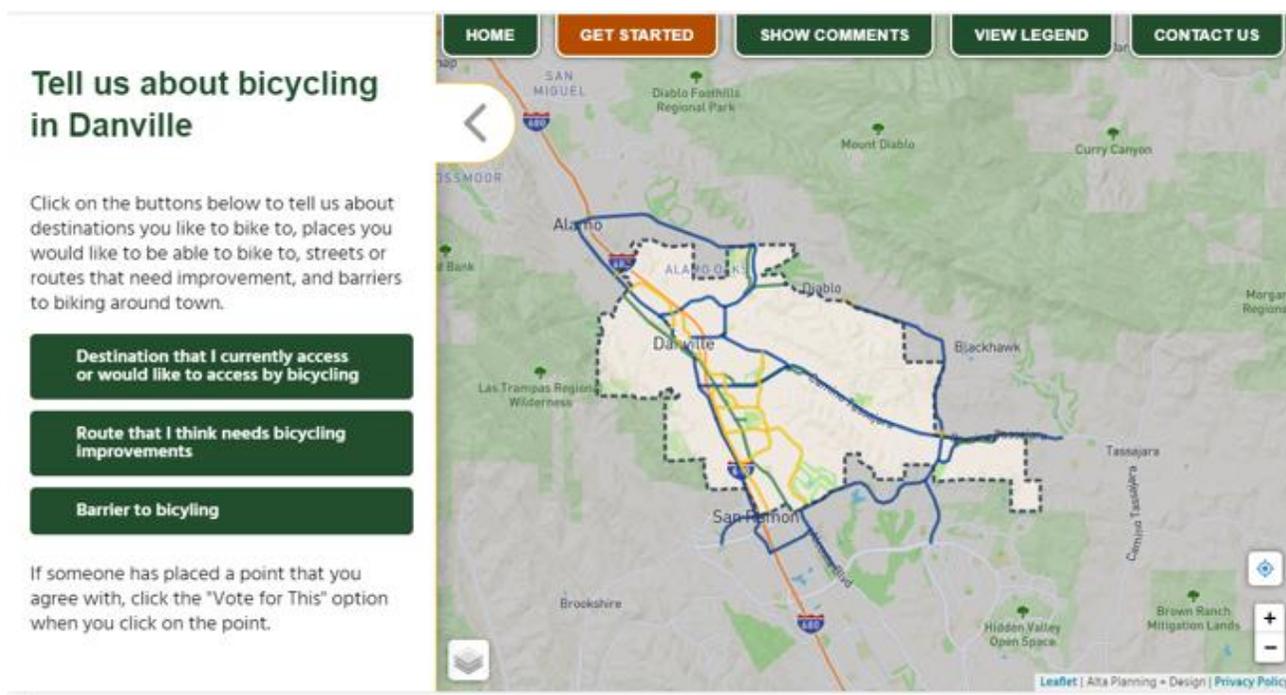
Educate and train department heads and city staff on Vision Zero, specifying the role each department or agency plays in addressing transportation safety issues. Department heads and city staff should understand opportunities for incorporating the Vision Zero and the Safe System approach in the planning, design, engineering, and operations of roadways. For instance, Repaving projects may present opportunities to reimagine safer roadways for all users. As part of the repaving of Laurel Road, the City of Oakley is exploring Complete Streets concepts to provide Safe Routes to School and safe mobility for all. City of Fremont is leveraging scheduled roadway repaving and planned development projects to plan, design, fund, and implement Complete Streets strategies on major arterials.

¹⁹ Bike East Bay (2015). *People Mean Business*.

²⁰ Edmonton, Alberta (2020). *Safe Mobility Strategy, 2021—2025*.

Authentic Engagement

Meaningful and accessible community engagement connects with people “where they are” and in a culturally appropriate manner. This is especially important in Contra Costa, which is home to many diverse communities with safety challenges and opportunities that vary across urban, suburban, and rural communities, and open space areas. Many communities—in Contra Costa and nationally—are moving away from the more traditional “weeknight community meeting” outreach strategy, and instead meeting people at pop-up events such as temporary demonstration projects (e.g., “living preview” installations that show how a future, more permanent project might operate) or information booths at local events and community gathering places such as transit stations, commercial and community centers, cultural events, and farmers markets. During the COVID-19 pandemic, while “Shelter-In-Place” orders have been in effect, jurisdictions have experienced success holding publicly accessible video conference meetings, administering online surveys, and sharing interactive mapping tools to reach the public.



Inset 5. Danville Bike Plan Public Input Map– Danville, CA

Authentic engagement provides opportunities for interactive feedback, such as through a walking audit, voting exercise, or other interactive activities, and communicates information effectively using concise and visually compelling resources. In most cases, having translated written materials and options for an interpreter in real-time is also important to gather representative feedback. Another strategy is to collaborate directly with community-based organizations (CBOs) and community leaders who can help design an effective engagement strategy and/or summarize community input. Vision Zero outreach and awareness and education campaigns are also important for public engagement, accountability, and progress.

Several cities in Contra Costa have used demonstration projects to test new strategies, such as the Yellow Brick Road in Richmond’s Iron Triangle neighborhood. During the community-led planning and design process, roadways and sidewalks were painted to appear as yellow brick intended to calm traffic and highlight the neighborhood’s network of walkways. As the community realized that public space could be reimagined, support increased to make the project permanent.

Considering Post-Collision Care

Post-crash care is one of the elements of the Safe System approach. 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, mental health services and legal support for people affected by collisions and their families, and data on collisions and injuries.*

* World Health Organization (WHO) (2016). “Post-crash response: Supporting those affected by road traffic crashes.” Accessed at https://www.who.int/violence_injury_prevention/publications/road_traffic/Post-crash_response_booklet.pdf

Suggested Next Steps for each Jurisdiction

Meet people where they are. Offer different formats for community engagement activities to include pop-up events and more accessible and interactive ways to gather feedback (e.g., walking audit, bike ride, youth activities, small groups, and one-on-one interactions)

- a. Include short-duration, time-flexible online surveys with meaningful distribution, and a minimum participation possibility of two to four weeks

Collaborate with non-governmental, community-based organizations (CBOs), and community leaders, hire staff and



Inset 6. Iron Triangle Yellow Brick Road Walkable Neighborhood Plan Demonstration Project– Richmond, CA

contractors representative of the community, and encourage community consultants (with local knowledge) to compete for contracts to be compensated for time and expertise

Reduce barriers to participating in outreach activities and transportation decisions by prioritizing outreach efforts in low-income communities, communities of color, and immigrant communities, while providing participants with reasonable accommodation, translation and interpreter services, childcare, food, and stipends

Use demonstration projects to gather community input on, gain support for, and iteratively adjust initial project recommendations

Further Considerations for Engagement During COVID-19 Pandemic

1. Consistently connect with community-based organizations, faith-based institutions, senior centers, community centers, schools, and parent, student, and teacher organizations
2. Consider using digital engagement strategies such as web-based townhalls, blogposts, podcasts, online video platforms (e.g., YouTube), virtual focus groups, online surveys, story maps, map-based surveys, social media posts, and digital advertisements
3. Non-digital engagement strategies include phone-banking, mobile-based texting, mailers, street art, and posting at local grocery stores
4. Participants can be compensated through e-gift cards or virtual credit for specific apps, such as DoorDash, Postmates, or InstaCart

CASE STUDY: SCAG Demonstration Projects

To support cities in their effort to address transportation safety concerns, the Southern California Association of Governments (SCAG) initiated *Go Human!*, a community outreach and safety marketing campaign to reduce traffic collisions in Southern California and promote active transportation. As part of the campaign, SCAG implemented demonstration projects at locations identified on their Regional High-Injury Network. Quick-build demonstration projects provide temporary “living previews” or “pop-ups” of potential strategies to address specific safety issues identified at their locations. By partnering with local advocacy groups and community-based organizations (CBOs), SCAG showcased potential safety improvements in real time, gathering feedback (and excitement) from people that use the facilities. These projects have helped win grant proposals to implement longer-term improvements. Example projects:

- [Glendora’s Roll to the Stroll event](#)
- [Meet on the Beach](#)
- [Envision San Jacinto](#)

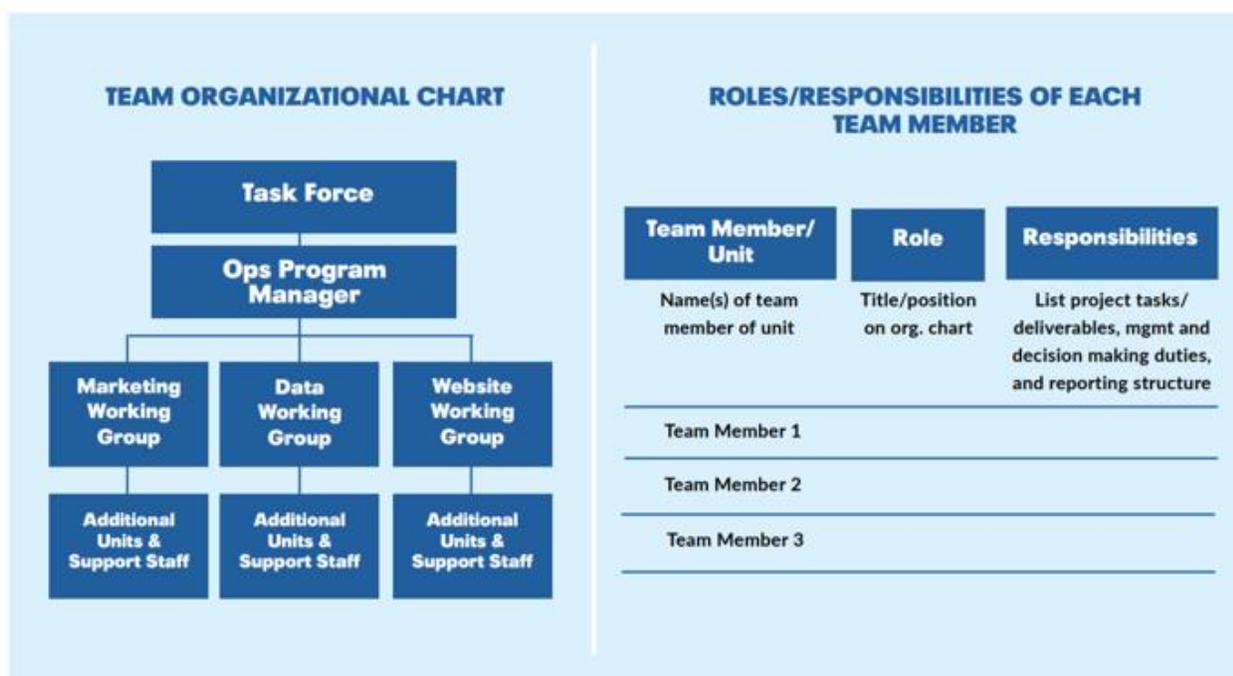


Inset 7. SCAG Go Human Demonstration Projects
Source: SCAG



Strategic Planning

Strategic planning for Vision Zero goes beyond a typical safety plan, where a problem is identified and treatments are proposed. Instead, strategic planning often takes the form of a Vision Zero Action Plan, which typically consists of goals, measurable strategies, and a clear timeline for achieving zero fatalities and severe injuries. The Action Plan and corresponding strategies can be built using the Safe System approach, which recognizes that people will inevitably make mistakes and that system designers and policymakers have a shared responsibility to set practices and policies to lessen the severity of collisions. Clearly assigned individual responsibility and a feeling of ownership of each action is important for holding (elected and staff) government officials accountable in achieving Vision Zero. Lead and supporting agencies (with a specific job title, name, email address, and phone number) should be identified for each action, as well as clear measures of effectiveness and implementation timelines (see example below).



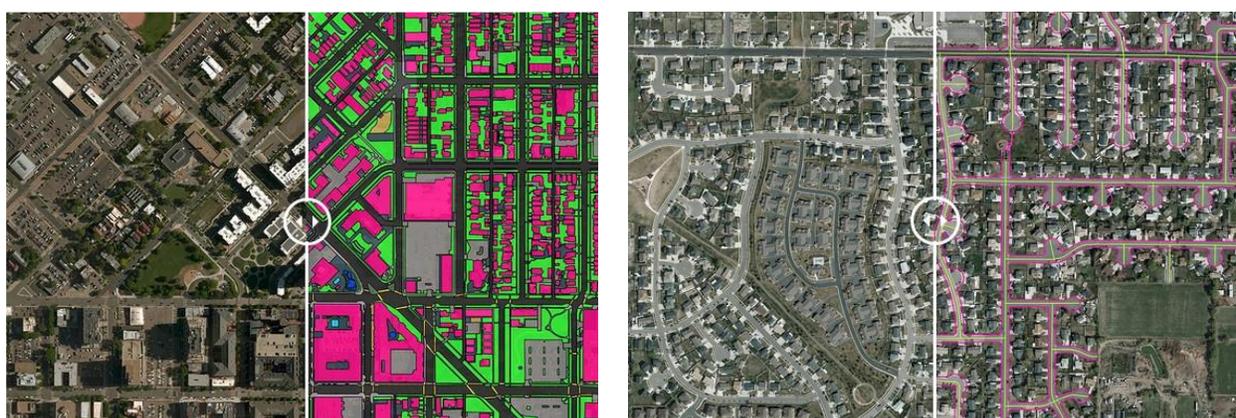
Inset 8. Example Table for Tracking Progress and Accountability for Next Steps

Source: Vision Zero Network

Introducing the CCTA Countywide Vision Zero Database

Building and maintaining a comprehensive database to inform safety planning and analysis also helps inform strategic planning decisions. As part of developing a Countywide Vision Zero Framework, CCTA developed a Vision Zero Database in GIS for use by local agencies, which includes countywide data regarding safety and the built environment, such as the location of sidewalks and crosswalks collected in partnership with Ecopia Tech.* *Appendix G. List of CCTA Vision Zero Database Variables* describes specific data included in the database, which ranges from collision records; pedestrian, bicycle, and transit facilities; roadway, intersection and interchange characteristics; school locations; and demographic data. Collision data was collected countywide and built environment data was collected within the Pedestrian Priority Areas (PPAs), as defined in the 2018 CBPP (see pages 30-35 in 2018 CBPP for more details). This database was used to inform the development of Countywide Priority Safety Locations (see section 3.5 *Responsive Planning* section), and Countywide Common Collision Patterns Summary (see section 3.6 *Proactive, Systemic Planning*). Jurisdictions can use the CCTA Vision Zero database to understand and proactively address safety risks in their community and inform Local Roadway Safety Plans.

* Ecopia Tech used artificial intelligence (A.I.) to analyze high-resolution aerial imagery to develop GIS inventories of built environment factors such as the location of sidewalks, crosswalks, channelized right turn lanes. For more details, visit <https://www.ecopiatech.com>



Inset 9. Applying A.I. to identify sidewalks and crosswalks using geospatial imagery
 Source: Ecopia Tech



Why Develop a Vision Zero Action Plan?

1. Makes your city more competitive for grant funding opportunities. Caltrans requires a Local Road Safety Plan to qualify for HSIP funding. In 2019, Caltrans confirmed that a Vision Zero Action Plan satisfies the Local Road Safety Plan requirement.
2. Ensures transparency on how safety issues are being addressed and how projects are being prioritized. It's unjust and inequitable to focus city resources on infrastructure improvements in part based on how organized and vocal neighbors are, instead of focusing on locations and populations that are disproportionately impacted by fatalities or injuries.
3. Supports satisfying statewide climate change adaptation mandates, including reducing greenhouse gas emissions, lowering vehicle miles of travel, and developing dense, compact communities.

Suggested Next Steps for each Jurisdiction

Adopt a two-year action plan, every two years including policy and programmatic recommendations and a project list, with a goal of achieving Vision Zero within 15 to 20 years (e.g., by 2035 or 2040, or by 2030 per the MTC's goal in its Resolution 4400 adopted [June 12, 2020](#)).

- a. Incorporate forward-thinking policies, goals, objectives, and actions that prioritize safety throughout land use and transportation-related review and decisions.

Set goals with a clear timeline for implementation, by defining success using measurable metrics, identifying a responsible organization and individual, and determining necessary resources.

Publish a summary of any necessary funding, training, construction, or maintenance projects, and collaboration with, and approval or participation from, other agencies (county, MPO, state), e.g., met vs. unmet needs.

Ensure program transparency by maintaining a comprehensive website (e.g., with links to MTC and CCTA resources), establishing a taskforce with publicly available agendas and meeting minutes, and regularly meeting with residents and community leaders.

Develop actionable strategies, such as:

- a. Prioritize proven pathway and roadway design strategies and countermeasures.
- b. Focus enforcement on strategies to reduce fatalities and injuries (e.g., speeding, unsafe vehicle maneuvers at and near crosswalks or trail crossings, e.g., Iron Horse Trail and Contra

- Costa Canal Trail) with care to reduce bias and disproportionate impact to communities of color.
- c. Use effective education strategies (e.g., City of Lancaster’s [See & Be Seen Campaign](#)), and outreach and awareness strategies, including relevant translations and interpretation, and tailored to specific audiences (e.g., people driving, walking, biking).

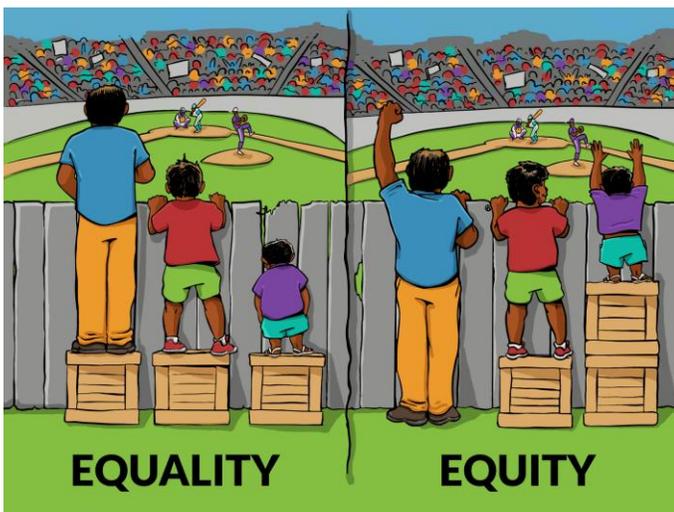
Coordinate with CCTA to contribute to and maintain a robust database to support a data-informed approach.

Use a Data-Informed Approach

Planning and implementation of Vision Zero and the Safe System approach should be an equitable, data-informed process. Data analysis proactively considers collision risk, particularly answering the who, when, where, and why of transportation-related safety issues. Based on the data-informed approach, programming and appropriation of funds should focus on the demographic groups and locations who have experienced the highest burden of transportation-related safety issues. Data-informed insights should also be supplemented and balanced with stories and lived experiences and perceptions from community members (see *0 Authentic Engagement* section). For instance, if potential safety concerns discourage or prevent people from walking or bicycling at a certain location, it may not be reflected in the data.

Equity-Focused Analysis & Programs

Improving equity is highlighted as a key goal in the 2018 CBPP and is an integral component of Vision Zero.²¹ Recent events have highlighted the systemic inequities built into American society, and transportation infrastructure, programming, operations, and service are no exception. Keith Benjamin, Director of Traffic and Transportation for the City of Charleston, South Carolina has shared that “[equity] in place is not simply the maturation toward inclusion. Equity is a tailored strategy that closes the gap between opportunity and access, ultimately eliminating privilege. We have a history of transportation being unapologetically used as a tool to exacerbate inequity and create a greater distance between opportunity and access.”²² Lack of safe access can be a barrier to financial stability and success, and the speed limits, geometric street dimensions, and even whether a street runs in one direction or two are among the ways transportation planning and engineering can worsen inequities. People of color consistently experience worse mobility outcomes, with longer (time and distance), more expensive, and more difficult trips to access employment and



Inset 10. The Difference Between Equality and Equity
 Source: Interaction Institute for Social Change | Artist: Angus Maguire

²¹ Countywide Bicycle and Pedestrian Plan Update, 2018, Contra Costa Transportation Authority, see Goal 5 “equitably serve all of Contra Costa’s communities while ensuring that public investments are focused on projects with the greatest benefits.” page 19.

²² [AARP Livable Communities National Conference 11/13/2018](#), Keith Benjamin, Director of Traffic and Transportation for the City of Charleston, South Carolina.

other critical needs. These barriers have a major, cumulative, and compounding impact on economic stability and wealth accrual, widening the wealth gap.

Integrating equity throughout Vision Zero is important at all stages of the process—budgeting, programming, appropriating, planning, design, construction, operation, monitoring, enforcement, and continuous improvement—and is especially imperative to address ethnic and racial inequality and to avoid perpetuating inequities by treating mobility, livability, and safety as optional or inaccessible. Studies show that low-income communities, communities of color, and immigrant communities often experience a disproportionate amount of transportation-related injuries and fatalities, lack infrastructure to facilitate safer access and mobility, and are more likely to be stopped by law enforcement personnel.²³ In Contra Costa, Communities of Concern—defined by MTC as census tracts having concentrations of both low-income and non-white populations—experience a disproportionate number of collisions that result in a fatality or severe injury.²⁴ Communities of Concern are located in the following Contra Costa County communities: Richmond, San Pablo, North Richmond, Rodeo, Concord, Bay Point, Pittsburg, and Antioch. Although Communities of Concern include 20 percent of the countywide population, they account for 28 percent of collisions involving all transportation modes that result in a fatality or severe injury (See *Appendix C. Countywide Collision Analysis Summary and Common Bicycle and Pedestrian Collision Patterns*). Thirty-nine percent of countywide collisions involving people walking and 26 percent of collisions involving people bicycling occurred in Communities of Concern in Contra Costa. Youth, seniors, and people with disabilities are also disproportionately affected by transportation safety issues.²⁵ People experiencing homelessness, and people who are unhoused, may risk more exposure to collisions, in part because of inhabiting places not designed for habitation and/or adjacent to roadways where people driving may not anticipate a pedestrian to cross.²⁶ Equity-focused analysis and programming should account and plan for people of all races, ethnicities, gender identity, incomes, ages, and abilities, with an initial focus on those groups, across different (or concentrated in particular) geographic areas, who have disproportionately been affected as compared to wealthier and/or white communities.

²³ See Vision Zero Network for more information on disparities in collisions and safety enforcement at http://visionzeronetwork.org/wp-content/uploads/2017/05/VisionZero_Equity.pdf

²⁴ MTC defines communities of concern as census tracts that have a concentration of both minority and low-income residents. See Plan Bay Area 2040 Appendix A for more information: https://www.planbayarea.org/sites/default/files/pdf/Draft_Plan_Bay_Area/Appendices_to_Draft_Equity_Analysis_Report.pdf

²⁵ Streetsblog (2011). “Older Pedestrians Remain Most Threatened by Traffic.” Accessed at <https://nyc.streetsblog.org/2011/06/09/report-older-pedestrians-remain-most-threatened-by-traffic/>; Centers for Disease Control (2020). “Child Passenger Safety: Get the Facts.” Accessed at https://www.cdc.gov/motorvehiclesafety/child_passenger_safety/cps-factsheet.html

²⁶ Angie Schmitt (2020). *Right of Way: Race, Class, and the Silent Epidemic of Pedestrian Deaths in America*. Island Press.

Suggested Next Steps for each Jurisdiction

Prioritize safety improvements for Black, Indigenous, and People of Color (BIPOC), in Communities of Concern, and/or in Environmental Justice Communities.²⁷

Define the study area and monitor success metrics at the neighborhood level to better understand the unique challenges people experience in various communities. For example, the City of San Diego recently adopted a *Climate Equity Index* that considers historical infrastructure investments and helps inform where new investments are made based on environmental and social equity factors.²⁸

Understand the history of socioeconomic, racial, and ethnic segregation and disinvestment in the community and determine which neighborhoods have experienced years or decades of underinvestment.

Reduce the emphasis on enforcement by prioritizing system design and engineering, cultural education, and socioeconomic equity.

Responsive Planning

Responding to past collision patterns and common, high-frequency injury locations is critical to achieving Vision Zero goals. A common approach to understand geographic collision trends is to map, and regularly update, a community's collision locations to guide priority actions, funding, and track jurisdictional traffic safety performance. CCTA, in coordination with MTC, can continue to develop the regional and countywide map tools, dashboards, and report generation for local agency access to more recent and more comprehensive collision and safety-related data to identify Priority Safety Locations to show which locations experience a disproportionate number of collisions that result in a fatality or severe injury.

To inform the Countywide Vision Zero Framework, CCTA analyzed countywide collision data to develop three Countywide Safety Priority Locations maps: one illustrating safety priority locations based on collisions involving all modes (**Figure 1**, including vehicle-to-vehicle collisions), one based only on collisions involving people walking or using mobility devices for accessibility (e.g., wheelchairs) (**Figure 2**), and one based only on collisions involving people bicycling (**Figure 3**). *Appendix D. Countywide Safety Priority Locations Maps—Collisions Involving All Modes, People Biking, and People Walking* includes a more detailed map series for each of the countywide planning subareas. Safety Priority Locations were determined using a methodological approach typically described as a High-Injury Network (HIN).²⁹ This process determines the roadway segments with the highest concentration of fatal and severe injury collisions and extrapolates these trends at the corridor level by looking at consistency of contextual and built environment factors such as speeds limits and number of lanes. Although collision “hot spots”

²⁷ For information on California EPA's EnviroScreen 3.0, see <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>

²⁸ City of San Diego. *Climate Equity Index (2020)*. Accessed at: <https://www.sandiego.gov/sustainability/social-equity-and-job-creation>

²⁹ For more information on the technical methodology for developing Safety Priority Locations, see Wasserman, D. (2018). “Vision Zero Analysis at the Regional Scale.” Accessed at <https://www.linkedin.com/pulse/vision-zero-analysis-regional-scale-david-wasserman/>



represent priority investment locations to avoid future collisions based on the location of past collisions involving fatalities or severe injuries of people walking & bicycling, all countywide collision locations (including vehicle-to-vehicle collisions) are mapped for countywide reporting. The *Countywide Safety Priority Locations* frequently coincide with corridors identified as *Regional Routes of Significance*, which are defined by CCTA as roadways that provide regional connections across jurisdictional boundaries. This underscores the role CCTA can play in coordinating planning and design efforts on corridors serving multiple jurisdictions, and the need for using multimodal safety as a critical evaluation lens when monitoring these facilities.

Suggested Next Steps for each Jurisdiction

Identify priority safety locations in your community that are shown on the Contra Costa Safety Priority Location Map online.

Analyze local collision data to identify additional local safety priority (high-frequency injury) locations, and risk factors in your community.

Prioritize projects located within the Contra Costa Safety Priority Location Map (online) and crowdsource public input before specific locations experience a severe injury or fatality.

Advocate for federal and state legislation from the U.S. Congress for consistent national policy from USDOT, and from the State Capitol in Sacramento for consistent statewide policy, respectively, to replace the patchwork of local approaches.

Regularly collect, update, improve and publicly share data on transportation-related fatalities and severe injuries in an easy-to-understand and visually compelling format (e.g., dashboard). Data should be collected from SafeTREC Transportation Injury Mapping System (TIMS),³⁰ Statewide Integrated Traffic Records System ([I-SWITRS](#)),³¹ police and hospital records, and local public health reporting.

³⁰ For more information on TIMS, visit <https://tims.berkeley.edu>

³¹ For more information on California Highway Patrol's SWITRS data, visit <https://www.chp.ca.gov/programs-services/services-information/switrs-internet-statewide-integrated-traffic-records-system>

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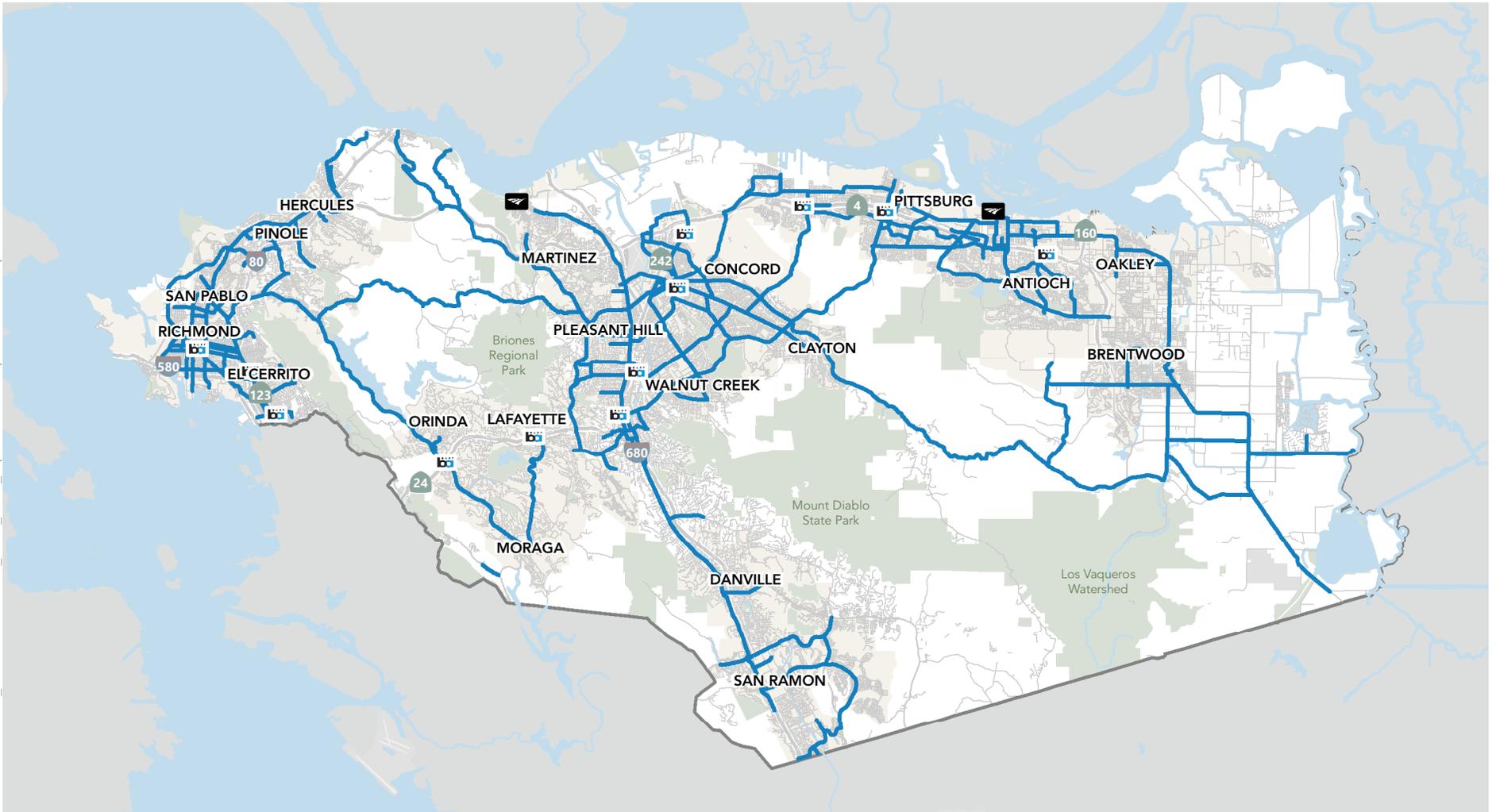


Figure 1



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Contra Costa Safety Priority Locations Map —Collisions Involving All Modes

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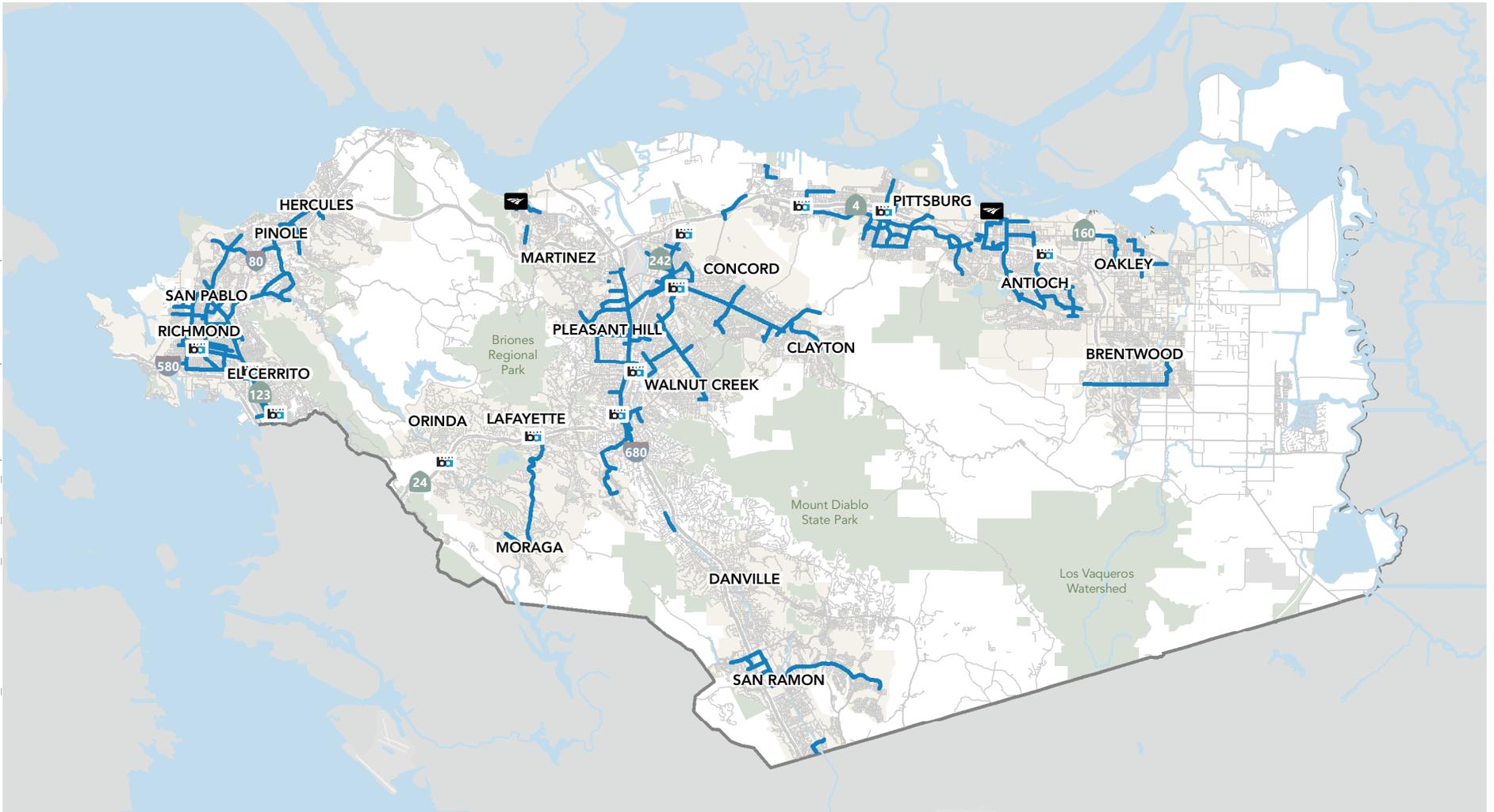


Figure 2



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Contra Costa Safety Priority Locations Map —Collisions Involving People Walking

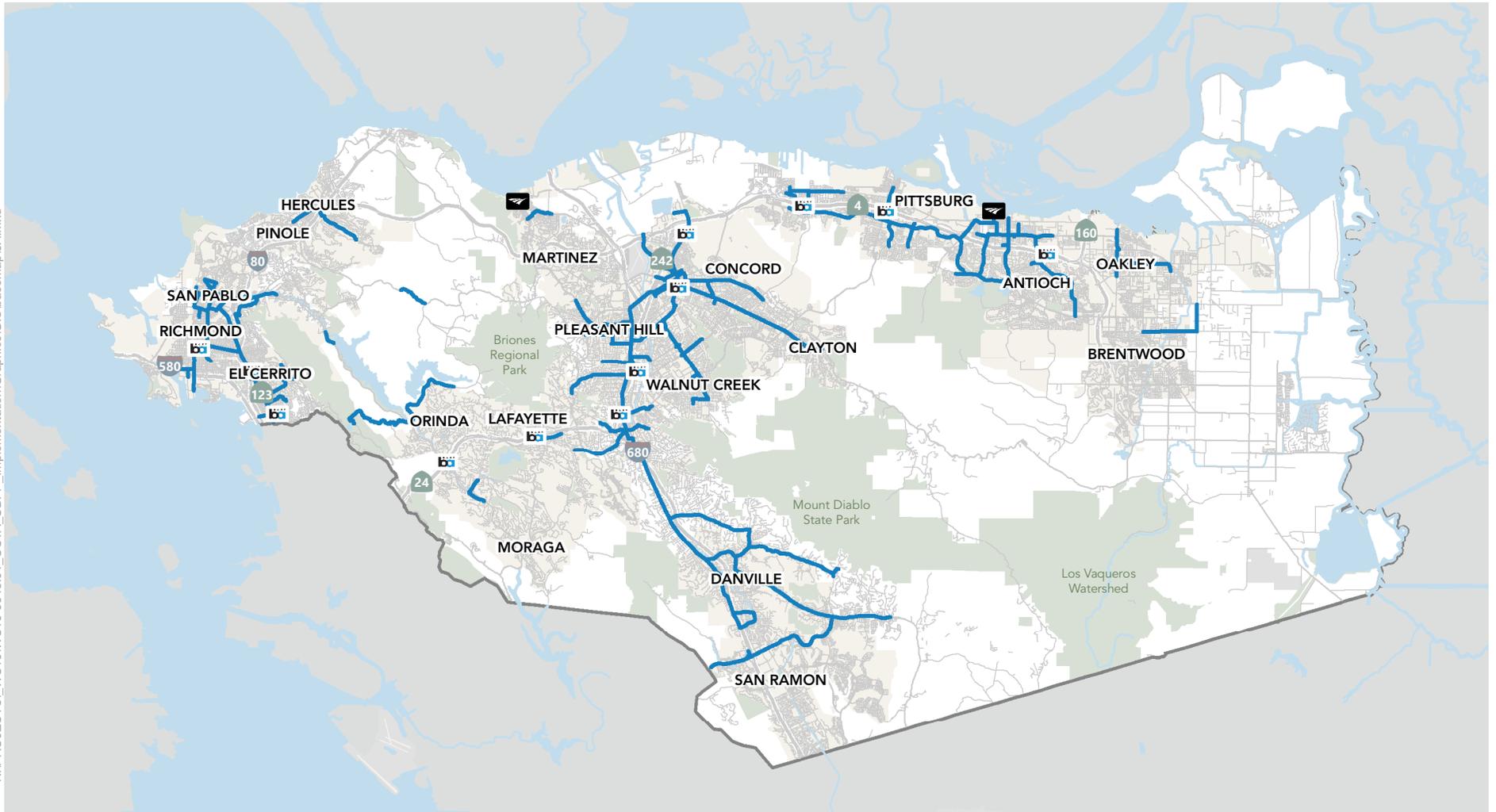


Figure 3



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

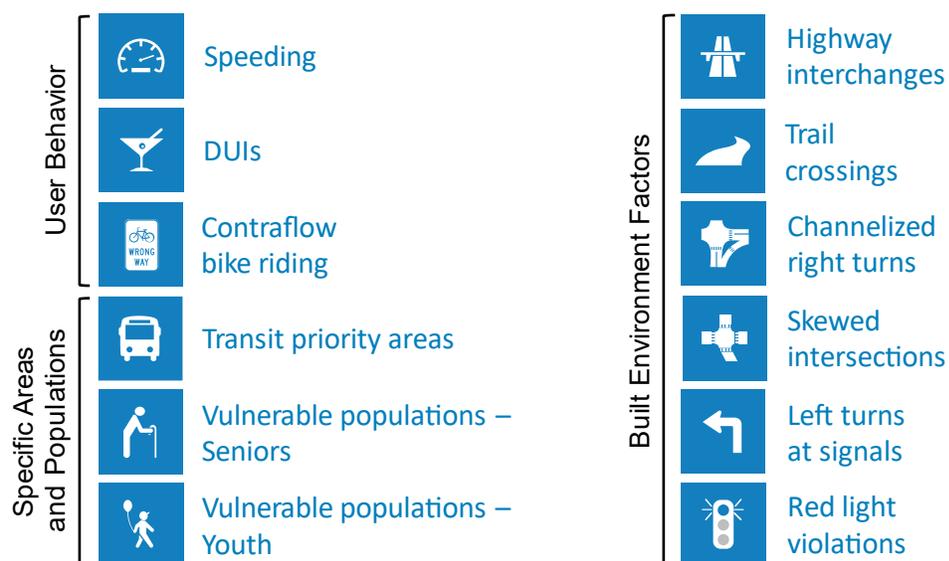
Contra Costa Safety Priority Locations Map —Collisions Involving People Biking

Proactive, Systemic Planning

A proactive, systems-based approach to safety is integral to Vision Zero because it identifies top risk factors to mitigate collision severity and the probability of future collisions. Instead of focusing only on where collisions occurred in the past, a reactive method, a systemic approach proactively identifies potential safety issues based on travel behavior, roadway design, and other built environment factors that contribute to collisions that result in a fatality or severe injury. This kind of data is used to first determine and then address the underlying risk factors influencing roadway safety: the where, how, and why severe collisions happen, along with the characteristics of people who are more likely to be affected.

Achieving zero transportation-related severe injuries and fatalities requires investments that proactively address the root causes of collisions resulting in a fatality or severe injury. Understanding the trends associated with these collisions will prepare CCTA and local jurisdictions to address the systemic causes underlying traffic safety issues, and develop a system that is safer for people using all types of transportation methods. By analyzing data from the Contra Costa Vision Zero Database, including built environment factors such as the location of crosswalks, sidewalks, and channelized right turn lanes collected in partnership with Ecopia Tech,³² CCTA identified the Common Bicycle and Pedestrian Collision Patterns presented below (see *Appendix C. Countywide Collision Analysis Summary and Common Bicycle and Pedestrian Collision Patterns* for more details). Understanding these trends will help CCTA and local jurisdictions prioritize and address key underlying traffic safety issues—even at locations that have not yet experienced fatal or severe injury collisions—to develop a system that is safer for all people.

Inset 11. Contra Costa Common Collision Patterns (based on 2008 through 2017 data)



³² Ecopia Tech uses artificial intelligence to analyze high-resolution aerial imagery to develop GIS inventories of built environment factors such as the location of sidewalks, crosswalks, channelized right turn lanes. For more details, visit <https://www.ecopiatech.com>



Suggested Next Steps for each Jurisdiction

Use the Contra Costa Common Collision Patterns to consider the “Who? Where? When? How? and Why” of traffic fatalities and severe injuries in your community.

Analyze local collision data against built environment factors (e.g., sidewalk gaps, skewed intersections, channelized right turn lane) using the *Contra Costa Vision Zero Database* (see *Appendix F. Vision Zero Core Elements Resource Library* for more details)—to identify additional common collision patterns that may be relevant at the local level.

Match Common Collision Patterns to Toolbox measures (see *Appendix E. Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling*) and develop project recommendations.

CASE STUDY: Bellevue “Near-Miss” Proactive Collision Analysis

There are often early indicators at locations that could be safer. Analyzing “near-miss” events contributes to a more comprehensive database than what is typically available through collision records. “Near-miss” events refer to proactively identifying potential traffic conflicts determined by observing patterns of driver, pedestrian, and bicyclist behavior in a given roadway design context. The City of Bellevue in Washington state partnered with Brisk Synergies (now Transoft) to analyze video of roadway activity at 40 locations using artificial intelligence (AI). This analysis leveraged Bellevue’s existing traffic camera system, without any additional hardware, to simultaneously detect, differentiate, count, and track the movements of people walking, bicycling, and driving—to develop a predictive collision analysis system. The technology works by tracking where collisions have occurred or are most likely to occur based on near-miss conflicts. City staff then used this analysis in support of more rapid project development, prioritization, and deployment.

To learn more, visit <https://www.bellevuereporter.com/news/bellevue-pioneering-road-safety-analysis-project/>



Inset 12. Example Footage from “Close-Call” Analysis

Source: Transoft/Brisk Synergies

Comprehensive Evaluation & Adjustments

Vision Zero planning is an iterative process and should include routine evaluations to inform adjustments after the initial plan. The process of comprehensively evaluating and adjusting plans and priorities should be collaborative and engage a variety of stakeholders. Monitoring Vision Zero efforts and outcomes, updating and sharing data regularly, and institutionalizing Vision Zero across a jurisdiction's planning, engineering, and policy work can help build trust and set expectations for accountability.

Vision Zero policies and action plans should be reevaluated and adjusted to meet community needs as circumstances, collision trends, and travel behavior change. For example, past Vision Zero action plans may not have considered the influence of emerging mobility options such as privately owned mopeds, shared e-bikes, e-scooters, transportation network company (TNC) services (e.g., Uber, Lyft), and automated vehicles (AVs). As an electric bicycle (e-bike) rebate program³³ is introduced to Contra Costa County and as a dockless shared e-bike fleet is expected to be deployed in Richmond by late 2020, regulating emerging modes of transportation is an important policy area Contra Costa can lead.

Suggested Next Steps for each Jurisdiction

Release quarterly and annual public progress reports on the government website and report progress to the (Town or) City Council or Board of Supervisors.

Use temporary pilot, quick-build and/or demonstration projects (e.g., "living previews") to test strategies within shorter timeframes and for less cost investment, and use lessons learned to inform interactive improvements and/or longer-term projects.

Study, evaluate, and develop policies to maximize community benefits and minimize risks related to emerging technology (e.g., micromobility, automated vehicles).

- a. Partner with CCTA to leverage new and emerging (and safety-proven) technologies to proactively inform decision-making, improve non-vehicular service, and address the safety of first-mile/last-mile connections between transit stops and other traveler destinations. These technologies may include shared mobility (e.g., bicycles, scooters, mopeds), mobility-on-demand online platforms, and vertiports for Unmanned Aerial Systems (UAS) urban transport of people, goods, and services.
- b. Address how these technology services function within and among service boundaries and provide a seamless experience countywide.

³³ 511 Contra Costa—*Electric Bicycle Rebate Program*. Accessed at: <https://511contracosta.org/biking/electric-bicycle-rebate/>



Encourage Safer Speeds and Create Safer Routes

Safer, context-appropriate speed limits and roadways, bikeways, and walkways are fundamental to the Safe System approach and achieving Vision Zero. These elements are essential in developing policies and designing private and public rights-of-way that enable safer mobility for people using all transportation methods and account for human error. Managing speeds is critical to achieving zero fatalities because the kinetic transfer of energy from vehicles traveling at high speeds is much greater than at lower speeds, and results in more fatalities and more injuries, increasing in severity as speeds increase.

Complete Streets for All

Vision Zero includes the integration of the Complete Streets concept into communitywide plans and projects to encourage a safer, well-connected transportation network for all people. A Complete Street is designed to be safer for all people including people walking, running, rolling, bicycling, riding transit, or driving, as well as freight and emergency vehicles. Daily decisions should consider all modes at every stage of the design process for all transportation and land use development projects, consistent with state and regional complete streets policies (e.g., MTC Resolution 3765). The Safe System approach calls for the separation of people using different transportation methods in both space and time. Strategies such as allocating separate rights-of-way for people walking, bicycling, or driving provides spatial separation, and dedicated signal phasing for people walking and driving provides temporal separation.

The 2018 CBPP identified potential Complete Streets project locations based on the Low-Stress Countywide Bicycle Network, and provides design guidelines for facilities for people walking and bicycling that can be referenced in Complete Streets planning (see *2018 CBPP, Appendix C. Best Practices*). Many of potential Complete Streets studies were identified for right-of-way-constrained arterials, where collisions are concentrated but multimodal trade-offs will be required to develop recommendations. Several of these locations overlap with the *Countywide Safety Priority Location Maps*, which reflect the highest concentrations of countywide traffic fatalities and severe injuries. These corridors also overlap with CCTA's *Regional Routes of Significance*, which highlights the importance of cross-jurisdictional coordination and collaboration to ensure the countywide bicycle and pedestrian networks are seamless. Further integrating Complete Streets planning and design with Vision Zero goals can help ensure that travel ways are safer for all people. *Appendix E. Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling* presents Complete Streets strategies that have been proven to enhance safety and address various roadway and land use contexts, including intersection locations. NACTO has recognized that intersection treatments often represent a major challenge for Complete Streets implementation, and released their design guide focused on intersection and crossing treatments, *Don't Give Up at the Intersection: Designing All Ages and Abilities Bicycle Crossings*, in 2019.³⁴

³⁴ NACTO. *Don't Give Up at the Intersection*. Accessed at: <https://nacto.org/publication/dont-give-up-at-the-intersection/>

Accommodating emergency and freight vehicles is also an important Complete Streets consideration and can require assessing different trade-off among travel modes, such as larger lane widths and turning radii needs for emergency and freight vehicles. Portland’s Fire Chief, Mike Myers, has spent decades advising cities on Complete Streets designs that accommodate emergency vehicles, and has also advocated for downsizing large emergency vehicles, when possible.³⁵ Chief Myers recognizes that there is a connection between the Safe System approach and proactive fire prevention and risk reduction. As another innovative example, Caltrans District 4 collaborated with Town of Windsor in Sonoma County to design and install a raised crosswalk that can accommodate freight and emergency vehicles at a US 101 on-ramp location.

Suggested Next Steps for each Jurisdiction

Institutionalize Complete Streets practices by integrating them into daily decision-making.

Prioritize local Complete Streets projects for implementation and coordinate with CCTA Planning to apply for grant funding if needed.

Select and apply Safe System Actions from the *CCTA Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling* (see *Appendix E*) to make streets, including private and public rights-of-way, safer for all people.

Leverage CCTA design guidelines and adapt based on local context

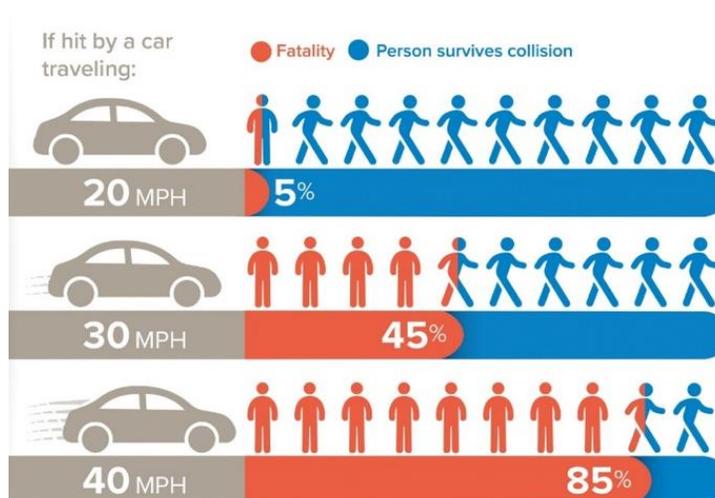
- a. Adopt a Complete Streets policy statement, e.g., as part of a City Council Resolution, consistent with the California Complete Streets Act of 2008 (AB 1358) and the Authority’s Complete Streets Policy, that ensures the street network accommodates people using all transportation modes.
- b. Document the level of effort to implement these policies, including during requests for funding, peer review of project design, and as part of the compliance requirement in the biennial Growth Management Plan (GMP) Checklist.

Coordinate with neighboring jurisdictions to ensure seamless connectivity of the bike and pedestrian network.

³⁵ “NACTO Webinar – Fire Trucks and Vision Zero.” National Association of City Transportation Officials, May 24, 2018: <https://nacto.org/event/fire-trucks-and-vision-zero/Guide>

Context-Appropriate Speeds

Context-appropriate speeds refers to travel speeds being set and managed to achieve safer conditions for specific roadway contexts and to protect people using all transportation methods, particularly those most at risk in collisions, such as people walking and bicycling. Speeds are critically important because the likelihood of a fatality or severe injury increases substantially the faster a vehicle is moving at the time of collision. Proven speed management policies and practices such as roadway reconfigurations, traffic-calming measures, speed limit reductions, and automated speed enforcement (ASE) are often prioritized by Vision Zero plans to attain this goal.



National Traffic Safety Board (2017) Reducing Speeding-Related Crashes Involving Passenger Vehicles. Available from: <https://www.nts.gov/safety/safety-studies/Documents/SS1701.pdf>

Inset 13. Probability of Pedestrian Survival Based on Vehicle Speed

Source: Transportation for America and Smart Growth America

Many jurisdictions outside of the State of California have seen success by reducing speed limits and/or implementing ASE to reduce speeds on higher-speed corridors. California, however, has historically set vehicle speed limits based on the 85th percentile speed, which is a metric based on how fast people drive vehicles on a given roadway; as a result, the faster that people tend to drive on a roadway, the higher the speed limit. California does not currently permit the use of ASEs to manage speeds. However, [AB 2363](#) required California’s Secretary of Transportation to establish and convene a [Zero Traffic Fatalities Task Force](#) to examine the use of the 85th percentile methodology for establishing speed limits.³⁶ In January 2020, the Task Force released a report concluding that California’s speed limit policies need to evolve to encourage safety before expeditious vehicular mobility on roadways, and to give local jurisdictions greater flexibility in managing and reducing speeds on local roadways. The task force also concluded that automated speed enforcement is an effective countermeasure to reduce vehicular speeds. As findings from the task force are integrated into actionable policy, CCTA and local jurisdictions could revisit the determination of context-appropriate speeds on different types of roadways (e.g., neighborhood street, local road, collector, arterial, state highway, and interstate highway), considering land use context, proactive and systemic planning, and collision locations. In addition, “*Twenty is Plenty*” is a global movement dedicated to advocating for 20 MPH speed limits on residential streets as a measure to prevent transportation-related fatalities and severe injuries. Many cities across the US, such as Seattle and Boston, have implemented 20 MPH speed limits in residential areas.

³⁶ Assembly Bill 2623, Zero Traffic Fatalities Task Force, 2018. Accessed at: https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB2363

The CCTA Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling (see Appendix E), and the design guidelines developed as part of the 2018 CBPP, present design strategies for managing speeds for different roadway and land-use contexts.

Suggested Next Steps for each Jurisdiction

Identify high-speed corridors based on speed surveys and Safety Priority Locations Maps. The concentration of locations on high-speed arterials reveals a relationship between speed and traffic collisions resulting in fatal or severe injuries.

Study and implement infrastructure changes that prioritize safety over speed, such as reducing travel lanes or adding self-enforcing traffic-calming measures (e.g., lane narrowing).

Stay up-to-date with state guidance on setting speed limits and adjust policies to align with safety goals (e.g., setting appropriate speed limits, particularly where many people walk and bike).

Select and apply countermeasures from Appendix E. Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling to prioritize the safety of people before speed, convenience, or volume of vehicles.



Inset 14. Space Needed to Transport 60 People by Bus, Bike or Car
 Source: Cycling Promotion Fund

Project Delivery

CCTA and local agencies can implement Vision Zero and safety-related projects by leveraging resources developed as part of CCTA's Countywide Vision Zero Framework on efforts such as active transportation plans, priority safety corridor studies, Local Roadway Safety Plans (LRSPs), Systemic Safety Analysis Reports (SSARs), and Highway Safety Improvement Program (HSIP) projects. Strategic planning followed by institutionalized policies, programs, and practices can help jurisdictions leverage state and federal grant funding opportunities to expedite safety projects and make progress toward Vision Zero. Grant funding opportunities for safety projects are summarized in **Table 1** below (see *2018 CBPP, Appendix F—Funding Sources* for more details). CCTA is also conducting a Pedestrian Needs Assessment which will recommend priority project types (e.g., uncontrolled crossing enhancements, sidewalk gap closures) to improve safety for people walking. As part of this assessment, CCTA will estimate high-level costs for improving pedestrian facilities in Pedestrian Priority Areas (PPAs), as defined in the 2018 CBPP, based on up to six priority project types.³⁷

The change from using level of service (LOS) to vehicle miles traveled (VMT) in transportation analysis for California Environmental Quality Act (CEQA) as part of SB 743 implementation has also elevated the relevance of connectivity projects to eliminate gaps in the bikeway and walkway network. Research shows that encouraging multimodal transportation reduces VMT and vehicle ownership per capita, the two strongest predictors of transportation-related fatalities.³⁸ Therefore, projects that focus on people bicycling and walking may increasingly be recommended to mitigate VMT impacts as part of the environmental review process for transportation and land use projects and plans, and could be funded through a development fee program. Caltrans released interim guidance in July 2020 as part of its *Land Development and Intergovernmental Review (LDIGR) Safety Review Practitioners Guidance* that institutionalizes safety as part of SB 743. As part of this new guidance, Caltrans recommends that lead agencies develop Safety Impact Analysis guidelines and establish a fee program to fund safety projects. Finally, SB 1000 requires jurisdictions with “disadvantaged communities” to incorporate Environmental Justice in their General Plans, either through a separate Environmental Justice element or integrating Environmental Justice principles in each element.³⁹ Incorporating Environmental Justice in General Plans provides cities and counties the opportunity to leverage grant funding from multiple sources to holistically address safety, health, and access concerns.

³⁷ See pages 30-35 in 2018 CBPP for more details on Pedestrian Priority Areas.

³⁸ Ahangari, H. et al. (2017). Automobile-dependency as a barrier to vision zero, evidence from the states in the USA, *Accident Analysis & Prevention*, Volume 107, 2017, Pages 77-85. Accessed at <https://www.sciencedirect.com/science/article/pii/S0001457517302476>.

³⁹ See SB-1000, General Plans, Safety, and Environmental Justice, 2016. Accessed at: https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1000

Suggested Next Steps for Each Jurisdiction

Incorporate Vision Zero and Safe System approach into General Plans, Climate Action Plans, Specific Plans, Entitlement Processes, Transportation Impact Assessment Guidelines and Community-Based Transportation Plans (e.g., adopt policies to reduce vehicle miles traveled, increase bicycling and walking, and follow a Safe System Approach).

Regularly apply for grant funding from statewide programs that focus on safety such as Local Road Safety Plans (LRSPs), Systemic Safety Analysis Reports (SSARs), Highway Safety Improvement Programs (HSIP), and other programs.

Apply for grant funding from statewide programs that encourage active transportation such as the Active Transportation Program, Cap-and-Trade, and SB 1 (gas tax).

- i. Work collaboratively with the CCTA Planning Department to, for example, develop creative funding mechanisms for projects that encourage walking and bicycling through enhanced safety, accessibility, and mobility

Leverage funding for collaborative efforts that can achieve multiple goals, e.g., work with Communities of Concern⁴⁰ to apply for grant funding and advance potential projects through the Lifeline Transportation Program and other sources, such as SB 1000.

Institutionalize the Safe System Approach within existing programs, e.g., as part of transportation impact analysis during environmental review, in-lieu fee programs, and Complete Streets policy implementation to prioritize or extend repaving projects.

Table 1. Potential Funding Sources Related to People Bicycling, Walking, or Using Mobility Devices

Funding Source	Administrator	Timeframe	Class I Bicycle Path	Class II Bicycle Lane	Class III Bicycle Route	Class IV Protected Bikeways	Pedestrian Project	Other Project	Planning and Programs
Congestion Mitigation and Air Quality Improvements Program (CMAQ)	FHWA	Annual	◐	●	●	●	●	◐	◐
Surface Transportation Block Grant (STBG)	FHWA	Annual	●	●	●	●	●	●	●
Highway Safety Improvement Program (HSIP) Grants	FHWA	Biennial	◐	●	◐	●	●	●	○
Caltrans Transportation Planning Grants	Caltrans	Annual	○	○	○	○	○	○	●
Local Transportation Fund (LTF)	Caltrans	Annual	●	●	●	●	●	●	○
California State Parks Recreational Trails Program (RTP)	FHWA/CA DPR	Annual	●	○	○	○	○	○	○
Land and Water Conservation Fund (LWCP)	US NPS/CA DPR	Biennial	●	○	○	○	○	○	○
Active Transportation Program (ATP)	Division of Local Assistance, Office of State Programs	Biennial	●	●	●	●	●	●	●
Transportation Development Act (TDA)	Caltrans	Annual	●	●	●	●	●	●	●
Affordable Housing and Sustainable Communities Program (AHSC)	SGC	Annual	◐	◐	◐	◐	◐	◐	◐
California Office of Traffic Safety Pedestrian and Bicycle Safety Grants	OTS	Annual	○	○	○	○	○	○	●
East Bay Regional Park District (EBRPD) Measure WW	EBRPD	-	●	●	●	●	●	○	○
Metropolitan Transportation Commission (MTC) One Bay Area Grants (OBAG)	MTC	5 year	●	●	●	●	●	●	●

Table 1. Potential Funding Sources Related to People Bicycling, Walking, or Using Mobility Devices

Funding Source	Administrator	Timeframe	Class I Bicycle Path	Class II Bicycle Lane	Class III Bicycle Route	Class IV Protected Bikeways	Pedestrian Project	Other Project	Planning and Programs
Bay Area Air Quality Management District (BAAQMD) County Program Manager Fund	BAAQMD	Annual	●	●	●	●	○	○	○
BAAQMD Transportation Fund for Clean Air (TFCA)	BAAQMD	Annual	●	●	●	●	○	○	○
Measure J, Transportation for Livable Communities (TLC)	CCTA	Annual	●	●	●	●	●	◐	◐
Measure J, Pedestrian, Bicycle and Trail Facilities (PBTF) program	CCTA	Annual	●	●	●	●	●	○	○
California Strategic Growth Council (SGC) Transformative Climate Communities (TCC) Program	SGC	Annual	●	●	●	●	●	●	●
SB 1	CA Transportation Commission	Annual	●	●	●	●	●	●	●
California Natural Resources Agency Environmental Enhancement and Mitigation Program	CA Natural Resources Agency	Annual	○	○	○	○	○	○	●
California Natural Resources Agency Urban Greening Program	CA Natural Resources Agency	Annual	●	○	○	○	○	○	○
Community Development Block Grant (CDBG) Program	HUD	Annual	●	●	●	●	●	●	○
Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grant Program	FHWA	Annual	●	●	●	●	○	○	○

Notes:

● Indicates that funds may be used for this category, ○ indicates that funds may not be used for this category, and ◐ indicates that funds may be used, though restrictions apply.



Appendix A. Vision Zero Best Practices Review



Memorandum

Date: March 25, 2020
To: Matt Kelly, CCTA
From: Eleanor Leshner, Inder Grewal and Meghan Mitman, Fehr & Peers
Subject: Best Practices Review – Contra Costa Vision Zero Framework & Systemic Safety Approach

WC16-3343.01

The Contra Costa Transportation Authority (CCTA) is advocating Vision Zero as a viable policy for adoption by local jurisdictions, one that can be integrated as standard practice in local and regional transportation planning and engineering. Developing a countywide framework for Vision Zero — which is a strategy to eliminate all traffic fatalities and serious injuries — was a key recommendation of the 2018 update of the Countywide Bicycle and Pedestrian Plan (2018 CBPP Update). The collision analysis and community outreach conducted as part of the 2018 CBPP Update highlights the need to address traffic safety issues across the county, particularly for people walking and biking. The 2018 CBPP Update recommends developing a Vision Zero Framework and Systemic Safety Approach as an implementation action to address safety issues in a proactive, systemic, data-driven, and equitable manner.

Through its role in countywide planning, policy and funding, CCTA is uniquely positioned to work with local jurisdictions to implement Vision Zero. Focusing on the three themes of planning, policy, and funding, this review explores best practices for county-level transportation authorities to integrate and promote Vision Zero. The Best Practices align with the Institute of Transportation Engineer's (ITE)



Core Elements for Vision Zero Communities, which is a national benchmark for Vision Zero efforts.¹ For each of the strategies presented in Table 1, this memorandum presents a definition, best practice example, and discussion of its applicability to the Contra Costa Vision Zero Framework.

Table 1: Summary of Best Practice Topics and Strategies

Topic	Strategy
Planning	Public, High-Level, and Ongoing Commitment
	Authentic Engagement
	Strategic Planning
	Equity-Focused Analysis and Programs
	Proactive, Systemic Planning
	Responsive, Hot Spot Planning
Policy	Complete Streets for All
	Context Appropriate Speeds
Funding	Project Delivery
	Comprehensive Evaluation and Adjustments

Key Takeaways

This section summarizes key takeaways for best practices that CCTA can employ for countywide Vision Zero-related planning, policy, and funding activities. Some of these elements are included in the scope of the Contra Costa Vision Zero Framework project (“Contra Costa VZ”), others are or could be implemented by local agencies (“Local Agencies”), and others are recommended for future consideration by CCTA (“CCTA Future”).

¹ More information on the *ITE Core Elements for Vision Zero Communities* is available at <https://visionzeronetwork.org/resources/vision-zero-core-elements/>





Planning

- Focus on achieving high-level commitment from elected officials and buy-in from the public (Contra Costa VZ; Local Agencies)
- Collaborate with relevant county agencies, such as Contra Costa Health Services (CCHS) and Contra Costa County Sheriff's Office (CCTA Future; Local Agencies)
- Coordinate countywide tasks such as data collection, marketing strategies, and technical assistance for implementation of Vision Zero and safety-related projects (Contra Costa VZ; CCTA Future)
- Meet communities “where they are” using authentic engagement and temporary demonstration projects such as “pop-up” protected bikeways or “car-free” days on main streets² (CCTA Future; Local Agencies)
- Define equity and determine how equity will be measured, integrated in the allocation of funding, and enforced (CCTA Future; Local Agencies)
- Develop collision typologies or profiles that take into consideration historical collision trends and contextual factors such as roadway type, travel mode, vehicle movement, land use characteristics, victims and/or other factors (e.g., presence of crosswalk, presence of bike lanes, time of day, lighting, etc.) to better understand countywide collision trends and prioritize safety improvements (Contra Costa VZ)
- Develop countywide High-Injury Networks (HINs) to spatially prioritize safety improvements (Contra Costa VZ; Local Agencies)

Policy

- Use the Contra Costa Vision Zero Framework to incorporate systemic safety principles and practices in Complete Streets planning, policy, and design (CCTA Future; Local Agencies)
- Develop guidelines for context appropriate vehicle speed limits by roadway type, land use characteristics, and/or Complete Streets concepts, especially as California refines statewide practices (CCTA Future)

² See examples of SCAG's Go Human! pop up events at <http://gohumansocal.org/Pages/Events.aspx>





Funding

- Select funding priorities based on the countywide HINs, collision profiles, and geographic and socioeconomic equity metrics (CCTA Future)
- Ensure consistency between Vision Zero and Local Road Safety Plans, Systemic Safety Analysis Reports, and Highway Safety Improvement Programs to maximize access to state and federal roadway safety funds (Local Agencies)
- Assess and consistently evaluate the safety, equity, and other community outcomes related to the Contra Costa Vision Zero Framework – as well as local Vision Zero Action Plans – to refine and adjust the countywide Vision Zero approach (CCTA Future; Local Agencies)

Planning

As a county-level transportation planning agency, CCTA leads collaborative, cross-jurisdictional processes that promote a safe, user-friendly, and integrated (with land use priorities) transportation system. CCTA also helps coordinate a consistent set of plans, policies, and design concepts across multiple jurisdictions to achieve a common set of goals. For example, the Countywide Transportation Plan (CTP) and the 2018 CBPP Update serve as a framework for local transportation planning efforts, and CCTA provides technical assistance to local jurisdictions in the form of data collection, management, and analysis to inform local decision-making. CCTA also leads planning for the county's Regional Routes of Significance – roadways that connect two or more planning areas of Contra Costa, cross county boundaries, carry significant through traffic, and/or provide access to a regional highway or transit facility.

The planning-related core elements of Vision Zero are:

- Public, High-Level, and Ongoing Commitment
- Authentic Engagement
- Strategic Planning
- Equity-Focused Analysis and Programs
- Proactive, Systemic Planning
- Responsive, Hot Spot Planning





The following sections outline best practices for CCTA and local Contra Costa jurisdiction consideration in support of these core elements, including Vision Zero-related actions that are in progress, as well as recommended future Vision Zero-related actions.

Public High-Level, and Ongoing Commitment

Successful Vision Zero efforts rely on having key elected officials and public agency leaders (especially from transportation, law enforcement, and public health departments) commit to a goal of eliminating traffic fatalities and serious injuries within a specific timeframe. This commitment is typically the first step in developing Vision Zero as a principle and policy toward safer streets. Beyond this high-level commitment, cross-departmental and interagency collaboration enable a comprehensive approach and are critical to Vision Zero planning and implementation in respective communities. Based on peer agency interviews, effective coordination and collaboration across groups can also be a challenging aspect of implementing Vision Zero that requires continuous collaborative effort.

A best practice example of achieving this kind of commitment comes from Montgomery County, Maryland.³ In 2016, the Montgomery County Council adopted a resolution to develop a Vision Zero Action Plan. The County Executive's Office spearheaded the effort based on their direct access to and ability to coordinate across a diverse group of stakeholders. The County Executive's office organized six working groups consisting of representatives from various County departments including transportation, planning, public health, and law enforcement, as well as state-level agencies and advocacy groups. These stakeholder groups developed a holistic understanding of systemic traffic safety issues within the county to craft a multi-agency effort to address these issues. By taking leadership at a regional level, Montgomery County has further inspired and supported local jurisdictions to adopt Vision Zero policies and implement safety projects.

Likewise, CCTA is leading the way for Vision Zero adoption and implementation by spearheading the Contra Costa Vision Zero Framework and by incorporating and acknowledging Vision Zero in the 2018 CBPP Update and Countywide Transportation Plan (CTP). While CCTA is not the executive administrative body for Contra Costa County, it is similarly well positioned to coordinate a diverse group

³ See Montgomery County's Vision Zero Action Plan at <https://www.montgomerycountymd.gov/visionzero/action.html>





of stakeholders like in Montgomery County’s case. CCTA’s Board of Commissioners – comprising 11 appointed Mayors, Councilmembers, and County Board of Supervisors – can also help lead the county and local jurisdictions toward Vision Zero goals.

CCTA has formed a Vision Zero Working Group (VZWG) of representatives from each of Contra Costa’s four Regional Transportation Planning Committees (RTPCs) as well as key advocacy groups and regional partners such as Bike East Bay, Bike Concord, the Metropolitan Transportation Commission (MTC), and UC Berkeley Safe Transportation Research and Education Center (SafeTREC). Furthermore, CCTA has an established relationship with the California Department of Transportation (Caltrans) to coordinate countywide planning efforts with state-level policymaking. By engaging stakeholders from the start of the process, CCTA is achieving high-level commitment to Vision Zero. Moving forward, CCTA plans to coordinate with and seek feedback from local jurisdictions, RTPCs, and other key county agencies such as Contra Costa Health Services (CCHS) and the County Sherriff’s Office.

Authentic Engagement

Authentic engagement is important to Vision Zero and goes beyond traditional community engagement efforts to connect with diverse communities “where they are” and in a culturally relevant manner. This is especially important in Contra Costa, which is home to many diverse communities; safety challenges and opportunities vary across urban, suburban, and rural communities, and open space areas. Many communities are moving away from the more traditional weeknight community meeting outreach strategy, and are focused instead on “meeting people where they are” through pop-up events such as temporary demonstration projects or information booths at local events, and community “hubs” such as farmers markets, transit stations, and community centers.

A best practice example of a regional approach to authentic community engagement comes from the Southern California Association of Government’s (SCAG) *Go Human!* Campaign,⁴ which promotes safe active transportation in Southern California communities. This campaign has focused on temporary demonstration projects at locations identified on their Regional High-Injury Network and a countywide safety marketing campaign. Demonstration projects provide temporary “living previews” or “pop-ups” of

⁴ See SCAG’s Go Human! Campaign at <http://gohumansocal.org/Pages/About.aspx>





potential strategies to address specific safety issues identified at their locations. By partnering with local advocacy groups and community-based organizations (CBOs), SCAG has demonstrated benefits of potential safety improvement projects and strategies in real-time, as well as feedback gathered from people that use the area, effectively “meeting the community where they are.” These types of demonstration projects have been successful both at generating excitement about safety projects as well as assisting local jurisdictions in winning grant proposals to implement longer-term improvements.

Vision Zero marketing and education campaigns are also highly important... and based on peer agency interviews these are sometimes overlooked. In Southern California, SCAG has played a strong role in developing a consistent road safety brand, messaging, and marketing campaign that local jurisdictions and partner organizations (e.g., schools) can use throughout the region. SCAG used focus group testing to develop its road safety brand and marketing campaign, and also conducts an online survey to evaluate how well their campaigns are reaching people driving, walking, and biking regionwide.

Several Contra Costa jurisdictions are already employing innovative public engagement strategies for safety studies. For example, in developing *Pittsburg Moves*, the City of Pittsburg’s active transportation plan, the city conducted several pop-up outreach events at community events and implemented a temporary demonstration project near the Pittsburg Center BART Station to test recommended safety strategies and gather feedback from the community. The City initially considered a more traditional outreach effort, such as hosting weeknight community meetings. However, these types of events have typically attracted a smaller number of participants – for example, it would not be uncommon for the number of City staff and consultants at an evening meeting to outnumber members of the public. To encourage broader public participation, the City decided to test-host a pop-up event, which proved to be successful in reaching more people – and a more representative sample of the City’s population. Some of the elements of the demonstration project on Railroad Avenue have also become permanent. For instance, the City, in collaboration with Caltrans, installed a leading pedestrian interval (LPI) at a Caltrans signal on the corridor, which has since become a permanent feature at this intersection. The success of the *Pittsburg Moves* demonstration project has inspired the City to organize additional pop-up events as part as the ongoing Railroad Avenue Complete Streets study. Other recent examples of demonstration projects as effective tools for public outreach and refining ultimate project design and implementation include the Yellow Brick Road project in Richmond’s Iron Triangle neighborhood, the





Telegraph Avenue Complete Streets project in nearby Oakland, and the Safer Taylor Street project in San Francisco.

Similar to SCAG, CCTA could further promote authentic public engagement activities and support local project implementation by leading demonstration projects or providing local jurisdictions and community groups with the best practice resources, materials, and/or funding to implement these types of projects. In the future, CCTA could also help further education and marketing efforts by developing a regional Vision Zero and safety marketing campaign, similar to SCAG, and provide local jurisdictions with marketing and outreach materials that they can tailor to their respective communities.

Strategic Planning

Strategic planning for Vision Zero often takes the form of a Vision Zero Action Plan, which typically consists of explicit goals, measurable strategies, and a clear timeline for achieving Vision Zero and often follows the “Safe Systems” approach.⁵ A Safe Systems approach acknowledges that people make mistakes and focuses on influencing system-wide practices, policies, and designs to lessen the severity of crashes, such as encouraging safer, more context-appropriate travel speeds and building “safety nets” into street design to prevent or mitigate severe and fatal collisions.

Best practices for developing local Vision Zero action plans are well documented by the *Vision Zero Network*.⁶ These action plans also reflect specific priorities and concerns unique to each jurisdiction. In the Bay Area, the cities of Fremont and Berkeley are examples of small-to-medium sized cities that have recently developed Vision Zero Action Plans. Fremont’s Vision Zero Action Plan focuses on technology-oriented strategies, as well as implementing quick-build projects, separated bikeways, and protected intersections. Berkeley’s Vision Zero Action Plan focuses on equity as well as engineering strategies to reduce speeds on higher speed arterials. Berkeley’s Plan also prioritized engagement of victims’ families and committed to post-crash care and victim remembrance.

To support Vision Zero action planning at the local jurisdiction level, CCTA can provide technical assistance to ensure these plans reflect best practices and are consistent with countywide transportation

⁵ See “Systems Approach” at <https://www.ite.org/technical-resources/topics/safe-systems/>

⁶ See Vision Zero Network Case Studies at <https://visionzeronetwork.org/resources/case-studies/>





plans. As part of the Contra Costa Vision Zero Framework, CCTA is developing countywide High Injury Networks (HINs), a Vision Zero Database, and a Vision Zero “How to” Guide to assist cities in developing local Vision Zero action plans. By leading key aspects of data collection, management, and analysis, CCTA will enable local jurisdictions to focus on “core elements” that are best suited for local jurisdictions to lead, such as authentic engagement and project delivery.

Equity-Focused Analysis and Programs

Elevating equity and meaningful community engagement, particularly in low-income communities and communities of color, should be a priority in all stages of Vision Zero work. Nationwide studies have concluded that low-income communities, communities of color, and immigrant communities often carry a disproportionate burden of traffic-related injuries and fatalities, lack infrastructure to facilitate safe access and mobility, and are more likely to be stopped by law enforcement.⁷ In Contra Costa County, many neighborhoods – such those located in Antioch, Bay Point, Concord (Monument Corridor), Martinez, Pittsburg, Richmond and San Pablo – have been identified as disadvantaged communities⁸ and continue to grapple with a legacy of community underinvestment. Countywide collision trends indicate that lower-income, non-white communities in Contra Costa carry a significant burden of fatal and serious injury collisions, especially those adjacent to high speed arterial roadways. While strategic enforcement can be an important tool for Vision Zero programs, ITE’s *Core Elements for Vision Zero Communities* recognizes that achieving zero traffic fatalities should focus primarily on roadway safety infrastructure investment, innovative engineering, and effective programming in neighborhoods most impacted by unsafe roadway conditions. Residents across Contra Costa should be included in the development of Vision Zero-related projects, from planning, design, and construction, in order to best meet community needs. At a countywide level, geographic equity is also important to ensure all communities within Contra Costa benefit from investments in traffic safety projects and programs.

⁷ See Vision Zero Network for more information on disparities in collisions and safety enforcement at http://visionzeronetWORK.org/wp-content/uploads/2017/05/VisionZero_Equity.pdf

⁸ See California Environmental Protection Agency’s (CalEPA) California Communities Environmental Health Screening Tool, Version 3.0 (CalEnviroScreen 3.0), accessible at <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>





Several cities, including San Francisco and Berkeley in the Bay Area, have placed equity at the forefront of their Vision Zero process by clearly defining what equity means and developing methods for incorporating equity in their decision-making process. For example, San Francisco overlays their High-Injury Network (HIN) with MTC's Communities of Concern to prioritize corridors for safety treatments.⁹ HIN corridors located in Communities of Concern are given a higher priority in Vision Zero implementation. In Berkeley, the City incorporates equity in their project prioritization process by focusing on neighborhoods that were historically "redlined" by the Federal Housing Administration (FHA). Through detailed analysis, the City found that these areas are directly correlated with the highest concentration of traffic collisions, poverty, and non-white residents. Berkeley uses this equity metric to help determine how infrastructure funding and resources will be allocated spatially as part of implementing their Vision Zero Action Plan. Some Vision Zero cities have also incorporated hospital data in their collision analyses to better understand the race and socioeconomic status of collision victims, which is not provided in California's Statewide Integrated Traffic Records System (SWITRS) database that is typically used in collision analyses.

As a planning, policy, and funding agency, CCTA can help address historical inequities in community and infrastructure investment across the county by prioritizing communities most burdened by traffic safety issues for Vision Zero-related safety improvement projects. To inform project prioritization, CCTA is developing a HIN and collision profiles to better understand countywide trends; the HIN helps determine where investment need to be made based on historical collision trends, and the collision typology analysis will inform which roadway users and contexts are most likely impacted by fatal and serious injury collisions. CCTA should further consider prioritizing projects based on whether they fall in a disadvantaged community and/or would benefit vulnerable roadway users (e.g., communities of older adults, Safe Routes to School projects, etc.).

Proactive, Systemic Planning

A proactive, systems-based approach to safety is integral to Vision Zero as it identifies top risk factors to mitigate crash severity and potential collisions. Instead of reactively focusing only on where collisions

⁹ See Page 2-1 of MTC's Plan Bay Area 2040 Equity Report for definition of Communities of Concern at http://2040.planbayarea.org/sites/default/files/2017-07/Equity_Report_PBA%202040%207-2017.pdf





have occurred in the past, systemic safety analysis proactively identifies potential safety issues based on travel behavior, roadway design, and other built environment factors that contribute to fatal and serious injury collisions. Systemic safety data is used to determine and address the underlying risk factors that influence roadway safety: the where, how, and why serious collisions happen, along with who is likely to be affected.

A best practice example of proactive, systemic planning comes from the Orange County Transportation Authority (OCTA). OCTA recently developed a data-driven Systemic Safety Plan to improve transportation safety countywide, with a focus on people walking and bicycling. The Plan analyzed collision data to develop crash typologies that identify key trends and specific conditions that place people walking and biking most at risk. OCTA was then able to develop focused countermeasures to address the most prevalent collision typologies, which included strategies such as: signal timing adjustments, intersection design measures, new signage, innovative bikeway designs, new pedestrian crossings, and low-cost, quick-build strategies.

CCTA is currently developing collision typologies to identify trends associated with serious and fatal collisions in Contra Costa County. Achieving a Vision Zero goal of zero traffic fatalities will require investments that proactively address the underlying risk factors related to fatal and serious injury collisions. Understanding the trends associated with fatal and serious injury collisions will help CCTA and local jurisdictions to address underlying traffic safety issues – even at locations that have not yet experienced fatal or severe injury collisions – to develop a system that is safer for all users.

Responsive, Hot Spot Planning

Responding to historic collision patterns and “hot spots” complements systemic, proactive planning and is therefore also important to achieve Vision Zero goals. A common Vision Zero approach to understand geographic collision trends is to map – and regularly update – a community’s fatal and serious injury crash locations to guide priority actions, funding, and track jurisdictional traffic safety performance. Vision Zero agencies typically develop a High-Injury Network (HIN) to determine which roadways carry a disproportionate burden of fatal or serious injury collisions based on collision data and community input.





For instance, Denver’s HIN shows that 50% of all traffic fatalities in Denver occur on just 5% of roads.¹⁰ Other cities also show that traffic fatalities disproportionately effect pedestrians and cyclists, despite the two groups representing a smaller commute mode share. In this way, HINs can help spatially pinpoint any collision “hotspots” that need to be addressed.

CCTA is currently developing three Countywide HINs as part of its Vision Zero effort: one focused on all collisions (including vehicle-to-vehicle collisions), one focused on bicyclist-involved collisions only, and one focused on pedestrian-involved collisions only. The Countywide HINs will identify roadways where fatal and serious injury collisions have been – and are likely to be – located. Note that since the Countywide HINs identify roadways at an aggregate, countywide level, local jurisdictions may find value in developing their own HINs that may identify additional locations and local safety trends that require attention at a local level.

Policy

From a Countywide policy perspective, CCTA can focus on advocating for policy-related core elements of Vision Zero such as:

- Complete Streets for All
- Context Appropriate Speeds

¹⁰ See Pages 3 to 10 for Denver’s HIN at <https://www.denvergov.org/content/dam/denvergov/Portals/705/documents/visionzero/Denver-Vision-Zero-Action-Plan.pdf>





Complete Streets for All

Vision Zero promotes the integration of Complete Streets concepts into communitywide plans and projects to encourage a safe, well-connected transportation network for people using all modes of transportation. A Complete Street is one that is designed to be safe for all users including people walking, biking, taking transit, and driving. Another aim of Complete Streets is to transform day-to-day transportation decisions so that all users are considered at every stage of the design process for all road projects. The adoption of Complete Streets policies has increased significantly over the past 10-15 years. For example, the State of California passed the State Complete Streets Act, Assembly Bill 1358, in 2008, which requires municipalities to incorporate a Complete Streets policy in their general plan.

The 2018 CBPP update identified potential Complete Streets project locations based on the Low-Stress Countywide Bicycle Network and provides design guidelines for bicycle and pedestrian facilities that can be referred to in Complete Streets planning. Many of the Complete Street studies were identified for right-of-way-constrained arterials, where collisions are concentrated but multimodal tradeoffs will be required to develop recommendations.

Further integrating Complete Streets planning and design with Vision Zero goals can help ensure roadways are safe for all users. To better inform Vision Zero and Complete Streets planning efforts, CCTA is developing a Vision Zero database including safety and built environment data. As part this effort, CCTA is developing an inventory of sidewalks and crosswalks in Priority Pedestrian Areas (PDAs), which were identified in the 2018 CBPP Update, using a big data vendor (Ecopia Tech). This type of data will help identify gaps in the pedestrian network and assist future local planning efforts. By developing this database, providing technical assistance to local jurisdictions, and funding Complete Streets and safety projects, CCTA can help encourage and facilitate Complete Streets implementation.

Context Appropriate Speeds

Context appropriate speeds refers to travel speeds being set and managed to achieve safe conditions for the specific roadway context and to protect all roadway users, particularly those most at risk in collisions such as people walking and biking. Speeds are critically important since the likelihood of a fatality or severe injury increases substantially the faster a vehicle is moving at the time of collision. Studies have shown that a person walking is 90% likely to survive a collision if the vehicle is traveling at 20 mph,





compared to 60% if the vehicle is traveling at 30 mph and 20% if the vehicle is traveling at 40 mph.¹¹ Proven speed management policies and practices, such as road diets, traffic calming measures, speed limit reductions, and automated speed enforcement (ASE) are often prioritized by Vision Zero plans to reach this goal.

Outside of the State of California many jurisdictions, such as Boston, have worked to reduce speed limits; in 2017, Boston reduced the default speed limit on city streets from 30 mph to 25 mph, in an effort to reduce the probability of fatal and severe injury collisions. A study conducted by the Insurance Institute for Highway Safety (IIHS) analyzed the effects of Boston speed limit reductions and found that after the speed limit was lowered, the odds of vehicle speeds exceeding 35 mph decreased by approximately 30 percent.¹² Vehicle speeds exceeding 30 mph decreased by approximately nine percent and vehicle speeds exceeding 25 mph decreased by three percent.

As another example, Montgomery County has reduced speed limits on County-owned roadways to adjust to changing land use context surrounding specific roadways, especially in locations with new residential and/or mixed-use development. In addition, Montgomery County, Washington D.C., New York City and Philadelphia, have adopted Automated Speed Enforcement (ASE) to reduce speeds on higher-speed corridors. ASEs have reduced speeds and traffic fatalities on these corridors by providing constant speed enforcement while reducing the need to dedicate limited police resources to speed management.

California has historically set vehicle speed limits based on the 85th percentile speed, which is a metric based on how fast people drive on a given roadway; as a result, the faster people tend to drive on a roadway, the higher the speed limit. Moreover, California does not currently permit the use of ASEs to manage speeds. However, AB 2363 required California's Secretary of Transportation to establish and convene a Zero Traffic Fatalities Taskforce to examine the use of the 85th percentile methodology for establishing speed limits. In January 2020, the Taskforce released a report concluding that California's

¹¹ Kumfer, W., LaJeunesse, S., Sandt, L., and Thomas, L. (2019). "Speed, Kinetic Energy, and the Safe Systems Approach to Safer Roadways." ITE Journal, Vol 89, No. 4, 32-36.

¹² See the Insurance Institute for Highway Safety study on Boston's speed limit reduction at <https://www.iihs.org/news/detail/city-drivers-slow-down-for-lower-speed-limit-in-boston>





speed limit policies need to evolve to promote safety over expeditious mobility on roadways, and to give local jurisdictions greater autonomy in managing speeds on local roadways. As findings from the Taskforce begin to permeate through actionable policy, CCTA can take a leading role in defining context appropriate speeds on different types of roadways, with consideration of the land use context, proactive and systemic planning, and collision hotspots.

Funding

Although CCTA does not have jurisdiction over local roadways and state highways, one of the main ways CCTA can influence the adoption of Vision Zero policies and implementation of related projects is through funding. Its role as a funding agency enables CCTA to effectively partner with local, regional, and state agencies for project implementation and influence municipal-level policy and decision-making. As a funding agency leading the Contra Costa Vision Zero Framework, CCTA can support the following funding-related core elements of Vision Zero:

- Project Delivery
- Comprehensive Evaluation and Adjustments

Project Delivery

Project delivery refers to how decision-makers, planners and engineers advance projects for safe, equitable, multimodal travel by prioritizing projects that address the most pressing safety issues, securing funding, and implementing these projects on the ground. Project delivery is essential to achieving Vision Zero goals around safety, health, and equity-related outcomes, and is typically spearheaded by local jurisdictions. However, project delivery begins with how funds are allocated, which is often decided at a regional or county level.

Regional funding agencies, such as the Mid-America Regional Council (MARC) in the Kansas City Area and Atlanta Regional Commission (ARC), have taken innovative approaches to project funding to further Vision Zero goals. For example, MARC has developed quantitative measures of safety and equity for roadway asset management and ARC has determined and monitored the percentage of funding allocated to environmental justice communities. As another example, Los Angeles' Vision Zero program uses the HIN to assign an intersection score to prioritize intersections in their funding process. In addition to considering the number of fatal collisions, additional "points" are added if a fatality at the





intersection involved vulnerable roadway users such as a child or senior, or if the intersection is in a disadvantaged community. This strategy ensures that vulnerable roadway users and disadvantaged communities are prioritized through Vision Zero project delivery.

Contra Costa HIN and collision profiles, alongside equity metrics such as MTC's *Communities of Concern*,¹³ can help guide project prioritization at the countywide level. CCTA could also weave equity goals into its funding decisions by tracking what percentage of the HIN falls within Communities of Concern or allocating a certain percentage of Vision Zero-related safety funding to Communities of Concern, or a combination thereof.

CCTA and local jurisdictions can also implement Vision Zero goals by leveraging resources developed as part of the Contra Costa Vision Zero Framework on active transportation plans, corridor studies, Local Road Safety Plans (LRSPs), Systemic Safety Analysis Reports (SSARs), and Highway Safety Improvement Programs (HSIP) projects. Consistency between these programs and different project types would help leverage additional state and federal grant funding opportunities to implement safety projects.

Comprehensive Evaluation and Adjustments

Vision Zero is an iterative process and should include routine evaluations that can inform any needed adjustments. The process of comprehensively evaluating and adjusting Vision Zero plans and priorities should be collaborative and engage a variety of stakeholders.

For example, after San Francisco adopted Vision Zero in 2014, the City undertook numerous interventions and programs to help achieve their goal, ranging from public education campaigns to upgrading pedestrian and bicycle facilities. While San Francisco had seen some successes toward this goal by 2017, local stakeholders voiced concerns whether Vision Zero could be achieved by 2024 based on the progress thus far. To address these concerns, San Francisco organized a one-day workshop to bring stakeholders from City departments, local advocacy groups, and leading transportation safety researchers to discuss what “Bold Ideas” could be implemented to help achieve Vision Zero by 2024.¹⁴ In this

¹³ See MTC's Communities of Concern at

<http://opendata.mtc.ca.gov/datasets/mtc-communities-of-concern-in-2018-acs-2012-2016>

¹⁴ For more information, see the *Vision Zero San Francisco Bold Ideas Workshop Summary Report* at





context, Bold Ideas referred to transportation policies and technologies that would require significant public investment and/or cross-agency cooperation to realize. Through this workshop – and subsequent working groups – San Francisco has worked to update its Vision Zero strategy, which shows how Vision Zero is an iterative process.

Vision Zero frameworks and action plans should be reevaluated and adjusted to meet the fluidity of community needs, collisions trends, and travel behavior. For example, several years ago, Vision Zero action plans may not have considered the influence of emerging mobility trends such as shared e-bikes and e-scooters or transportation network company (TNC) services (e.g., Uber, Lyft). As shared e-bikes are implemented in Richmond later this year, for example, this may be an important topic to monitor in Contra Costa. As a county-level funding agency, CCTA can monitor and evaluate how funds allocated to traffic safety projects and programs are being used and the outcomes they produce, such as those related to safety, equity, and other community outcomes. CCTA can use these evaluations to strategically tailor traffic safety planning and funding priorities moving forward.

<https://visionzerosf.org/wp-content/uploads/2018/06/Bold-Ideas-for-Vision-Zero-Workshop-Report-2018.pdf>





Appendix B. Contra Costa Local Plan Review



Memorandum

Date: March 6, 2020
To: Matt Kelly, CCTA
From: Eleanor Leshner and Inder Grewal, Fehr & Peers
Subject: Existing Safety Plan Review – Contra Costa Vision Zero Framework & Systemic Safety Approach

WC16-3343.01

This memorandum summarizes recent traffic safety plans and projects in Contra Costa County to lay the foundation for the development of the Contra Costa Vision Zero Framework & Systemic Safety Approach project. This summary describes countywide plans, systemic safety plans, active transportation plans, and corridor plans that focus on safety and have been completed since 2015 or are ongoing as of Winter 2020. Contra Costa organizations and local jurisdictions have recently adopted or implemented several important safety projects the Vision Zero Framework can build on. Several recent projects have focused on addressing systemic safety issues as well as incorporating robust public outreach, “pop-up” temporary demonstration (i.e., “living preview”) installations, and design innovations such as Class IV separated bikeways.

Countywide Plans

Countywide Bicycle & Pedestrian Plan Update (Contra Costa Transportation Authority)

In 2018, the Contra Costa Transportation Authority (CCTA) adopted the Countywide Bicycle & Pedestrian Plan (2018 CBPP) Update. The 2018 CBPP reflects many new policies, best practices, and standards developed since the 2009 CBPP, through the following four approaches:

- Focus on the “interested but concerned” group of bicyclists, who represent most of the population and need clearly separated facilities to feel safe and comfortable



- Use level of traffic stress (LTS) to evaluate how stressful a roadway is for bicyclists and create a network of low-stress bikeways that better serve bicycle riders of all ages and skill levels, promote safer travel behavior across all modes, and could attract more riders that identify with the “interested but concerned” group
- Incorporate new practices and standards that focus on making crosswalks and bikeways safer and more connected, including traffic-separated bikeways
- Encourage local agencies to develop “complete streets” plans – both alone and collaboratively – to identify designs for streets and implement low-stress facilities for walking and biking

Key elements of this cross-jurisdictional and multifaceted project included a comprehensive collision analysis, the development of a low-stress countywide bikeway network (CBN), and identification of priority pedestrian areas (PPA). The project also conducted various “pop up” community outreach events countywide (at BART stations, farmers markets, and community events) and an online townhall to provide different opportunities for community engagement and “meet people where they are.” The plan also provides design guidelines for innovative facilities such as Class IV separated bikeways and protected intersections. One of the key implementation actions recommended in this plan was for CCTA to develop a Vision Zero framework and Systemic Safety approach for the County.

Contra Costa Transportation Authority Safe Routes to School (Contra Costa Transportation Authority)

In 2016, CCTA completed their Safe Routes to School (SR2S) Needs Assessment, which comprehensively evaluated SR2S programs and projects throughout the county. The countywide SR2S needs assessment involved extensive outreach focused on creating partnerships between county agencies, school districts, and local jurisdictions to streamline the ongoing identification and delivery of SR2S projects. Based on this assessment, CCTA developed an online SR2S resource guide, synthesizing best practices, case studies, model policies and programs, and standards and guidelines in one place. The tools provided in the resource guide help local jurisdictions strategically address engineering, programming, and funding challenges for school-related access and safety projects.

Contra Costa County Vision Zero Action Plan (Contra Costa County)

Contra Costa County is in the process of developing a Vision Zero Action Plan to address severe injury and fatal collisions on County-owned roadways, largely located in unincorporated areas. The Vision Zero Action Plan will identify key collision trends, priority corridors, and an implementation strategy to address identified trends. The comprehensive implementation strategy will encompass engineering, education, and enforcement measures.





Systemic Safety Plans

The Systemic Safety Analysis Report (SSAR) and Local Roadway Safety Plan (LRSP) programs are statewide programs that support local agencies in developing a holistic approach to systemic traffic safety. SSARs take a proactive safety approach that focuses on evaluating an entire roadway network using a defined set of criteria to identify high-risk roadway characteristics. Systemic analysis acknowledges that historical collision data is not sufficient to prioritize countermeasures across a system. Likewise, LRSPs also take a proactive approach to roadway safety by creating a framework to systematically identify and analyze problems and recommend safety improvements. Projects identified in SSARs and LRSPs will be considered for Highway Safety Improvement (HSIP) funding.

San Pablo SSAR

In 2018, the City of San Pablo conducted a SSAR to evaluate roadway safety at four specific intersections. To achieve some of project's systemic goals, the San Pablo SSAR report comprised the following elements:

- Analysis of bicycle and pedestrian collision data to identify collision trends and the main contributors to collisions resulting in severe injuries and fatalities
- Analysis of how different roadway and bike facility types affect pedestrian and bicycle safety
- Prioritization and cost-benefit analysis of site-specific infrastructure improvements to address primary collision types throughout the City

The projects identified in the SSAR will be considered as potential candidates for HSIP funding.

Local Road Safety Plan

In 2019, Caltrans released a new funding application for jurisdictions to develop Local Roadway Safety Plans (LRSP). Several Contra Costa jurisdictions have been awarded funding for the development of a LRSP, which are listed below. None of these cities have started their LRSP as of yet.

- Antioch
- Concord
- El Cerrito
- Lafayette
- Pittsburg
- Pleasant Hill
- Richmond
- San Ramon
- Walnut Creek





Future cycles of the HSIP will require jurisdictions to have an adopted Local Road Safety Plan. Caltrans has confirmed that this Contra Costa Vision Zero Framework will “check the box” for CCTA member jurisdictions to apply for HSIP funding in the future.

As part of developing the Contra Costa Vision Zero Framework, CCTA will develop resources including a Vision Zero database and “how to” guide to assist local jurisdictions in the adoption of Vision Zero policies and implementation of safety projects. These resources could also set the groundwork for local jurisdictions to develop robust LRSPs. Caltrans is also likely to release additional LRSP funding and CCTA will share application materials with local jurisdictions if and when this funding becomes available.

Active Transportation Plans (ATPs)

The Active Transportation Program in California was created through Senate Bill 99 to encourage increased use of active modes of transportation, such as walking and biking, and to meet state-mandated greenhouse gas (GHG) emissions reduction goals. ATPs typically contain goals, policies, and recommendations for developing and implementing pedestrian and bicycle networks, as well as education, encouragement, enforcement, and evaluation programs. ATPs often contribute to roadway safety by identifying deficiencies or risks in the active transportation network, through analysis of network gaps and collision trends and development of countermeasure strategies. The projects described below are examples of ATPs that have taken a more proactive approach to safety and/or have developed walking and biking networks with a focus on making them safe and comfortable for people of all ages and abilities, and therefore have moved beyond conventional collision analysis. ATPs that have taken a more conventional approach to safety analysis are listed below.

Pittsburg Moves

The City of Pittsburg is currently finalizing their ATP, known as *Pittsburg Moves*. The purpose of Pittsburg Moves is to increase walking and biking in the City by identifying and prioritizing improvements that enhance safety, accessibility, and connectivity between housing, schools, transit, parks, community centers, and commercial areas. The City conducted a comprehensive crosswalk assessment to identify potential safety enhancements on marked crosswalks located on high-volume, high-speed roadways. This assessment helped identify appropriate countermeasures to enhance crosswalk safety, such as median refuges, high visibility striping, and flashing beacons. A “pop-up” demonstration project (a.k.a. “living preview”) was conducted near the Pittsburg Center BART Station to test the recommended safety strategies and gather feedback from the community. The Plan also provides a formal commitment to Vision Zero and sets the goal of eliminating all bicycle and pedestrian severe injuries and fatalities in Pittsburg by 2040.





City of Concord Bicycle, Pedestrian, and Safe Routes to Transit Plan

In 2016, the City of Concord adopted their Bicycle, Pedestrian, and Safe Routes to Transit Plan, which focuses on the development of a pedestrian and bicycle network that is safe and comfortable for all ages and abilities. The Plan focuses on improving access to transit stops and stations as well as the Iron Horse Trail, Lime Ridge Open Space, and the Contra Costa Canal Trail, and includes “human-centered” design guidelines for pedestrian and bicycle facilities. The plan also recommends wayfinding signs and maps, secure places to park bicycles, and other education and encouragement programs as features that support the recommended pedestrian and bicycle networks.

Other Recent Active Transportation Plans

Other ATPs that have been developed over the past five years – or are currently under development – in Contra Costa County include:

- Danville Town-wide Bicycle Master Plan (ongoing)
- Pleasant Hill Citywide Bicycle and Pedestrian Master Plan (ongoing)
- City of San Ramon Bicycle Master Plan (2018)
- Brentwood Pedestrian Connectivity Study (2018)
- City of San Pablo Bicycle and Pedestrian Master Plan (2017)
- The City of El Cerrito Active Transportation Plan (2016)
- Town of Moraga Walk Bike Plan (2016)

Corridor Studies

Several Contra Costa cities have recently conducted major corridor safety studies to improve safety on arterial roadways. The studies have generally sought to provide safe access to transit, implement complete streets designs, reduce potential conflicts between vehicles and active modes, and improve access to key destinations for people walking and biking by incorporating innovative analysis methods and community engagement techniques. Several key projects are summarized below, and projects still in early planning stages are listed below for reference.

San Pablo Avenue Safe Routes to Transit, El Cerrito

As part of the San Pablo Avenue Specific Plan, the Safe Routes to Transit study seeks to improve transit access for people walking and biking in midtown El Cerrito. Given the limited right-of-way on San Pablo Avenue and the number of competing users, the study recommends installing Class II buffered bike lanes with bus boarding islands and pedestrian safety enhancements within the study area. The bus boarding islands would reduce conflicts between buses and bicyclists since the buffered bike lane would be installed between the





boarding island and the sidewalk. This study seeks to manage demand on the corridor by improving transit operations and creating safe routes to transit, therefore making public transit a more attractive alternative to driving in a more suburban setting.

Rumrill Boulevard Complete Streets, San Pablo

The City of San Pablo is currently in the design and permitting phase of the Rumrill Boulevard Complete Streets project. Located in a diverse area of the city, Rumrill Boulevard has historically served as an automobile-oriented corridor and represents a gap in the existing bicycle and pedestrian network, which poses safety concerns for the neighborhoods surrounding the corridor. The project seeks to reorient the corridor to serve the needs of all users and all modes by reallocating roadway space. Improvements include Class IV separated bikeways along the length of the corridor, bicycle supportive infrastructure (e.g., bike parking), new crosswalks, flashing beacons at crosswalks, ADA ramps, improved lighting, and new traffic signals.

Yellow Brick Road Iron Triangle Walkable Neighborhood Plan, Richmond

In 2019, the City of Richmond completed final plans for the Yellow Brick Road Iron Triangle Walkable Neighborhood Plan. The decade-long, community-driven planning and design process seeks to improve walkability to key destinations within Richmond's Iron Triangle Neighborhood as well as safety on both east-west and north-south pedestrian-oriented corridors. These corridors will include yellow-colored brick roadways and sidewalks intended to calm traffic and highlight the neighborhood's pedestrian network.

Richmond-San Rafael Bridge "People Path," Richmond

In November 2019, the Metropolitan Transportation Commission (MTC) and Caltrans opened the pilot project for the Richmond-San Rafael Bridge Bicycle and Pedestrian Path. The two-way separated "People Path" separates people walking and biking from vehicles with a moveable concrete barrier and replaces a maintenance lane on the upper deck of the bridge. The path provides an important active transportation link between Contra Costa County and Marin County and fills a critical gap in the planned 500-mile long San Francisco Bay Trail. In addition to implementing the path on the bridge, the project includes buffered bicycle lanes and protected intersections on Richmond roadways leading up to the bridge, and provides a direct route from the Richmond BART station. One of the challenges in implementing this project is the level of traffic congestion on the Richmond-San Rafael Bridge. Public officials and residents from both counties have lobbied to restrict active modes on the bridge during peak commute hours and instead use the "People Path" as an additional vehicle lane to mitigate congestion. However, MTC and Caltrans have determined that a bicycle and pedestrian facility on the bridge would encourage travel by active transportation modes during peak commute hours and serve as a transportation demand management (TDM) strategy. The new path is a temporary demonstration project and Caltrans will evaluate its use and traffic impacts over a four-year period to determine whether to implement a permanent path.





Railroad Avenue Complete Streets Study, Pittsburg

The City of Pittsburg is currently conducting a transportation planning and engineering study to improve multimodal access and safety along Railroad Avenue near the Pittsburg Center BART Station. The complete streets study prioritizes the travel modes in the following order: pedestrian and bicycle access, transit operations, and motor vehicle mobility. This project has taken an innovative approach to analyzing safety along the corridor: in addition to analyzing historical collision data, the project analyzes “near-miss” traffic incidents¹ involving all travel modes using high-resolution cameras and Brisk Synergies software. This kind of near-miss analysis is an innovative systemic safety tool since it seeks to proactively address potentially fatal or harmful interactions between people walking and bicycling, and motor vehicles.

Monument Boulevard Corridor Community-Based Transportation Plan, Concord

In 2020, CCTA, in partnership with the City of Concord, anticipates completing the Monument Boulevard Corridor Community-Based Transportation Plan (CBTP). This CBTP seeks to update the Monument Boulevard Corridor to be more compatible with land use and demographic-related changes along the corridor since the first CBTP was adopted for this area in 2006. As part of the public outreach process, roadway users expressed concerns related to pedestrian and bicycle safety, with an emphasis on SR2S. The plan recommends SR2S improvements including low-stress bikeways and a “bicycle school bus,” among others. Additional recommended infrastructure improvements include enhanced crossings at specified distances, traffic signal coordination, closure of sidewalk gaps, and consolidation of commercial driveways.

Iron Horse Trail Corridor Plan, Contra Costa County

Contra Costa County is currently addressing public comments on the draft Iron Horse Corridor Active Transportation Study. The study analyzes opportunities and constraints for the entire length of the 18.5-mile long Iron Horse Trail Corridor within Contra Costa boundaries. Through collaboration with multiple cities, extensive public outreach, and data analysis, the study finds that the greatest safety issues are related to intersection crossings and trail access. To address these concerns, the study proposes building a bicycle superhighway, a long-distance bicycle route that is entirely separated from vehicular traffic. This long-term vision would eliminate at-grade intersection crossings and increase access points from key destinations along the corridor. Implementing a bicycle superhighway would require significant coordination between the County, the five local jurisdictions along the corridor, and the East Bay Regional Park District.

¹ Near-miss traffic incidents refer to “incidents in which no property was damaged, and no personal injury was sustained, but where, given a slight shift in time or position, damage or injury easily could have occurred.” (OSHA)





Marsh Creek Corridor Multi-Use Feasibility Study, Contra Costa County

Contra Costa County is currently exploring the feasibility of designing a non-motorized trail along a 12-mile stretch of the Marsh Creek Road corridor between Round Valley Regional Preserve and the Clayton city limits. Marsh Creek Road serves as an alternative route to State Route 4 for vehicles traveling between central and east Contra Costa, where vehicles often travel at high speeds. Through extensive public outreach and an evaluation of trail alignment alternatives, the study seeks to leverage the corridor's rural terrain to provide a useful and enjoyable transportation corridor for non-motorized travel, including pedestrians, bicyclists, and equestrian users.

Other Recent Corridor Studies

Other corridor studies that have been recently completed in the past year– or are currently under development – in Contra Costa County include:

- Lincoln Avenue Complete Street Project, Walnut Creek (ongoing)
- Pleasant Hill Road, Lafayette (ongoing)
- Pleasant Hill Road Complete Streets Study, Pleasant Hill (2019)
- ConnectOrinda Plan, Orinda (2019)

Conclusion

In the past five years, many important safety-projects have been completed, or are ongoing. Several have incorporated proactive collision data collection and/or analysis methods, such as 'near-miss' data collection and analysis in Pittsburg. Several projects have also included robust public outreach, such as the "pop-up" events as part of the Iron Horse Trail Corridor Plan, Marsh Creek Corridor Multi-Use Feasibility Study, and others, which serve to "meet people where they are" and broaden community engagement. Recent plans and projects, such as the 2018 CBPP Update and Richmond-San Rafael Bridge "People Path," have also incorporated innovative design treatments, such as Class IV separated bikeways and protected intersections. These projects will serve as a foundation to develop the Countywide Vision Zero Framework and Systemic Safety Approach.





Appendix C. Countywide Collision Analysis Summary and Common Bicycle and Pedestrian Collision Patterns



**Vision
ZERO**

**Countywide Collision Analysis Summary and
Common Bicycle and Pedestrian Profiles**

FEHR PEERS

10-28-2020

 CONTRA COSTA
transportation
authority

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Data Source

- Collision data source:
 - Statewide Integrated Traffic Records System (SWITRS) maintained by the California Highway Patrol (CHP), accessed using UC Berkeley SafeTREC's Transportation Injury Mapping System (TIMS) platform.
- Date range of collision data analyzed:
 - 1/1/2008 to 12/31/2017
- Data **excluded** to focus on collisions involving people walking and using mobility devices, and people biking:
 - Collisions occurred on freeways
 - Collisions resulting in property damage only (PDO) rather than an injury or fatality

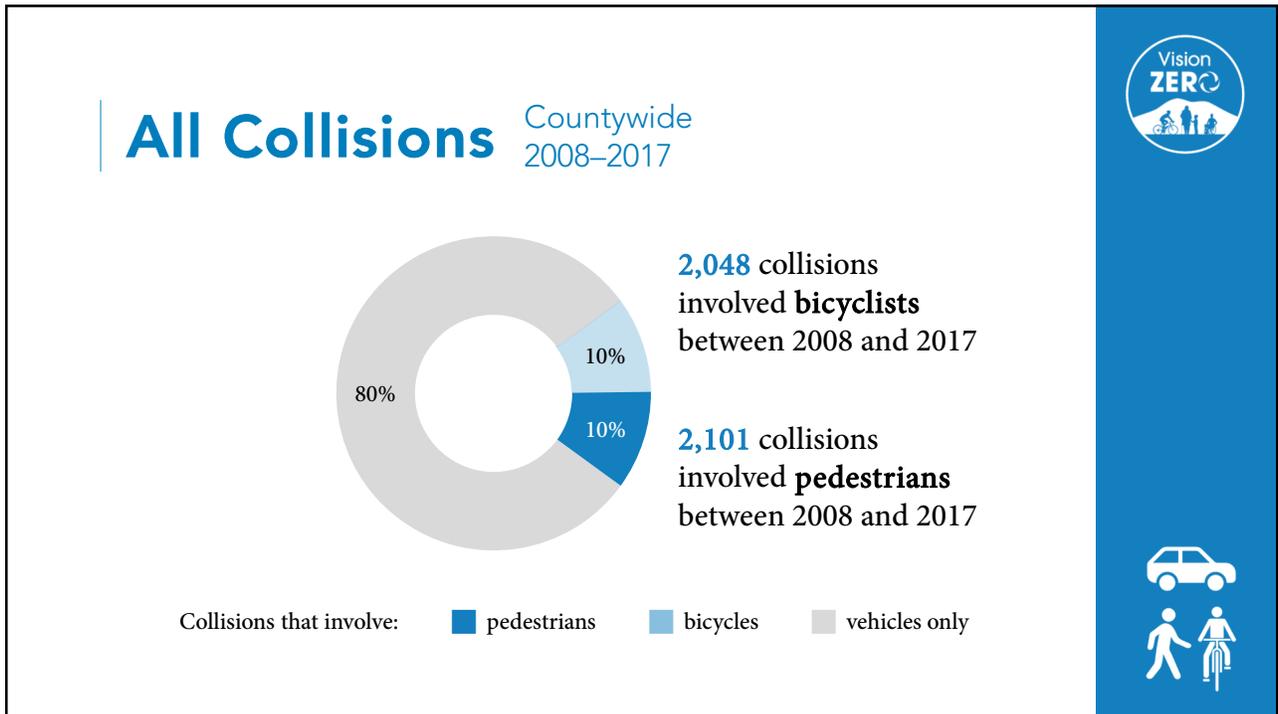
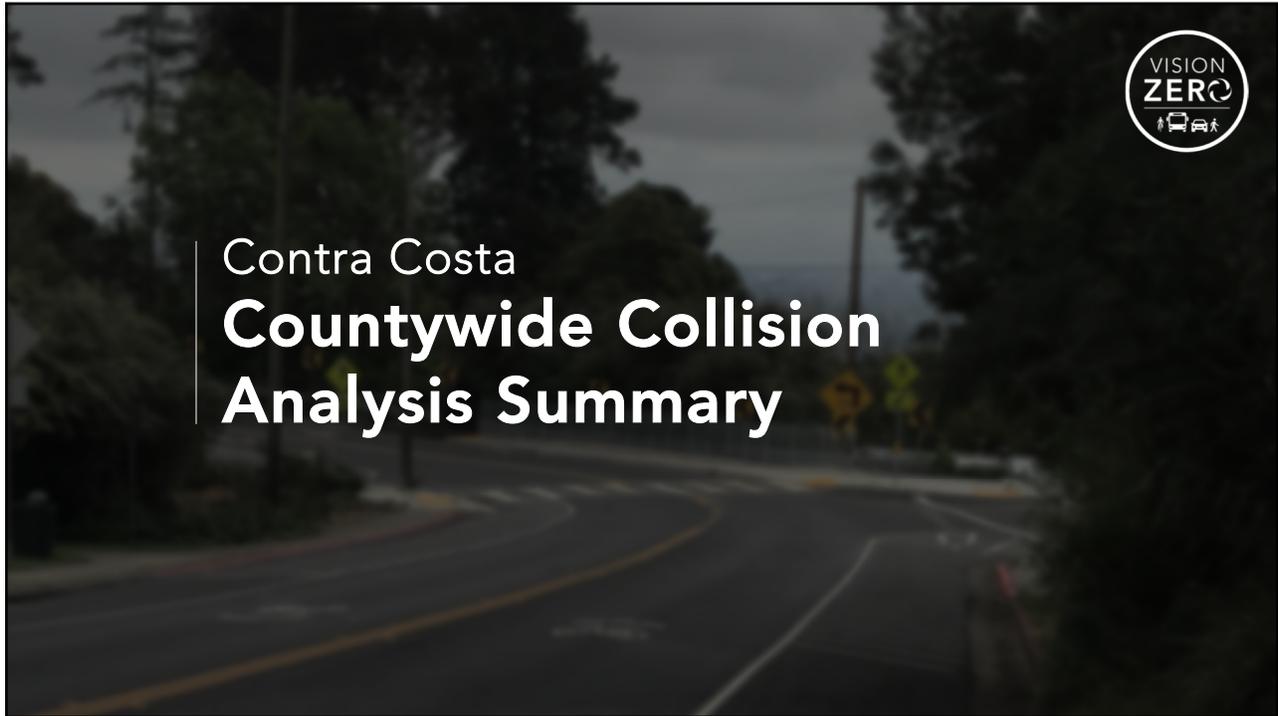


Key Definitions

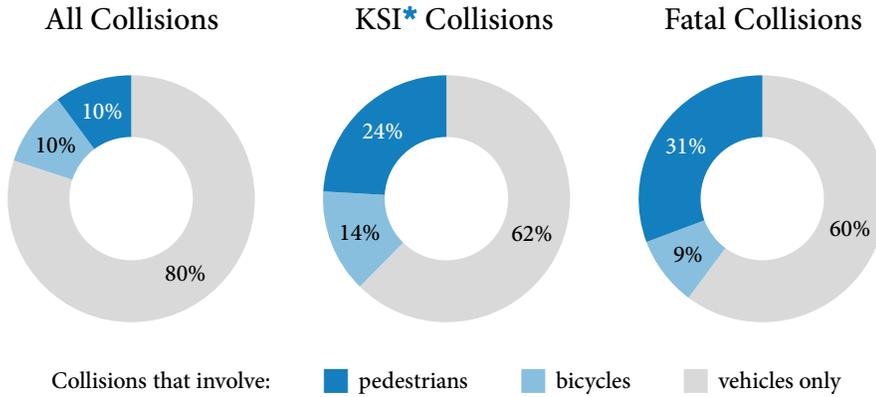
Collision analysis is presented for the following categories by mode:

- “**Pedestrian**” or “pedestrian-involved” collisions, which involve people walking or using personal assisted mobility device (e.g., wheelchair) 
- “**Bicycle**” or “bicycle-involved” collisions, which involve people bicycling (at least one party bicycling).^{*} 
- “**Vehicle-only**” collisions, which involve only people driving, and do not involve people walking or biking. 
- “**All collisions,**” which includes “vehicle-only” collisions as well as collision that involve people walking and biking. 

^{*} Note that SWITRS data does not currently distinguish between bicycle, e-bike, and e-scooter collisions



Collisions by Mode Countywide 2008–2017

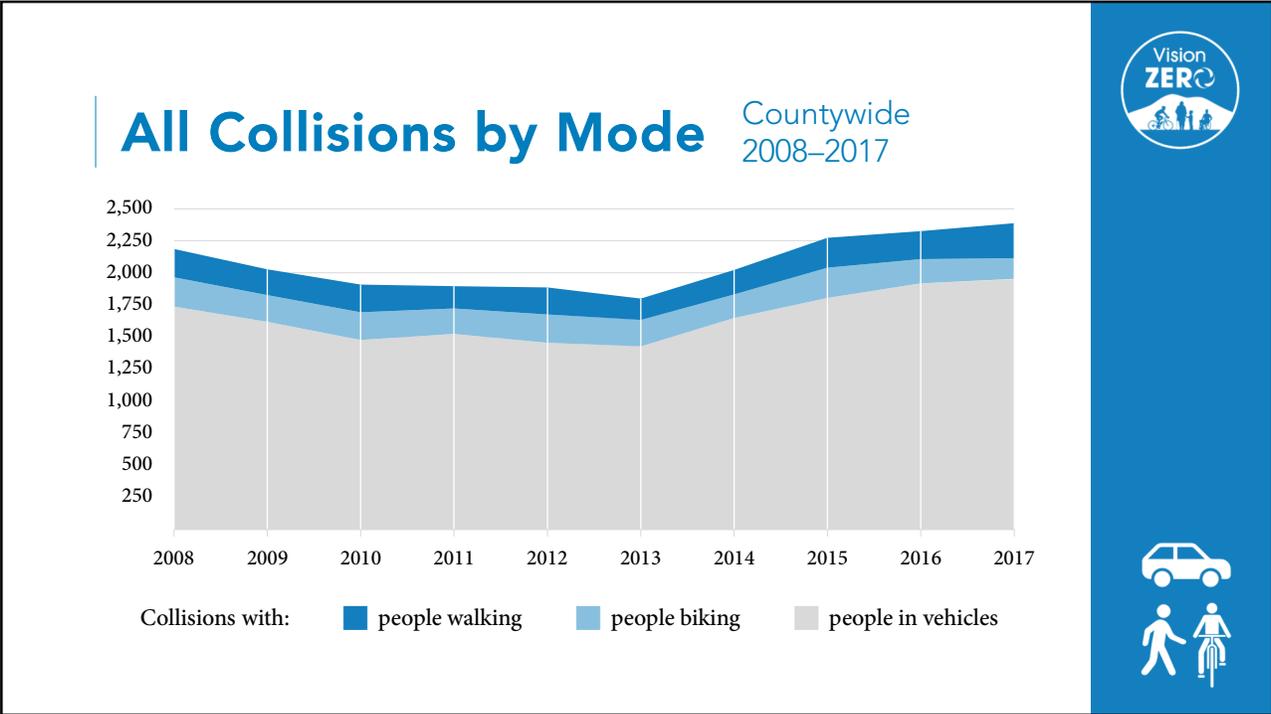


* Killed or severely injured



People walking are involved in 10% of all countywide collisions, but account for **31% of all fatal collisions**





The number of collisions in Contra Costa County **increased 9%** from 2008 to 2017.

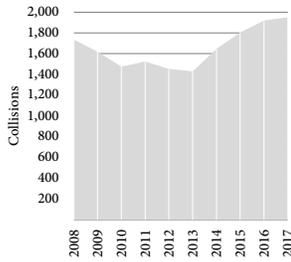


All Collisions by Mode

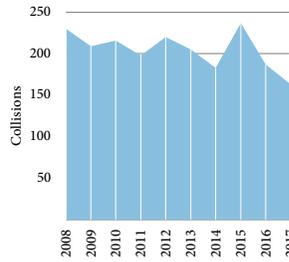
Countywide
2008–2017



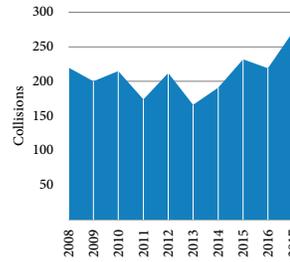
Auto Collisions
up 12%
from 2008 to 2017



Bicycle Collisions
down 29%
from 2008 to 2017



Pedestrian Collisions
up 24%
from 2008 to 2017

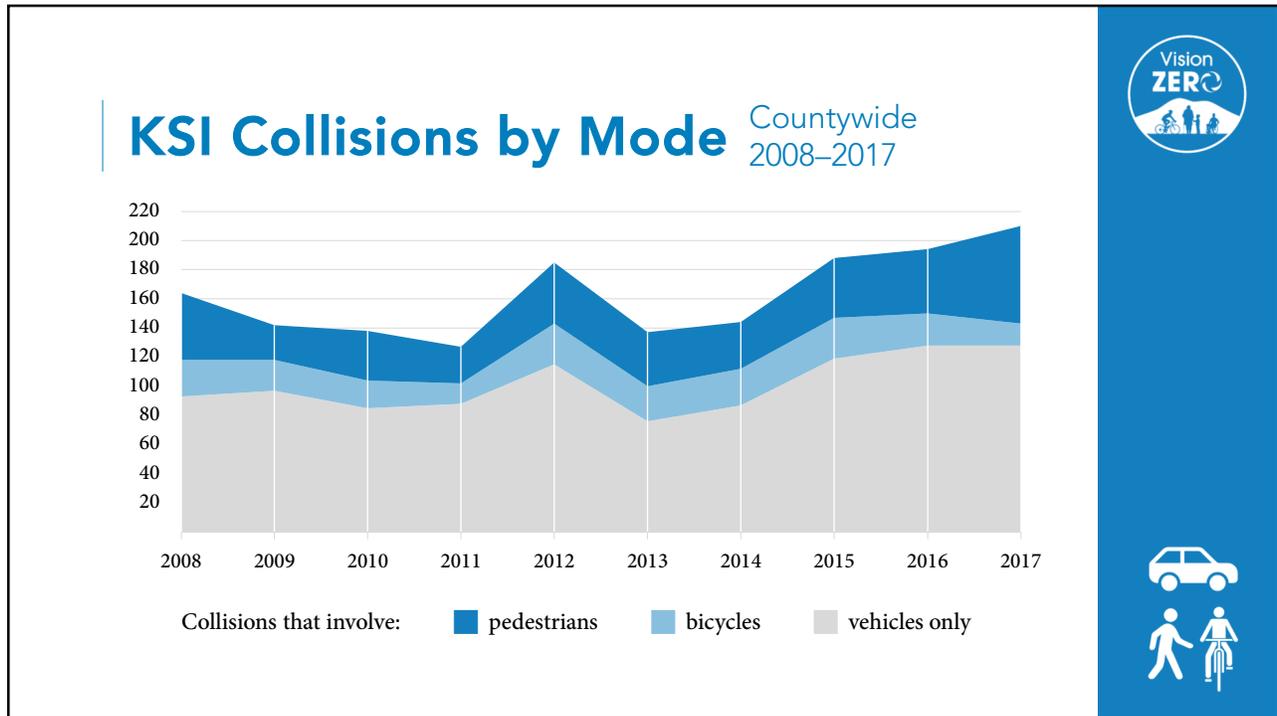


Collisions that involve: vehicles only bicycles pedestrians



Over that same time period (from 2008 to 2017), collisions involving people walking **increased 24%**





From 2008 to 2017, total KSI collisions **increased 28%** and pedestrian KSI collisions **increased 46%**

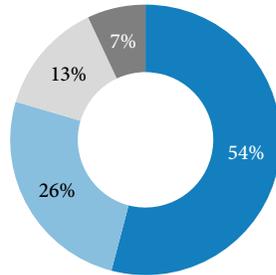


Pedestrian Action

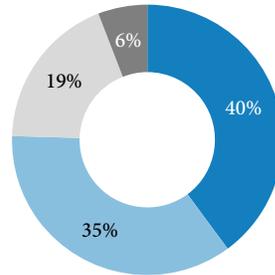
Pedestrian Collisions
2008–2017



All Pedestrian Collisions



KSI Pedestrian Collisions



Collisions where pedestrians are:

- crossing in crosswalk
- crossing not in crosswalk
- in road
- at other locations



Most pedestrian collisions happen **in crosswalks**

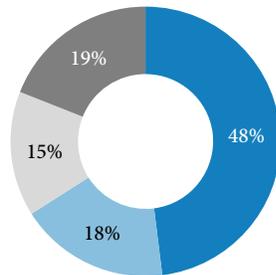


Action Before Collision

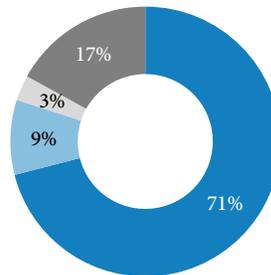
Countywide
2008–2017



All Pedestrian Collisions



KSI Pedestrian Collisions



Collisions where the motorist:

- proceeding straight
- left turn
- right turn
- other movement



About **half** of all pedestrian collisions involve a driver **proceeding straight** before the collision, and **a third** involve **right or left turns**.*

* The remainder occur due to some other movement before collision

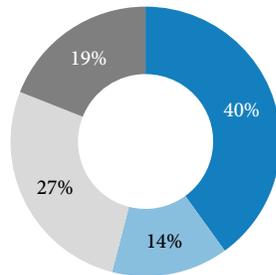


Action Before Collision

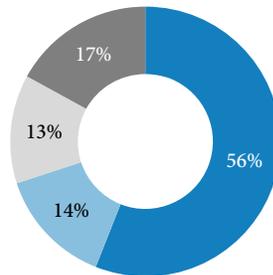
Countywide
2008–2017



All Bicycle Collisions



KSI Bicycle Collisions



Collisions where the motorist is:

- proceeding straight
- left turn
- right turn
- other movement



40% of all bicycle collisions involve a driver **proceeding straight** before the collision, more than **25%** involve **right turns** and almost **15%** involve **left turns**.*

* The remainder occur due to some other movement before collision





Primary Collision Factors (PCF)

Traffic Signs and Signals

Includes drivers not observing the rules of a particular signal or sign, such as a vehicle not stopping at the limit line, stop bar, or crosswalk at an intersection, as well as the running of red lights.

Wrong Side of Road

Includes driving or bicyclists riding on the wrong side of the road, passing improperly when there are double solid yellow lines, and driving improperly across highway medians.

Unsafe Speed

Includes instances of people driving at a speed greater than is reasonable or prudent given the roadway conditions.

Improper Turning

Includes turns at intersections and turning off road, improper signaling during lane changes, illegal U-turns, turning from a lane that does not allow turns, or making a turn that is signed as prohibited.

Continued >>



Primary Collision Factors (PCF)

Automobile ROW

Includes drivers observing their right-of-way improperly, such as not yielding to oncoming traffic during a left turn, not yielding properly at a stop sign, and not yielding when entering a road from a driveway.

Driving Under Influence

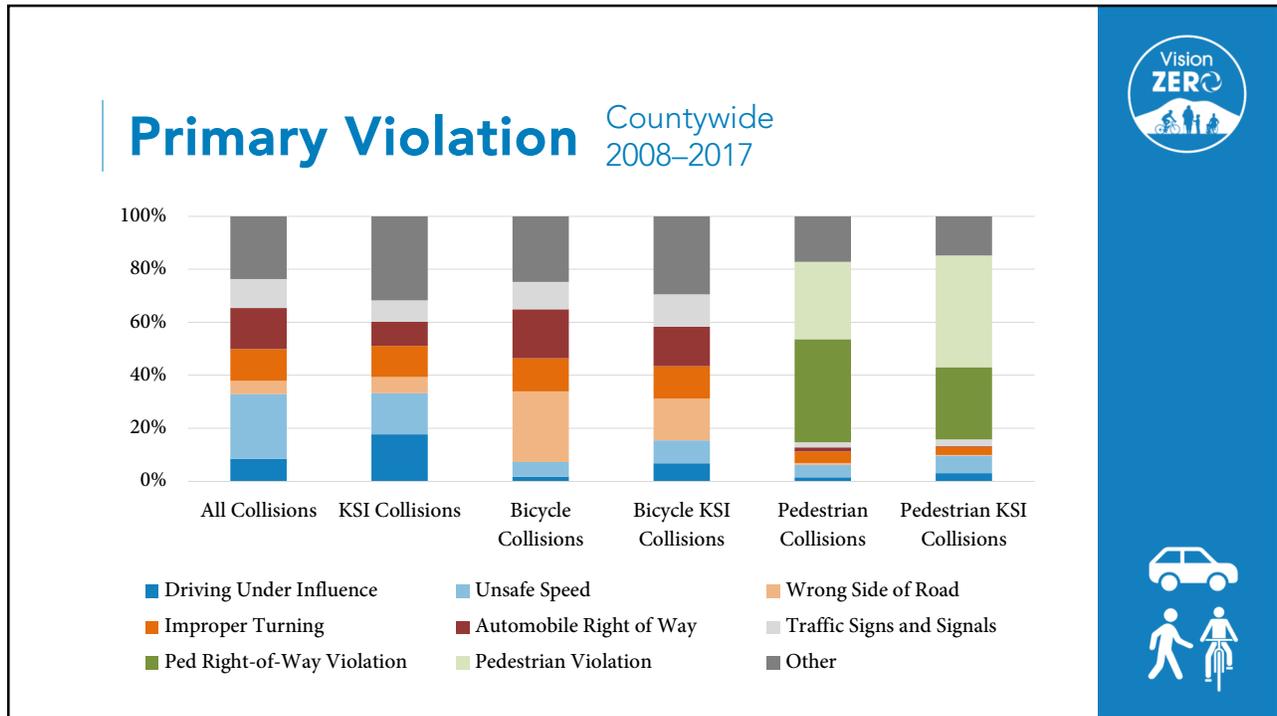
Includes driving or bicycling under the influence of alcohol or a drug.

Pedestrian ROW Violation

Includes drivers violating a pedestrian's right-of-way, such as drivers not yielding at a crosswalk.

Pedestrian Violation

Includes instances with pedestrians not following a rule of the road, such as crossing outside of a crosswalk and not yielding to vehicles, crossing during the red phase of a signal, or suddenly leaving the curb.



Common primary collision factors include **unsafe speeds, DUIs, improper turning, wrong-way bike riding, pedestrian violations,** and other **right-of-way violations**



Collision Types

* Definitions from the CHP
Collision Investigation Manual



Hit Object

A motor vehicle strikes a fixed object or other object.

Head-On

Two vehicles, approaching from opposite directions, make direct contact. For example, the front of one vehicle collides with the front of another. Or prior to impact, one vehicle skids sideways, causing the side of the skidding vehicle to collide with the front of the other.

Overtaken

A vehicle overturns and no prior collision caused the overturning. This would include a motorcyclist losing control, causing the vehicle to lie down on its side.

Broadside

One motor vehicle strikes another vehicle at an angle greater than that of a sideswipe.

Continued >>

Collision Types

* Definitions from the CHP
Collision Investigation Manual



Sideswipe

One motor vehicle strikes the side of another with a glancing blow. For example, two vehicles are proceeding in the same direction or from opposite directions, and the side of one vehicle strikes the side of the other.

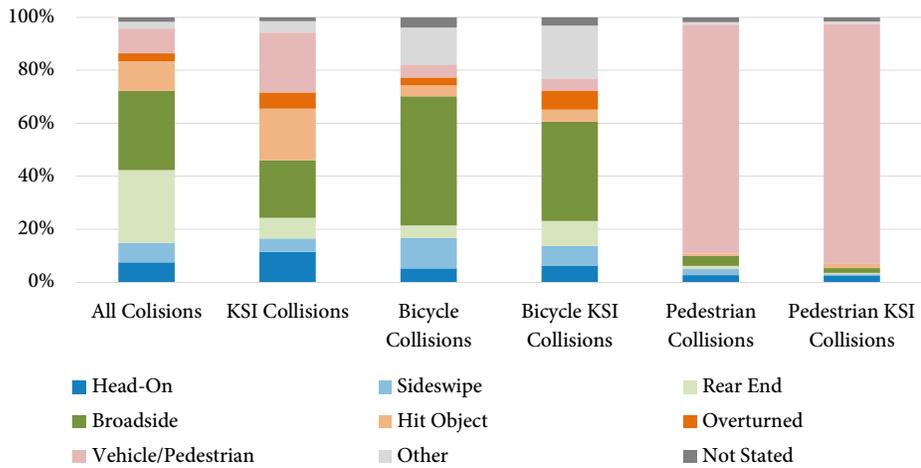
Vehicle/Pedestrian

A vehicle strikes a pedestrian.

Rear-End

Two vehicles, traveling in the same direction, make direct contact. For example, the front of one vehicle strikes the rear of another vehicle, or one vehicle approaches the other from the rear and skids sideways during a braking action, causing the side of the skidding vehicle to strike the rear of the other.

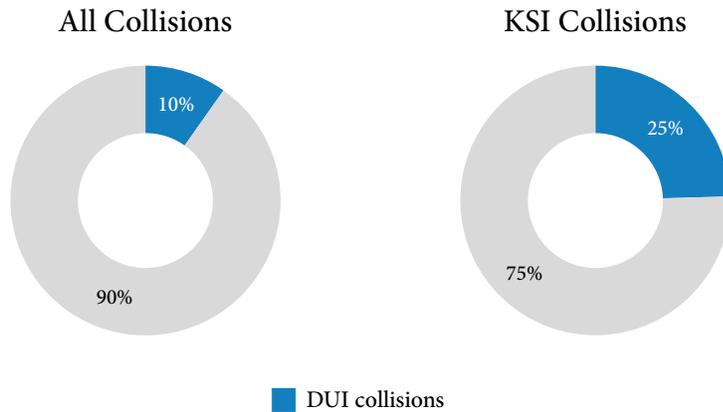
Collision Type Countywide 2008–2017



Common collision types include **rear-end**, **broadside**, **hit object**, **sideswipe**, and **pedestrian** collisions

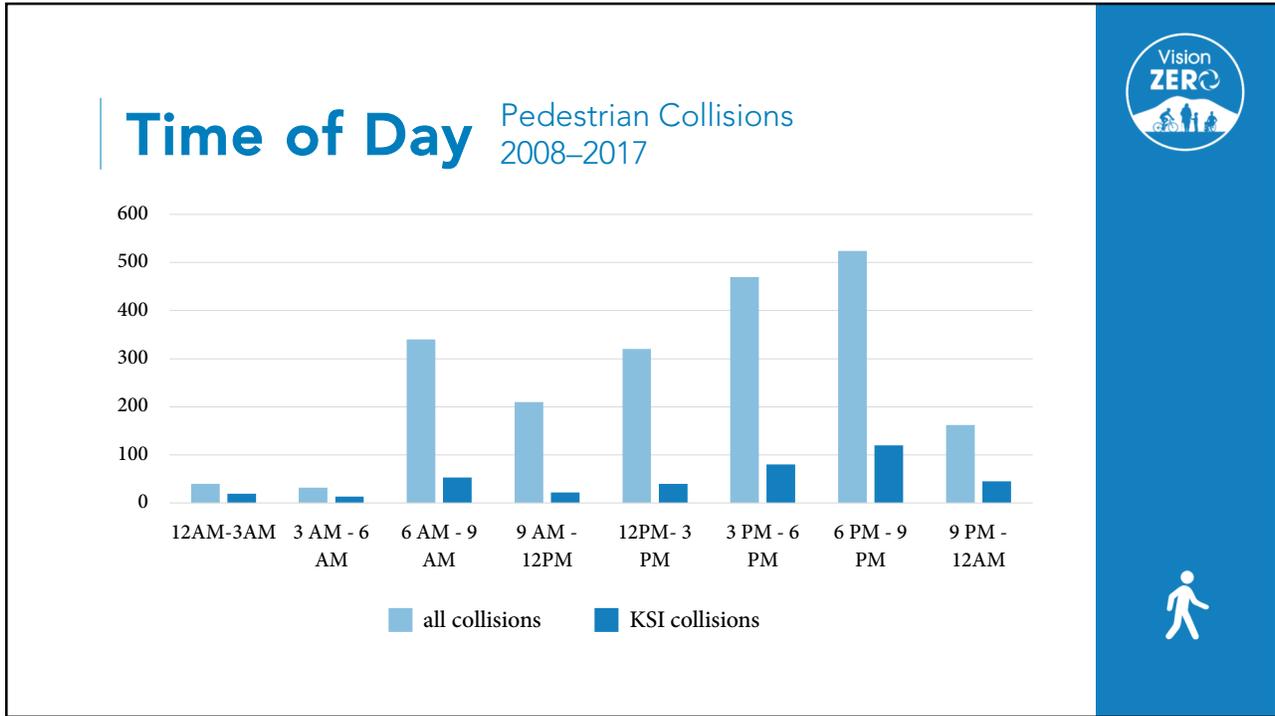


Driving Under the Influence Countywide 2008–2017



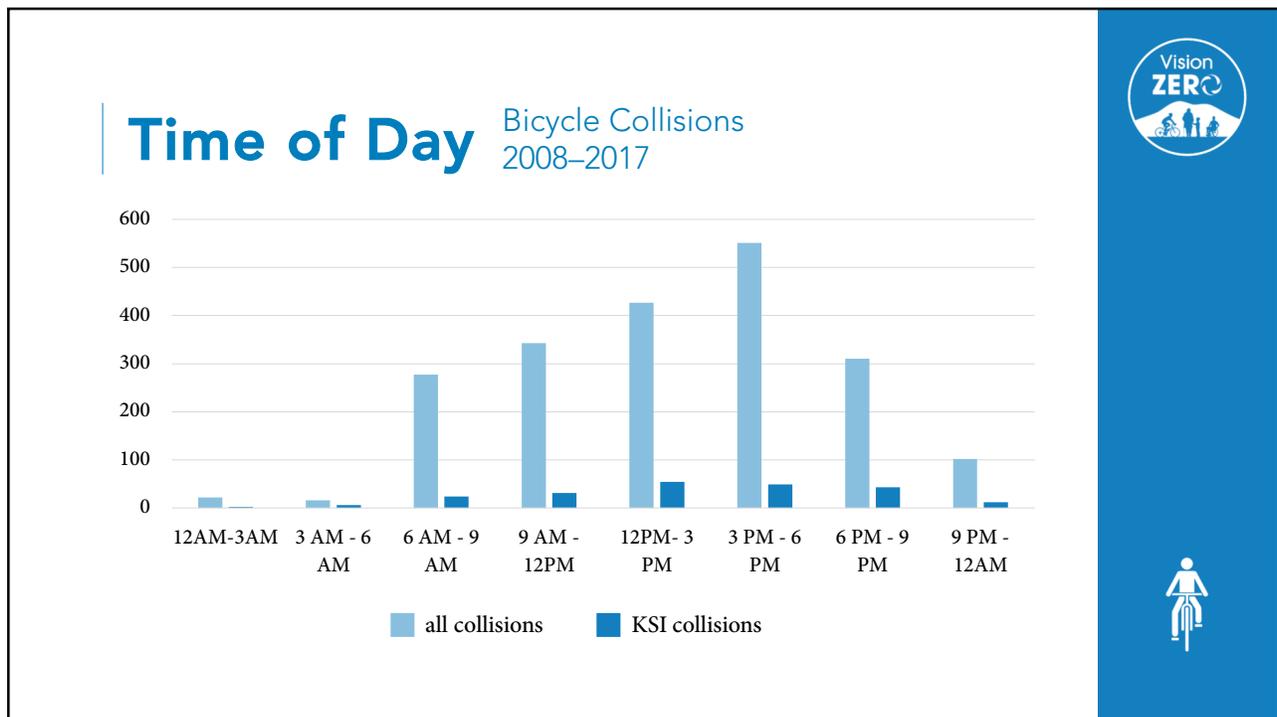
DUIs make up **10%** of **all collisions** but **25%** of **KSI collisions**





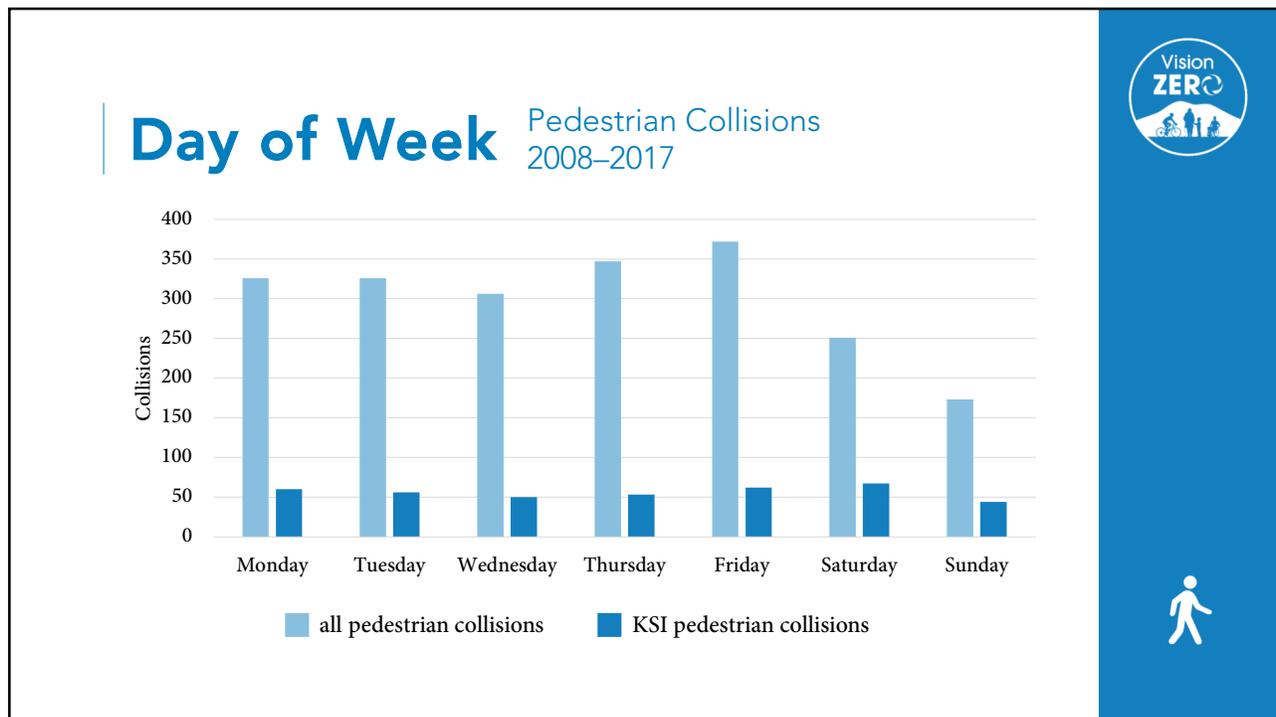
Pedestrian collisions are more common in the **afternoon, evening, and at-night.**



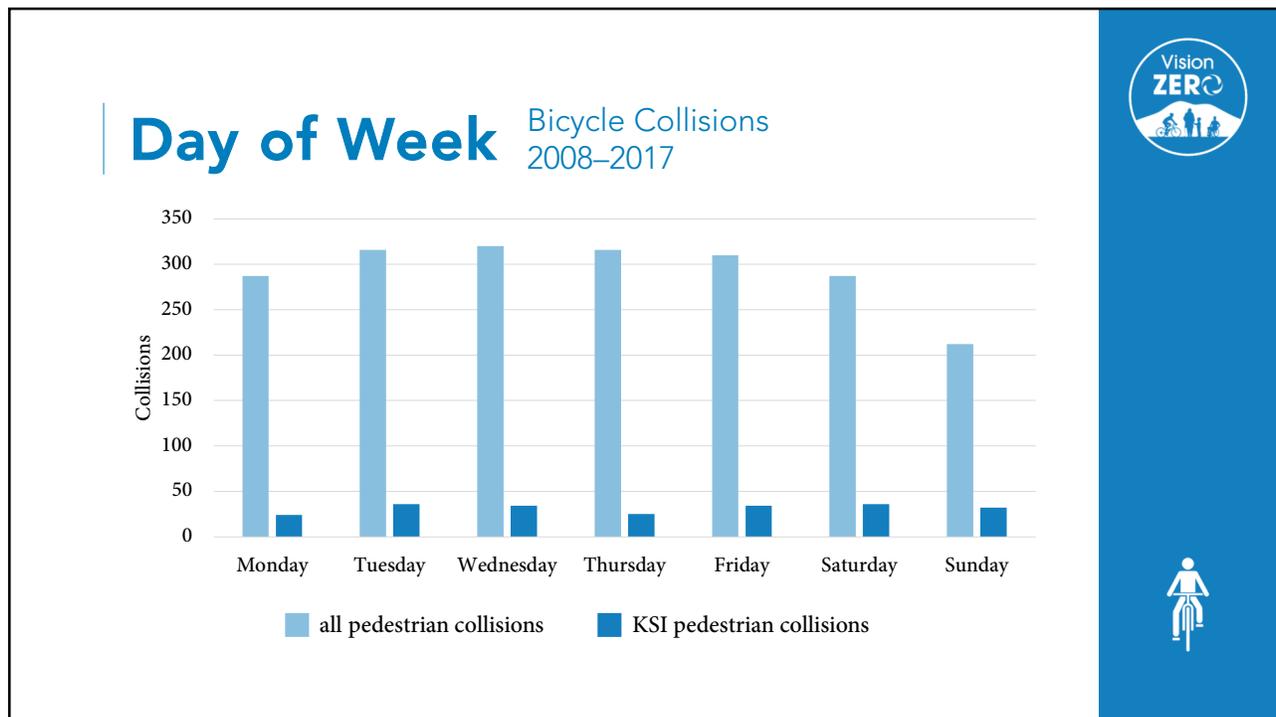


Bicycle collisions tend to occur **throughout the day**, and are more common **afternoon**.

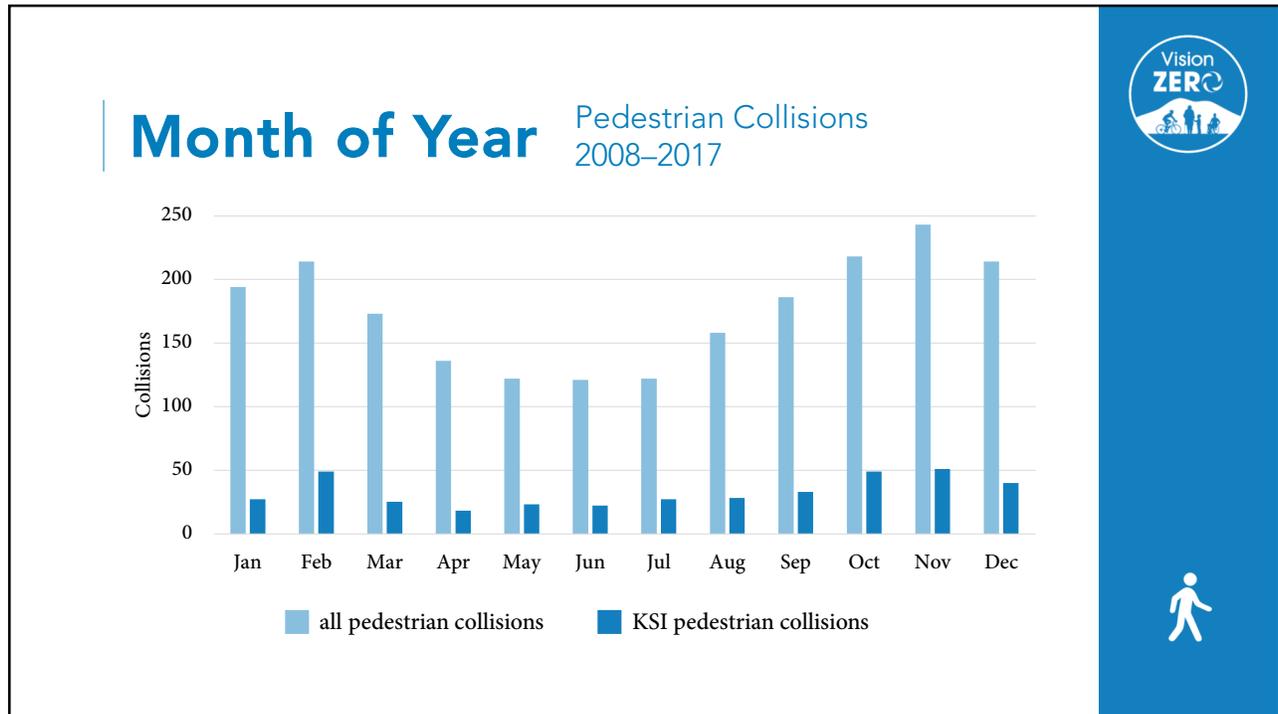




Pedestrian collisions tend to occur **throughout the week**, and are more common on **weekdays**.

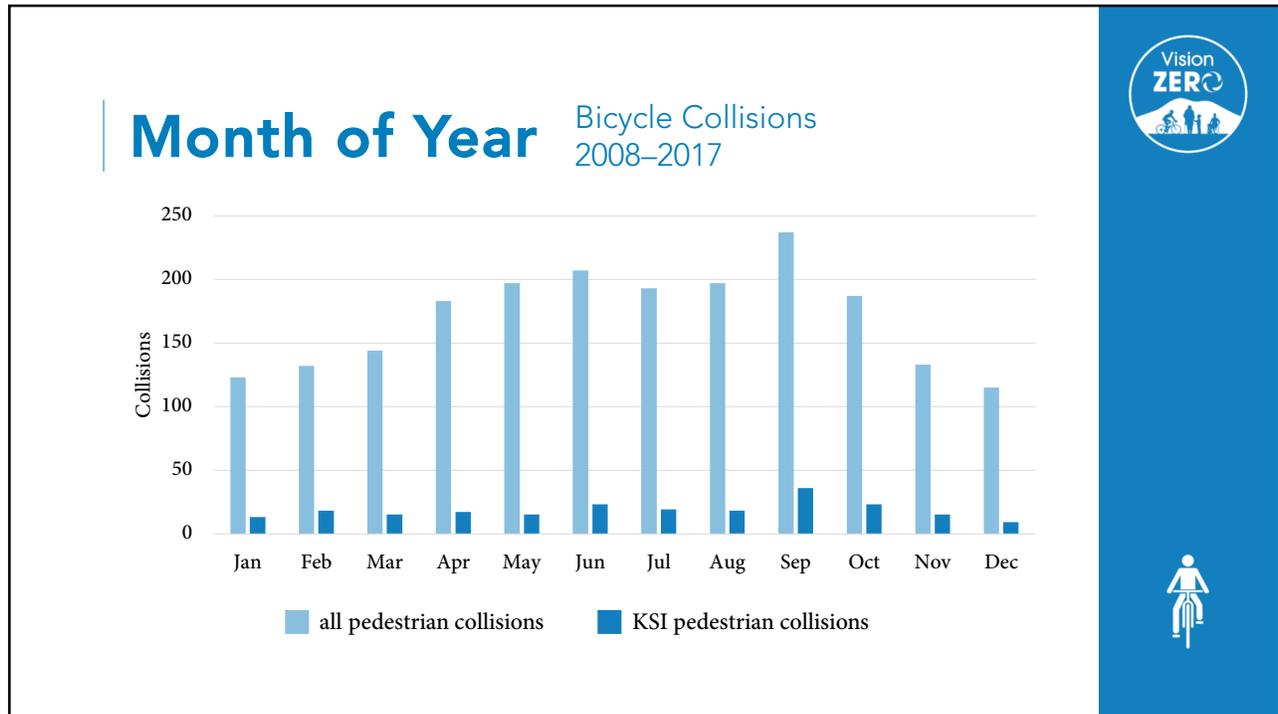


Bicycle collisions tend to occur **throughout the week**, including on **weekends**.



Pedestrian collisions occur **throughout the year**, and are more common during the **fall** and **winter months**.

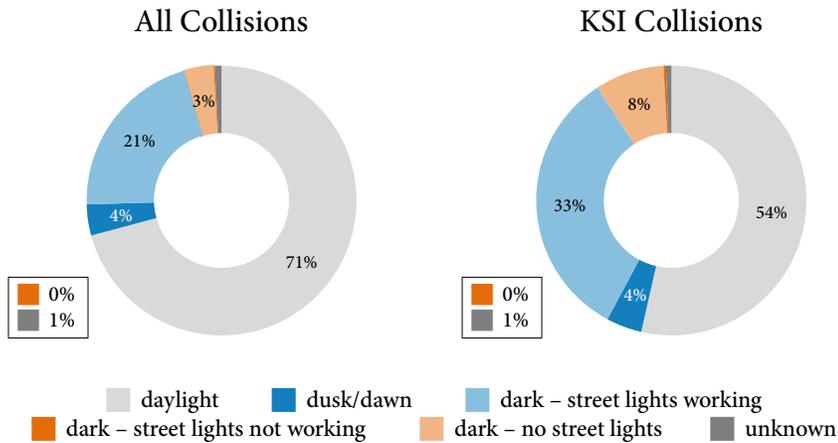




Pedestrian collisions occur **throughout the year**, and are more common during the **spring, summer** and **early fall**

Lighting Conditions

All Collisions
2008–2017



Most collisions occur during **daylight conditions**, but KSI collisions are more likely during **dark conditions** (with or without street lights)

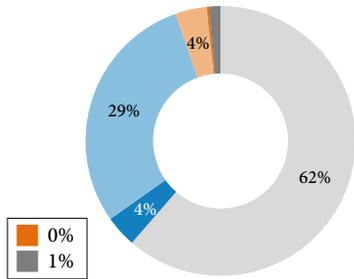


Lighting Conditions

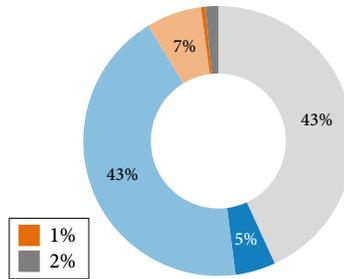
Pedestrian Collisions
2008–2017



Pedestrian Collisions



Pedestrian KSI Collisions



daylight
 dusk/dawn
 dark - street lights working
 dark - street lights not working
 dark - no street lights
 unknown



Pedestrian KSI collisions are also more likely during **dark conditions** (with or without street lights)

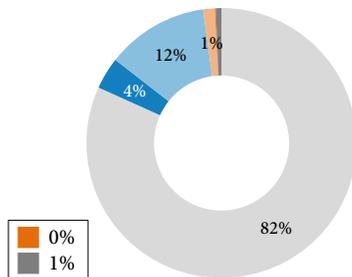


Lighting Conditions

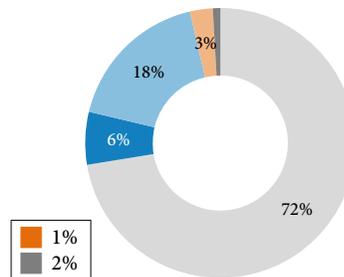
Bicycle Collisions
2008–2017



Bicycle Collisions



Bicycle KSI Collisions

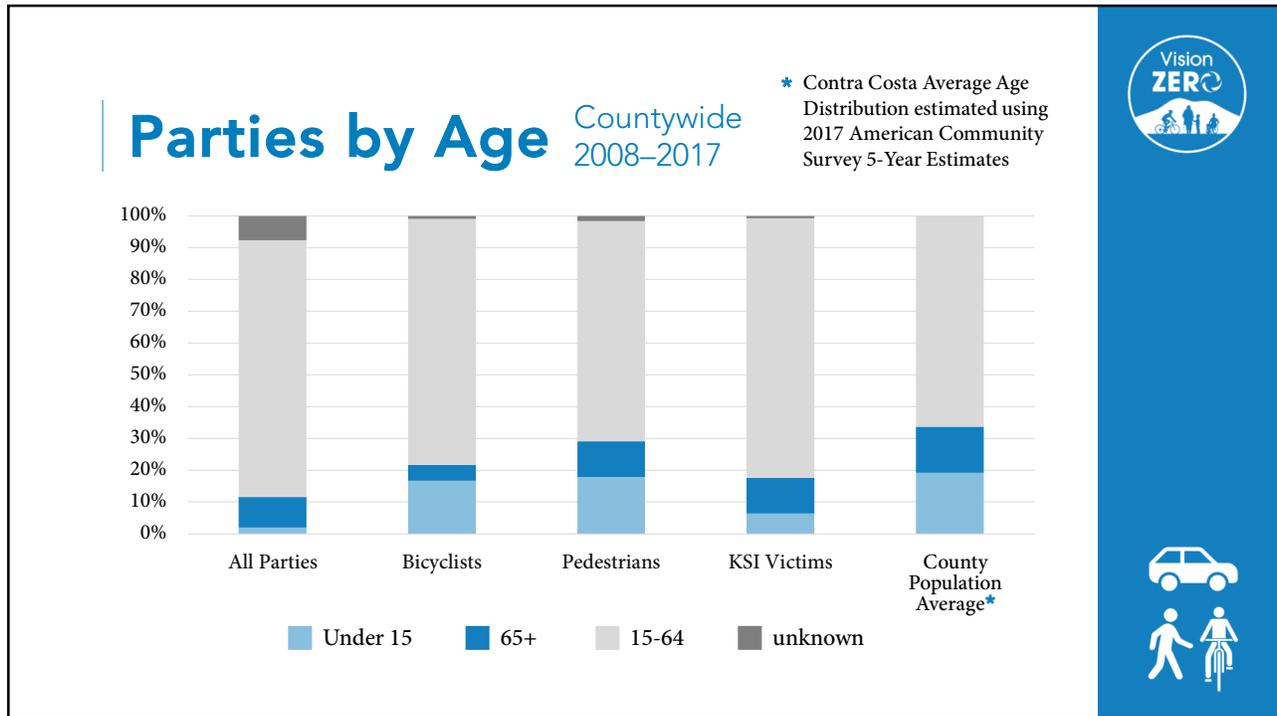


daylight
 dusk/dawn
 dark – street lights working
 dark – street lights not working
 dark – no street lights
 unknown



Most bicycle collisions occur during **daylight conditions**, but KSI bicycle collisions are more likely during **dark conditions** (with or without street lights)

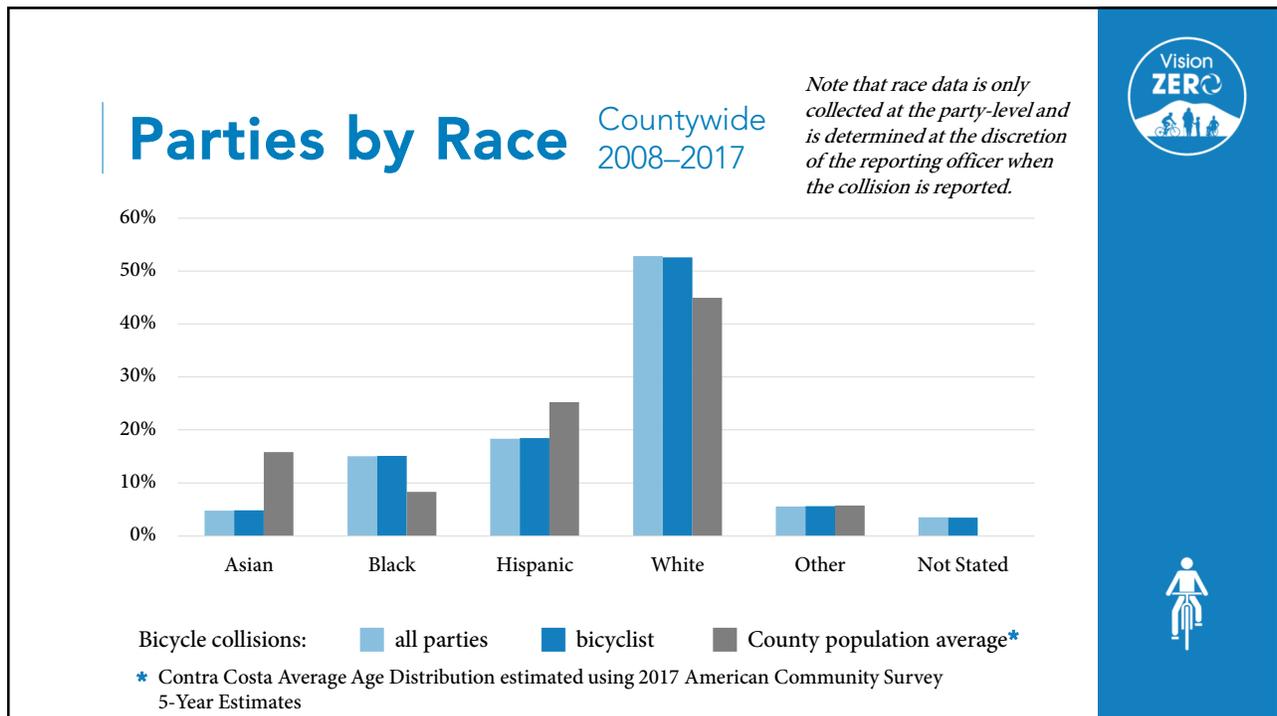
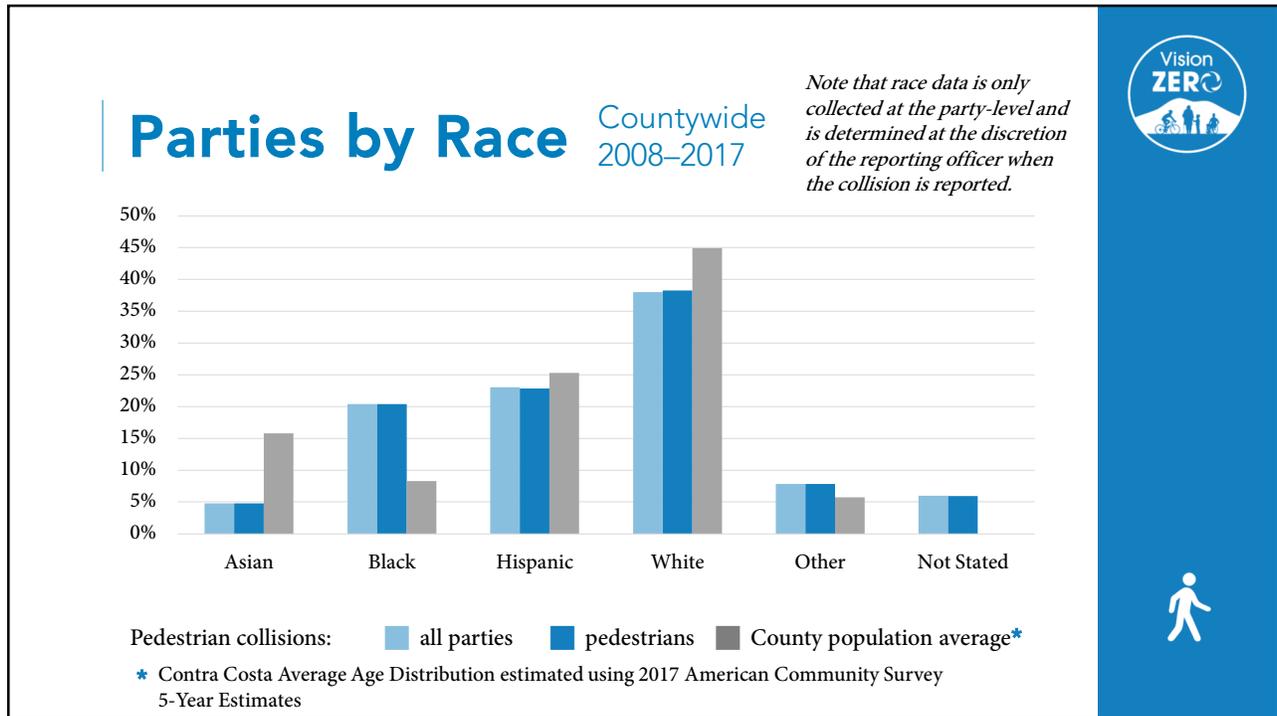


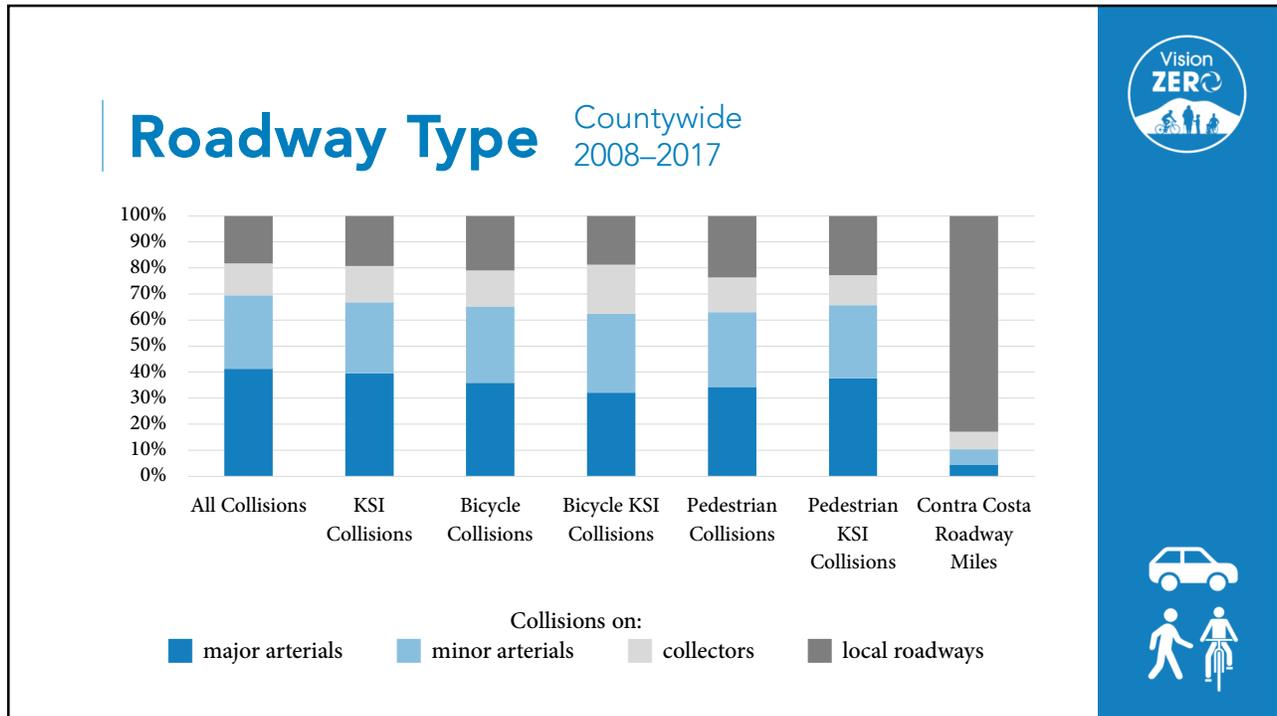


People **aged 15-64** are **more likely** to be involved in a **collision**. However, **people aged <15 or 65+** are **more likely** to be involved in **pedestrian/bicycle** and **KSI collisions**.



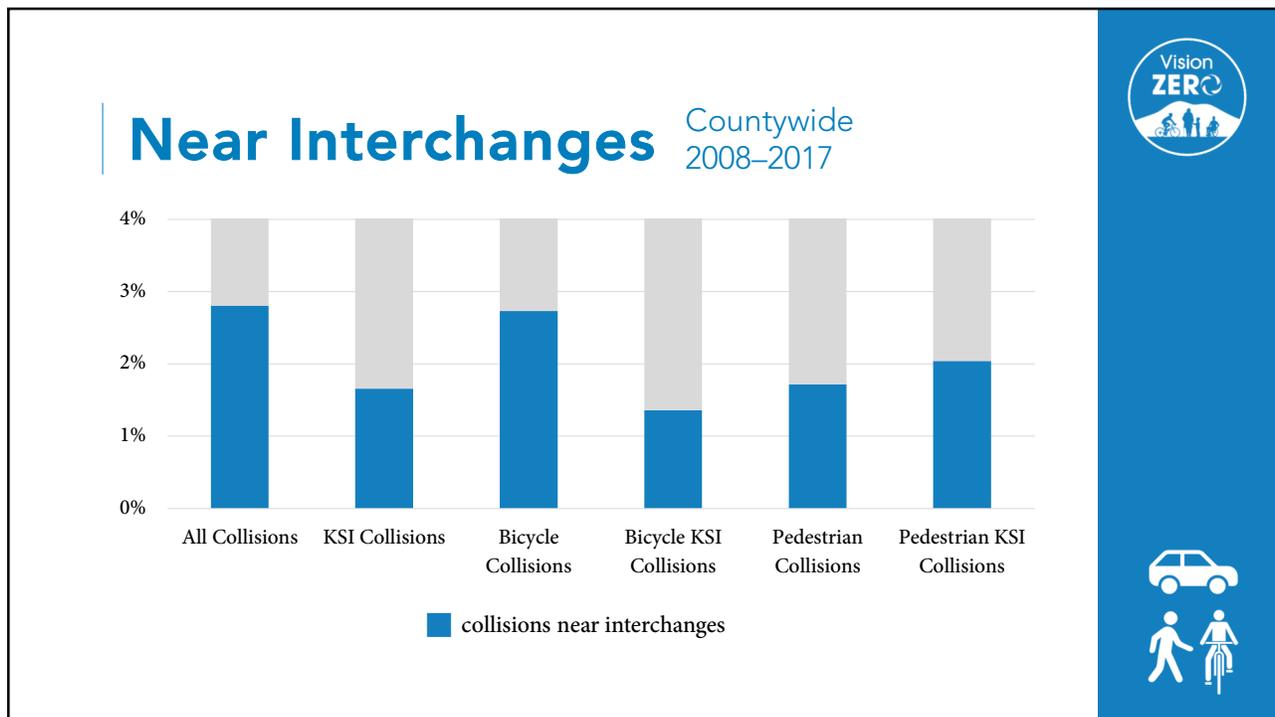






The **majority** of pedestrian & bicycle collisions occur on **arterial roadways**



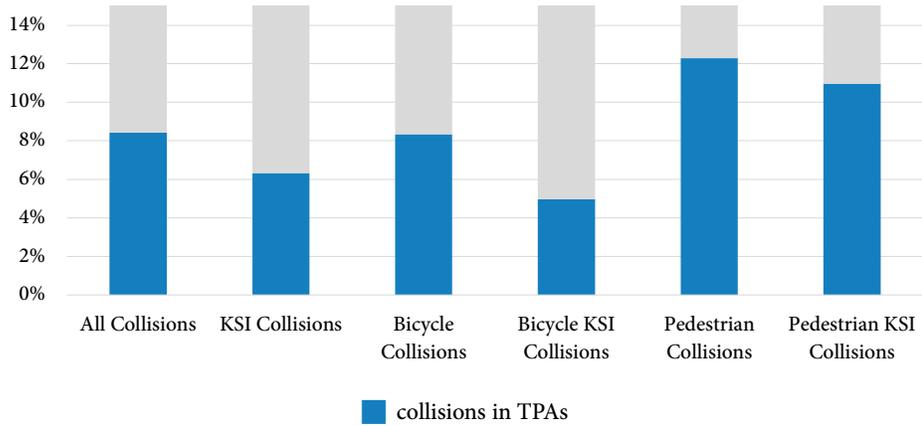


Although a smaller proportion collisions occurs near **interchanges**, **pedestrian KSI & bicycle** (all injury levels) collisions are **more common**





Transit Priority Areas (TPAs) Countywide 2008–2017

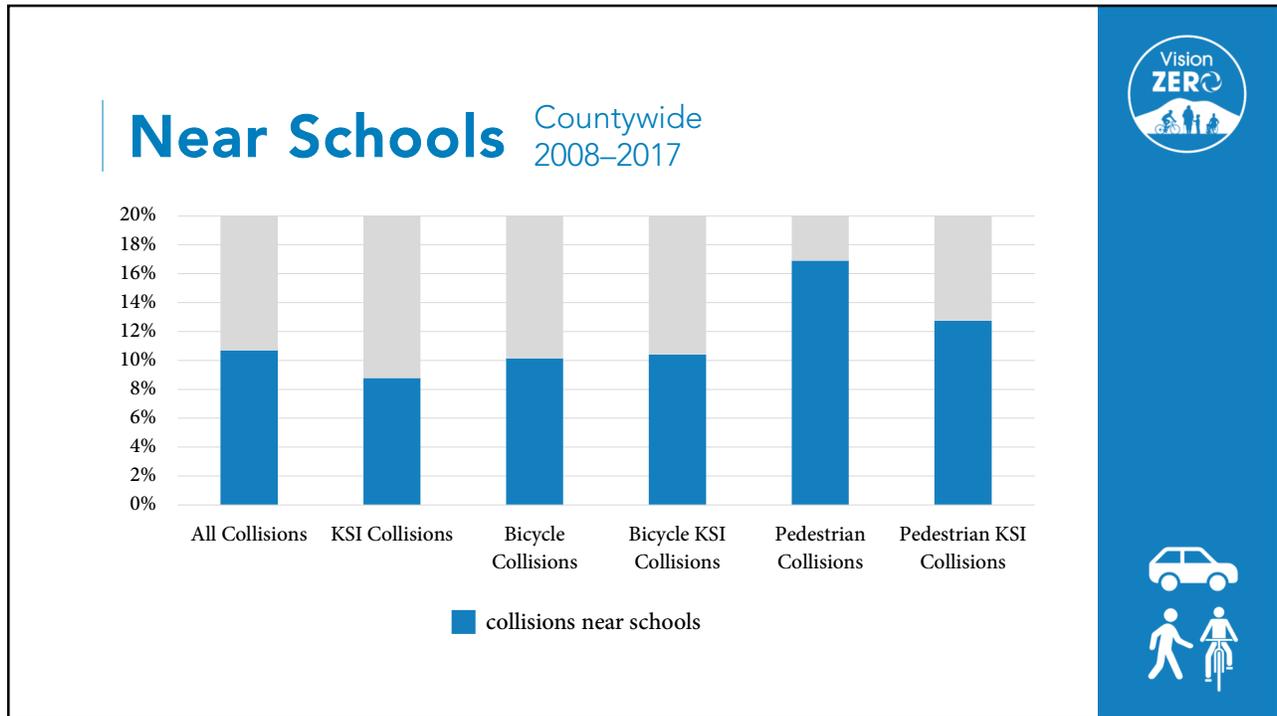


Transit Priority Areas (TPAs) are defined as areas within a half-mile walk of transit stations with 15-minute headways or better during peak periods



Pedestrian KSI collisions are more common in Transit Priority Areas





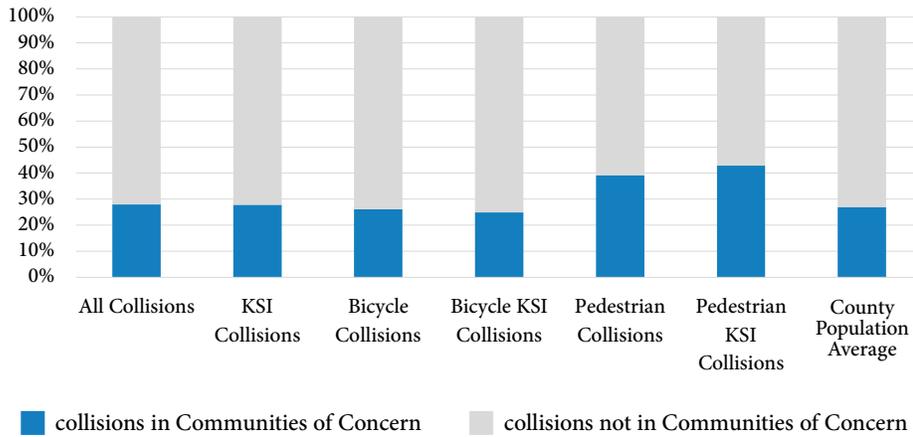
Pedestrian collisions are more common near schools





Communities of Concern

Countywide
2008–2017



Communities of Concern are defined by the Metropolitan Transportation Commission as census tracts having concentrations of both low-income and non-white populations; Contra Costa population average estimated using 2017 American Community Survey 5-Year Estimates

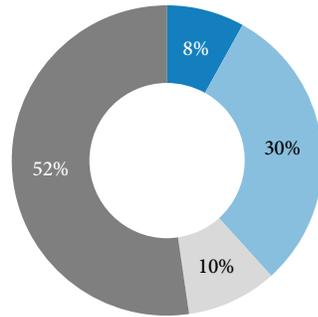


Pedestrian collisions are more common in Communities of Concern



Existing Bike Facilities

Countywide
2008–2017



Bicycle collisions on:

- bike paths
- bike lanes
- shared facilities
- no bike facilities present

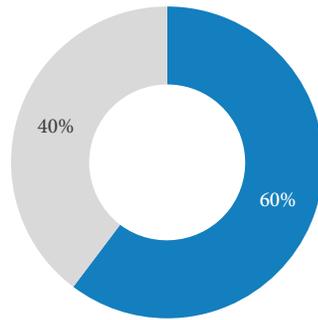


Bicycle collisions are more common where no bicycle facilities are present



Countywide Bicycle Network

Bicycle Collisions
2008–2017



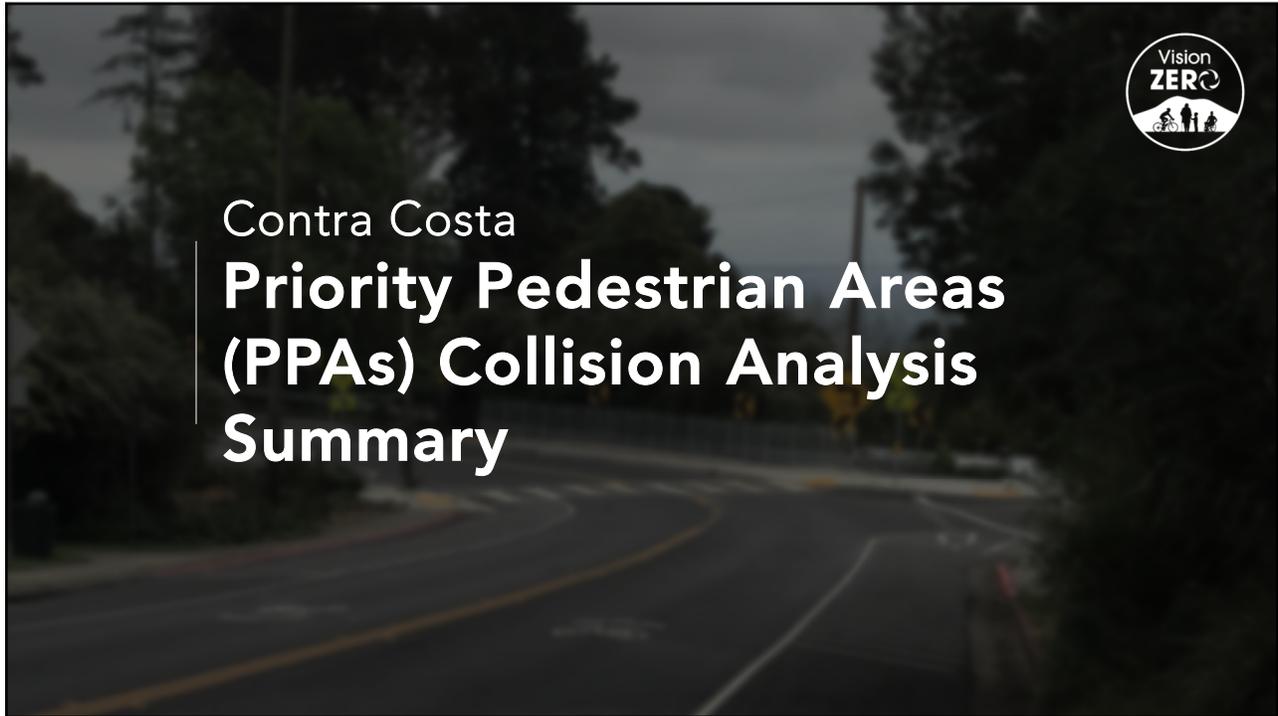
■ collisions on backbone network

CCCTA's 2018 Countywide Bicycle and Pedestrian Plan Update identifies the Low-Stress Countywide Bicycle Network, where bicycle improvements are prioritized to create a low-stress backbone bicycle network across Contra Costa.



The majority of bicycle collisions occur along the **Countywide Bicycle Network**, which are prioritized for low-stress improvements





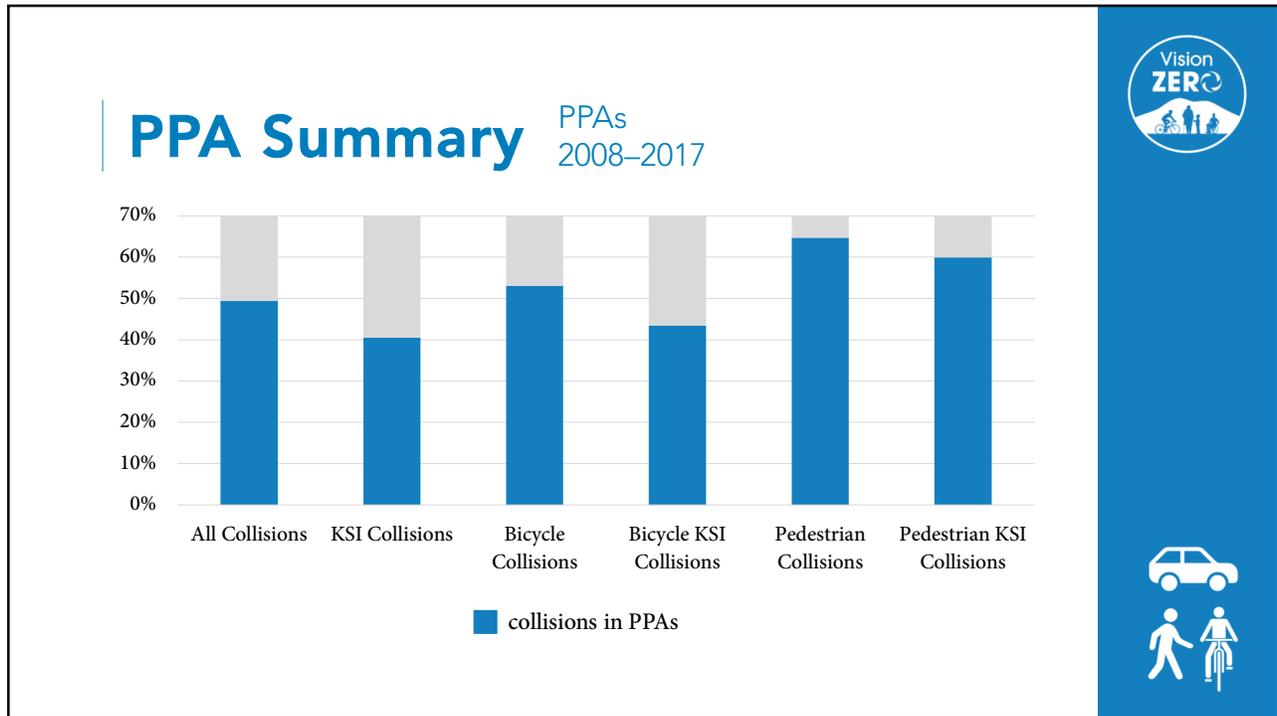
Contra Costa Priority Pedestrian Areas (PPAs) Collision Analysis Summary

Pedestrian Priority Areas (PPAs)

The map displays the geographical layout of Contra Costa County, highlighting designated Pedestrian Priority Areas (PPAs) in orange. It also shows incorporated areas in light brown and the locations of Amtrak and BART stations. A legend at the bottom of the map provides the following information:

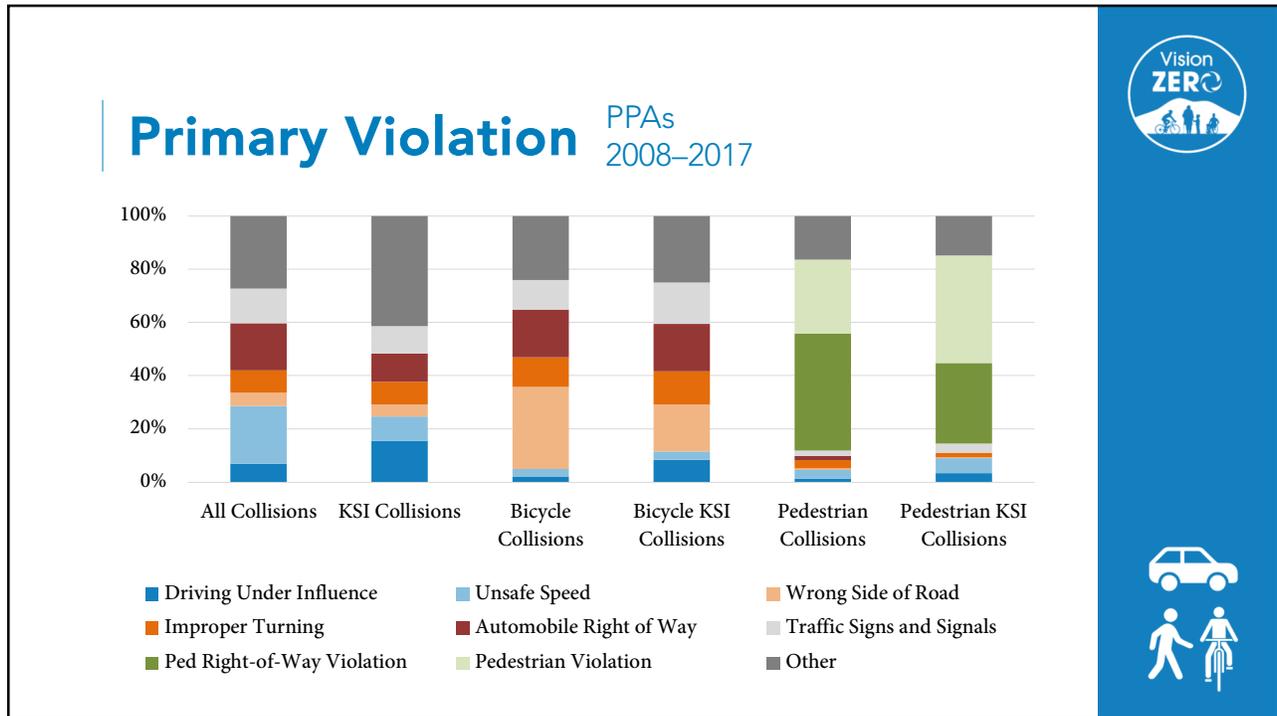
- Pedestrian Priority Areas
- Incorporated Area
- Within 1/4 Mile of Public Schools
- ▲ Amtrak Station
- BART Station

CCCTA's 2018 Countywide Bicycle and Pedestrian Plan Update identifies Priority Pedestrian Areas (PPAs), which include areas within walking distance of schools and major transit stops and locations with the greatest concentrations of pedestrian collisions.

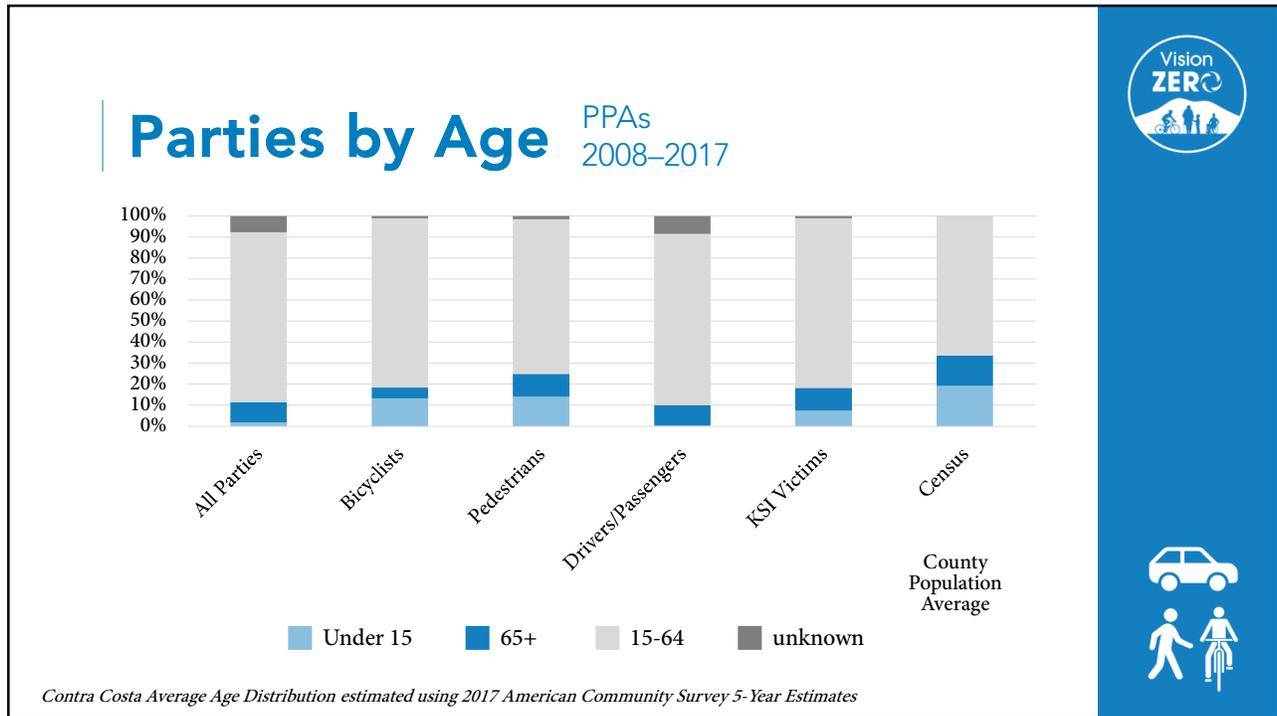


Two-thirds of pedestrian collisions and half of bicycle collisions occur in Priority Pedestrian Areas defined in the 2018 Countywide Bicycle & Pedestrian Plan Update





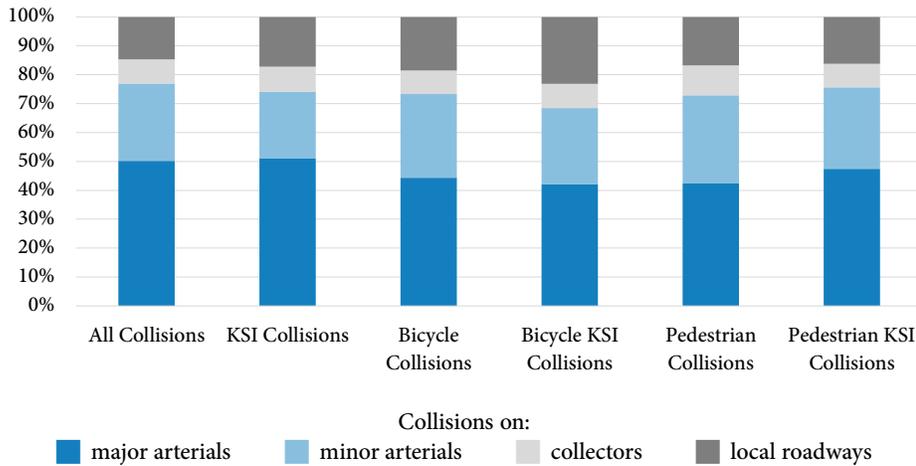
Common primary collision factors in PPAs are similar to countywide trends, and include **unsafe speeds, DUIs, improper turning, wrong-way bike riding, pedestrian violations, and other right-of-way violations**



In PPAs, **youth (<15)** and **seniors (65+)** are more likely to be involved in **pedestrian/bicycle** and **KSI collisions** compared to all collision trends

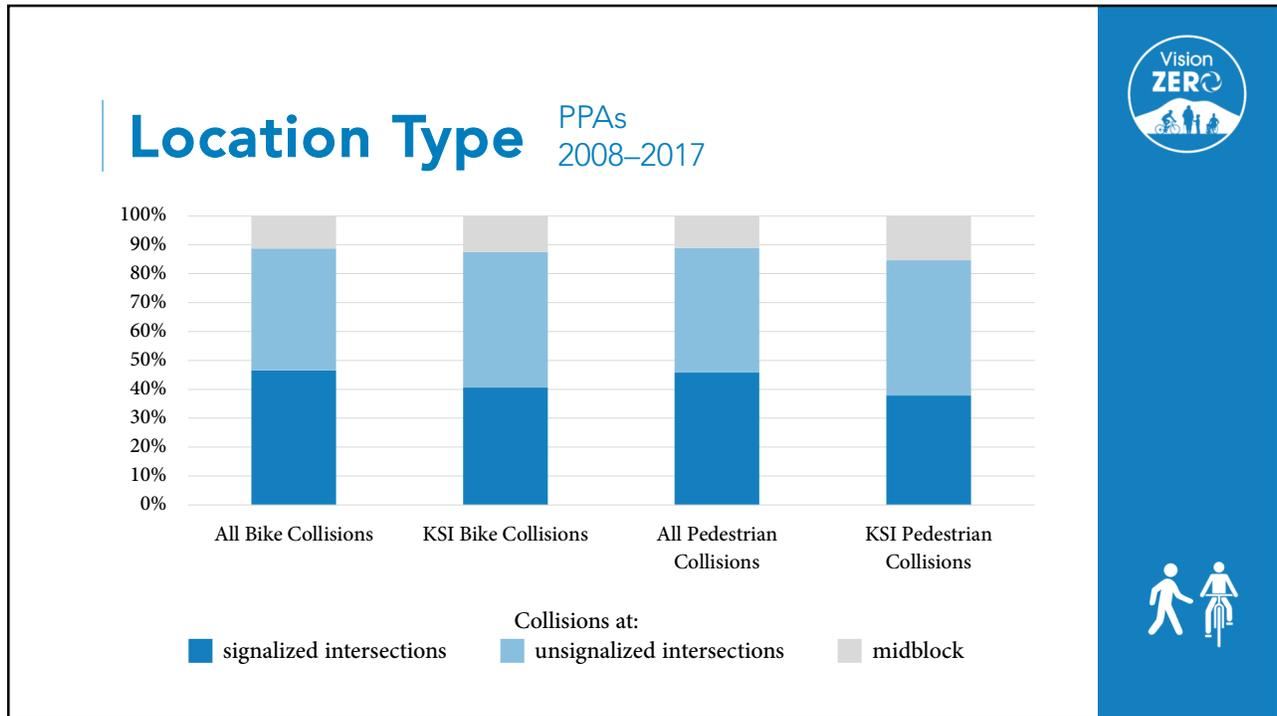


Roadway Type PPA's 2008-2017



Compared to countywide trends, collisions in PPA's are even more likely to occur on **arterial roadways**





Collisions in PPAs are more likely to occur **at intersections** (signalized or unsignalized) compared to midblock

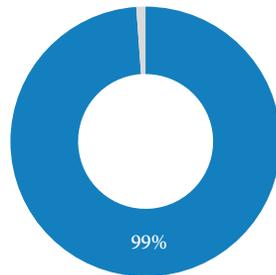


Sidewalks

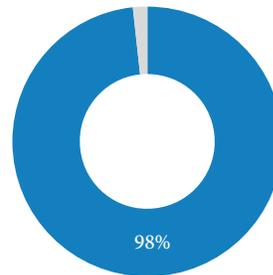
PPAs
2008–2017



All Pedestrian Collisions



KSI Pedestrian Collisions



Pedestrian collisions: ■ on streets with sidewalks



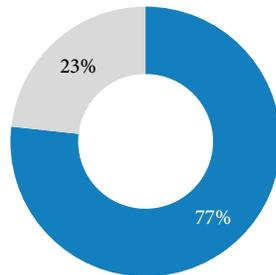
Most pedestrian collisions in PPAs occur where sidewalks are present, but **KSI collisions** are **twice as likely** where **sidewalk gaps** exist



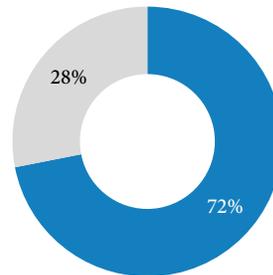
Crosswalks PPA's 2008–2017



All Pedestrian Collisions



KSI Pedestrian Collisions

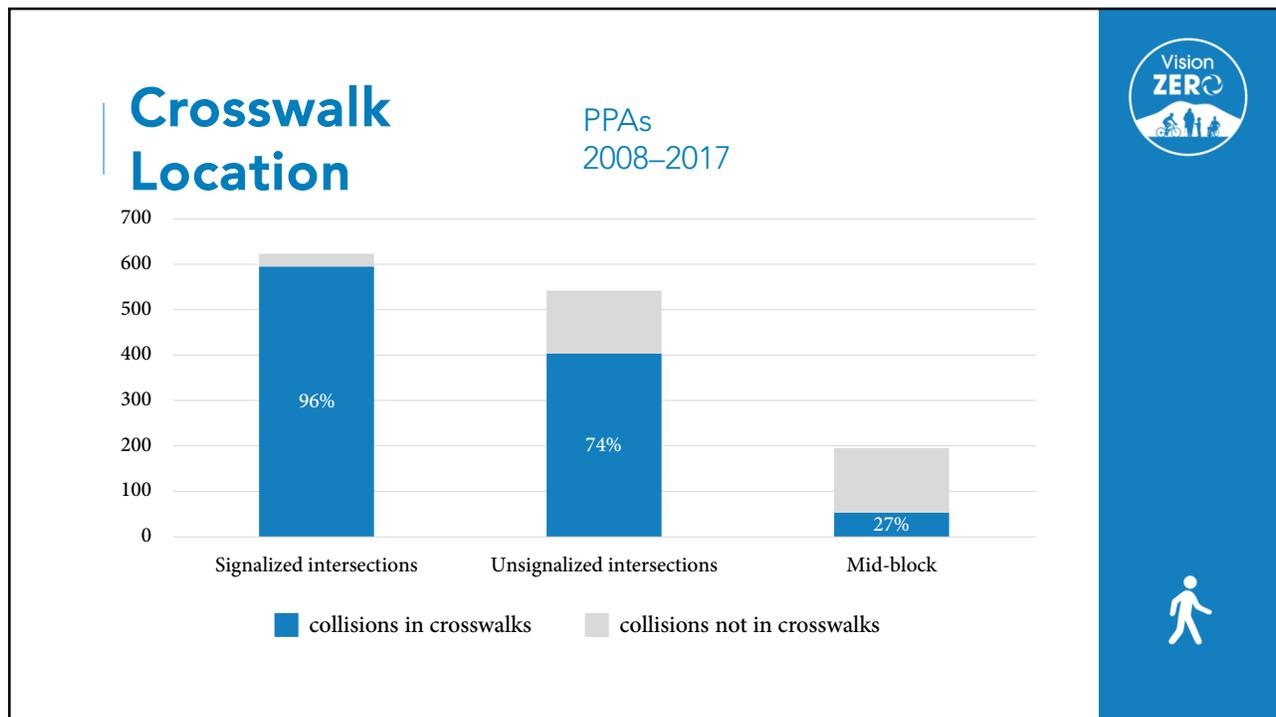


Pedestrian collisions: ■ collisions at marked crosswalks



Most pedestrian collisions in PPAs occur where crosswalks are marked, but **KSI collisions** are **more likely** where **crosswalks** are **not marked**





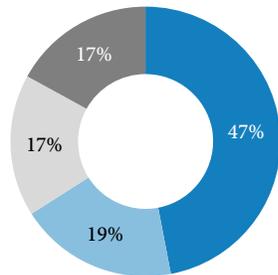
Pedestrian collisions are more likely to occur **outside of marked crosswalks** at **unsignalized intersection** or **mid-block** locations

Vision ZERØ

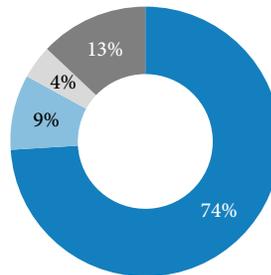
Action Before Collision PPAs 2008–2017



All Pedestrian Collisions



KSI Pedestrian Collisions



Collisions where the motorist:
 ■ proceeding straight ■ left turn ■ right turn ■ other movement



Similar to countywide trends, **pedestrian KSI** collisions in PPAs are more likely to occur when a driver is **proceeding straight**

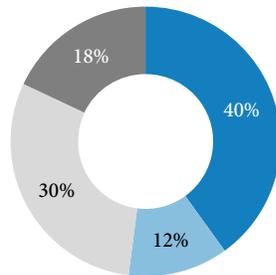


Action Before Collision

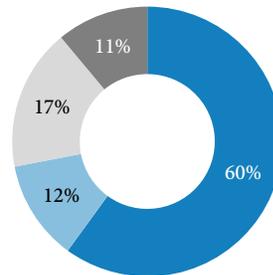
PPAs
2008–2017



All Bicycle Collisions



KSI Bicycle Collisions



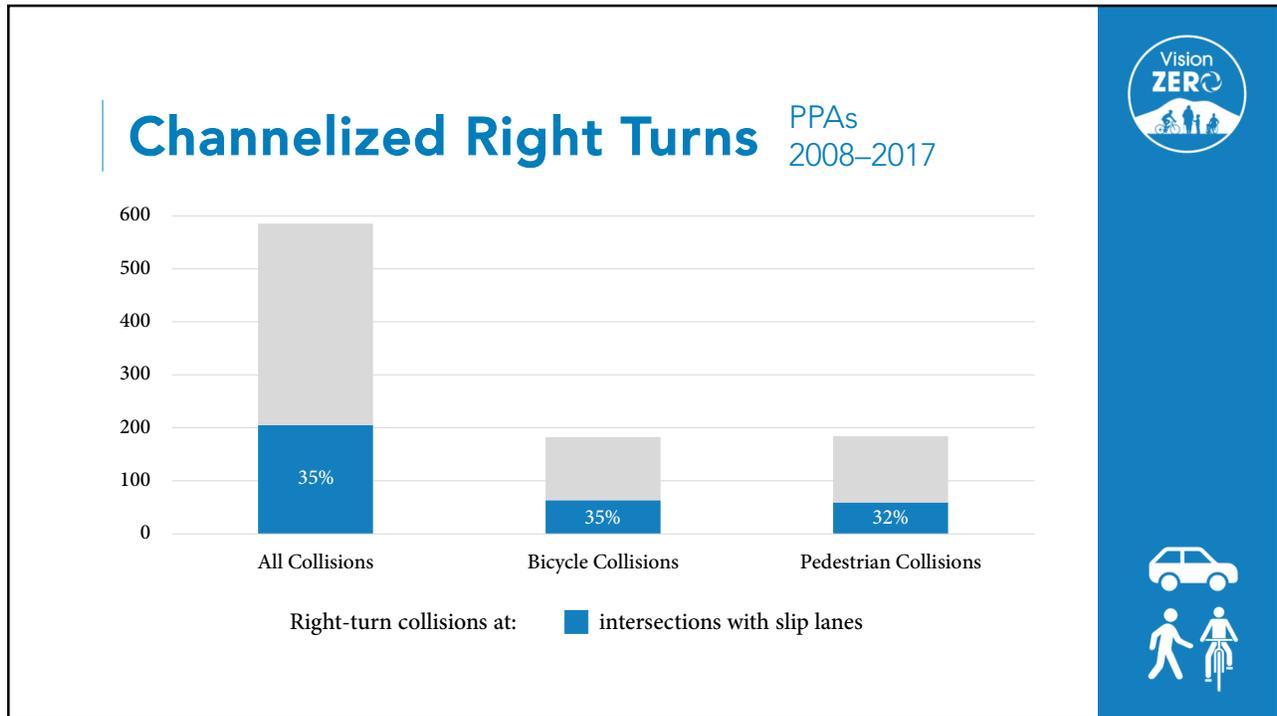
Collisions where the motorist:

- proceeding straight
- left turn
- right turn
- other movement



Compared countywide trends, **bicycle** collisions in PPAs are more likely to occur when a driver is **proceeding straight** or **turning right**

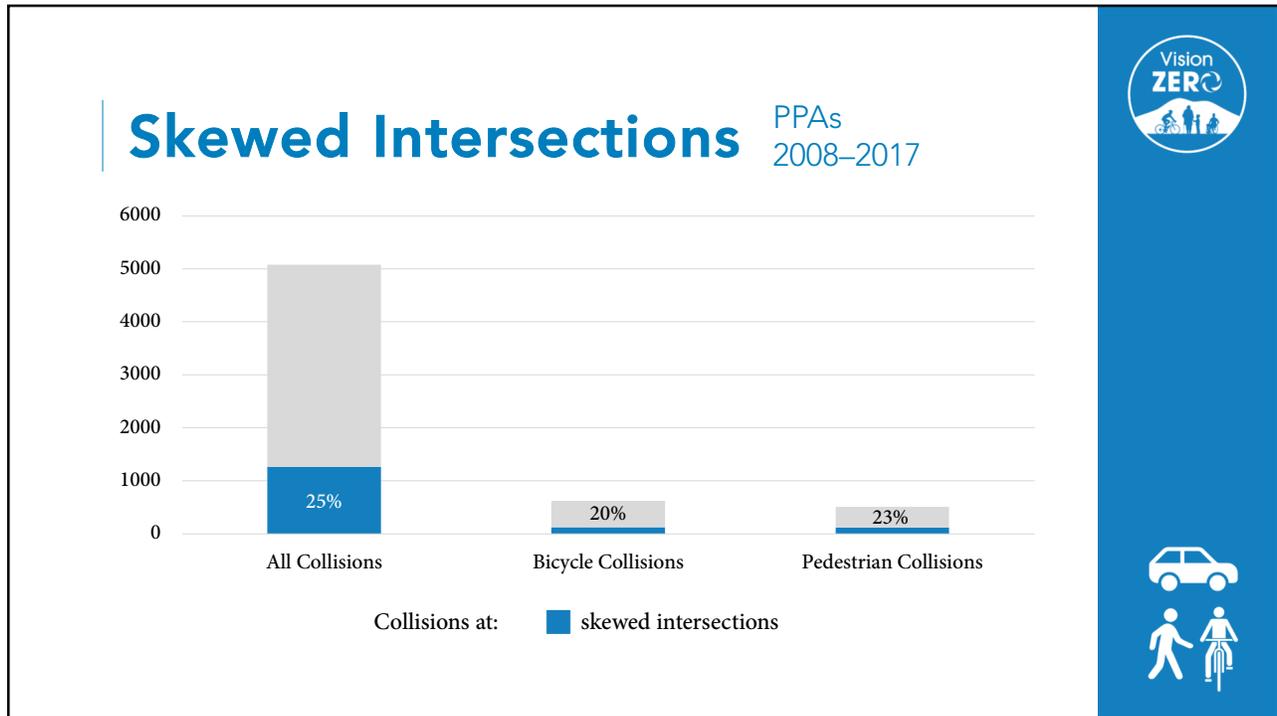




One-third of pedestrian & bicycle collisions involving a right-turn happen at intersections with **channelized right turn lanes**



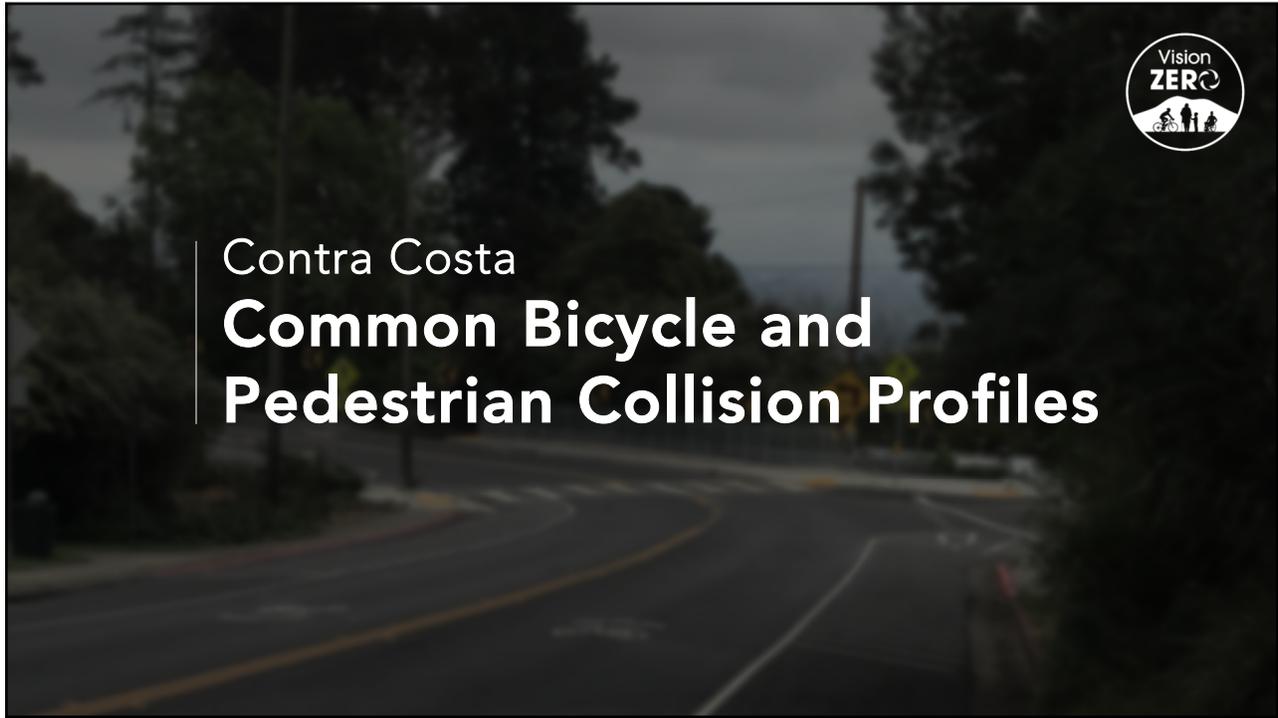




About 20% of
pedestrian and bicycle
collisions occur at
skewed intersections

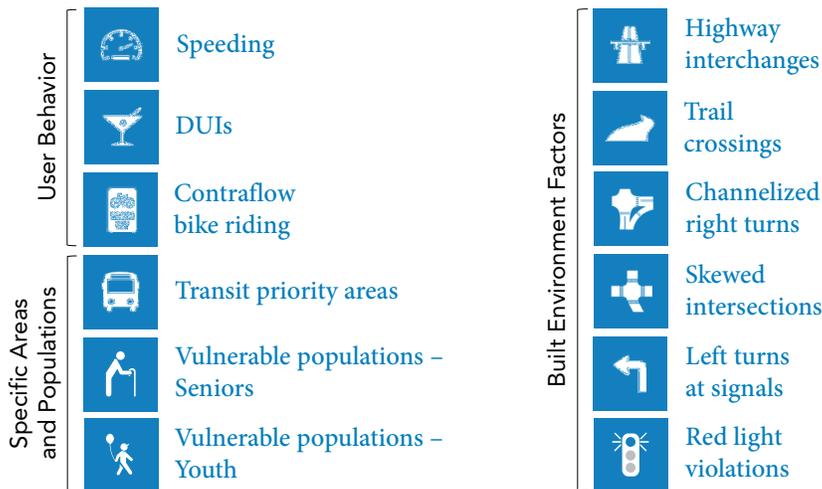


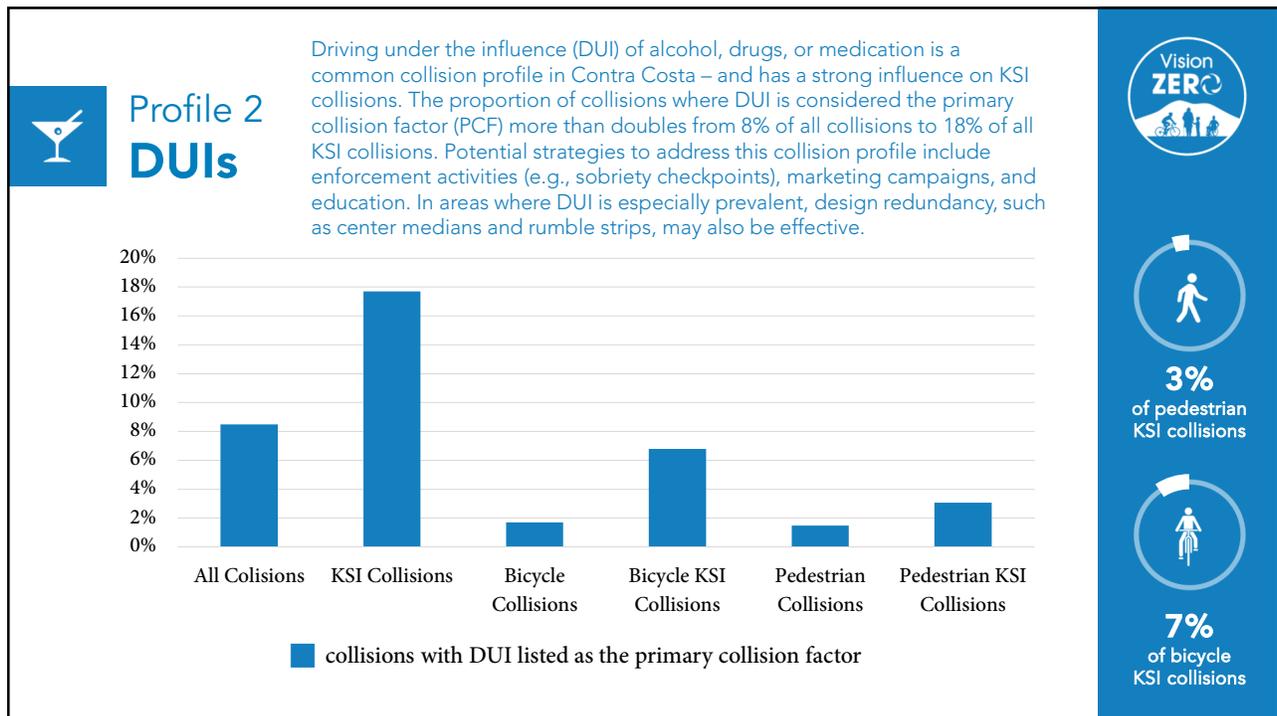
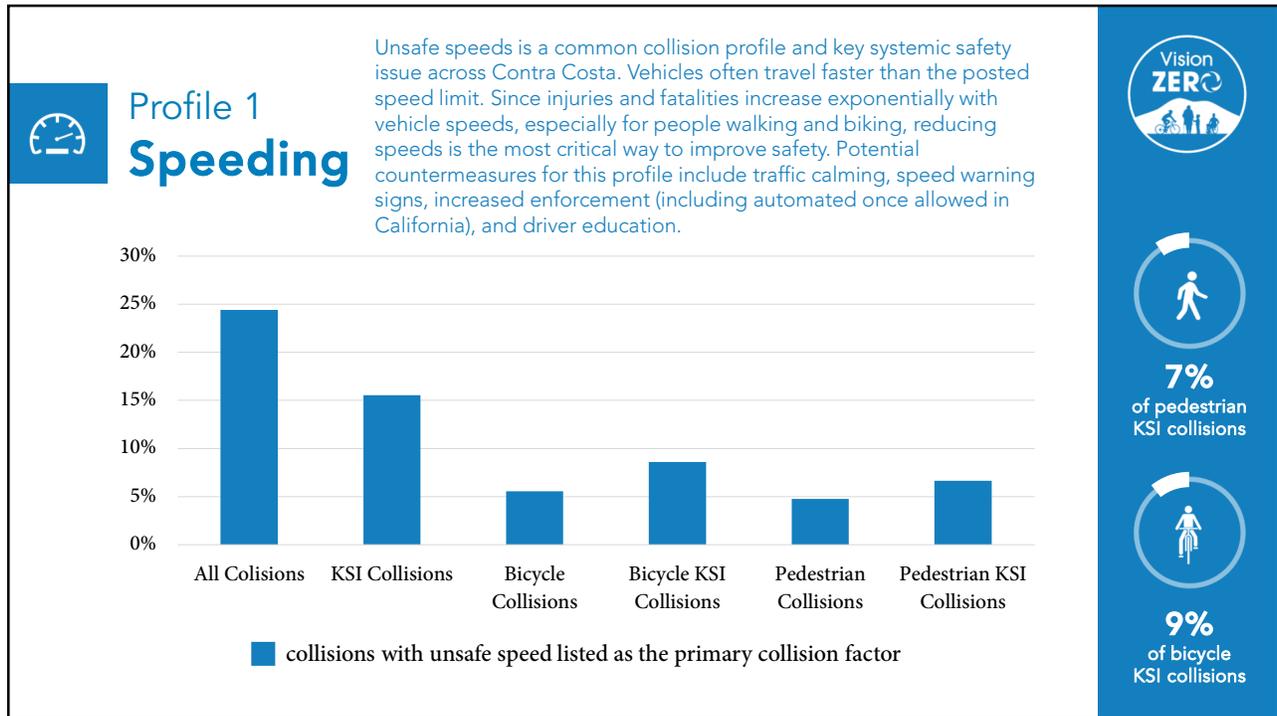


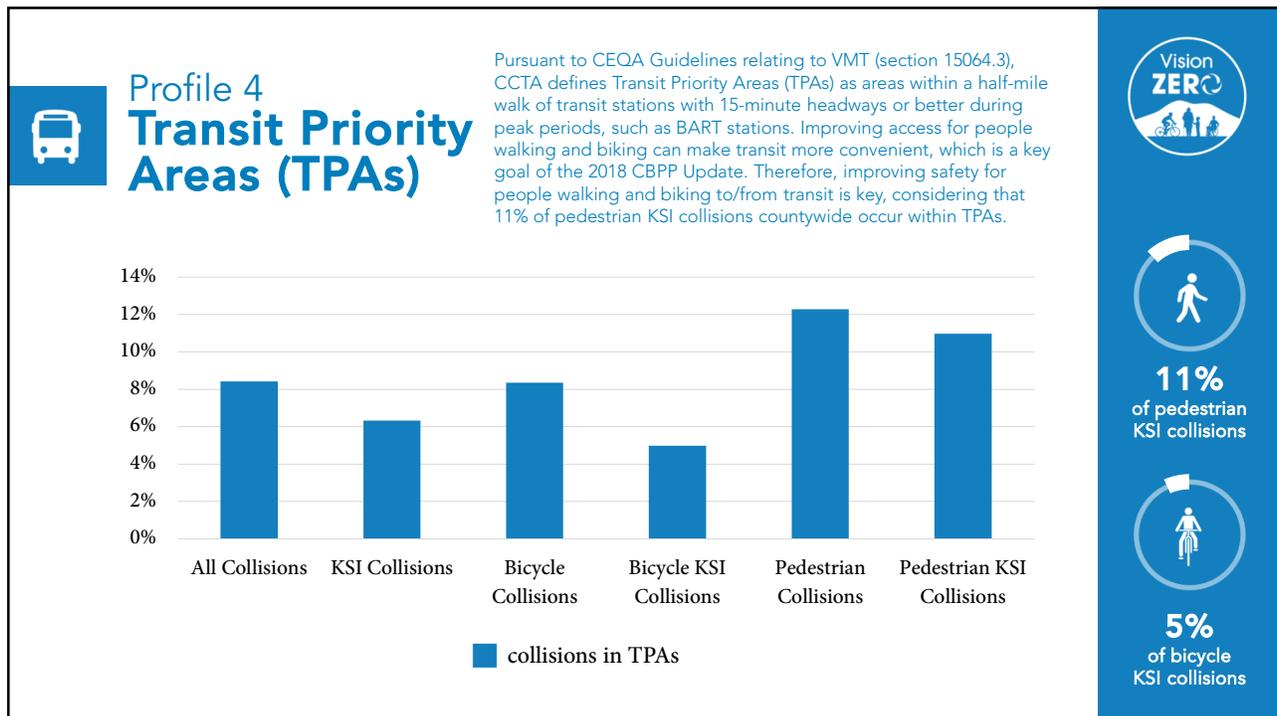
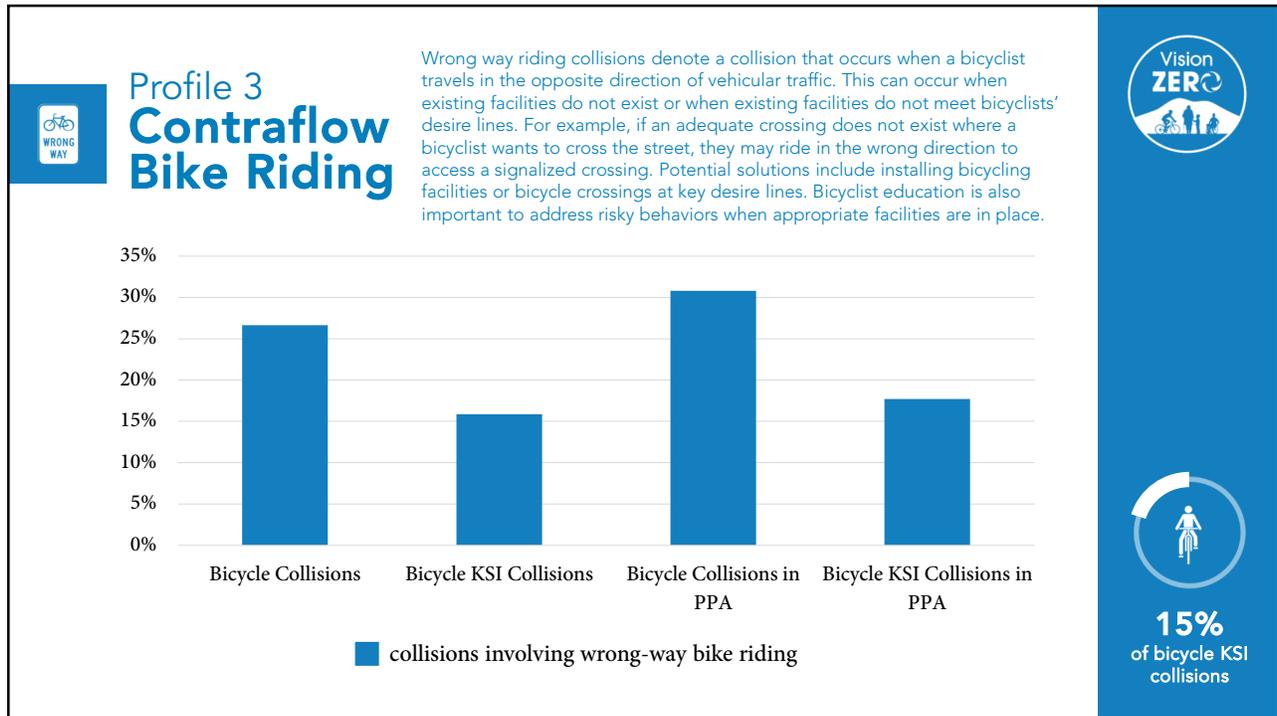


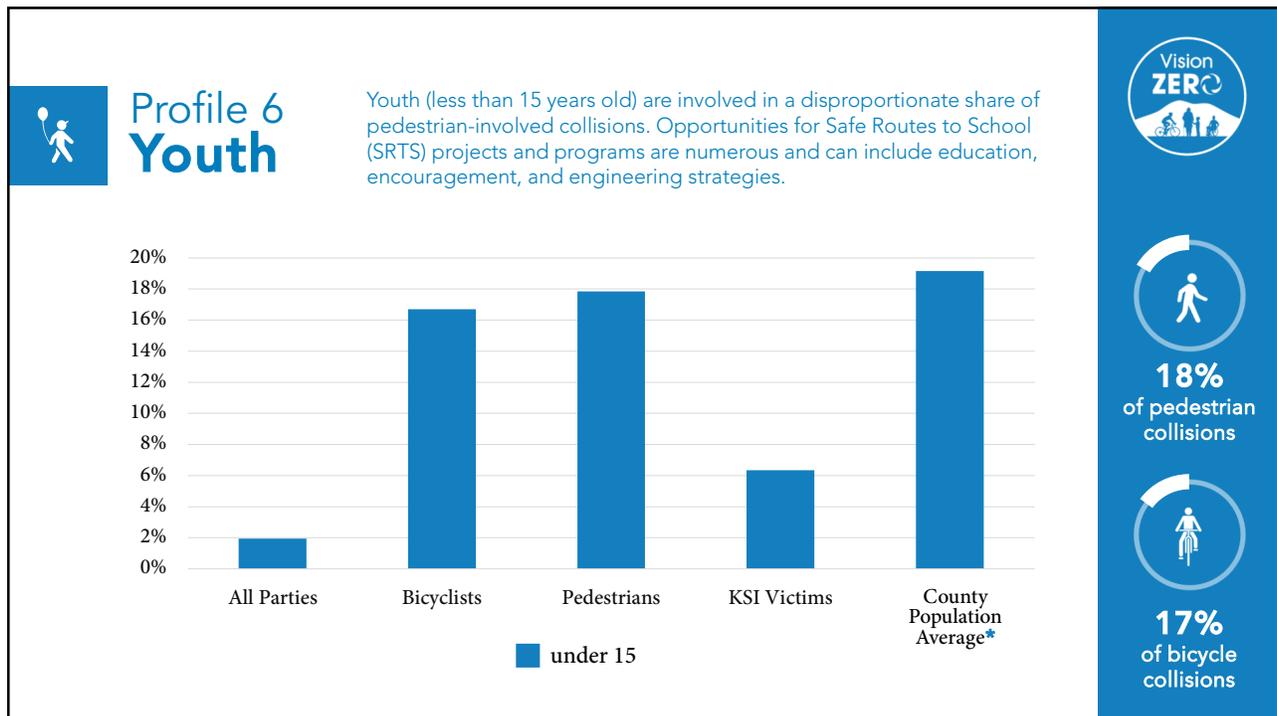
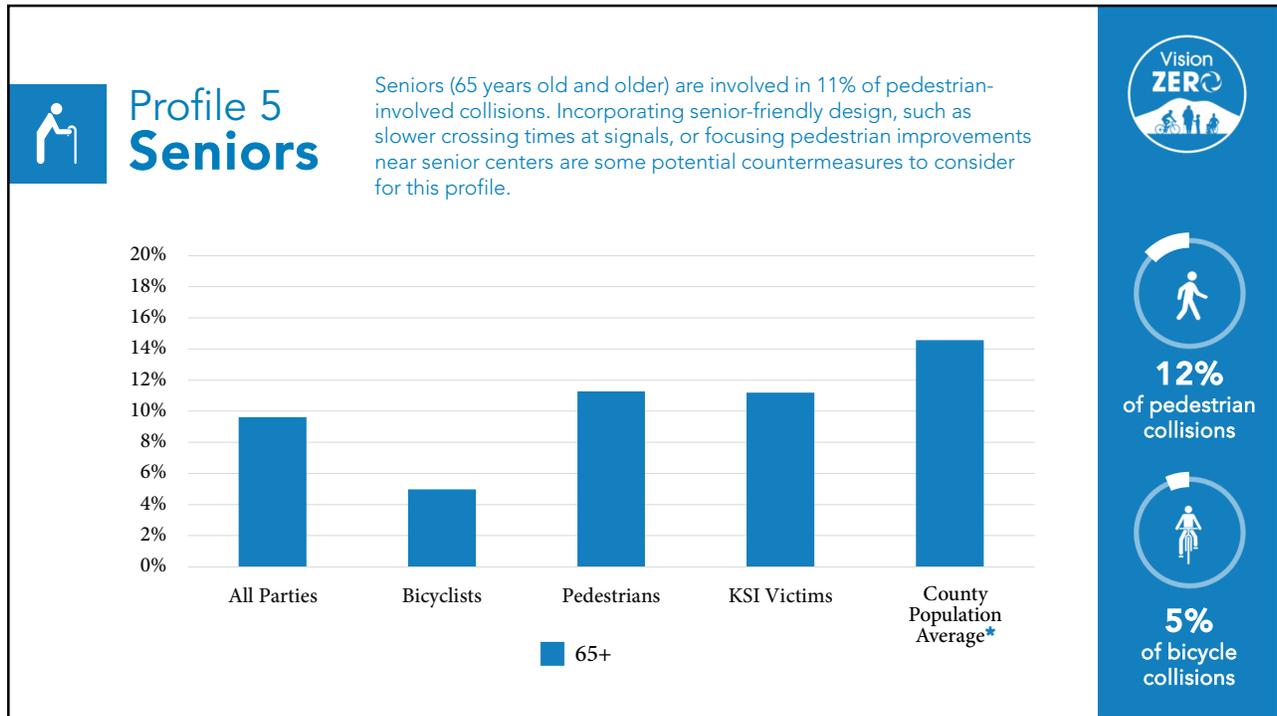
Contra Costa Common Bicycle and Pedestrian Collision Profiles

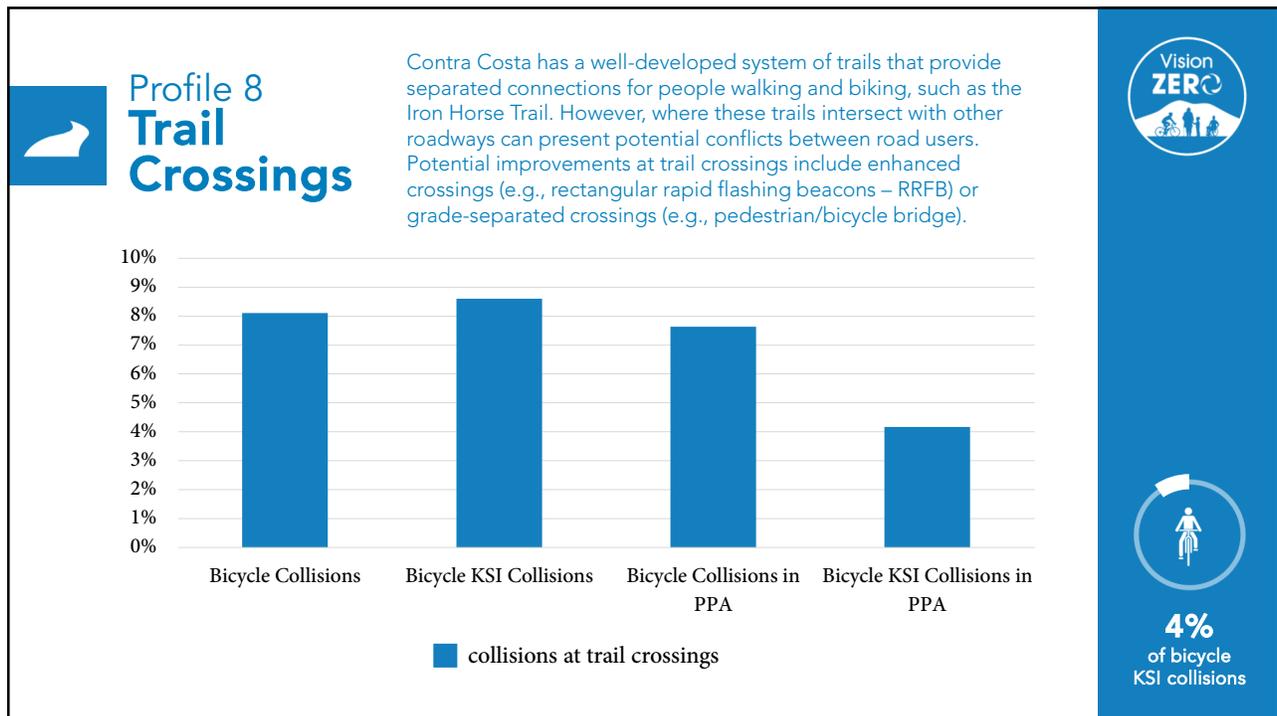
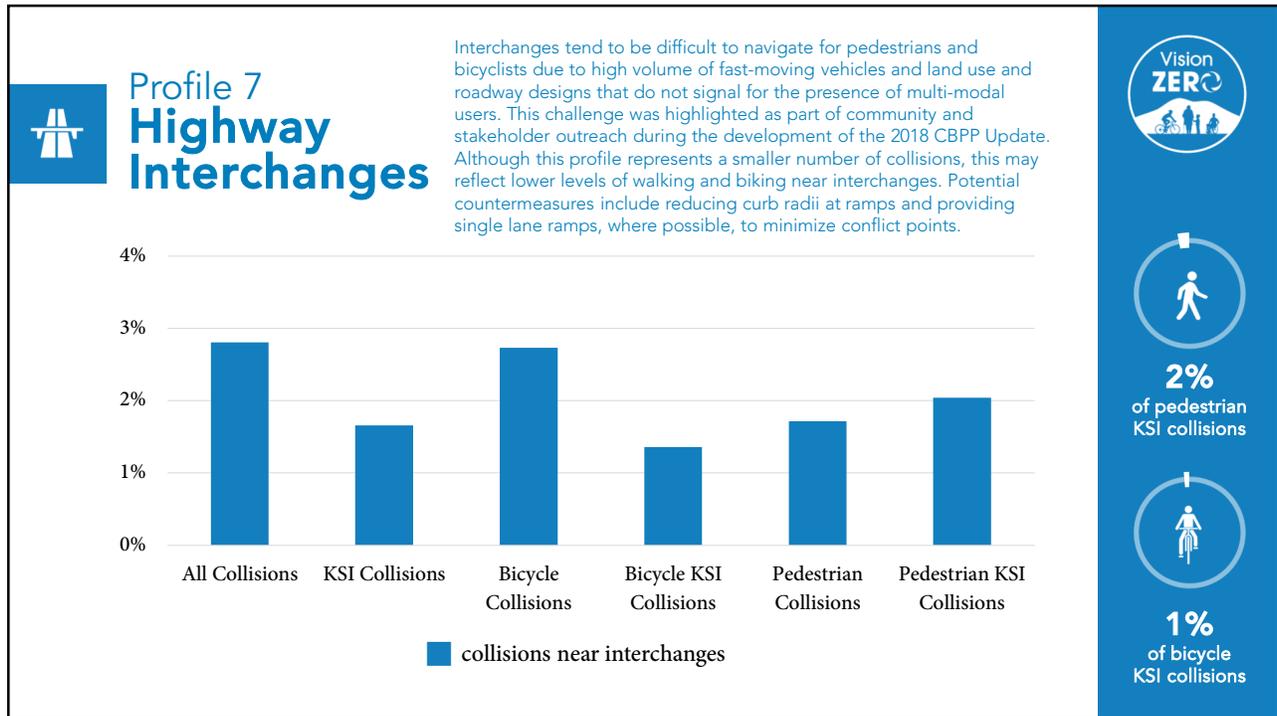
Common Bicycle and Pedestrian Collision Patterns

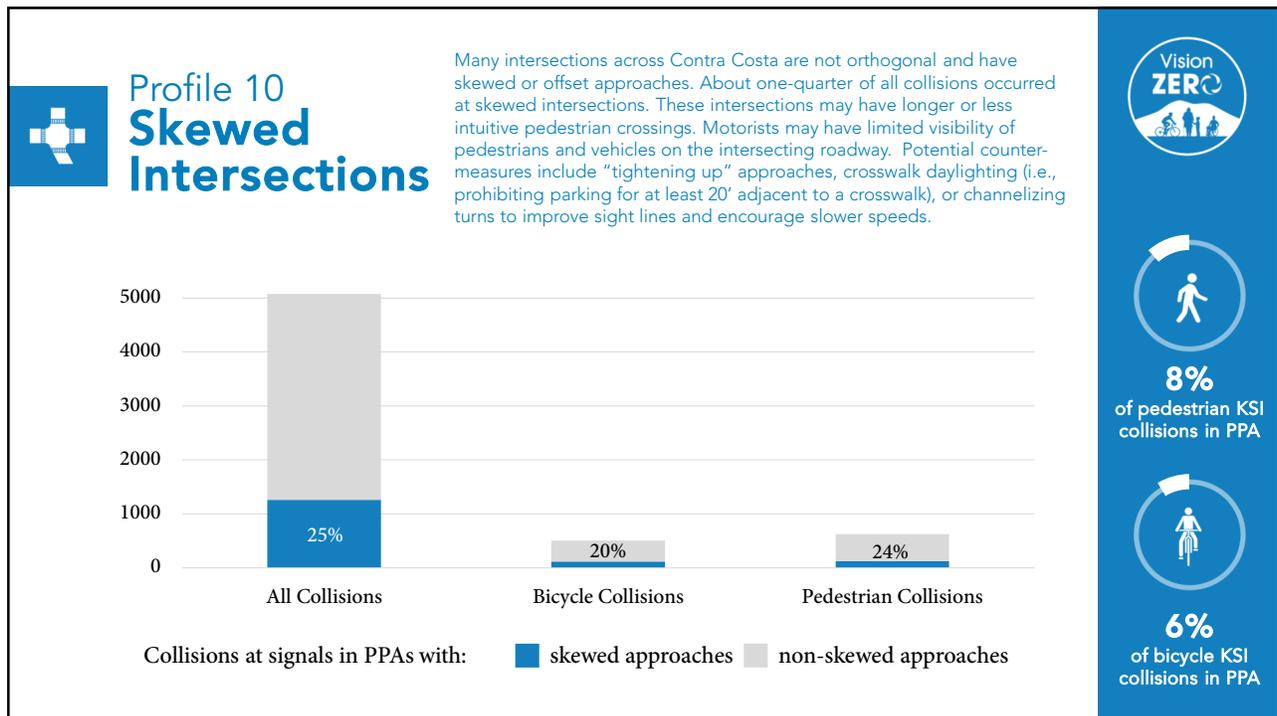
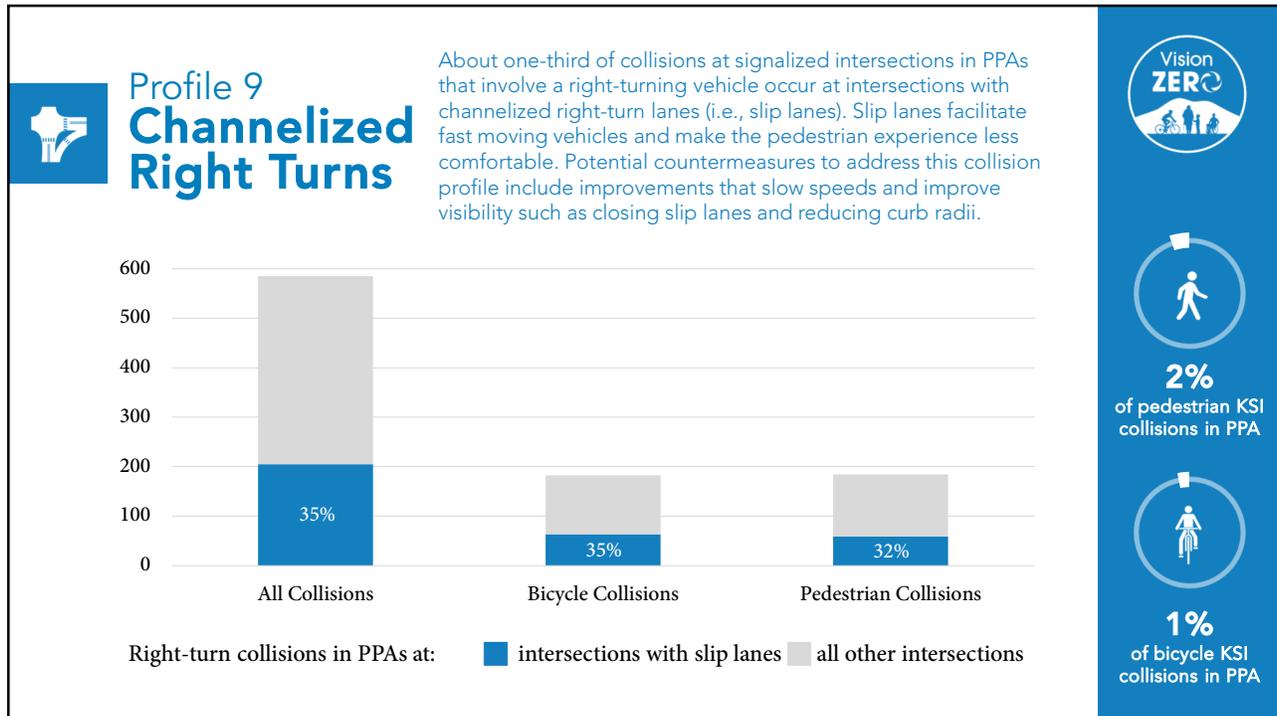


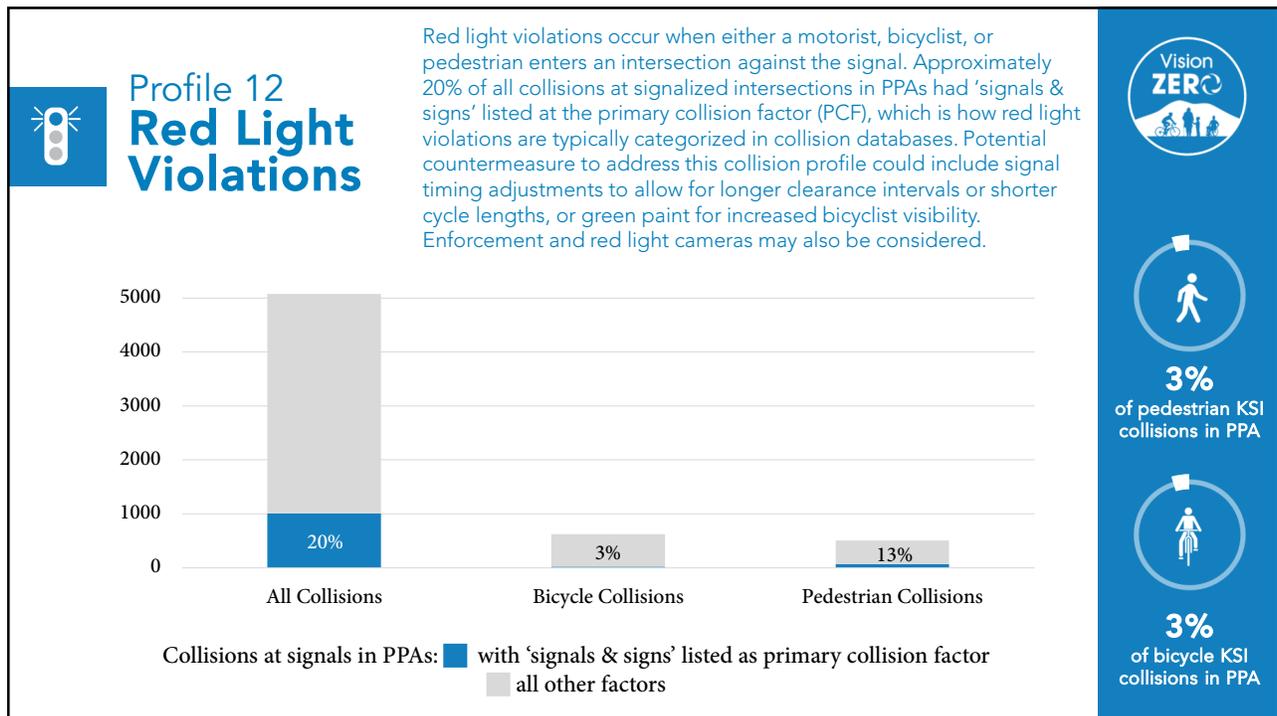
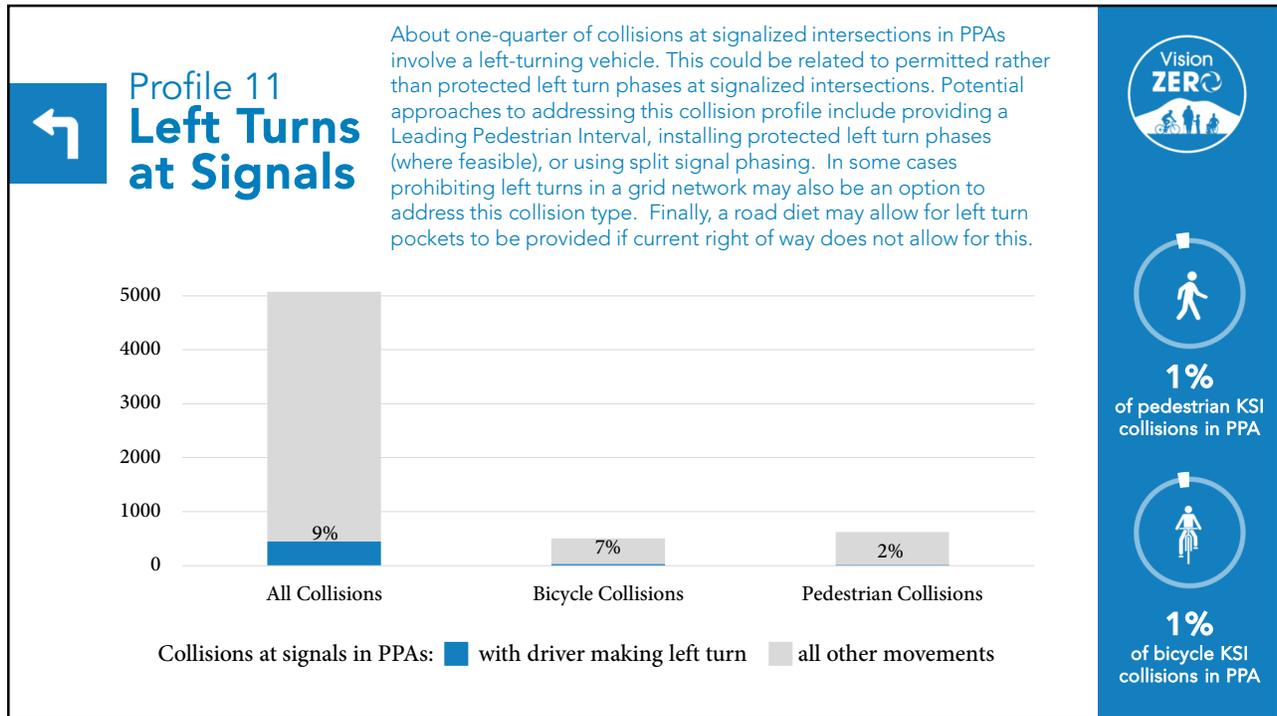














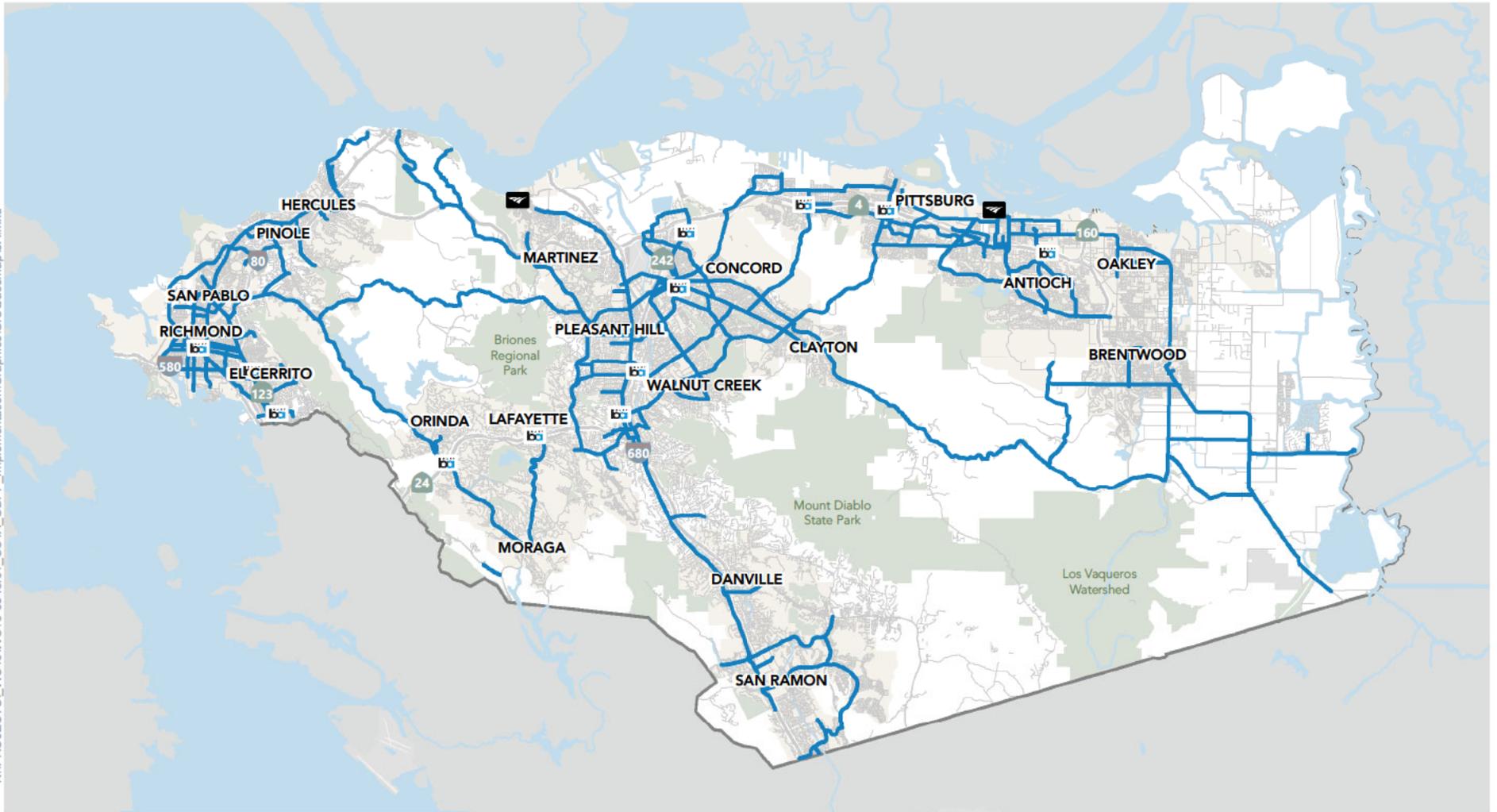
Other Potential Patterns

During CCTA's Vision Zero Working Group #3 on 10/6/20, the following ideas were generated regarding other potential patterns to investigate, if data is available and/or as part of forthcoming Pedestrian Needs Assessment

- User Behavior
 - Distracted driving and distracted walking, which is often underreported in Police Collision Reports, since collision parties are unlikely to admit that they were on their phone at the time of the collision
 - Driving while fatigued/tired
 - Pedestrians crossing outside crosswalks, especially near schools
- Specific Areas & Populations
 - School drop-off areas (related to congestion, queuing, and risky maneuvers)
- Built Environment Factors
 - Improper turning, both at intersections and driveways
 - Lighting
 - Pedestrian facility gaps (e.g. sidewalk gaps or unmarked crosswalks)
 - Sight distance concerns (e.g., related to trees and brush)



Appendix D. Countywide Safety Priority Locations Maps—Collisions Involving All Modes, People Biking, and People Walking



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Figure 1A
Contra Costa Safety Priority Locations Map—
Collisions Involving All Modes

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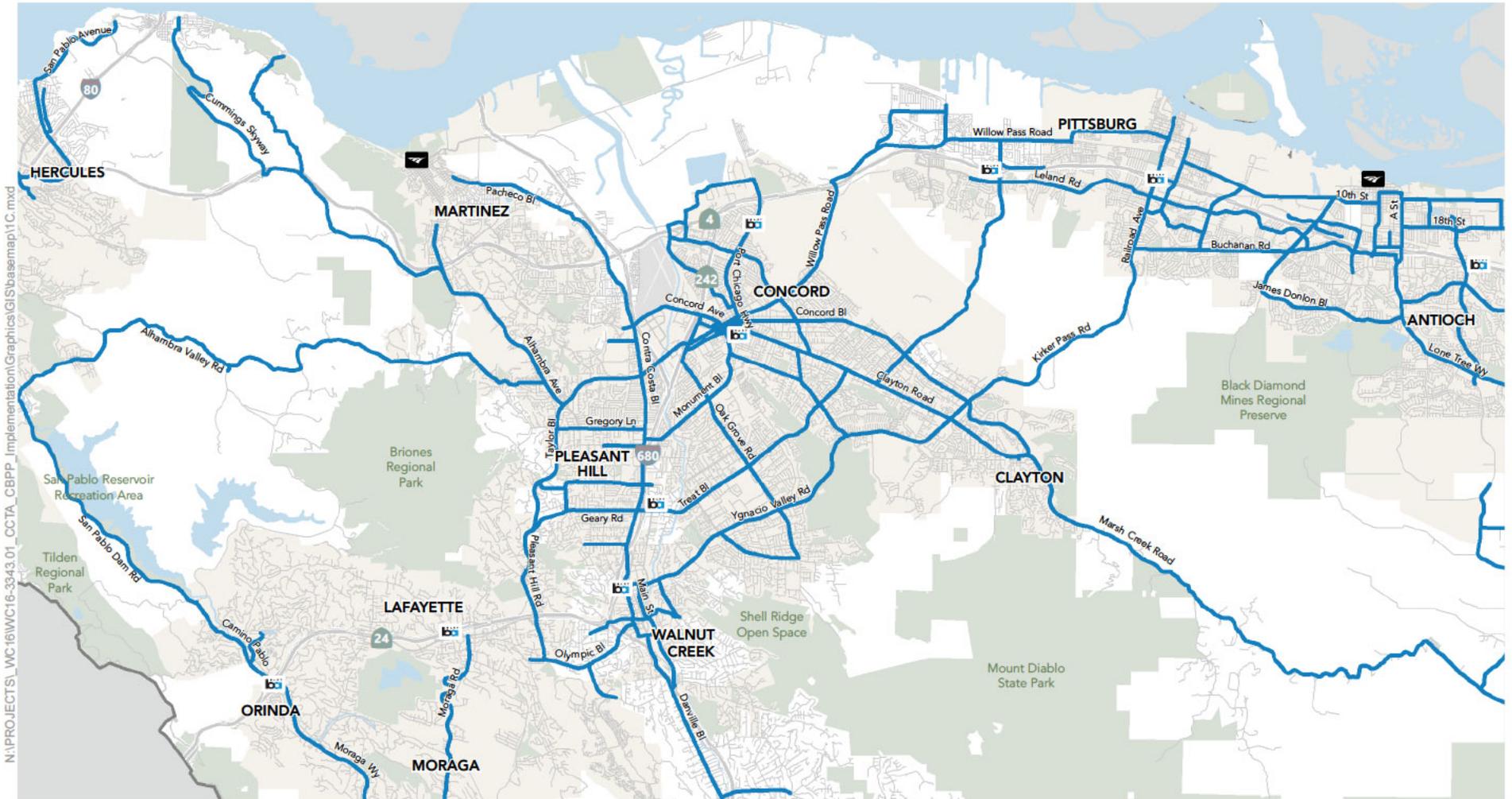


Figure 1B

Contra Costa Safety Priority Locations Map— Collisions Involving All Modes



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas



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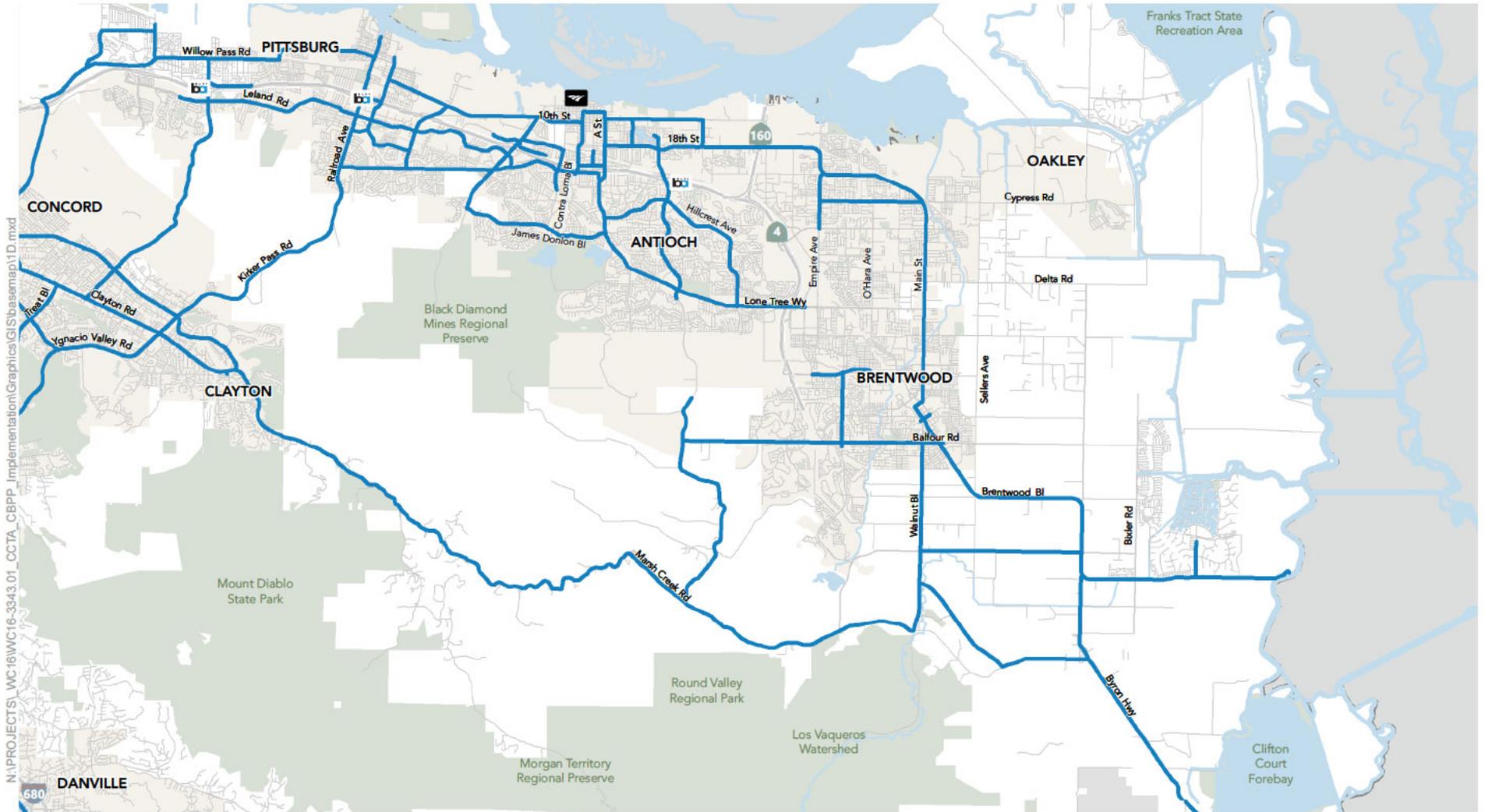


Figure 1C



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Contra Costa Safety Priority Locations Map—
Collisions Involving All Modes



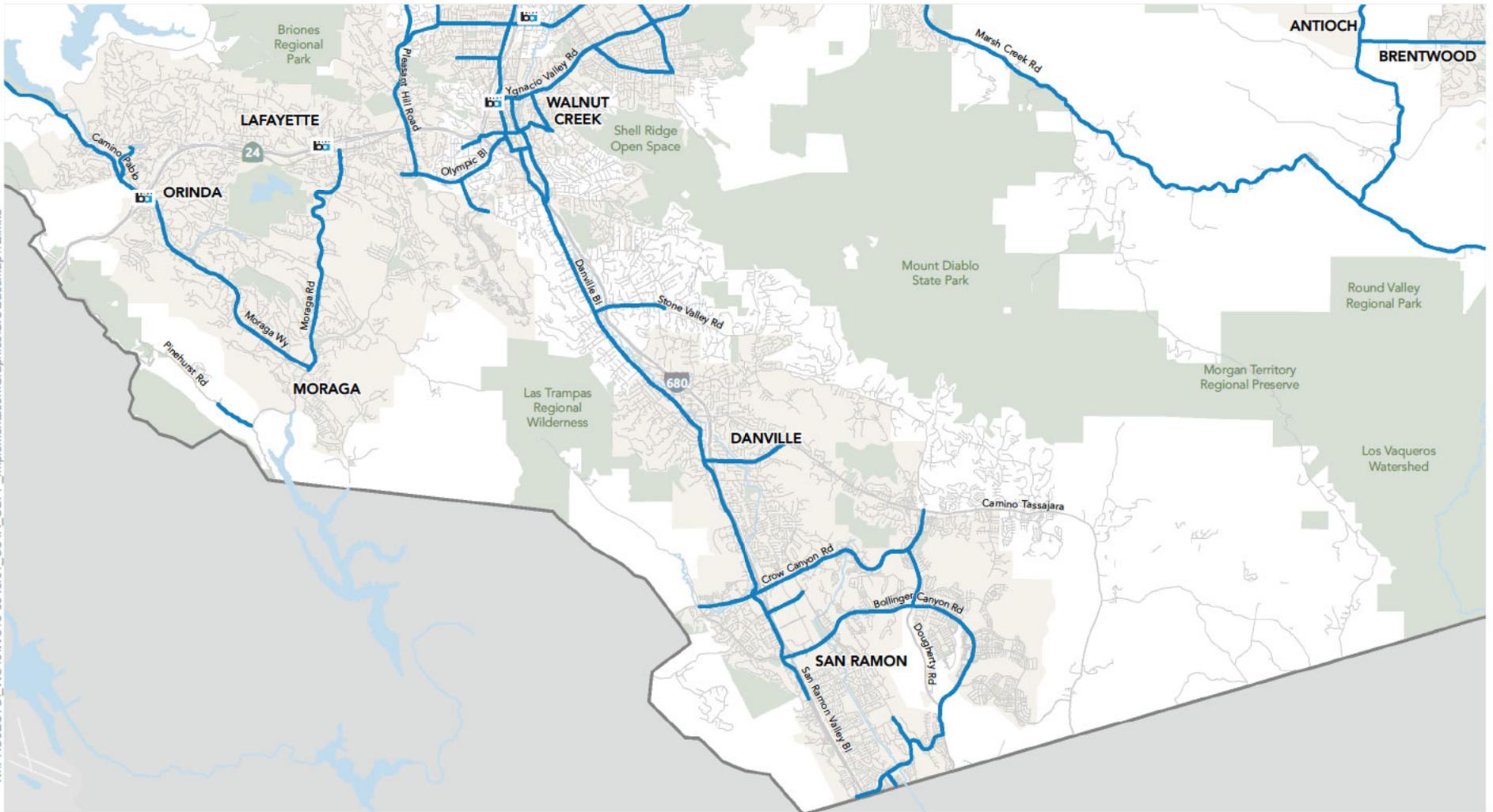
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-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Figure 1D
 Contra Costa Safety Priority Locations Map—
 Collisions Involving All Modes

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-  BART
-  Amtrak

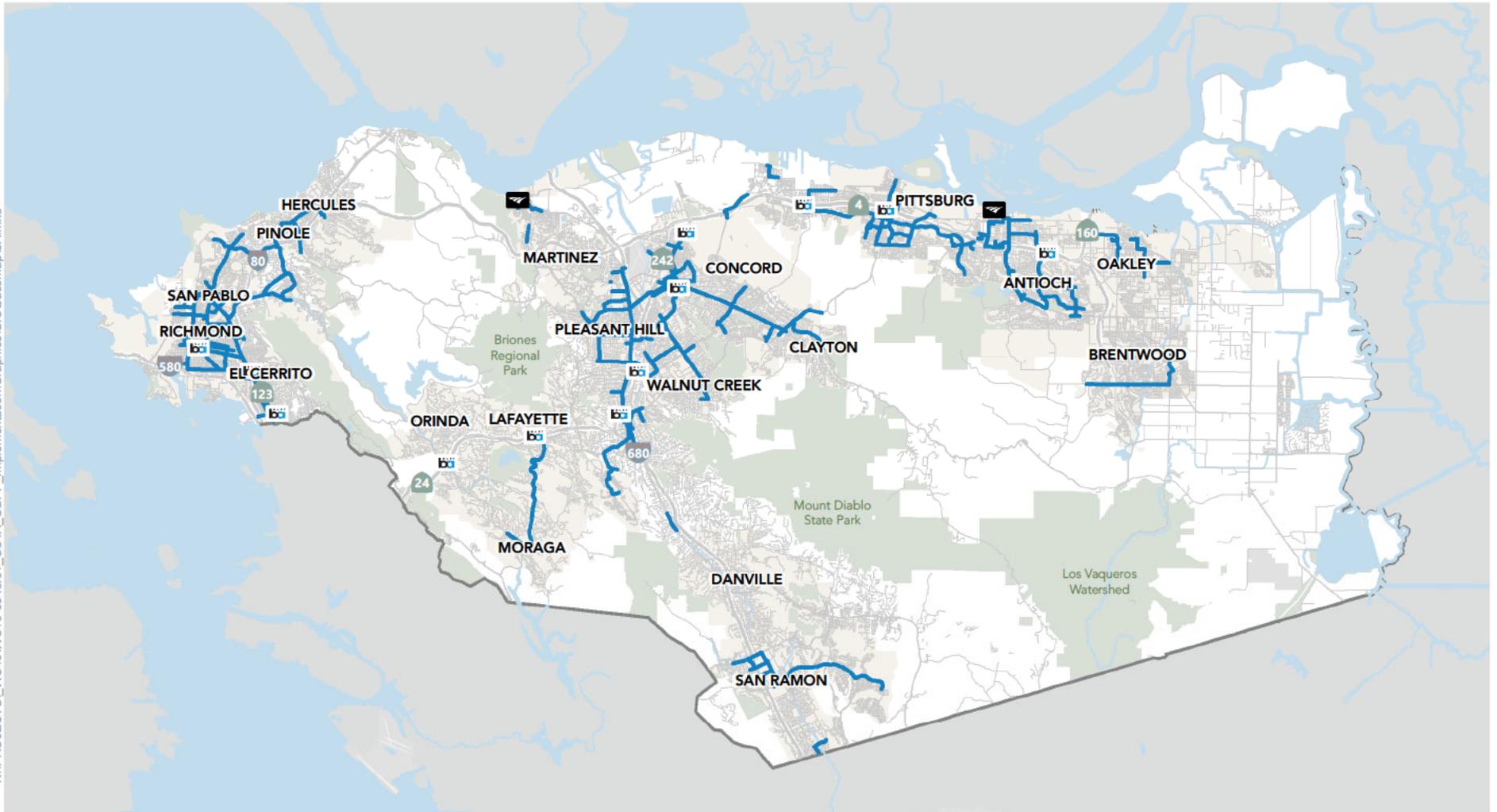
-  Safety Priority Locations
-  Incorporated Areas



Figure 1E

Contra Costa Safety Priority Locations Map— Collisions Involving All Modes

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-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Figure 2A

Contra Costa Safety Priority Locations Map— Collisions Involving People Walking

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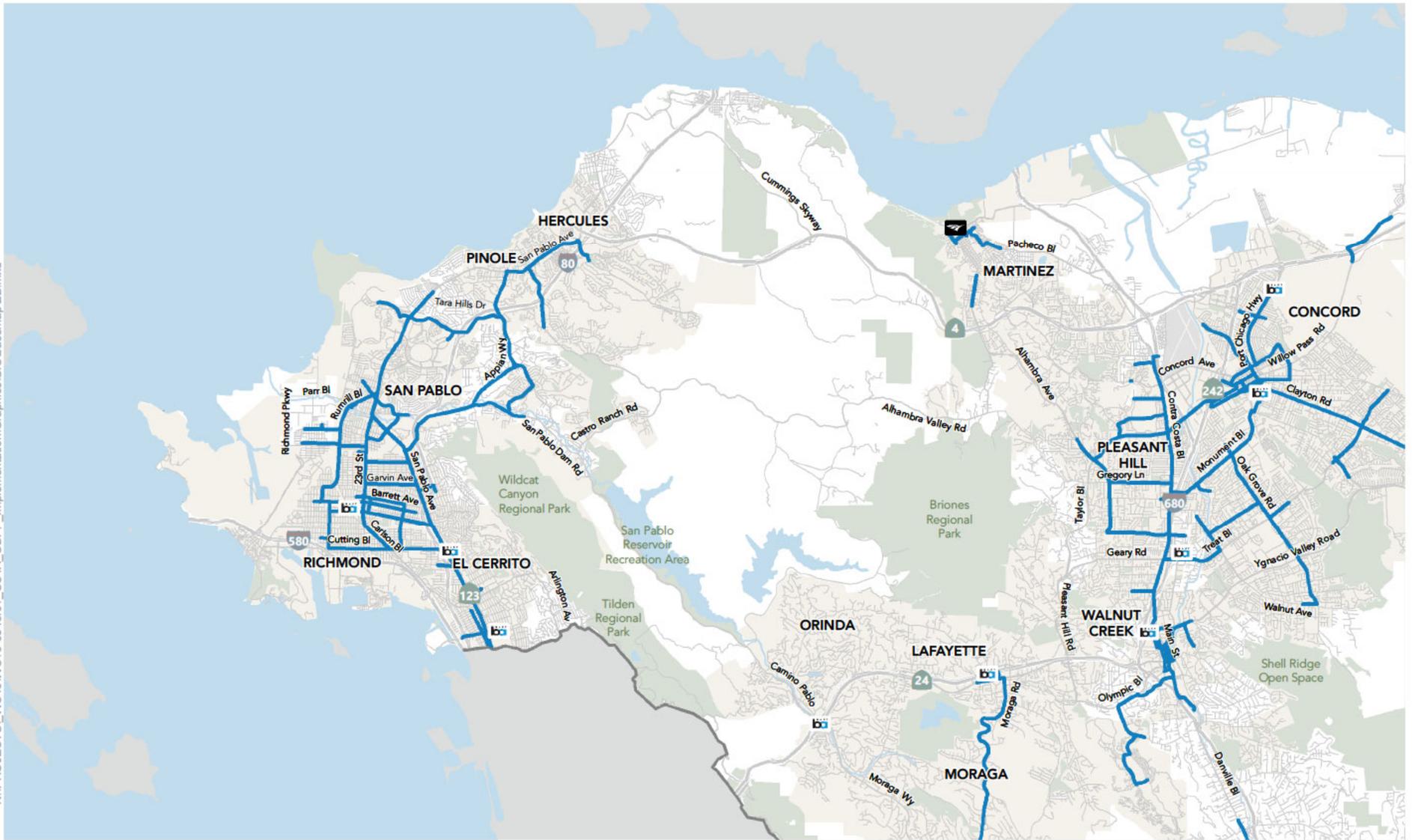


Figure 2B



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Contra Costa Safety Priority Locations Map— Collisions Involving People Walking



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Figure 2C

Contra Costa Safety Priority Locations Map—
Collisions Involving People Walking



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas



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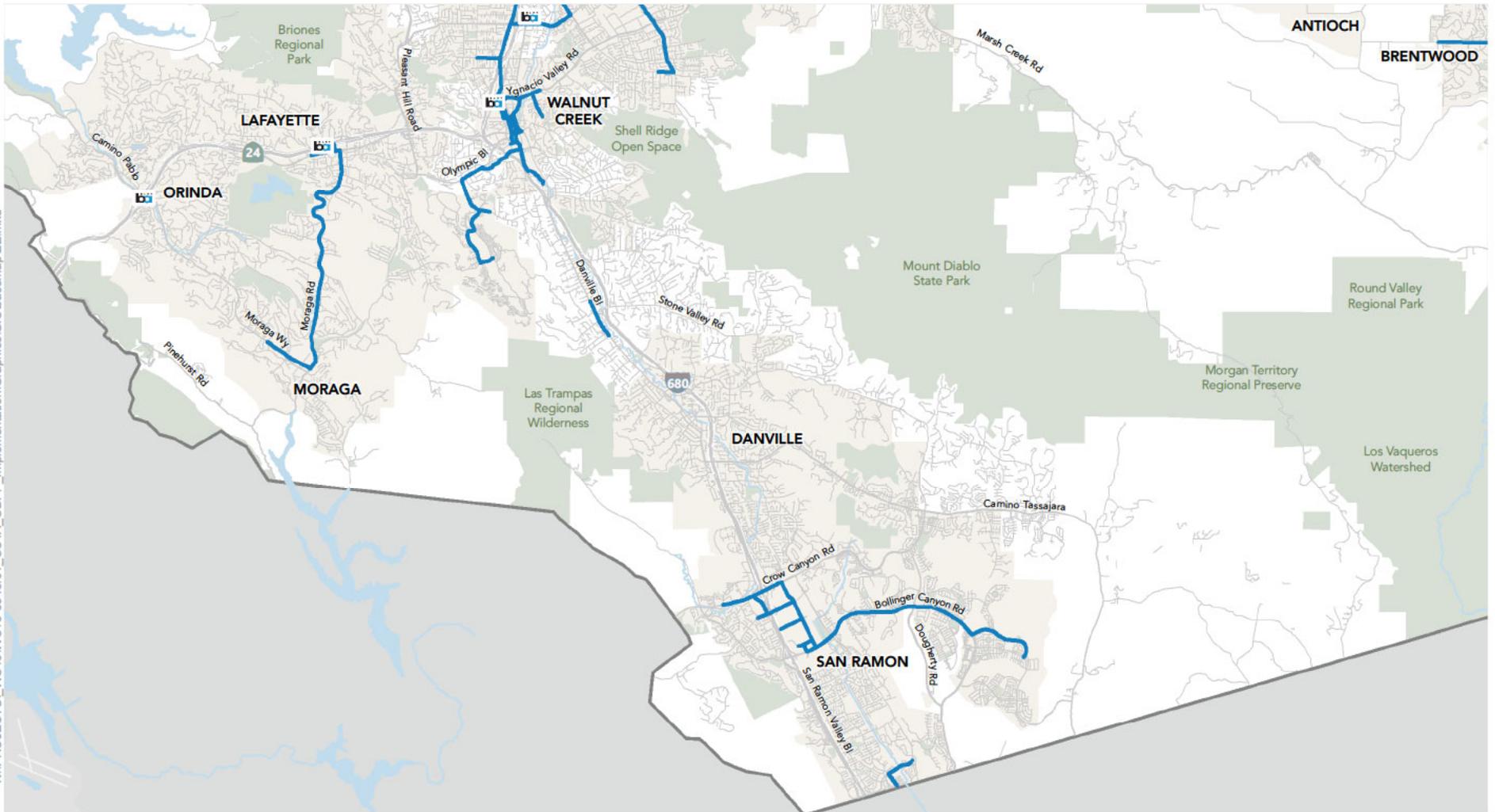
-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas



Figure 2D

Contra Costa Safety Priority Locations Map— Collisions Involving People Walking

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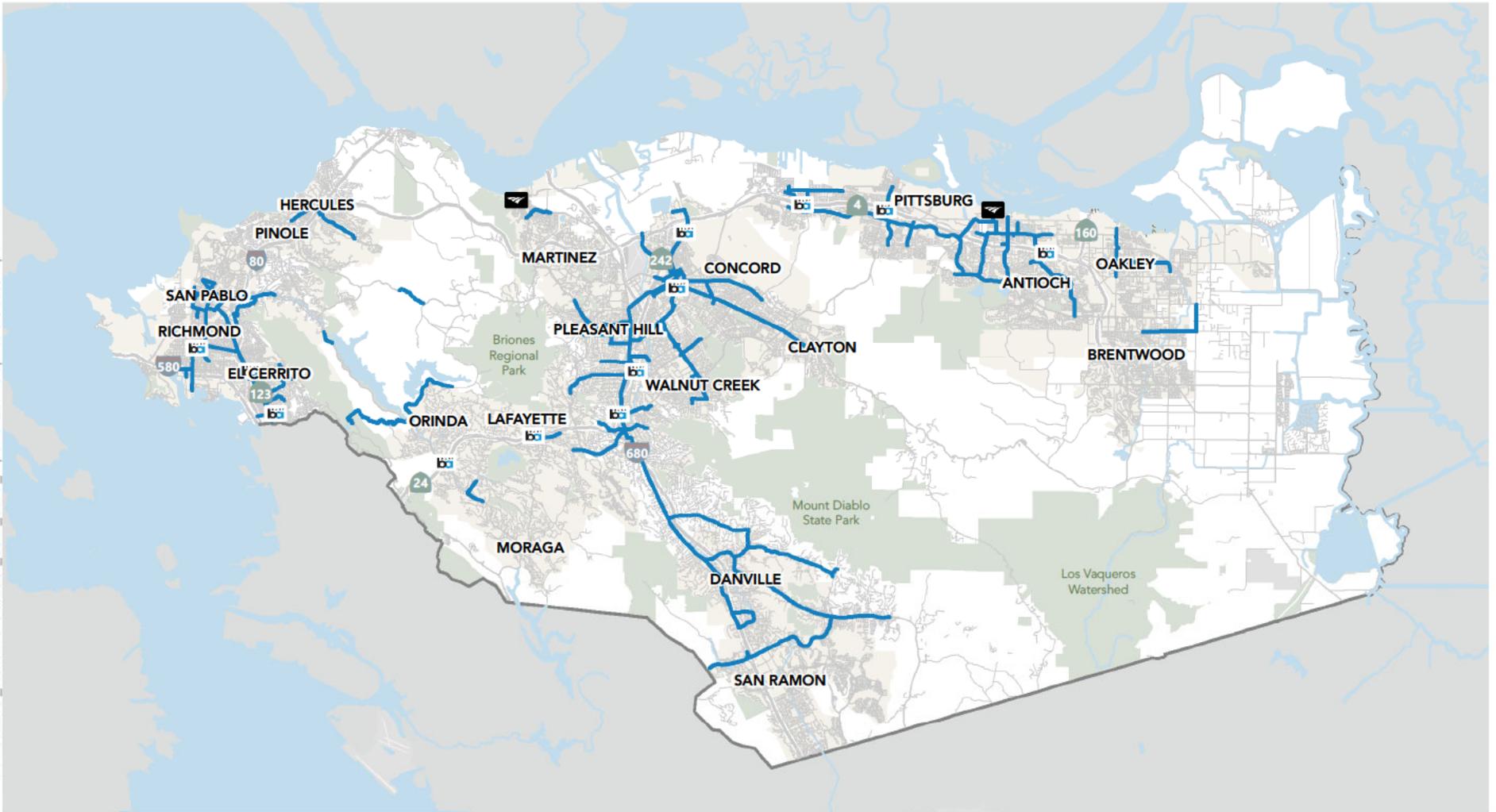
-  BART
-  Amtrak

-  Safety Priority Locations
-  Incorporated Areas

Figure 2E

Contra Costa Safety Priority Locations Map— Collisions Involving People Walking

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-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Figure 3A
Contra Costa Safety Priority Locations Map—
Collisions Involving People Biking

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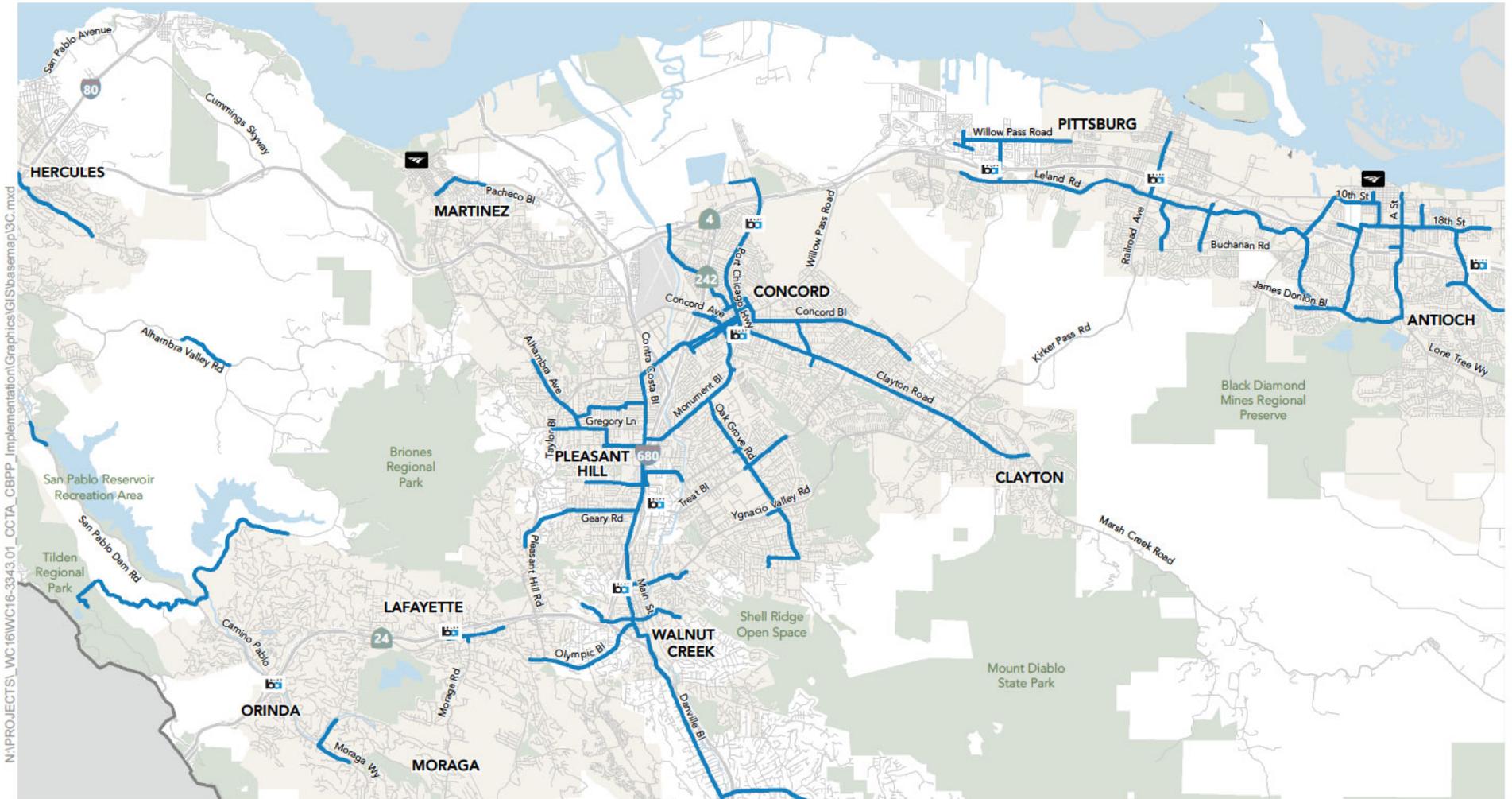


Figure 3B



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Contra Costa Safety Priority Locations Map— Collisions Involving People Biking



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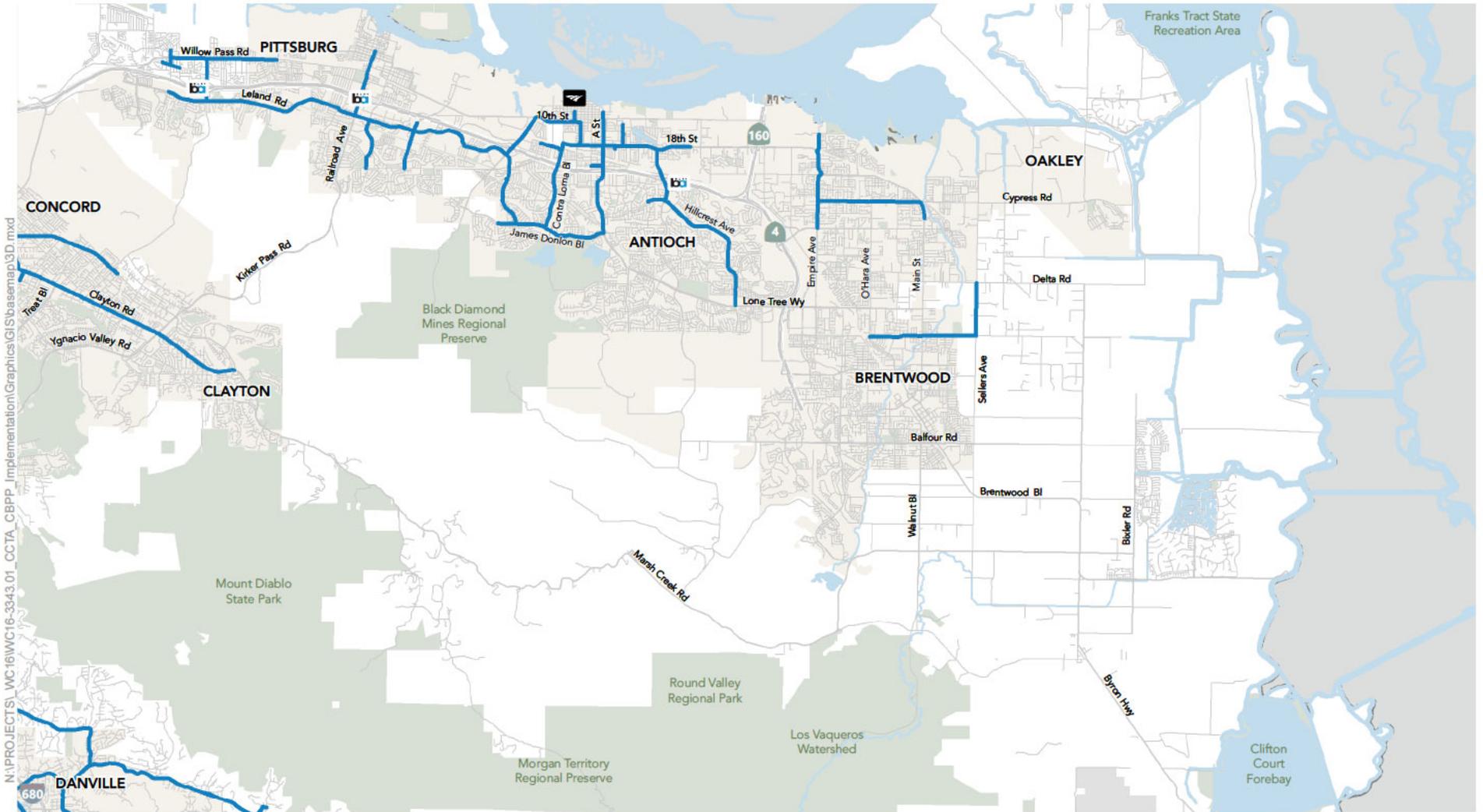


Figure 3C

Contra Costa Safety Priority Locations Map—
Collisions Involving People Biking



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas



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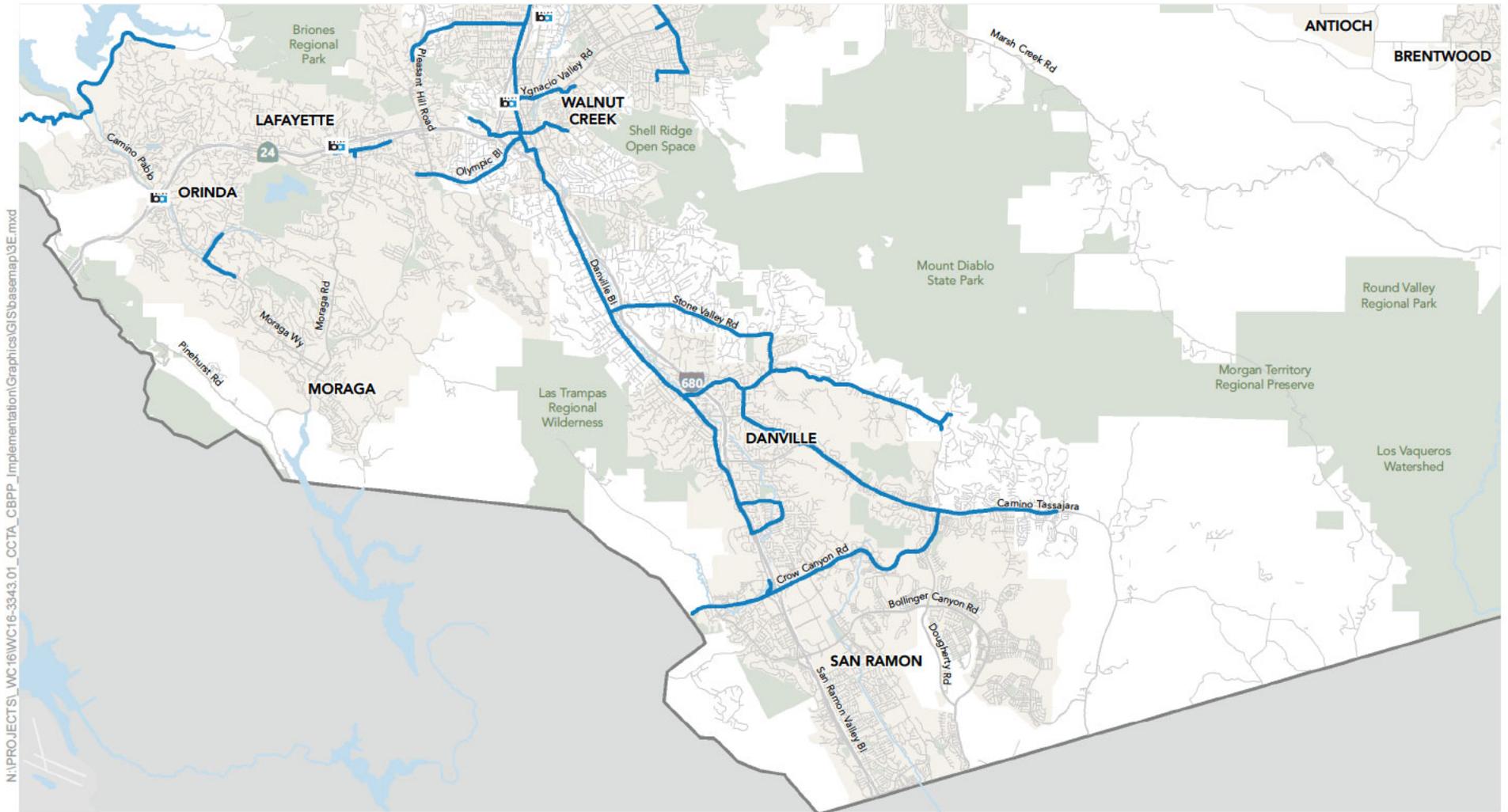
-  BART
-  Amtrak

-  Safety Priority Locations
-  Incorporated Areas



Figure 3D

Contra Costa Safety Priority Locations Map— Collisions Involving People Biking



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Figure 3E



-  BART
-  Amtrak
-  Safety Priority Locations
-  Incorporated Areas

Contra Costa Safety Priority Locations Map— Collisions Involving People Biking



Appendix E. Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling

CCTA Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling

Summary

This Toolbox presents 53 safety countermeasures applicable in different roadway contexts across California.

Many of these countermeasures are recommended for addressing the collision profiles identified in the How To Guide. As noted in the figure below, for each countermeasure, a description and the recommended treatment locations are noted. A full list of countermeasures is presented on the following page.

Many of these actions can be implemented to address the Countywide Common Bicycle

and Pedestrian Collision Patterns (see Appendix C). A menu of potential pedestrian and bicycle engineering countermeasures are presented on the following pages. Visit www.ccta.net to contact staff with any questions.

The 2018 Countywide Bicycle and Pedestrian Plan also provides design guidelines for facilities for people walking and bicycling that can be referenced in Complete Streets planning.

What You'll See in This Toolbox:

Countermeasure title

Countermeasure icon

Treatment locations

COUNTERMEASURE

Convert Two-Way Stop to All-Way Stop



Converting two-way stops to all-way stops prevents motorists, bicyclists, and pedestrians from having to cross free-flowing lanes of traffic at a side-street stop-controlled intersection and reduces the risk of collision.

Locations: Unsignalized Street Crossings

Countermeasure description



List of Countermeasures:

A. SIGNAL TIMING & PHASING

- Additional Signal Heads
- Extend Pedestrian Crossing Time
- Flashing Yellow Turn Phase
- Leading Pedestrian Interval
- Pedestrian Phase Recall
- Replace Permissive with Protected Left Turn
- Pedestrian Scramble
- Reduce Cycle Lengths
- Coordinated Signal Operation
- Extend Green Time for Bikes
- Extend Yellow and All Red Time

B. INTERSECTION & ROADWAY DESIGN

- Close Slip Lane
- Raised Intersection
- Convert Two-Way Stop to All-Way Stop
- Install Sidewalk
- Protected Intersection
- Raised Median
- Lane Narrowing
- Road Diet
- Widen Shoulder
- Roundabout
- Signal Head Improvements
- Traffic Circles
- Programmable Signals/Visors/Louvers
- Edge Line/Center Line Rumble Strips
- Hardened Centerlines

C. BIKEWAY DESIGN

- Bicycle Crossing (Solid Green Paint)
- Bicycle Signal/Exclusive Bike Phase
- Bike Detection
- Class I Bicycle Path or Mixed Use Trail
- Bike Box
- Class II Bike Lane
- Class IV Separated Bikeway
- Green Bike Lane Conflict Zone Markings
- Two-Stage Turn Queue Bike Box

D. PEDESTRIAN CROSSINGS

- Install Pedestrian Countdown Timer
- Pedestrian Hybrid Beacon (PHB)
- Curb Extension
- High-Visibility Crosswalk
- Pedestrian Median Barrier
- Raised Crosswalk
- Pedestrian Refuge Island
- Rectangular Rapid Flashing Beacon (RRFB)
- Reduce Curb Radius
- ADA-Compliant Directional Curb Ramps and Audible Push Buttons
- Extended Time Push Button

E. SIGNS & MARKINGS

- Prohibit Right-Turn-on-Red
- Advance Yield Markings
- Advance Stop Markings
- Pedestrian Signs

F. OTHER

- Access Management
- Intersection & Street Scale Lighting
- Remove Obstructions for Sightlines

A. SIGNAL TIMING & PHASING

COUNTERMEASURE

Additional Signal Heads



Additional signal heads allow drivers to anticipate signal changes farther away from intersections, decreasing the likelihood of driver error resulting in a collision with a pedestrian.

Locations: **Signalized Intersections**

COUNTERMEASURE

Pedestrian Phase Recall



Signals can be put in “recall” full time or for key time periods of day such as peak business hours or school drop-off/pick-up times. During these periods the “WALK” signal would be displayed every signal cycle without prompting by a pedestrian push button.

Locations: **Signalized intersections**

COUNTERMEASURE

Extend Pedestrian Crossing Time



Increases time for pedestrian walk phases, especially to accommodate vulnerable populations, such as children and the elderly.

Locations: **Signalized intersections**

COUNTERMEASURE

Replace Permissive with Protected Left Turn



Provides a protected green arrow phase for left turning vehicles while showing a red light for both on-coming traffic and parallel pedestrian crossings. Eliminates conflicts between pedestrians and left-turning vehicles.

Locations: **Signalized Intersections**

COUNTERMEASURE

Flashing Yellow Turn Phase



Flashing yellow turn arrow alerts drivers to proceed with caution and decide if there is a sufficient gap in oncoming traffic to safely make a turn. To be used only when a pedestrian walk phase is not called. Protected-only phases should be used when pedestrians are present.

Locations: **Signalized Intersections**

COUNTERMEASURE

Pedestrian Scramble



A form of pedestrian “WALK” phase at a signalized intersection in which all vehicular traffic is required to stop, allowing pedestrians to safely cross through the intersection in any direction, including diagonally.

Locations: **Signalized Intersections**

COUNTERMEASURE

Leading Pedestrian Interval (LPI)



Gives people walking a head start, making them more visible to drivers turning right or left. “WALK” signal comes on a few seconds before the cars get their green light. May be used in combination with No Right Turn on Red restrictions.

Locations: **Signalized Intersections**

COUNTERMEASURE

Reduce Cycle Lengths



Traffic signal cycles should be kept short (preferably 90 seconds maximum) to reduce pedestrian delay. When delay is significant, pedestrians are more inclined to ignore signal indications.

Locations: **Signalized Intersections**

COUNTERMEASURE

Coordinated Signal Operation



Interconnected signal systems provide coordination between adjacent signals to better facilitate travel through a corridor. When implemented, the number of stops is reduced, and therefore the opportunity to run red lights is also reduced.

Locations: **Signalized Intersections**

COUNTERMEASURE

Extend Green Time For Bikes



Prolongs the green phase when bicyclists are present to provide additional time for bicyclists to clear the intersection. Can occur automatically in the signal phasing or when prompted with bicycle detection. Topography should be considered in clearance time.

Locations: **Signalized Intersections**

COUNTERMEASURE

Extend Yellow and All Red Time



Extending yellow and all red time allows drivers and bicyclists to safely cross through a signalized intersection before conflicting traffic movements are permitted to enter the intersection.

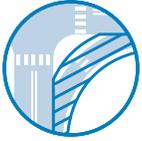
Locations: **Signalized Intersections**



B. INTERSECTION & ROADWAY DESIGN

COUNTERMEASURE

Close Slip Lane

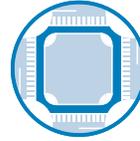


Modifies the corner of an intersection to remove the sweeping right turn lane for vehicles. Results in shorter crossings for pedestrians, reduced speed for turning vehicles, better sight lines, and space for landscaping and other amenities.

Locations: **Signalized Intersections**

COUNTERMEASURE

Protected Intersection

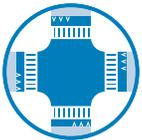


Protected intersections use corner islands, curb extensions, and colored paint to delineate bicycle and pedestrian movements across an intersection. Slower driving speeds and shorter crossing distance increase safety for pedestrians. Separates bicycles from pedestrians.

Locations: **Signalized Intersections**

COUNTERMEASURE

Raised Intersection



Elevates the intersection to bring vehicles to the sidewalk level and increases the visibility of pedestrians. Serves as a traffic calming measure by extending the sidewalk context across the road.

Locations: **Unsignalized Street Crossings**

COUNTERMEASURE

Raised Median



A concrete or landscaped area between the two directions of travel. Increases safety by reducing vehicular speeding and reducing pedestrian crossing distance.

Locations: **Unsignalized Street Crossings**

COUNTERMEASURE

Convert Two-Way Stop to All-Way Stop



Converting two-way stops to all-way stops prevents motorists, bicyclists, and pedestrians from having to cross free-flowing lanes of traffic at a side-street stop-controlled intersection and reduces the risk of collision.

Locations: **Unsignalized Street Crossings**

COUNTERMEASURE

Lane Narrowing



A reduction in lane width produces a traffic calming effect by encouraging motorists to travel at slower speeds, lowering the risk of collision with bicyclists, pedestrians, and other motorists.

Locations: **Along the Road**

COUNTERMEASURE

Install Sidewalk

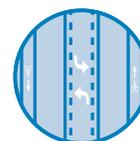


Sidewalks and walkways are “pedestrian lanes” that provide people with space to travel within the public right-of-way that is separated from roadway vehicles. They are associated with reduced crashes where pedestrians were walking along the roadway.

Locations: **Along the Road**

COUNTERMEASURE

Road Diet

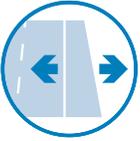


Depending on the street, road diets may change the number of lanes, turn lanes, center turn lanes, bike lanes, parking lanes, and/or sidewalks. Road diets optimize street space to benefit all users by improving the safety and comfort of pedestrians and bicyclists, and reducing vehicle speeds and the potential for rear end collisions.

Locations: **Along the Road**

COUNTERMEASURE

Widen Shoulder

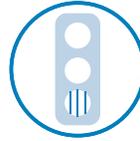


In rural areas, widened shoulders that are clean and well-paved, can create greater separation between vehicles and pedestrians and also provide motor vehicle safety benefits, such as space for inoperable vehicles to pull out of the travel lane and be repaired.
(for use in rural areas only)

Locations: Along the Road

COUNTERMEASURE

Programmable Signals/Visors/Louvers



These may be installed at traffic signals to limit the field of view of a particular signal head. They are applicable in cases when where the road user could be misdirected, particularly at skewed or closely-spaced intersections when the road user sees the signal indications intended for other approaches before seeing the signal indications for their own approach.

Locations: Signalized Intersections

COUNTERMEASURE

Roundabout

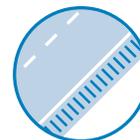


Roundabouts are circular intersections designed to eliminate left turns by requiring traffic to travel in a counter-clockwise direction and exit to the right. Installed to manage vehicular speeds, reduce pedestrian exposure, improve safety at intersections through eliminating angle collisions, and help traffic flow more efficiently.

Locations: Signalized Intersections, Unsignalized Street Crossings, Roundabouts

COUNTERMEASURE

Edge Line/Center Line Rumble Strips

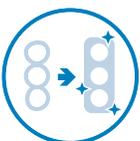


Rumble strips can be installed along the edge line or center line to address roadway departure and head-on crashes caused by distracted, drowsy, or otherwise inattentive drivers who drift from their lane.

Locations: Along the Road

COUNTERMEASURE

Signal Head Improvements



Improving signal head visibility reduces the likelihood of crashes caused by traffic signal violations. Installing backplates, increasing the size of signal displays, and installing LED lenses should all be considered as potential countermeasures.

Locations: Signalized Intersections

COUNTERMEASURE

Hardened Centerlines



Uses rubber curb with plastic bollards on the receiving roadway's centerline to modify the angle of motorists turning left. Widening the turning radii of left-turning vehicles expands the driver's field of vision and increases pedestrian visibility.

Locations: Signalized Intersections, Unsignalized Street Crossings

COUNTERMEASURE

Traffic Circles



Installed at stop-controlled intersections to facilitate a circular flow at an intersection, which result in slower speeds through the intersection.

Locations: Along the Road, Unsignalized Intersections



C. BIKEWAY DESIGN

COUNTERMEASURE

Bicycle Crossing (Solid Green Paint)



Solid green paint across an intersection that signifies the path of the bicycle crossing. Increases visibility and safety of bicyclists traveling through an intersection.

Locations: **Signalized Intersections**

COUNTERMEASURE

Bike Box



A designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase. An advance stop line may be an alternative approach to this strategy.

Locations: **Signalized Intersections**

COUNTERMEASURE

Bicycle Signal/Exclusive Bike Phase



A traffic signal directing bicycle traffic across an intersection. Separates bicycle movements from conflicting motor vehicle, streetcar, light rail, or pedestrian movements. May be applicable for Class IV facilities when the bikeway is brought up to the intersection.

Locations: **Signalized Intersections**

COUNTERMEASURE

Class II Bike Lane



Using designated lane markings, pavement legends, and signs, bike lanes provide dedicated street space for bicyclists, typically adjacent to the outer vehicle travel lane.

Locations: **Along the Road**

COUNTERMEASURE

Bike Detection



Bike detection is used at signalized intersections, either through use of push-buttons, in-pavement loops, or by video or infrared cameras, to call a green light for bicyclists and reduce delay for bicycle travel. Discourages red light running by bicyclists and increases convenience of bicycling.

Locations: **Signalized Intersections**

COUNTERMEASURE

Class IV Separated Bikeway



Space on the roadway set aside for the exclusive use of bicycles and physically separated from vehicle traffic. Types of separation may include, but are not limited to, grade separation, flexible posts, physical barriers, or on-street parking.

Locations: **Along the Road**

COUNTERMEASURE

Class I Bicycle Path or Mixed Use Trail



Provides a completely separate right of way that is designated for the exclusive use of people riding bicycles and walking with minimal cross-flow traffic. Paths and trails offer opportunities for the lowest stress bicycle travel.

Locations: **Along the Road**

COUNTERMEASURE

Green Bike Lane Conflict Zone Markings



Green pavement within a bicycle lane to increase visibility of bicyclists and to reinforce bicycle priority. The green pavement can be either as a corridor treatment or as a spot treatment in conflict areas such as frequently used driveways.

Locations: **Along the Road**

COUNTERMEASURE

Two-Stage Turn Queue Bike Box



This roadway treatment provides bicyclists with a means of safely making a left turn at a multi-lane signalized intersection from a bike lane or cycle track on the far right side of the roadway. In this way, bicyclists are protected from the flow of traffic while waiting to turn. Usage could be mirrored for right-turns from a one-way street with a left-side bikeway.

Locations: Signalized Intersections



D. PEDESTRIAN CROSSINGS

COUNTERMEASURE

Install Pedestrian Countdown Timer



Displays “countdown” of seconds remaining on the pedestrian signal. Countdown indications improve safety for all road users, and are required for all newly installed traffic signals where pedestrian signals are installed.

Locations: **Signalized Intersections**

COUNTERMEASURE

Pedestrian Median Barrier



Under specific circumstances, pedestrian median barriers restrict pedestrians from crossing the median at locations where nearby crossings are available and midblock crossings may have poor sight distance or insufficient crossing enhancements for the conditions.

Locations: **Along the Road**

COUNTERMEASURE

Pedestrian Hybrid Beacon (PHB)



Pedestrian-activated beacon used at mid-block crosswalks and side-street stop-controlled intersections to notify oncoming motorists to stop with a series of red and yellow lights. Also known as a High-intensity Activated crossWALK (HAWK) beacon

Locations: **Unsignalized Street Crossings, Roundabouts**

COUNTERMEASURE

Raised Crosswalk



The crosswalk is elevated to match the sidewalk to make pedestrians more visible to approaching vehicles. Typically located at midblock crossings or across free right turns, they encourage motorists to yield to pedestrians and reduce vehicle speed. An entire intersection may be raised similarly.

Locations: **Unsignalized Street Crossings, Roundabouts**

COUNTERMEASURE

Curb Extensions



Widens the sidewalk at intersections or midblock crossings to shorten the pedestrian crossing distance, to make pedestrians more visible to vehicles, and to reduce the speed of turning vehicles.

Locations: **Intersection Geometry, Unsignalized Street Crossings**

COUNTERMEASURE

Pedestrian Refuge Island



Pedestrian refuge islands provide a protected area for pedestrians at the center of the roadway. They reduce the exposure time for pedestrians crossing the intersection. They simplify crossings by allowing pedestrians to focus on one direction of traffic at a time.

Locations: **Signalized Intersections, Unsignalized Street Crossings**

COUNTERMEASURE

High-Visibility Crosswalk



A crosswalk that is designed to be more visible to approaching drivers. Crosswalks should be designed with continental markings and use high-visibility material, such as inlay tape or thermoplastic tape instead of paint.

Locations: **Signalized Intersections, Unsignalized Street Crossings**

COUNTERMEASURE

Rectangular Rapid Flashing Beacon

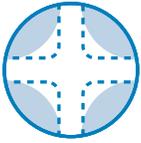


Pedestrian-activated flashing lights and additional signs enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings.

Locations: **Unsignalized Street Crossings, Roundabouts**

COUNTERMEASURE

Reduce Curb Radius



Decreasing curb radii can improve safety for bicyclists and pedestrians by requiring motorists to reduce vehicle speeds by marking sharper turns. Smaller radii provide larger pedestrian waiting areas at corners, improve sight distances, and shorten crossing distances.

Locations: Intersection Geometry, Unsignalized Street Crossings

COUNTERMEASURE

ADA-Compliant Directional Curb Ramps and Audible Push Buttons



Directional curb ramps improve ADA accessibility at all intersection approaches so that pedestrians with mobility challenges, or those pushing carts or strollers, can safely enter and exit all crosswalks, while audible push buttons for pedestrian signals improve access for visually-impaired pedestrians who are blind or have low vision.

Locations: Signalized Intersections

COUNTERMEASURE

Extended Time Push Button



A push button that can be pressed to request extra time for crossing the crosswalk, beyond the standard crossing time. Ideal near land uses where there are pedestrian with special needs.

Locations: Signalized Intersections



E. SIGNS & MARKINGS

COUNTERMEASURE

Prohibit Right-Turn-on-Red



Should be considered at skewed intersections, or where there are exclusive pedestrian "WALK" phases, LPIs, sight distance issues, or high bicycle and pedestrian volumes. Can help prevent bicycle and pedestrian crashes, as well as those between vehicles turning right on red from one street and through vehicles on the cross street.

Locations: Signalized Intersections

COUNTERMEASURE

Advance Yield Markings



Yield lines are placed 20 to 50 feet in advance of multi-lane pedestrian crossings to increase visibility of pedestrians. Used in conjunction with Yield to Pedestrian signs. Can reduce the likelihood of a multiple-threat crash, or sightlines being blocked by stopped vehicles.

Locations: Unsignalized Street Crossings

COUNTERMEASURE

Advance Stop Markings



A stop bar placed ahead of the crosswalk at stop signs and signals can reduce potential conflicts with pedestrians from motorists encroaching on the crosswalk.

Locations: Signalized Intersections, Unsignalized Street Crossings

COUNTERMEASURE

Pedestrian Signs



Pedestrian signs use bright color and retroreflective properties to attract the attention of motorists. It provides advance warning of the potential of pedestrians in the roadway and alerts motorists to reduce driving speed.

Locations: Unsignalized Street Crossings

F. OTHER

COUNTERMEASURE

Access Management



Vehicles entering and exiting driveways may conflict with pedestrians and with vehicles on the main road, especially at driveways within 250 feet of intersections. Consolidating driveways near intersections with high crash rates related to driveways may reduce potential conflicts.

Locations: Along the Road

COUNTERMEASURE

Intersection & Street-Scale Lighting



Street and intersection lighting helps make pedestrians and other road users or hazards more visible to motorists at night, improving driver perception and reaction time and reducing the risk of collision.

Locations: Unsignalized Street Crossings, Roundabouts

COUNTERMEASURE

Remove Obstructions For Sightlines



Remove objects that may prevent drivers and pedestrians from having a clear sightline. May include installing red curb at intersection approaches to remove parked vehicles (also called “daylighting”), trimming or removing landscaping, or removing or relocating large signs.

Locations: Along the Road, Roundabouts, Signalized Intersections, Unsignalized Street Crossings





Appendix F. Vision Zero Core Elements Resource Library

Appendix F. Vision Zero Core Elements Resource Library

What is Vision Zero

- What is Vision Zero?
 - [Resource](#) – *What is Vision Zero?* – Vision Zero Network
 - [Resource](#) – *Core Elements for Vision Zero Communities* – Institute of Transportation Engineers (ITE) and Vision Zero Network (VZN)
 - [Resource](#) – *Vision Zero and Safety* – National Association of City Transportation Officials (NACTO)
 - [Report](#): *Road to Zero: A Vision for Achieving Zero Roadway Deaths by 2050* – National Safety Council and RAND Corporation
 - [Report](#): *Dangerous by Design* – Smart Growth America and National Complete Streets Coalition
- What does “Safe System” mean for Vision Zero?
 - [Webinar](#): *Safe Systems: The Foundation of Vision Zero* – Vision Zero Network
 - [Webinar](#): *Safe Systems — What Does it Mean for Vision Zero?* – Vision Zero Network
 - [Resource](#): *Primer on the Safe System Approach* – Institute of Transportation Engineers (ITE)
 - [NACTO Guide](#): *City Limits: Setting Safe Speed Limits*
 - [FHWA](#) – *Local Road Safety Plans: Your Map to Safer Roadways*

Public, High-Level & Ongoing Commitment

- Achieving Commitment in Mid-Sized, Suburban Communities
 - [Webinar](#): *Vision Zero Approach for Mid-Sized Cities: Fremont, California* – Vision Zero Network
- Vision Zero Policy Statements
 - [Webpage](#): *Vision Zero Resolutions and Directives* – Vision Zero Network
- Reframing Transportation Safety Conversations
 - [Summary](#): *How Does Vision Zero Differ from the Traditional Traffic Safety Approach in U.S. Communities?* – Vision Zero Network



- [Webinar](#): Global Learnings for the U.S. Vision Zero Movement – Vision Zero Network
- [Report](#): The State of Transportation Equity and Health – Smart Growth America (see Chapter 1 “Reframe the Transportation Conversation”)
- [Article](#): The Central Role of Public Health in Vision Zero – Vision Zero Network
- [Series](#): 2019 Community Health Needs Assessments for Contra Costa County – Kaiser Permanents
- [Factsheet](#): Complete Streets Fight Climate Change – Smart Growth America
- Best Practices for Inter-departmental Coordination
 - [Webinar](#): Creating and Sustaining a Strong Task Force
 - [Case Study](#): Vision Zero from the Inside-Out; A Case Study on Prioritizing Interdepartmental Coordination & Accountability – Vision Zero Network
 - [Case study](#): Joint Departmental Vision Zero Budget Requests: An L.A. Case Study – Vision Zero Network

Authentic Engagement

- Best Practices for Authentic Engagement
 - [Webinar](#): Centering Community in the Public Engagement Process – Vision Zero Network
 - [Case Study](#): The Green Line’s Process Altered the Rules of Engagement – Trusted Advocate Pilot, St-Paul/Minneapolis
 - [Webinar](#): Words Matter: Effective Vision Zero Messaging – Vision Zero Network
- Tools for Effective Engagement
 - [Resources](#) & [Framework](#): IAP2 Resources & Framework – International Association For Public Participation
 - [Tool](#): Street Story: A Platform for Community Engagement – UC Berkeley Safe Transportation Research and Education Center (SafeTREC)
- Strategies for Engaging Youth
 - [Webinar](#): *Building Our Future: Engaging and Empowering Youth in Vision Zero* – Vision Zero Network



Strategic Planning

- Developing a Vision Zero Action Plan with Performance- and Outcomes-Based Metrics and Indicators
 - [Guidelines](#): *Developing Effective Vision Zero Action Plans* – Vision Zero Network
 - [Guidelines](#): *Vision, Strategies, Action: Guidelines for an Effective Vision Zero Action Plan* – Vision Zero Network
 - [Example Action Plans](#): (*See Action Plans section*) – Vision Zero Network
 - [Report](#): *The Road to Zero: A Vision for Achieving Zero Roadway Deaths by 2050*– Rand Corporation
 - [Guide](#): *How to Develop a Pedestrian Safety Action Plan* – Federal Highway Administration
 - [Guide](#): *Guide to Developing a Vision Zero Plan* – University of North Carolina, Chapel Hill
 - [Program](#): *See and Be Seen* – Active Transportation Safety and Healthy Living Program, City of Lancaster

Equity-Focused Analysis & Programs

- Integrating Equity into Vision Zero
 - [Report](#): *At the Intersection of Active Transportation and Equity* – Safe Routes Partnership
 - [Article](#): *Five Ways Vision Zero Should Address Race and Income Injustice* – Bike Portland
 - [Principles](#): *Principles of Mobility Justice* – Untokening Collective
 - [Resource](#): *Vision Zero: A Health Equity Road Map for Getting to Zero in Every Community* – Prevention Institute
- Equity Analysis and Programming
 - [Guidelines](#): *Equity Strategies for Practitioners* – Vision Zero Network
 - [Report](#): *Environmental Justice Analysis in Transportation Planning State of the Practice* – FHWA
 - [Memo](#): *Equity-Oriented Performance Measures in Transportation Planning* – APA
- Enforcement and Equity
 - [Blog](#): *Dropping Enforcement from the Safe Routes to School 6 E's Framework* – Safe Routes Partnership
 - [Presentation](#): *Being Black and Brown in public: How Safety, Harassment, and Policing Shape Mobility* – Charles T. Brown, Rutgers University
 - [Guidelines](#): *Steps to Fight Racism in Traffic Enforcement* – Governors Highway Safety Association



- [Toolkit](#): *Law Enforcement Interactions Toolkit* -Governor’s Highway Safety Association

Responsive Planning

- Identification of Safety Priority (High-Frequency Injury) Locations
 - [Webinar](#): *How Data Can Focus Vision Zero Efforts* – Vision Zero Network
 - [Article](#): *Vision Zero Analysis at a Regional Scale* – David Wasserman (Fehr & Peers)
 - [Case study](#): *HIN (High Injury Network) for the WIN* – Vision Zero Network
 - [Report](#): *Collision Reporting Research: Assessing the Collision Data Needs of Transportation Engineers* – ITE

Proactive, Systemic Planning

- Best Practices for Proactive, Systemic Planning
 - [Webinar](#): *Developing a Proactive, Systems-Based Approach to Safety* – Vision Zero Network
 - [Article](#): *How Data Helps Cities Achieve Vision Zero Goals* – Government Technology
- Proactive Safe System Actions
 - [Resource](#): *Proven Safety Countermeasures* – FHWA

Comprehensive Evaluation & Adjustments

- Example Vision Zero Evaluation Reports
 - [Report](#): *Vision Zero Year Three Report* – New York City
 - [Report](#): *Vision Zero 2019 Update* – City of Seattle
- Considering Micromobility in Safety Planning
 - [Guide](#): *NACTO Guidelines for Regulating Shared Micromobility* – National Association of City Transportation Officials (NACTO)
 - [Policy Statement](#): *APBP’s Policy Statement: Shared Micromobility Programs* – Association of Pedestrian and Bicycle Planners (APBP)
 - [Report](#): *Understanding and Tackling Micromobility* – Governors Highway Safety Association
- Considering Automated Vehicles in Safety Planning



- [Article](#): *Safeguarding Safety for Road Users Now While Planning for an Autonomous Future – ITE*
- [Guide](#): *Blueprint for Autonomous Urbanism – NACTO*

Complete Streets for All

- Design Guidelines for Complete Streets
 - [Design Guidelines](#): *Best Practices: Pedestrian and Bicycle Treatments – CCTA*
 - [Design Guidelines](#): *NACTO Urban Street Design Guide – NACTO*
 - [Design Guidelines](#): *Multimodal Access Design Guidelines – BART*
 - [Guide](#): *Applying Design Flexibility and Reducing Conflicts – FHWA*
 - [Guide](#): *Guidance to Improve Pedestrian and Bicycle Safety at Intersections – NCHRP*
 - [Guide](#): *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations – FHWA*
 - [Guide](#): *Designing for All Ages & Abilities – NACTO*
 - [Guide](#): *United Nations Sustainable Development Goal 3.6 – United Nations*
 - [Collection](#): *Livable Communities Library – AARP*
- Proven Actions That Improve Safety
 - [Guide](#): *Proven Safety Countermeasures – FHWA*
 - [Resources](#): *Traffic Safety Resources – Caltrans*
 - [Training Materials](#): *Roadway Safety Training and Materials – Caltrans*
 - [Blog](#): *“Daylighting” Makes San Francisco Crosswalks Safer – SFMTA*
 - [Study](#): *Sight Distance Study in Iowa – NACTO*
- Slow Streets
 - [Project Example](#): *Neighborhood Slow Zones – NYC DOT*
 - [Report](#): *Slow Streets Program Report – Oakland Department of Transportation*

Context-Appropriate Speeds

- Speed-Related Research
 - [Report](#): *CalSTA Report of Findings - AB 2363 Zero Traffic Fatalities Task Force – CalSTA*
 - [Research](#): *Speed Management – Insurance Institute for Highway Safety (IIHS)*



- Resources for Speed Management
 - [Guide](#): *Setting Safe Speed Limits on Urban Streets* – NACTO
 - [Guide](#): *Design Speed* – NACTO
 - [Webinar](#): *Promising Practices to Manage Speeds* – Vision Zero Network
 - [Plan](#): *Speed Management Program Plan* – National Highway Traffic Safety Administration (NHTSA)
 - [Manual](#): *Speed Management Manual for Decision Makers and Practitioners* - World Health Organization (WHO)
 - [Primer](#): *Traffic Calming* – FHWA
 - [Webinar](#): *Integrating Pedestrian Safety to Roundabout Designs* – Transoft

Project Delivery

- Funding Resources and Guidelines
 - [Resource](#): *Funding Sources* – CCTA
 - [Program Information](#): *Local Road Safety Plan* – Caltrans
 - [Program Information](#): *Highway Safety Improvement Program* – Caltrans





Appendix G. List of CCTA Vision Zero Database Variables



CCTA Vision Zero Database

Database Variables

Category/Feature Dataset Name	Data	Data Type	Feature Class Name
Collisions (Source: TIMS/SWITRS, 2008- 2017)	Presence of collisions (2007-2018)	Point	Collisions_contextual
	Collision Severity	Attribute	BikeSevInj PedSevInj VehSevInj
	Collision Type	Attribute	Type_of_Collision
	Violation Category	Attribute	PCF_Violation_Category
	Primary Collision Factor Violation Code	Attribute	Primary_coll_factor
	Pedestrian Action	Attribute	Ped_Action
	At intersection or mid-block location	Attribute	DIST_Skewed_angle_int DIST_interchanges DIST_signalized DIST_unsignalized
	Driver Behavior (turning left, right)	Attribute	Move_pre_acc
	Victim Behavior (turning left, right)	Attribute	Move_pre_acc
	Victim's Age	Attribute	AvgVAGE
	HIN	Line	HIN_all_0203 HIN_bike_0203 HIN_ped_0203



Pedestrian Facilities (Source: Ecopia Tech data collection)	Presence of crosswalks	Polygon	Crosswalks
	Type of crosswalk (e.g. continental, ladder)	Polygon, range	Crosswalks
	Crosswalk location (mid-block vs. intersection)	Polygon, binary	Midblock_Crosswalks
	Presence of sidewalks + sidewalk width	Line, range	sidewalks
	Presence of advance yield limit lines (i.e. sharks teeth)	Point	Crosswalk_SharkPoint
Bike Facilities (Source: 2018 CBPP)	Presence of bicycle facilities	Line, range	Backbone_Bicycle_Network Trails Bike_Facilities_T1_T3
Roadways (Source: Ecopia Tech (width), OpenStreetsMap (OSM) & Caltrans (classification))	Roadway width	Line, range	Road_Centerlines
	Roadway classification	Line, range	Road_Facilities_Class
Intersection Approaches (Source: OSM or inferred based on functional class)	Number of lanes (inferred)	Line, range	OSM_Intersection_Approaches
	Operating speed or speed limit (inferred)	Attribute	Sum_Lanes_num
Intersections (Source: inferred based on functional class (traffic control), Ecopia Tech (skewed angle, channelized turns))	Signal Inventory / Traffic Control (i.e. signalized, stop-controlled) (inferred)	Point, binary	Intersections
	Skewed angle intersection (intersection geometry)	Point, binary	Skewed_angle_int
	Presence of channelized right turn lanes	Point, binary	Channelizedrights_osm Channelizedrights_ecopia
Interchanges (Source: OSM)	Presence of interchange	Point	Interchange_Points



Demographics (Sources: Census data, MTC, CalEnviroScreen)	MTC's Communities of Concern	Polygon (Census Tract)	Communities of Concern
	CalEnviroScreen 3.0 results	Polygon (Census Tract)	CalEnviroScreen_2018
	Presence of Seniors	Polygon (Census Tract)	CalEnviroScreen_2018 ("pct_over75"); Communities of Concern ("Elderly > 65")
Schools (Source: 2018 CBPP)	Presence of schools	Point	Schools_Point
Transit (Source: 2018 CBPP (rail) and local transit agencies (bus))	Presence of rail transit stations	Point	Rail_Transit
	Presence of bus stations	Point	CCCTA_Stops