CITY OF LAFAYETTE
VISION ZERO AND LOCAL ROAD SAFETY PLAN

DRAFT PLAN | June 12, 2023

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ACRONYMS

ADA – Americans with Disabilities Act
CCTA – Contra Costa Transportation Authority
CHP – California Highway Patrol
CMFs – Crash Modification Factors
FHWA – Federal Highway Administration
GIS – Geographic Information System
HIN – High Injury Network
KA – Killed or Seriously Injured
LRSP – Local Road Safety Plan
MTC – San Francisco Bay Area Metropolitan Transportation Commission
NHTSA - National Highway Traffic Safety Administration
SWITRS – Statewide Integrated Traffic Records System
TIMS – Transportation Injury Mapping System
TDM – Travel Demand Management
TransCirc – Transportation & Circulation Commission
VMT – Vehicle Miles Traveled
VZAP – Vision Zero Action Plan

KEY TERMS

Vision Zero – A strategy to eliminate all roadway fatalities and serious injuries while increasing safe, healthy, and equitable mobility for all.[1]

Safe System Approach – A proven methodology to achieve Vision Zero that seeks to dramatically reduce serious injury and fatal crashes on our roadways through a systems-based approach to prioritizing safety. The Safe System Approach recognizes that humans make mistakes and therefore focuses on eliminating fatal and serious injury crashes instead of *all* crashes.[2]

Local Road Safety Plan – A plan that provides a framework for identifying, analyzing, and prioritizing roadway safety improvements on local roads. The Local Road Safety Plan development process and content are tailored to local issues and needs, resulting in a prioritized list of issues, risks, actions, and improvements that can be used to reduce fatalities and serious injuries on local roads.[3]

[1] "What is Vision Zero?" *Vision Zero Network,* https://visionzeronetwork.org/about/what-is-vision-zero/. Accessed April 7, 2023.

[2] "Zero Deaths and Safe System." *Federal Highway Administration*, https://highways.dot.gov/safety/zero-deaths. Accessed April 7, 2023.

[3] "Local Road Safety Plans." *Federal Highway Administration*, https://highways.dot.gov/safety/proven-safety-countermeasures/local-road-safety-plans. Access April 7, 2023.

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INTRODUCTION

A CALL FOR SAFER ROADS IN LAFAYETTE

In September 2021, a volunteer crossing guard lost his life as he pushed children out of the way of an oncoming vehicle outside of Stanley Middle School in Lafayette. This tragic incident underscored the need for immediate action to improve roadway safety and save lives in Lafayette. Two months later, in November 2021, the Lafayette City Council unanimously adopted a Vision Zero Policy that committed the City to eliminating fatalities and serious injuries among all system users.[4]

Roadway fatalities and serious injuries in Lafayette are relatively low, with 14 reported fatal or severe injury (KA) collisions in the time period between 2017 and 2021. However, the goal of Vision Zero is to reach zero deaths and serious injuries on roadways in Lafayette. Lafayette is close to reaching Vision Zero and will hopefully do so through the actions and projects outlined in this Local Road Safety Plan (LRSP or Plan).

The LRSP includes a goal of eliminating traffic fatalities within Lafayette by 2033.

VISION ZERO AND THE SAFE SYSTEM APPROACH

Vision Zero, as defined by the Vision Zero Network, is a global initiative to eliminate all roadway fatalities and serious injuries while increasing safe, healthy, and equitable mobility for all.[5] Its core belief is simple: no one should be killed or severely injured by roadway crashes. Compared to a traditional transportation planning and design approach, the Vision Zero framework represents a different way of looking at roadway safety. It acknowledges that while humans make mistakes, roadway fatalities can be prevented if our transportation systems are designed to anticipate these mistakes and reduce the severity of their consequences.

[4] "Adoption of a City Vision Zero Policy." *City of Lafayette Staff Report*, 2021, https://lafayette.granicus.com/MetaViewer.php?view_id=&clip_id=5874&meta_id=142829, Accessed April, 7, 2023.

[5] What is Vision Zero?" *Vision Zero Network,* https://visionzeronetwork.org/about/what-is-vision-zero/. Accessed April 7, 2023.

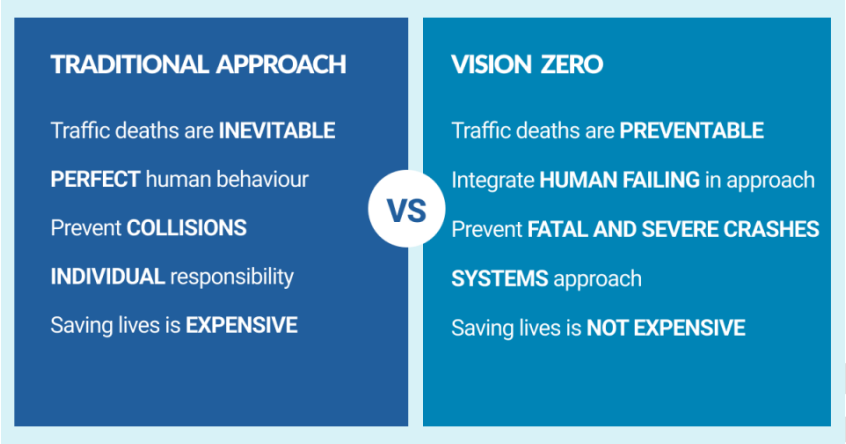


Figure 1. Traditional approach to roadway safety compared to Vision Zero approach. Source: Vision Zero Network

To reach the goal of zero traffic deaths and severe injuries established through Vision Zero, the City has committed to using the Safe System Approach. The Safe System Approach is a proven method that seeks to dramatically reduce serious injury and fatal crashes on roadways through a systems-based approach to prioritizing safety. The principles of the Safe System Approach, as defined by FHWA, are:

- Death/serious injury is unacceptable
- Humans make mistakes
- Humans are vulnerable (i.e., there is a limit to which the human body can tolerate crash forces before death occurs)
- Responsibility is shared among roadway users, transportation system managers, and vehicle manufacturers
- Safety is proactive (i.e., risks must be mitigated before crashes occur, not after)
  Redundancy is crucial (i.e., all parts of the transportation system should be strengthened so there are still multiple parts protecting people in the event that one fails)[6]

These principles and the elements of The Safe System Approach are depicted in Figure 2.

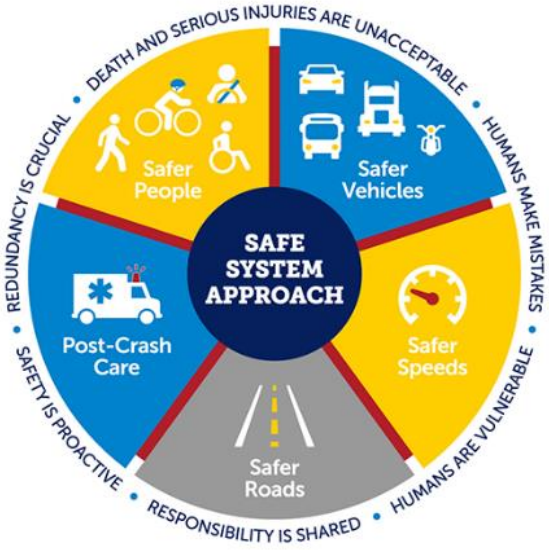


Figure 2. Principles of a Safe System Approach
Source: FHWA

[6] "The Safe System Approach." Federal Highway Administration, https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/FHWA_SafeSystem_Brochure_V9_508_200717.pdf.

The Safe System Approach provide s the strong foundation that Lafayette needs to reach Vision Zero.

The Safe System Approach is a fundamental shift in the way we make roadway safety decisions to reach zero roadway deaths and serious injuries in Lafayette by 2033. The Safe System Approach is intended to be the lens through which all roadway safety decisions are made in Lafayette and directly inform policy, practice, program, and especially project decisions in Lafayette. All Safe System Approach principles and elements should be considered in a way that creates one system that is safe for all road users. The Safe System Approach framework should be used in every roadway project to ensure that if a crash occurs, it does not result in fatal or serious injury by separating users in space, separating users in time, increasing visibility and attentiveness, and reducing speeds and impact forces.

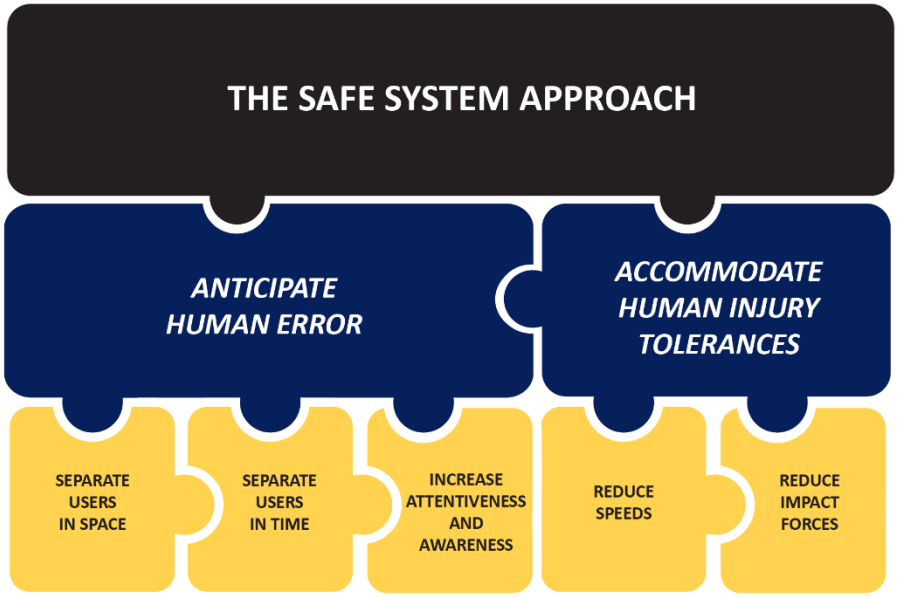


Figure 3. How the Safe System Approach elements function together to eliminate KA crashes

BACKGROUND

The 2021 Vision Zero Policy set the stage for this LRSP by laying out safety needs and actions on Lafayette's roads. The LRSP outlines a plan for actions and projects need to prevent death and serious injuries on roads in Lafayette. The City also maintained and continuously updated the Lafayette LRSP webpage to keep the public updated throughout the project, sharing project materials and recordings.[7]

Road safety should not be siloed and should be integrated with other plans that also impact transportation decisions in Lafayette. Other transportation-related plans that should work in tandem with the LRSP are referenced in this section. All of these transportation plans and policies must work together to create one transportation system that is safe, equitable, and accessible.

EXISTING TRANSPORATION PLANS

The City of Lafayette has a number of existing plans, programs, and other efforts that advance roadway safety. The visions, goals, and strategies of the LRSP are aligned with the following efforts:

City of Lafayette General Plan

The General Plan for Lafayette is a long-range, comprehensive plan that serves as a blueprint for how and where the City will change over the next 20 years.[8] Every city and county in California is required by State law to have a General Plan. Master plans, specific plans, zoning ordinances, and guidelines must be in conformance with the General Plan. A General Plan includes a Circulation Element to set goals for making the transportation network work as efficiently and safely as possible for all users of the network given the expected build-out of land uses. While the Housing and Safety Elements of the General Plan were recently updated, it is expected that an update to the Circulation Element will be initiated in 2024. Consistent with the LRSP, the Circulation Element Update is expected to include new and revised Goals and Policies to provide for a balanced transportation network that will support and encourage walking, bicycling, and transit ridership. Goals and Policies will be written to reduce greenhouse gas emissions, plan for future technology, and improve safety in the circulation system.

[7] "Lafayette Local Roadway Safety Plan." City of Lafayette, 2022, https://www.lovelafayette.org/city-hall/city-departments/engineering/transportation/local-road-safety-plan.

[8] "General Plan." City of Lafayette, https://www.lovelafayette.org/city-hall/city-departments/planning-building/general-master-specific-plans/general-plan.

Bikeways Master Plan (2006)

The Lafayette Bikeways Master Plan provides a broad vision and specific strategies and actions for improving bicycling in Lafayette.[9] It articulates a vision for a connected network of bicycle facilities to allow for safe, efficient, and convenient bicycle travel within Lafayette and between Lafayette and regional destinations. In addition, the Master Plan provides recommendations for infrastructure projects and supporting programs that are intended to work together to improve conditions for cyclists. Consistent with the LRSP, the Bikeways Master Plan sets out goals to prioritize bikeway projects and capital improvement projects that address safety issues for cyclists and provide access to major destinations. The Plan also makes recommendations for upgrades and enhancements to the existing bicycle network to promote safety, and outlines new educational and promotional programs to complement the infrastructure projects. An expected future update to the Bikeways Master Plan is envisioned and would be aligned with the LRSP's direction on identifying appropriate infrastructure, policies, and programs based on crash patterns and Lafayette's unique roadway characteristics.

Downtown Specific Plan (2012)

The City's Downtown Specific Plan provides design guidance to support the land uses in the downtown area and preserve the downtown character.[10] It also seeks to improve circulation in and through downtown through management of traffic congestion, but also by facilitating safe and convenient walking, biking, and transit use. The vision for active transportation in the City's downtown is articulated through a number of goals, policies, and programs. As an example, the Plan states that in the Downtown Retail district "the pedestrian experience in this district is a high priority, and sidewalks are preferred over walkways." A Mt. Diablo Boulevard Corridor Plan is expected to be initiated in the upcoming year, and would be influenced by the direction set in the LRSP for a safe and comfortable active transportation network along Lafayette's primary commercial destinations.

Master Walkways Plan (1999 with 2015 update)

The City's Master Walkways Plan sets out a vision for the pedestrian network through the provision of a system of walkways that will afford safe and efficient pedestrian movement.[11] The pedestrian network is

[9] "Lafayette Bikeways Master Plan." City of Lafayette, 2006, https://www.lovelafayette.org/city-hall/city-departments/engineering/transportation/walking-biking/bikeways-plan.

[10] "City of Lafayette Downtown Specific Plan." City of Lafayette, 2012, https://www.lovelafayette.org/home/showpublisheddocument/1507/637661097717270000.

[11] "Master Walkways Plan." City of Lafayette, 2015, https://www.lovelafayette.org/city-hall/city-departments/engineering/transportation/walking-biking/walkways-plan.

intended to include an arrangement of walkways in the downtown area, but also to provide connections between residential neighborhoods with key destinations such as public transportation, schools, community amenities, parks, trail systems, and downtown. Walkways are defined in the Plan as spaces for pedestrians that provide safe separation between vehicles and pedestrians. The Plan identifies the criteria for the selection and prioritization of walkway segments that have not been constructed. An expected future update to the Walkways Master Plan is envisioned and would be aligned with the direction set by the LRSP.

Contra Costa Countywide Bike and Pedestrian Plan (2018)

Updated in 2018, the Contra Costa Countywide Bicycle and Pedestrian Plan (CBPP) updates some policies, best practices for developing the primary pedestrian and bicycle facilities in Contra Costa County, standards that have been developed over the past decade, as well as those in newly adopted local active transportation plans. [12] Further, it expands on the goals, policies, and strategies set out in the Countywide Transportation Plan (CTP). Both plans set goals for increasing walking and bicycling and identify actions the CCTA and its partners, including Lafayette, should take to achieve them. Importantly, the updated Plan updates the implementation chapter to include new issues and concerns such as Vision Zero, and redefines the Countywide Bikeway Network as a low-stress and connected system of facilities designed to serve all ages and abilities.

Metropolitan Transportation Commission Vision Zero Policy (2020)

The Metropolitan Transportation Commission (MTC) Regional Safety/Vision Zero Policy establishes a region-wide policy of intent to work with our partner agencies to encourage and support actions towards eliminating traffic fatalities and serious injuries in the Bay Area by 2030.[13] In addition, in order to make the region's roadways safer for pedestrians, bicyclists, and others, MTC is developing a region-wide Safety Data Repository and Safety Analysis Tool that will integrate information and data about crashes, infrastructure, equity, demographics, and additional data that becomes available over time. For Lafayette, this data can be used to identify specific safety challenges and develop safety enhancing countermeasures. MTC is also leading a Bay Area Vision Zero Working Group, which includes City of Lafayette staff, to share information about safety initiatives and approaches in cities across the Bay Area.

[12] "Countywide Bicycle and Pedestrian Plan." Contra Costa Transportation Authority, 2018, https://ccta.net/projects/countywide-bicycle-and-pedestrian-plan/.

[13] "MTC Regional Safety/Vision Zero Policy." Metropolitan Transportation Commission, 2020, https://mtc.ca.gov/sites/default/files/10a%2020-0788%20-%20ResoNo%204400%20Regional%20Safety%20VZ%20Policy.pdf.

Contra Costa Transportation Authority Vision Zero Safety Policy and Implementation Guide (2021)

This Guide, created by the Contra Costa Transportation Authority (CCTA), represents a collaborative effort among the county and its cities to develop a Vision Zero framework that supports safe travel in Contra Costa County.[14] The guide identifies safety challenges that are unique to Contra Costa's roadways and leverages best practices to recommend transportation safety policies, programs, and projects to address the challenges and issues. Additionally, through the CCTA's Vision Zero process, Safety Priority Locations and Emphasis Areas were identified. Guidance from the Vision Zero Safety Policy and Implementation Guide informed the development of the Lafayette LRSP.

City of Lafayette Capital Improvement Program (2022)

The City of Lafayette's 5-Year Capital Improvement Program (CIP) is a multi-year planning and management tool to create a 5-year plan for priority capital improvements, including construction and maintenance.[15] The financial plan is prepared by staff and adopted by City Council as a guide for prioritization of projects that will achieve various citywide goals. The improvements identified in future CIPs will be informed, in part, by the safety countermeasures and projects identified in the LRSP.

[14] "Contra Costa Countywide Transportation Safety Policy and Implementation Guide." Contra Costa Transportation Authority, 2021, https://ccta.net/wp-content/uploads/2021/09/CCTA_VZ_How_To_Guide_Aug2021.pdf.

[15] "Capital Improvement Program Update and Proposed 5-Year Projects." City of Lafayette, 2022, https://lafayette.granicus.com/MetaViewer.php?view_id=19&clip_id=6205&meta_id=151494.

WHAT GOES INTO A LOCAL ROAD SAFETY PLAN?

LRSP CONTENTS AND PURPOSE

This LRSP will serve as an Action Plan, establishing strategies and actions that utilize the Safe System Approach to reach the goal of zero roadway deaths and serious injuries in Lafayette. It follows the best practices of local road safety planning as well as guidance provided by the Federal Highway Administration (FHWA) and Caltrans. Completion of the LRSP will allow Lafayette to apply for Federal and State funding to support the implementation of its identified recommendations. As this LRSP will include all roads in the community, coordination and collaboration with partner agencies with jurisdiction over other roads in Lafayette will be essential. Resources and requirements related to LRSPs and HSIPs in California can be found on the Caltrans Local Roadway Safety Plan and Systemic Safety Analysis Report Program page.[16]

Figure 4. The LRSP Development Process. Source: FHWA

An LRSP balances a data-driven approach with the lived experience of community members to create a proactive plan to reach zero roadway fatalities, addressing safety factors before a crash occurs rather than after. The LRSP identifies actions that address Emphasis Areas, citywide safety countermeasures, and recommendations for improving the High Injury Network. Emphasis Areas, discussed in detail later within the LRSP, are the key trends and contributing factors that the City should address to effectively improve safety and achieve its goal of zero roadway fatalities and serious injuries.

[16] "Local Roadway Safety Plan (LRSP) and Systemic Safety Analysis Report Program (SSARP)." Caltrans, 2023, https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program/local-roadway-safety-plans.

PLAN GOALS AND OBJECTIVES

To meet FHWA guidance that LRSPs be tailored to each community's needs and engage local leadership, the process of developing this LRSP included several project development meetings with a multidisciplinary LRSP Task Force made up of community members and local agency representatives with expertise in transportation, public health, emergency response, equity, transit, biking, and walking, as well as two presentations given to the City's Transportation & Circulation Committee (TransCirc).

At the beginning of the planning process, the LRSP Task Force developed a set of goals and objectives to guide development of the LRSP. Each goal describes an outcome that the LRSP seeks to achieve and identifies corresponding objectives that are necessary to achieving each goal. The goals are introduced below, and the goals and objectives are included in the Policies, Programs, and Practices section of the LRSP as Actions and Steps for implementation.

GOAL 1: Engage with the local community, stakeholders, and different City agencies to better understand factors that are affecting the safety of roadway users within the City of Lafayette.

GOAL 2: Promote a safety culture throughout the community and within different agencies.

GOAL 3: Implement a data-driven approach, supplemented by public input, to identify where and why roadway collisions resulting in fatalities and serious injuries and near misses are occurring; which locations feel unsafe; and which locations have risk factors that may result in collisions in the future.

GOAL 4: Prioritize roadway safety actions and programmatic recommendation investments to advance Lafayette's Vision Zero goals.

GOAL 5: Produce a plan to build safer roadways for all.

For detail on each goal's objectives and their implementation status, please refer to the Policy, Program, and Practice Actions Section of the LRSP.

UNDERSTANDING SAFETY ISSUES IN LAFAYETTE

Understanding safety challenges is a multi-pronged process that includes a data-driven approach as well as thoughtful community engagement to identify community concerns and ideas on roadway safety. Therefore, in addition to reviewing analysis data, the LRSP Task Force provided guidance and community input to develop Emphasis Areas, the key factors on which the City should focus to achieve its goal of zero roadway fatalities.

LRSP TASK FORCE

The LRSP Task Force members were selected to provide local leadership and help guide the LRSP development process. The LRSP Task Force provided critical input in all stages of LRSP development and assisted in reviewing data and connecting dots between the data and the community's lived experiences. The LRSP Task Force included at-large community members and representatives from:

- The City of Lafayette's Transportation & Circulation Commission
- Lafayette City Council
- Public Works and Engineering Departments
- Contra Costa Transportation Authority
- Lafayette School District
- Acalanes Union High School District
- Lafayette Police Department
- Contra Costa Fire Protection District
- 511 Contra Costa
- Contra Costa Health Services; and
- Chamber of Commerce

LRSP Task Force members provided subject-matter expertise, communicated community priorities, provided input and feedback at critical project milestones, and engaged their constituent communities or agencies throughout the LRSP development process. Five LRSP Task Force meetings and one joint meeting between the LRSP Task Force and TransCirc were conducted as part of the development of the LRSP. All meetings included an update on the project and an opportunity for LRSP Task Force members, Commissioners, and the public to provide input.

KEY PLAN DEVELOPMENT MEETINGS

- Five LRSP Task Force Meetings
- Public Open House
- One Transportation & Circulation Committee Presentation
- One Joint Meeting with the Transportation & Circulation Committee and LRSP Task Force
- Final City Council presentation for Plan adoption

COMMUNITY ENGAGEMENT

The public engagement process used a range of methods to reach as much of the Lafayette community as possible, with the two main efforts being an interactive web map survey and a virtual open house. Input was also given by the community through email and by phone.

ENGAGEMENT PROCESS

The initiatives presented in this LRSP were informed by extensive public engagement on roadway safety issues, including:

- A virtual public open house
- A survey completed by over 1,200 participants providing over 1,800 inputs
- Five LRSP Task Force presentations open to the public

VIRTUAL OPEN HOUSE

The virtual open house took place on December 1, 2022, at 6 PM using the Zoom platform. Approximately 45 people attended (including project team, volunteers from the City, and LRSP Task Force members). The meeting began with a short presentation to inform attendees about the LRSP process, followed by three breakout rooms facilitated by City and Toole Design staff and LRSP Task Force Members. Each breakout room had about 10-15 people each (including facilitators) and was catered toward small group discussion. A guided discussion focused around four themes – unsafe roadway behaviors, unsafe roadway elements, solutions, and locations – was led by staff using two tools: the Miro interactive whiteboard platform and the web map portion of the online survey. Respondents were additionally encouraged to think about how their feelings towards unsafe roadway behaviors and roadway elements might change given the context (e.g., downtown versus near a school). The open house was an opportunity to have in-depth facilitated conversations to fully capture the nuances of sentiments from a variety of stakeholders.

Within each group, community members discussed the four key themes and considered how a range of safety factors work together under the Safe System Approach. The members used the interactive virtual boards to post and share ideas within these categories. When it came to unsafe behaviors, community members identified distracted driving, reckless driving, and speeding as common occurrences within Lafayette, as well as instances of all roadway users not following the rules of the road. Attendees noted that they were most concerned about dangerous intersections, roadways with high posted speed limits, and roadways that lacked adequate safety elements for pedestrians and bicyclists. Specific locations cited included downtown Lafayette (especially the Mt. Diablo Boulevard/Moraga Road intersection), winding parts of arterial roads, areas near bus and BART stops, and roadway intersections with the Lafayette/Moraga Trail. When prompted for ideas for solutions, attendees supported education and enforcement on the rules of the road for all users.

Figure 5. Students walk along School Street. Source: City of Lafayette

WEB MAP SURVEY

The web map survey was available for public input from October 24 through December 4, 2022. The purpose of the survey portion was to collect information about travel behaviors, traffic safety concerns, challenges, and ideas. The purpose of the web map was to identify specific locations within Lafayette where people feel safe or unsafe, and to determine how the community thinks traffic safety could be improved.

When visiting the survey page, respondents could:

- Read a brief overview of the LRSP effort and learn more about the project via a link to the project webpage
- Take a survey to provide information on their travel behaviors and feedback about roadway safety
- Participate in a mapping exercise

The web map survey was promoted to the community through a variety of methods, including:

- the City of Lafayette's social media channels
- advertising at popular public facilities such as the Library and Community Center
- pop-up events where promotional materials with a QR code were distributed
- direct outreach to many stakeholder groups including the Lafayette School District, senior citizens, and families of pre-school children.

- LRSP Task Force members

The survey portion drew over 1,200 unique visitors. Respondents were first asked in what ways they primarily get around Lafayette. A series of safety-related questions were then asked to identify what behaviors and conditions make people feel unsafe. Programmatic and design changes options were provided to get an idea of what the community thinks will help to improve safety. The demographic questions at the end of the survey were intended to provide background on the survey respondents. These questions had a very low response rate and were therefore not compared against the City of Lafayette's overall demographics. All questions were optional, and respondents had the option to skip directly to the mapping exercise. Not all respondents answered every question. Many questions allowed respondents to select more than one answer. Results of this survey are not considered scientific or statistically significant.

Figure 6. Common words related to behaviors that make the City of Lafayette community unsafe

Responses to the online survey were similar to input collected at the virtual open house. Respondents cited speeding traffic, distracted driving, unsafe intersections, stop sign and traffic light violations, and lack of separation from traffic as key concerns. They also sought to see design changes that reduced vehicle speeds and improved crossing safety for people biking and walking. Enforcement was by far the preferred programmatic strategy, followed by distracted driving and educational campaigns.

Respondents also provided over 1,800 inputs on the web map by dropping pins in response to questions. The intersection of Mt. Diablo Boulevard and Moraga Road was the most cited as an unsafe location. Additional unsafe locations include, but are not limited to:

- Moraga Road and Brook Street
- Moraga Road and School Street
- St. Mary's Road by Stanley Middle School
- School Street by Stanley Middle School
- The CA24 interchange at Mount Diablo Boulevard and Pleasant Hill Road

- Pleasant Hill Road and Stanley Boulevard
- Pleasant Hill Road and Olympic Boulevard
- Glenside Drive and the Lafayette/Moraga Trail

The areas with the most "safe" pins included some portions of central and downtown Lafayette, and near Merriewood Drive in Burton Valley.

The resulting maps in Figure 7 and Figure 8 illustrate the density and distribution of pins dropped across the map. A GIS map, located on the project webpage, provides the web map responses. Pinned "safe" and "unsafe" locations from web map respondents also granted insight into areas where community members see needs for improvements, and what areas have characteristics of safe roadways.[17]

COMMUNITY ENGAGEMENT KEY TAKEAWAYS

While some people feel Lafayette does not need to improve roadway safety, most respondents identified safety concerns as well as strategies to improve safety.

In terms of roadway design, respondents were most concerned about:

- Dangerous intersections, including lack of visibility at uncontrolled locations and stop sign/red light running
- Speeding and/or high posted speed limit
- Improving safety for pedestrians and bicyclists
    - Improving crossings
    - Creating more space and time separation from motor vehicles
    - Installing more sidewalks

Specific locations that the public is concerned about include:

- Downtown (particularly around the Mt. Diablo Boulevard/Moraga Road intersection)
- Near schools (particularly Stanley Middle School)
- On winding roads
- Where the Lafayette/Moraga Trail intersects with roadways (notably, Glenside Drive)
- Streets near transit and/or BART access

Respondents felt the most unsafe roadway behaviors were:

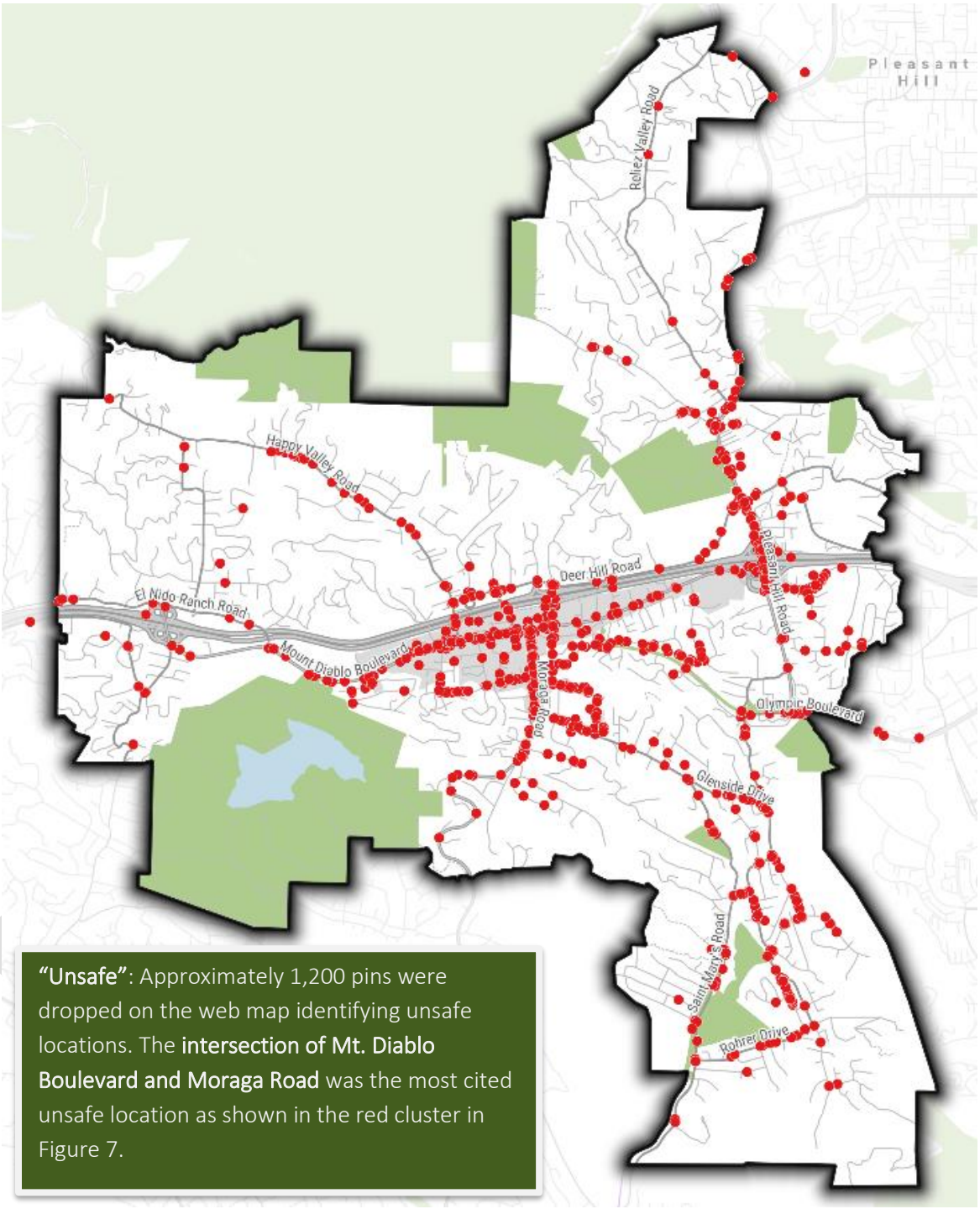
- Speeding

[17] "Local Road Safety Plan Webmap Survey – Public Comments (10/24/22 – 12/4/22)." City of Lafayette, 2022, https://cityoflafayettep.maps.arcgis.com/apps/instant/sidebar/index.html?appid=d299ee8d4d9946e9931c2d0bca034898&center=-122.1151;37.8891&level=18.

- Distracted driving/walking (usually involving phones)
- All roadway users not following or knowing the rules of the road

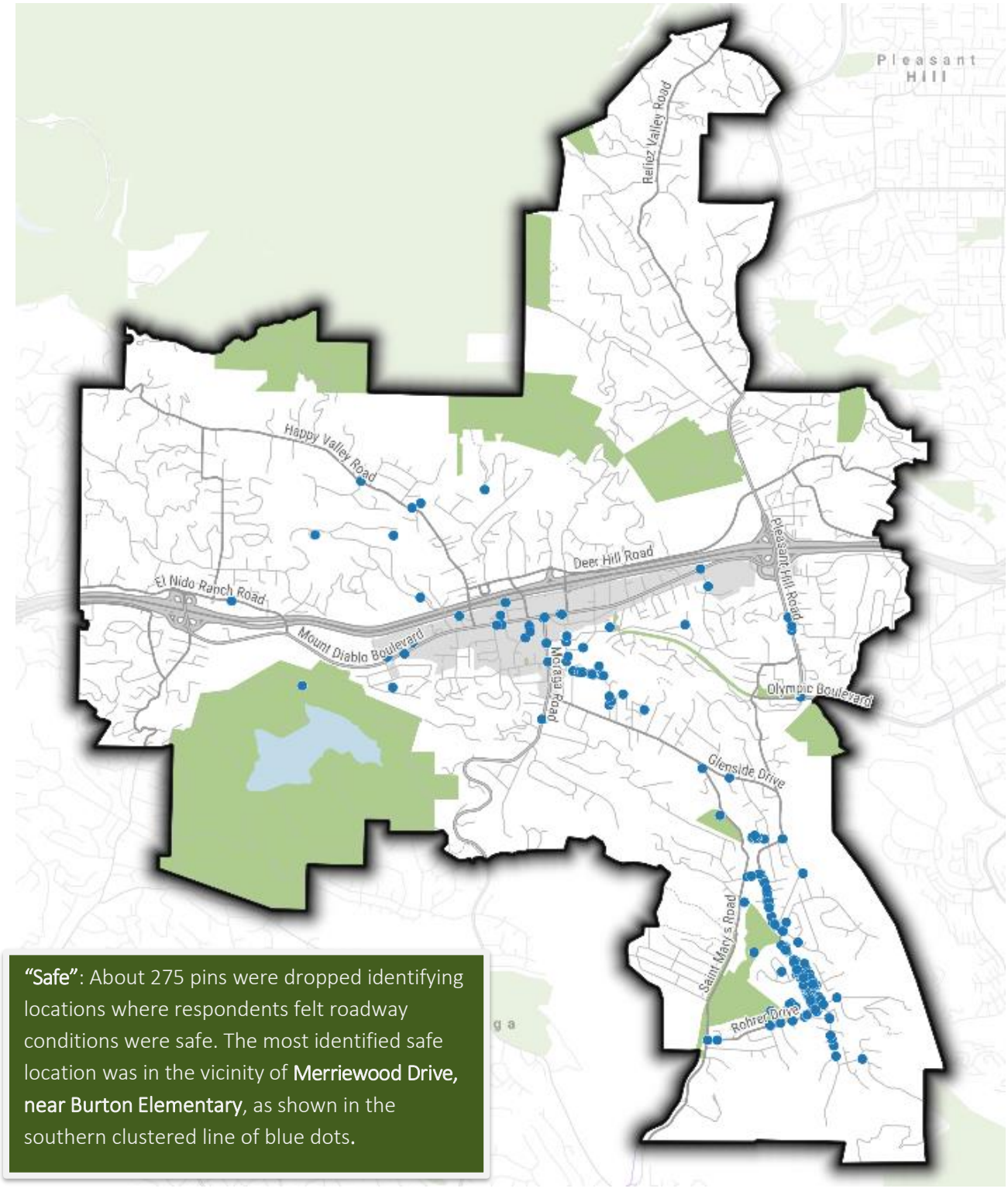
While survey respondents emphasized enforcement as a key behavioral change strategy, meeting attendees focused more on education for all roadway users. Even those who believe they know the rules of the road can benefit from education, particularly when it comes to interacting with other modes of transportation.

While driving is the primary mode of travel in Lafayette, the community did want to see increased safety for people walking and biking, particularly downtown, and many community members noted that they use more than one mode when traveling in Lafayette.



"Unsafe": Approximately 1,200 pins were dropped on the web map identifying unsafe locations. The **intersection of Mt. Diablo Boulevard and Moraga Road** was the most cited unsafe location as shown in the red cluster in Figure 7.

Figure 7. Web Map Results of Community-Identified Unsafe Locations



"Safe": About 275 pins were dropped identifying locations where respondents felt roadway conditions were safe. The most identified safe location was in the vicinity of **Merriewood Drive, near Burton Elementary**, as shown in the southern clustered line of blue dots.

Figure 8. Web Map Results of Community-Identified Safe Locations

CRASH ANALYSIS

In Lafayette, there were a lower number of crashes, including fatal or severe injury (KA) crashes during the study period. The LRSP relies in part on a data-driven approach to understand where crashes have historically occurred and contributing factors of roadway deaths and injuries.

Broadly, crash reports are required to be completed by the police if a crash is reported to 911 per the California Collision Report Form.[18] However, some crashes, especially those that do not result in immediate injury, sometimes go unreported. [19] Crash reports document key crash details, including the location of the crash, roadway context, and dynamics between the parties involved. Key information from the crash reports is then entered into a database to analyze crashes across California.

There were **14 fatal or severe injury crashes** in Lafayette out of 47 total local road crashes between 2017 and 2021.

The crash data for the LRSP's analysis were from the California Highway Patrol's (CHP) Statewide Integrated Traffic Records System (SWITRS) accessed via the Transportation Injury Mapping System (TIMS).[20,21] The crash analysis focused on any reported injury crash on locally owned roads operated by the City of Lafayette within the last five years, from 2017-2021. State highway crashes were excluded because the state highway is under the jurisdiction of Caltrans. Property damage-only crashes were not included in TIMS and therefore were also excluded from this analysis.

Crash mapping and descriptive crash analysis were completed to inform the LRSP. The crash mapping included crash severity location mapping, sliding windows analysis, development of High Injury Networks, and a systemic, proactive Safer Streets Model mapping for pedestrians and bicyclists. The descriptive

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[18] "Traffic Collision Report." State of California Department of Highway Patrol, https://one.nhtsa.gov/nhtsa/stateCatalog/states/ca/docs/CA_CHP555_sub6_2012.pdf.

[19] A National Highway Traffic Safety Administration (NHTSA) survey estimated that 30 percent of crashes across the United States go unreported. Crash data is also ultimately collected by humans and information on the exact location or contributing factors is often determined by an officer's discretion at the scene of the crash. Because this Plan only includes police-reported crashes it does not reflect near miss crashes. Source: "National Telephone Survey of Reported and Unreported Motor Crashes", National Highway Traffic Safety Administration, 2015, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812183.

[20] "SWITRS – Statewide Integrated Traffic Records System." California Highway Patrol, https://www.chp.ca.gov/programs-services/services-information/switrs-internet-statewide-integrated-traffic-records-system.

[21] "Transportation Injury Mapping System." UC Berkeley Safe Transportation Research and Education Center, https://tims.berkeley.edu/.

crashes analysis used statistical analysis using pivot tables and equivalent property damage only (EPDO) methods.

WHERE ARE CRASHES OCCURING IN LAFAYETTE?

There were 14 fatal or severe injury crashes in Lafayette of 47 total local road crashes between 2017 and 2021. These include crashes involving motor vehicles, motorcycles, bicycles, and pedestrians. As shown in Figure 9, KA crashes occurred on Olympic Boulevard, Pleasant Hill Road, Mount Diablo Boulevard, Moraga Road, Deer Hill Road, and Reliez Valley Road, along with a handful of residential roadways.

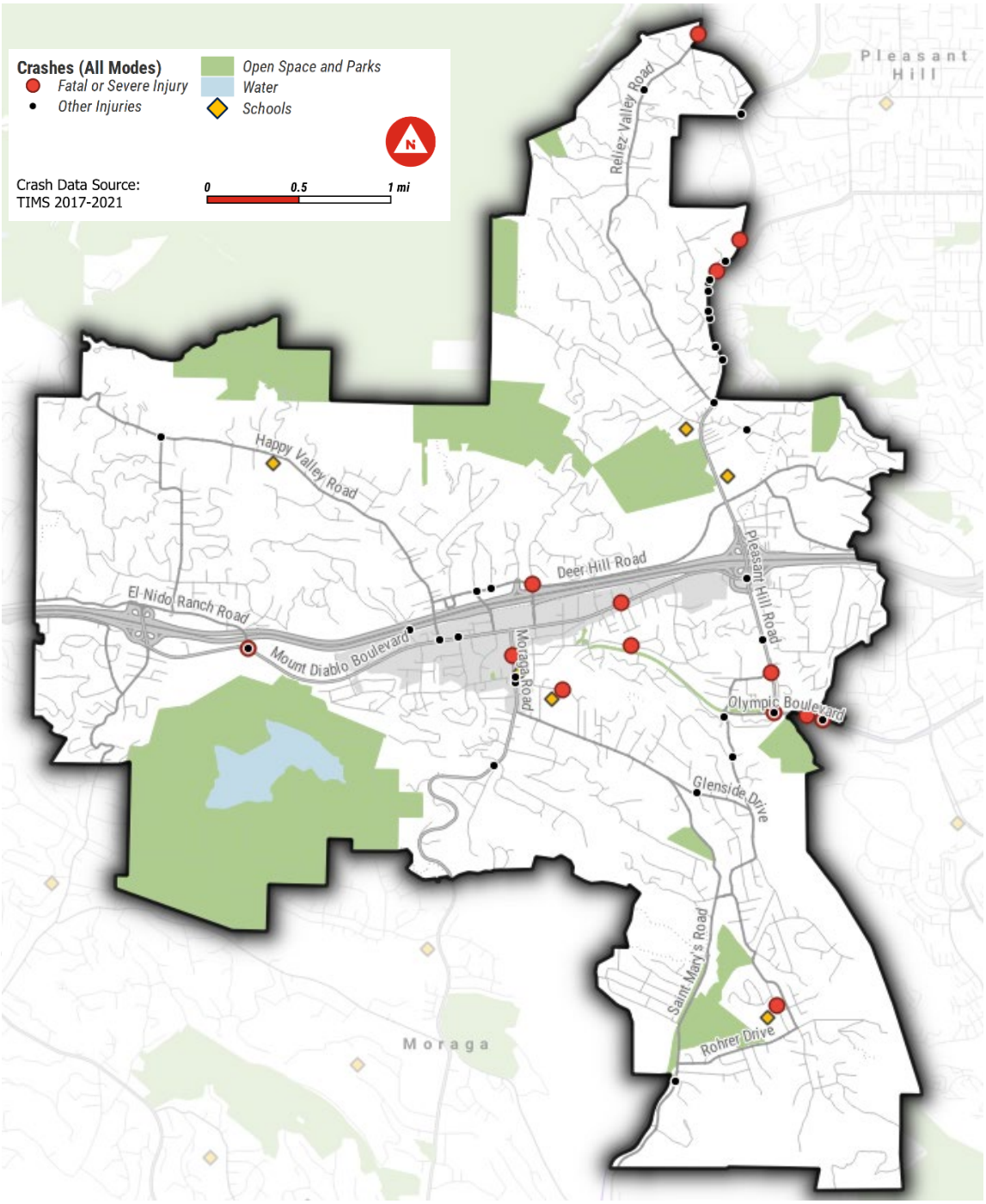

Figure 9. Locations of fatal or severe injury crashes in Lafayette from 2017-2021 based on recorded crashes in TIMS

CRASH ANALYSIS METHODOLOGIES

High Injury Network

The High Injury Network (HIN) was developed to identify roadways with the highest crash risk using weighted crash scores calculated from sliding window analysis. These are roadways with at least one fatal or serious injury crash and one other crash, or at least four other crashes.

Crashes along roadways were scored based on injury severity and total number of crashes. The analysis also analyzed modes involved by pedestrian, bicycle, motorcycle, and motor vehicle. From the sliding windows maps, threshold scores were included in HIN maps by mode. The HIN network maps for each mode varied slightly, and all three were ultimately combined to produce the overall HIN map, shown in Figure 10.

Many of the HIN segments connect to downtown Lafayette and parallel or intersect CA-24. The exact extents of several segments have been adjusted slightly to account for roadway context and based on LRSP Task Force recommendations.

Table 1. List of High Injury Network Segments

City of Lafayette High Injury Network		
1	Olympic Boulevard	between Reliez Station Road and Newell Court
2	Moraga Road	between Mount Diablo Boulevard and Old Jonas Hill Road
3	School Street	between Moraga Road and Topper Lane
4	Reliez Valley Road	between the northern city limit and Sterling Heights Lane
5	Moraga Boulevard	between Moraga Road and Victoria Avenue
6	Mount Diablo Boulevard	between Willow Drive and Pleasant Hill Road
7	Pleasant Hill Road	between Taylor Boulevard and Olympic Boulevard
8	Deer Hill Road	between Happy Valley Road and Miller Drive
9	Mount Diablo Boulevard	between Acalanes Road and Risa Road

The HIN is where the majority of resources should be dedicated to improving roadway safety and preventing where fatal and severe injury crashes have historically occurred. Once fatal and severe injury crashes are resolved on the HIN, the City can identify similar conditions where crashes could occur and make similar safety improvements at those locations.

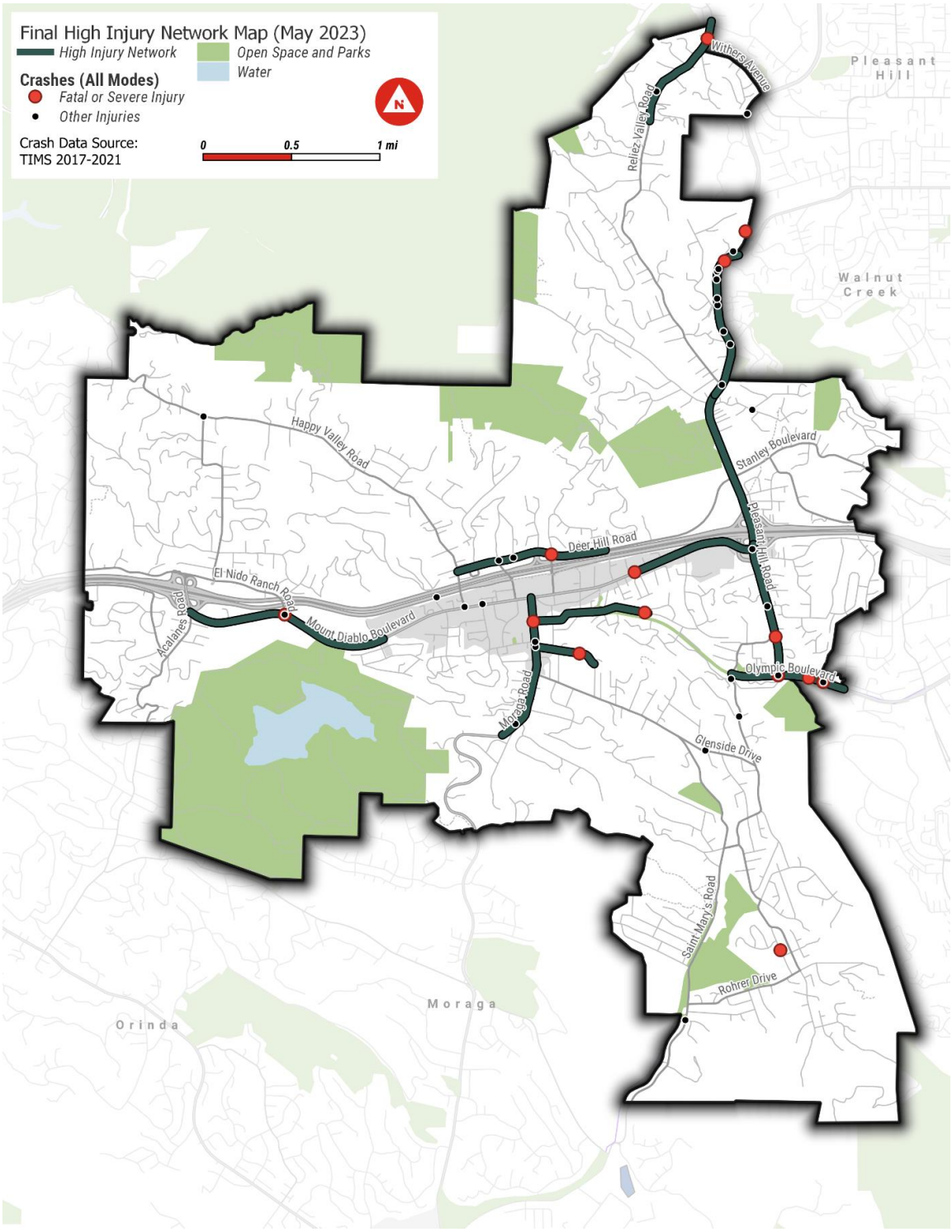

Figure 10. Lafayette High Injury Network based on 2017-2021 TIMS data

Equivalent Property Damage Only (EPD)

The total equivalent property damage only (EPDO) method was used as part of the LRSP's analysis to evaluate crash severity. In many cases, crash characteristics are summarized by the transportation mode involved using the total number of crashes, total number of fatal and severe injury crashes (KA), and the total EPDO score. The EPDO method normalizes crashes to a base unit of property damage only (PDO) crashes to allow for comparison. A fatal crash is approximately 120-190 PDO crashes. EPDO scores vary by location type. Location types included roadway, signalized intersections, and non-signalized intersections. For example, KA crashes at unsignalized intersections typically result in more persons injured or more severe injuries than at signalized intersections or along segments.

Sliding Windows Analysis

A sliding windows analysis, conducted using Toole Design's Safer Street Priority Finder (SSPF), identified segments with the highest crash density and weighted by crash injury severity. The analysis was done by determining the number and injury severity of crashes in a 1/2 "window" on a roadway and shifting that window along the roadway 1/10 mile increments as illustrated in Figure 12. This analysis determined roadways with the highest concentration of total crashes and KA crashes using only historical crash data.

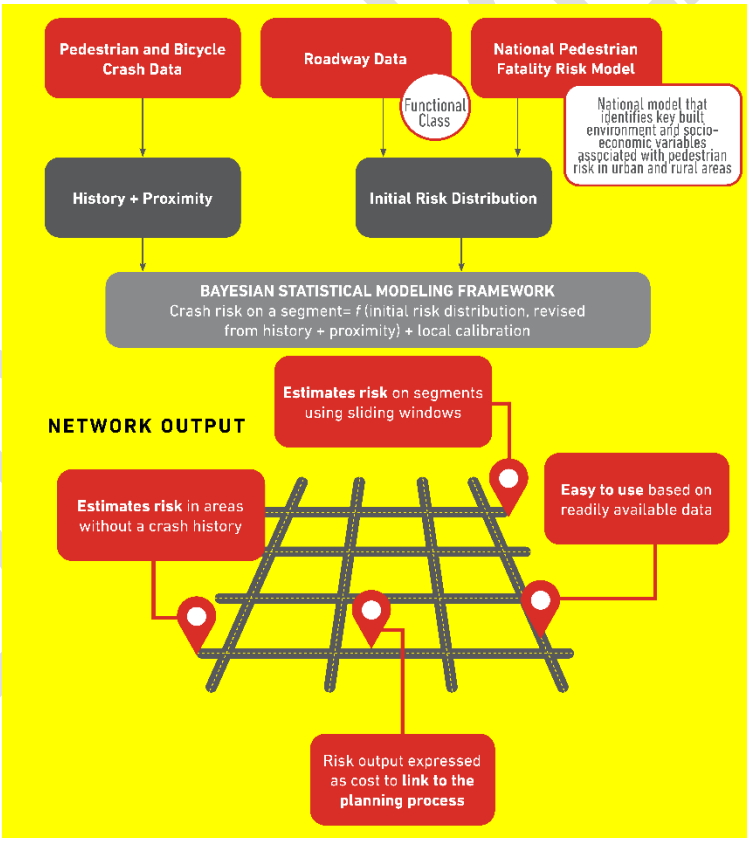

Figure 11: The Safer Street Priority Finder (SSPF) Tool, Source: Toole Design

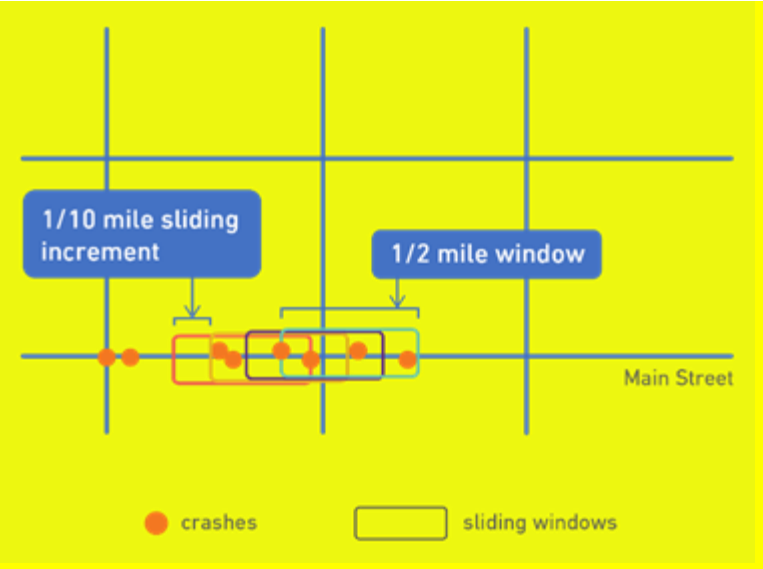

Figure 12: Example of a sliding window analysis. Source: Toole Design

Safer Streets Model

The Safer Streets Model brought the sliding window analysis results into a Bayesian statistical framework to estimate crash risk throughout the system for pedestrian and bicyclist crashes. This framework incorporated external information about how many crashes might be expected—called a Bayesian prior—alongside the observed crash history.

The model estimated crash risk rates per mile for each road segment and each crash mode (pedestrian and bicyclist only) and severity. These values were then converted to crash cost estimates based on the costs assigned to each crash severity.

The Safer Streets Model assigned a base level of risk to segments based on census tract and functional class, using national average rate of fatal crashes per mile on a roadway based on its functional class. Segments without any observed crash risk may still have a crash risk calculated. Since there is a low

number of crashes in Lafayette, the Safer Street Model was used as an additional corridor review to support the sliding window analysis.

DESCRIPTIVE CRASH ANALYSIS KEY FINDINGS

- **Year of crash data**: 2017-2021
- **Total crashes on local roads:** 47
- **Total fatal and serious crashes on local `roads:** 14

Crashes by Year: As shown in Figure 13, the highest number of crashes were in 2019. 2021 had the second highest number of crashes.

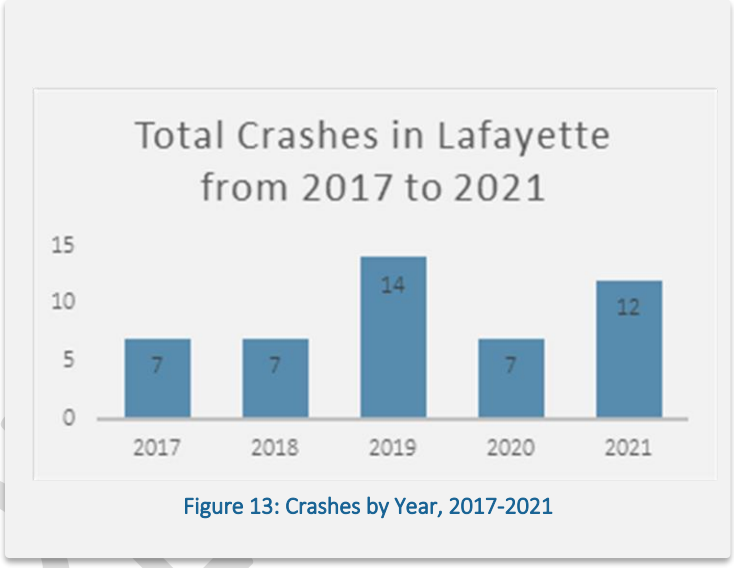

Figure 13: Crashes by Year, 2017-2021

Crashes by Mode: Motor vehicle crashes accounted for the largest share of overall crashes (57%), followed by pedestrian crashes (19%), bicycle crashes (17%), and motorcycles (6%). Vulnerable roadway users (pedestrians, bicyclists, and motorcyclists) accounted for nearly two-thirds of KA crashes, but just over 40% of overall crashes as shown in Figure 14.

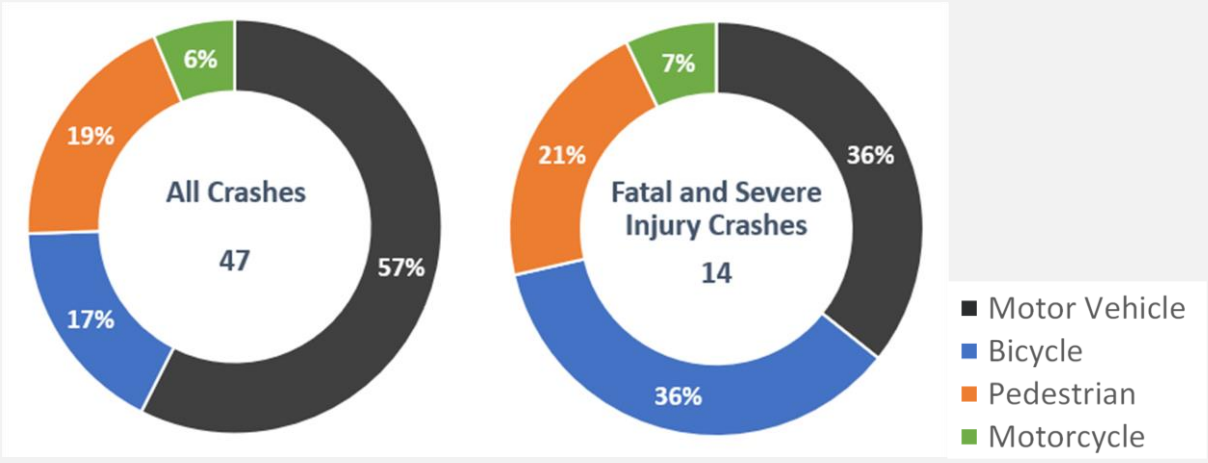

Figure 14: Share of crashes compared to the percent of crashes that resulted in a KA, 2017-2021.

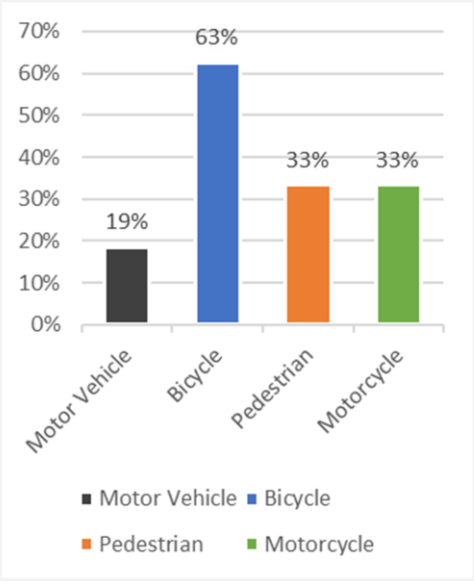

Figure 15: Share of crashes by mode that resulted in a KA, 2017-2021.

As seen in Figure 15, 63% of all bicyclist crashes result in KA, followed by 33% of pedestrian crashes and motorcycle crashes, and 19% of motor vehicle crashes. This suggests vulnerable roadway users have a higher probability of being involved in a crash with a KA outcome.

Crash Location (Intersection vs. Segment): Most crashes with "automobile right of way" as the primary violation occurred at unsignalized locations in which motorists failed to yield while making a left turn (or U-turn) or occurred at a two-way stop-controlled intersection and failed to yield to traffic not controlled by the stop sign.

Bicycle Crash Types: In general, five of the eight bicycle crashes involved a motorist proceeding straight at the time of the crash.

Pedestrian Crash Types: Most pedestrian crashes occurred at crosswalks. These crashes occurred along Mt Diablo Boulevard, Happy Valley Road, and Moraga Road. Four of the nine pedestrians that crashed involved a motorist turning while a pedestrian was crossing in a crosswalk.

Motor Vehicle Crash Types: Solo motor vehicle crashes involving a motorist proceeding straight or driving off the road were the most common.

Crash Type: The top crash types by crash frequency include:

- Hit Fixed Object (21% of crashes).
- Broadside (17% of crashes).
- Vehicle/Pedestrian (15% of crashes).

More than half of the fixed object crashes occurred along Pleasant Hill Road. Broadside crashes occurred at unsignalized intersections, typically involving a user not yielding to the right of way or disregarding a stop sign.

Movement Type: Crashes involving only solo motor vehicle for the largest share of crashes (34%) and KA crashes (36%). Eleven of the 16 solo crashes occurred along Pleasant Hill Road, with most crashes having a crash type of striking a fixed object or overturning their vehicle.

Reported Violation Type: Unsafe Lane change (23% crashes, 14% KA), automobile right of way (19% crashes, 29% KA), and improper turning (13% crashes, 14% KA) were the three most common violations types. For unsafe lane change, seven of the 11 unsafe lane changes involved only a single motor vehicle in which the motorists struck a fixed object.

Daylight/Nighttime Conditions: Most crashes occurred during daylight conditions.

Posted Speed Limit: Streets with a posted speed limit of 35 mph accounted for the largest share of overall crashes (49%) and KA crashes (50%).

Transit Stop: Intersections with a bus stop had a higher crash rate than intersections without a bus stop. Additionally, seven of the nine reported pedestrian crashes occurred at intersections with a bus stop.

ENGINEERING FIELD VISITS

Engineering field visits were conducted on all identified HIN segments from the Crash Analysis. On each HIN segment, Engineers reviewed geometric design, traffic control devices, and observed road user behaviors to confirm existing conditions and determine potential safety issues.

Figure 16. A bicyclist uses shared lane markings at Mt. Diablo Boulevard and Moraga Road.

The visits noted where critical safety infrastructure was missing or deficient, and where conditions on the segments had been recently changed, for instance through repaving or recent projects. Common observations included limited visibility, faded and missing signage and striping, large corner radii, and insufficient lighting.

Figure 17. Crosswalk striping on Reliez Valley Road

Key observations from field visits informed Location Profiles for each of the HIN segments, which include land use context and crash history.

Figure 18 shows an example of a Location Profile for Moraga Road between Mount Diablo and Old Jonas Hill Road.

Key Observations	
Inconsistency in signage	Poor visibility at driveways
Some signage does not comply with the California Manual on Uniform Traffic Control Devices	Uncontrolled left turns across Moraga Road
Poor visibility of lane line markings	Marked pedestrian crossings across Moraga Road are infrequent
Sidewalks are not consistent along both sides of the roadway	Most crosswalks are not high-visibility
No bicycle facilities	Lack of lighting
Failure to yield to pedestrians	

Figure 18. Moraga Road Field Visit Observations

EMPHASIS AREAS

As illustrated in Figure 19, Emphasis Areas emerged from collaboration with the LRSP Task Force, community engagement, crash analysis, and engineering field visits. They are consistent with Vision Zero best practices but were adapted to represent the specific context, needs, and priorities for Lafayette.

Emphasis Areas are where Lafayette should focus their efforts to eliminate fatal and severe injury crashes.

To ensure consistency and build upon earlier planning efforts in Contra Costa County and the Bay Area, potential Emphasis Areas were compared to priorities identified in the Contra Costa Common Collision Patterns, as identified through the Contra Costa Transportation Authority Vision Zero framework (CCTA VZ) [22], and the Metropolitan Transportation Commission (MTC) Challenge Areas. The overlap resulted in the final Emphasis Areas in Table 2 below, which shows which effort supported their inclusion as an Emphasis Area. A description of each follows Table 2.

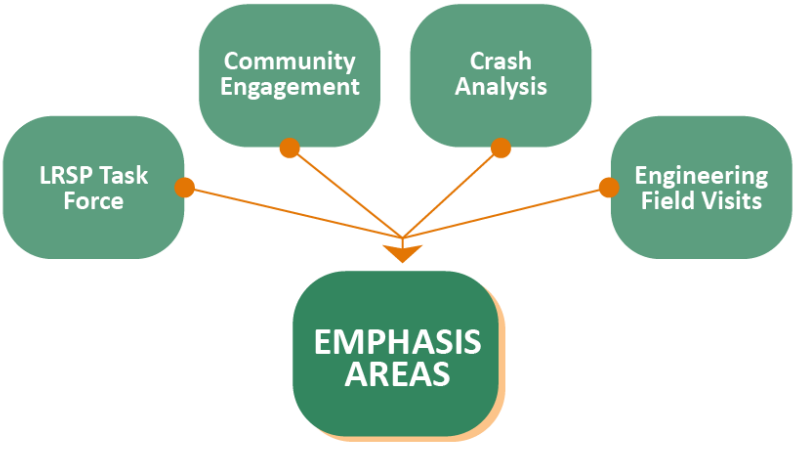

Figure 19. Emphasis Areas influences

[22] "Countywide Vision Zero." *Contra Costa Transportation Authority*. https://ccta.net/planning/countywide-vision-zero/.

Table 2. Emphasis Area Origins

Emphasis Areas	Crash Analysis	Field Visit	Public Feedback	CCTA VZ	MTC
Bus Stops at Intersections	X			X	
Distracted Driving			X		
Failure to Yield	X	X	X		
Improper Turning	X		X	X	
Interactions between Bicyclists and Motorists	X	X	X	X	X
Interactions between Pedestrians and Motorists	X	X	X		X
Lane Departure	X	X	X		X
Speeds	X	X	X	X	X
Trail Crossings		X	X	X	
Unsignalized Intersections	X	X	X		

The Emphasis Areas provide direction for tailoring safety strategies to meet the unique needs of Lafayette's roadways and users. The following section discusses three types of strategies and improvements crafted to address these.

Bus Stops at Intersections

Intersections with a bus stop had a higher crash rate than intersections without a bus stop. Additionally, seven of the nine reported pedestrian crashes occurred at intersections with a bus stop. Roadway design and signage should communicate to drivers to expect pedestrians near bus stops, and improvement should enhance safe access for riders.

It is important to note that the bus stop information obtained was based on data available from 2018, and several bus routes have been updated since then. Further, Lamorinda school bus routes data were not included in the analysis, presenting a further analysis the City may undertake to focus improvement locations.

Distracted Driving

Through survey responses and the community workshop, community members observed that distracted driving was a common behavior that makes people feel unsafe on the roadways. Concerns were especially focused on areas around schools and downtown where there are high levels of pedestrian activity. Education and enforcement, as well as roadway design interventions that maintain high levels of attentiveness on arterials, would work to decrease potential violations such as lane departure or failure to yield that may result from distracted driving.

Failure to Yield

In Lafayette, failure-to-yield violations typically occurred at stop signs, against oncoming traffic, or when pedestrians were in crosswalks. Motorists failing to yield the right of way was the most reported violation for KA crashes (29%), and 44% of failure to yield crashes led to a fatality or severe injury. In the online survey, community members noted that "stop sign running by cars or bikes" as the second most selected unsafe behavior. Additionally, community members expressed interest in improving crossing safety by increasing yield compliance. Where enforcement and design improvements can improve driver yielding behavior, roadway users will benefit from better separation and increased driver responsibility.

Improper Turning

Improper turning was the third most reported violation for KA crashes (14%), with failure to yield when turning left or making a U-turn being the most common violation. When looking at pedestrian crashes, motorists making a left or right turn while a pedestrian is crossing at a crosswalk is the most common violation (44%). Illegal turning was voiced by the public as unsafe roadway behavior and a concern. While dangerous driver behavior can be difficult to control, improved intersection and signal design can help reduce the incidences of crashes from unsafe turns.

Interactions between Bicyclists and Motorists

Bicyclist crashes make up 17% of all crashes but 36% of fatal and serious injury crashes. Bicyclist crashes are typically more severe, with 63% of all bicyclist crashes resulting in fatal and serious injury outcomes. Based on concerns raised by the public and field visits, crashes between motorists and bicyclists often result from general confusion about who has the right of way at an intersection. Trail crossings, too, emerged through public engagement as sites of high concern for conflicts between vehicles

Interactions between Pedestrians and Motorists

Pedestrians were involved in 19% of all crashes and 21% of fatal and severe crashes. Pedestrian crashes are concentrated in Downtown Lafayette along Moraga Road, School Street, and Mount Diablo Blvd at intersections with marked crosswalks. These crashes involved motorists failing to yield to pedestrians crossing or motorists making an improper turn.

Lane Departure

Lane departure, or unsafe lane change violations, represent 14% of the violations cited in KA crashes, making the type tied for the second-most reported violation in KA crashes. Seven of the 11 citations of unsafe lane changes involved only a single motor vehicle, in which the motorist struck a fixed object. Feedback during the community workshop also noted winding roads as unsafe locations, where speeding can lead to lane departure concerns.

Speeds

Higher travel speeds increase crash risk, frequency, and the likelihood that a crash will result in a fatal or serious injury. Vehicle speeds directly correlate with the likelihood of a fatality or seriously injury, as shown Figure 20. In Lafayette, roadways with posted speed limits of 40 and 55 miles per hour had a higher crash rates and more severe injuries relative to roadways with lower posted speed limits. Supporting this, “traffic is too fast or doesn’t stop” was the top unsafe roadway factor that the public cited in the survey.

Setting context-appropriate speed limits for the safety of all road users and designing roadways so that motor vehicles operate at that safe speed are critical components of Vision Zero and the Safe System Approach.

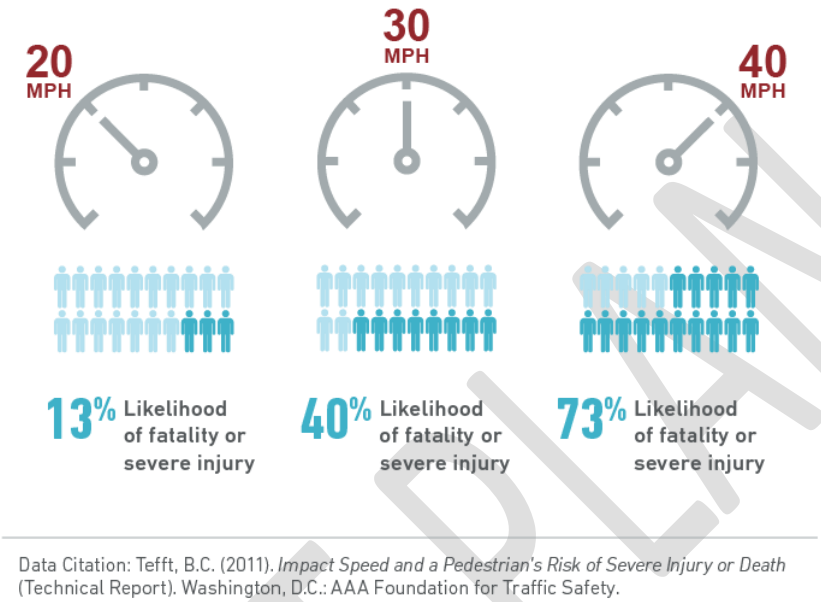

Figure 20. Speed and pedestrian crash severity correlation

Trail Crossings

Bicyclist crashes primarily occurred near trail access points, such as the intersection of Olympic Boulevard and Moraga Boulevard near the Lafayette/Moraga Regional Trail, and along Reliez Valley Road near the Reliez Valley Trail. The community expressed interest in opportunities to increase access to trails, especially as an established safe route to school. Intersection and facility improvements that create greater separation in time and space between vehicles and trail users would increase safety and expand access to more users.

Unsignalized Intersections

In Lafayette, unsignalized intersections were 43% of all crashes and 50% of KA crashes. From the survey responses, "dangerous intersections" was the second most selected factor that made people feel unsafe. Generally, the community noted a lack of visibility at uncontrolled locations, especially for people walking and biking. Improvements that enhance visibility at unsignalized intersections, or that slow turning movements to give roadway users more time to react, will better separate people in time during potential conflicts at unsignalized intersections.

SAFETY STRATEGIES

This section presents recommended safety strategies, which fall into three categories as shown in Figure 21.

1. Program, Policy, and Practice Actions
2. Citywide Systemic Roadway Improvements
3. High Injury Network Projects

These strategies comprise the City's strategic approach to achieving Vision Zero and were developed through the LRSP Task Force in collaboration with stakeholder members representing various perspectives of roadway safety: transportation, enforcement, public and environmental health, business, emergency services, schools, and the public. The strategies work together to target and address the Emphasis Areas identified in the previous section.

These strategies draw from national best practices and build on existing citywide plans and programs related to roadway safety. These strategies emerged from the key takeaways in each step of the LRSP process and raft from the Safe System Approach, key crash risks, community engagement, and the Emphasis Areas.

Figure 21. Safety Strategies Framework

POLICY, PROGRAM, AND PRACTICE ACTIONS

Policy, Program, and Practice actions promote a paradigm shift in how we view and approach safety. The aim is to move away from assigning blame to users when a crash occurs and instead focus on education that might decrease crashes from occurring in the first place. One of the most important actions from the LRSP is the recommendation of the adoption of a goal year to reach zero roadway deaths and serious injuries by 2033. This goal was established by recommendation of the LRSP Task Force members.

USING THE ACTIONS TABLE

The Policy, Program, and Practice actions are out Table 3 outlines a detailed series of actions and steps to work toward zero fatalities and serious injuries within Lafayette and is a core product of the LRSP. Within the table, strategies are sorted by three types:

- Policies are considered to be overall, systematic changes that guide how priorities are set and culture is established.
- Programs are ongoing efforts that include both changes to existing programs and departments as well as recommendations to established ones.
- Practices are more detailed actions that propose more exact approaches and strategies.

Within each of these categories, actions are labeled as the overarching strategy the City should take, which can be achieved through the associated groups of steps. By completing a series of steps, Lafayette will complete the overall action. An achievement metric is identified for each action and step, noting which outcomes indicate that a step is complete. Each action is also tied to corresponding Emphasis Areas, demonstrating how their completion will address key safety factors within Lafayette.

The table is intended to be used as a living document to track implementation and updates to the actions and steps in this LRSP. Goals and Objectives established by the LRSP Task Force have also been included as actions and steps, so that their completion may be tracked and documented. As Lafayette departments and stakeholders complete actions and steps, the table should be updated regularly.

Table 3. Policies, Programs, and Practice Action Table

Policies, Programs, and Practices

		Safety Actions and Steps	Emphasis Areas	Timeline	Who Should Be Involved?	Achievement
Policies		*Defining roles, responsibilities, and new approaches to City priorities*		*Immediate (<1 year), Medium (2-3 years), Longterm (3-5 years), Ongoing, or Completed*	*Stakeholder agencies and groups*	*Metric or outcome marking completion*
1	**Action**	**Incorporate a safety checklist into all City roadway projects**				
	a	Create a Vision Zero project process checklist	All	Immediate	Public Works, Engineering	Safety checklist
	b	Ensure use of checklist as a framework for prioritizing safety in all stages of the project process	All	Ongoing	Public Works, Engineering	Completed checklists (ongoing)
	c	Create a post construction review process to ensure improvements are reducing fatal and serious injury crashes and evaluation of any safety adjustments or further improvements needs are documented	All	Immediate	Public Works, Engineering	Review process
	d	Refine project based on post-project evaluation	All	Ongoing	Public Works, Engineering	Project refinements
2	**Action**	**Develop approach to lower speeds at locations along the HIN**				
	a	Develop list of areas, such as schools and business districts, where speed limits can be lowered based on state law	Speeds	Medium	TransCirc, Engineering, CCTA	List of lower limit areas
	b	Create an interim low-cost safety countermeasure checklist for any speed reduction project on the HIN until permanent road geometry changes can be made	All	Immediate	TransCirc, Public Works, Engineering, CCTA	Project planning sheet
	c	Focus any speed management resources, such as traffic calming or speed limit setting, on HIN corridors where speed limits or speeding are safety concerns	Speeds, Failure to yield	Immediate	Public Works, Engineering, TransCirc, Police Department	Policy update
3	**Action**	**Focus enforcement on the High Injury Network and behaviors related to safety issues**				
	a	Enforce speeding, red-light violations, distractions, and pedestrian right-of-way violations	Speeds, Failure to yield, Motorist-pedestrian interactions, Distracted driving	Immediate	Police Department	Enforcement approach
	b	Strategically deploy speed radar stations to collect speed information and move towards a data-driven enforcement approach	Speeds	Ongoing	Police Department, Engineering	Speed radar stations deployed
4	**Action**	**Adopt goal to reach zero roadway deaths and severe injuries by 2033.**				
Programs		*Regular, ongoing efforts*				
4	**Action**	**Develop a project Task Force to help guide the development of the LRSP. (LRSP Goal established through Task Force)**				
	a	Develop project website to share LRSP progress, engagement opportunities, project updates, draft deliverables, and roadway safety educational materials	All	Completed	City staff, TransCirc, Task Force	Project website
	b	Host a public meeting, attend pop-up events throughout the community, and launch an online survey to engage the public to share project updates and collect local knowledge, concerns, and opportunities.	All	Completed	City staff, TransCirc, Task Force	Public meeting, online survey
	c	Provide project updates and collect input/feedback through public hearings with City Council and the City's Transportation & Circulation Commission	All	Completed	City staff, TransCirc, Task Force	Public hearings
	d	Develop an interactive webmap and survey to collect from the public location-based safety related concerns	All	Completed	City staff, TransCirc, Task Force	Interactive webmap
5	**Action**	**Establish and maintain a Safe Routes to School (SRTS) program led by the Lafayette School District to share educational materials with students and track SRTS project implementation**				
	a	Assess previous SRTS planned projects and identify where projects complement HIN corridors, prioritizing those for implementation as funding opportunities allow	Motorist-pedestrian interactions, Intersections with bus stops	Immediate	Lafayette School District, CCTA	List of SRTS projects
	b	Coordinate with the Lafayette School District community to establish a SRTS educational outreach program to develop and share safety educational materials with students and parents	Motorist-pedestrian interactions, Intersections with bus stops	Immediate	Lafayette School District, CCTA	Educational materials
	c	Gather feedback from the Lafayette School District community through the SRTS program to inform safety projects	Motorist-pedestrian interactions, Intersections with bus stops	Ongoing	Lafayette School District, CCTA, Engineering	Collected feedback
	d	Regularly evaluate performance of implemented safety improvements in school zones, collecting data on vehicle speeds and crashes	Motorist-pedestrian interactions, Intersections with bus stops, Speeds	Ongoing	Lafayette School District, CCTA, Public Works, Engineering	Project evaluation, crash data (ongoing)
6	**Action**	**Establish an ongoing Vision Zero Program within the City to guide roadway safety work and updates**				

	a	Maintain a Vision Zero Task Force through TransCirc that meets periodically to evaluate progress and implemented projects	All	Immediate	City staff, TransCirc, Task Force	VZ Task Force
	b	Through the program, formalize and share a standardized data collection process. The process should be conducted before or after any projects to evaluate safety improvements, with safety goals identified at the start of project.	All	Medium	Public Works, Engineering, CCTA	Data collection process established
	c	Develop and share standard Vision Zero and roadway safety language for use across City departments, agency partners, and in community communications.	All	Medium	City staff, CCTA, Caltrans	Safety language standards document
	d	Conduct crash mapping annually to monitor where fatal and severe crashes continue to happen, and compare to projects implemented through the Vision Zero process	All	Medium	Public Works, Engineering, CCTA	Annual maps generated
7	**Action**	**Incorporate safety project implementation into Pavement Management during maintenance or paving projects**				
	a	Develop approach to align Pavement Management program with incorporating safety countermeasures	All	Medium	Public Works, Engineering	Pavement Management approach
	b	Establish Paving Management program schedule that prioritizes HIN streets	All	Medium	Public Works, Engineering	Refined program schedule
Practices	*Distinct methods or approaches*					
8	**Action**	**Promote a safety culture throughout community and within agencies (LRSP Goal established through Task Force)**				
	a	Maintain regular communication with City partners on importance of roadway safety and shared stakeholder responsibility	All	Ongoing	TransCirc, City staff, CCTA, Caltrans	Regular plan updates
	b	Include partners from various departments, agencies, businesses and community in the development of LRSP	All	Ongoing	TransCirc, City staff, CCTA, Caltrans	Number of stakeholder groups engaged
	c	Promote an external safety culture with community members through methods such as social media and school outreach, involving broader community in safety projects and plans	All	Ongoing	TransCirc, City staff, CCTA, Caltrans, Lafayette School District	Materials generated and distributed
9	**Action**	**Implement a data-driven planning approach, supplemented by public input, to identify where and why roadway collisions resulting in fatalities and serious injuries and near misses are occurring (LRSP Goal established through Task Force)**				
	a	Conduct a systemic and proactive collision analysis of Lafayette's roadway network	All	Completed	Engineering	Crash analysis memorandum
	b	Use quality data and the latest analytical processes to better understand crash causation and crash risk	All	Completed	Engineering	Crash analysis memorandum
	c	Identify high priority locations using historical crash data and analysis, proactive systemic safety analysis, stakeholder and public input, and in-person field visits	All	Completed	Engineering	High Injury Network
10	**Action**	**Prioritize roadway safety actions and programmatic recommendation investments to advance Lafayette's Vision Zero goals (LRSP Goal established through Task Force)**				
	a	Identify actions utilizing strategies across all roadway safety disciplines, engineering, enforcement, education, and emerging technologies	All	Completed	TransCirc, Task Force, City staff	Safety Actions spreadsheet
	b	Develop a safety actions toolbox that includes systemic and effective short-and longer-term actions that are specific to Lafayette's crash patterns	All	Completed	TransCirc, Task Force, City staff	Safety Countermeasure Toolbox
	c	Produce a list of engineering projects pulling from resources included in the safety action toolbox aimed at improving roadway safety for all	All	Ongoing	TransCirc, Task Force, City staff	List of projects
	d	Include an assessment of current policies, plans, guidelines, and/or standards to identify opportunities to improve how processes prioritize safety	All	Completed	TransCirc, Task Force, City staff	Adopted LRSP
12	**Action**	**Produce an LRSP to build safer streets for all (LRSP Goal established through Task Force)**				
	a	Use the safety actions toolbox and priority locations to proactively address crash risk throughout Lafayette	All	Ongoing	Public Works, Engineering	Number of actions achieved, countermeasures implemented
	b	Utilize the best available data and publicly collected feedback to produce a prioritized list of engineering projects that can be submitted for grant application processes	All	Completed	TransCirc, Engineering	List of projects and countermeasures
	c	Apply for Caltrans funding to fund improvements and steps in this Action Plan	All	Medium	TransCirc, City staff, City Council	Applications submitted
	d	Ensure that the plan includes recommendations and tools that will enable the city to measure safety trends, update the progress of the plan over time, and be competitive for grant funding	All	Ongoing	TransCirc, City staff, City Council	List of recommendations
	e	Increase the number of people walking, rolling, and biking in Lafayette	Motorist-pedestrian interactions, Motorist-bicyclist interactions	Ongoing	TransCirc, City staff, City Council	Increased bike/walk modeshare
13	**Action**	**Centralize Vision Zero-related data in accessible and useful formats**				
	a	Create a Vision Zero Data Dashboard to track and map safety data and crashes and report project progress	All	Immediate	Engineering, Police Department	Creation of VZ dashboard

	b	Conduct a video-based artifical intelligence near-miss analysis on the HIN	Failure to yield, Lane departure, Distracted driving, Motorist-pedestrian interactions	Medium	Engineering, TransCirc	Survey conducted
	c	Use the Caltrans Active Transportation Street Story Tool to understand near misses and safety concerns	Failure to yield, Lane departure, Distracted driving, Motorist-pedestrian interactions	Medium	Engineering, TransCirc	Data collected
	d	Share an annual report of Vision Zero progress, including crash statistics, mapped crashes, and any changes to the program. The LRSP Task Force may support through guidance and review of the annual report.	All	Ongoing	TransCirc, Engineering, Task Force	Annual VZ report
14	**Action**	**Provide progress updates to community on safety evaluation results and project implementation**				
	a	Conduct regular community outreach as part of HIN projects and subsequent safety improvements to inform, educate, and collect continued feedback	All	Medium	TransCirc, Task Force, City staff	Community feedback collected, outreach materials and events
	b	Regularly report progress on LRSP actions and HIN projects via established VZ program channels and involved City departments	All	Medium	TransCirc, Task Force, City staff	LRSP progress reports
15	**Action**	**Improve user safety and visibility at intersections following the Safe Systems approach**				
	a	Implement Systemic Actions, such as Leading Pedestrian Intervals, at HIN intersections to improve pedestrian safety and visibility. See: Systemic Actions Table.	Motorist-pedestrian interactions, Failure to yield	Medium	Public Works, Engineering	Implemented countermeasures
16	**Action**	**Identify gaps in pedestrian and bicycling networks and apply the Safe Systems approach of separating users in time and space to increase user safety**				
	a	Review HIN for gaps in pedestrian and bicyclist networks	Motorist-pedestrian interactions, Motorist-bicyclist interactions, Trail crossings	Medium	Public Works, Engineering	Identified list of gaps
	b	Identify potential project opportunities to address gaps	Motorist-pedestrian interactions, Motorist-bicyclist interactions, Trail crossings	Medium	Public Works, Engineering	Project list

PROACTIVE SYSTEMIC ROADWAY IMPROVEMENTS

Proactive systemic roadway improvements should be implemented broadly throughout the city as capacity, need, and resources allow. These improvements often do not require any further analysis or engineering to implement at specific locations. It is recommended that these projects first be implemented along the HIN segments first and then citywide, following City policies and appropriate guidance.

This set of safety countermeasures provides solutions for the Emphasis Areas, with a focus on those that address multiple Emphasis Areas such as intersection treatments and speeds. Reducing corner radii, for example, slows turning vehicles at intersections. This set of improvements was also identified as being applicable to a variety of roadway types and less dependent on individual roadway contexts. For information on where and in what instances the improvement types should be selected, view the full Safety Countermeasures Toolbox in the appendix.

The implementation of systemic safety countermeasures may require a change identified in or supported through the Policies, Programs, and Practices actions mentioned above. Theses proactive systemic safety countermeasures and all roadway improvements should be decided and implemented through the lens of the Safe System Approach framework[23].

[23] "Safe Systems Framework." *Institute of Transportation Engineers*, 2019, https://www.ite.org/pub/?id=C8B1C6F9-DCB5-C4F3-4332-4BBE1F58BA0D. Accessed May 22, 2023.

Table 4. Citywide Systemic Roadway Safety Countermeasures

Systemic Safety Countermeasures	Relevant Emphasis Areas	Relevant Roadway Type
Install Leading Pedestrian Intervals	Motorist-Pedestrian Interactions	All
Install and upgrade to high-visibility crosswalks (continental)	Motorist-Pedestrian Interactions, Failure to Yield	All
Install stop bars at existing crosswalks	Motorist-Pedestrian Interactions, Failure to Yield	All
Reduce corner radii	Speeds, Improper Turning	All
Harden centerlines at intersections	Speeds, Improper Turning	Arterial, collector
Install centerline and edgeline rumble strips and stripes	Speeds, Lane Departure	Arterial
Install chevron signs at curves	Lane Departure	Arterial
Pedestrian refuge islands	Motorist-Pedestrian Interactions, Failure to Yield	All
Bulb-outs/curb extensions	Speeds, Improper Turning	All

Continental crosswalk and stop bar
(Source: Toole Design)

Tightened corner turning radii, temporary treatment
(Source: Toole Design)

Hardened intersection centerline, concept graphic (Source: NYCDOT)

Figure 22. Example systemic safety countermeasures

HIGH INJURY NETWORK PROJECTS

The LRSP prioritizes roadway safety improvements along the HIN segments that were identified through the crash analysis and confirmed through community engagement and field observations. HIN projects are comprised of location-specific countermeasures selected based on conditions and behaviors indicated by crash data.

In Table 5, HIN segments are prioritized first by the number of KA crashes recorded followed by the number of web map unsafe points indicated during community engagement. If resources are limited to implement all the safety improvements needed on the HIN segments, priority should be given to those at the top of the list.

Table 5. Prioritized HIN Segments

Rank	Corridor	Limits	Number of KA	Number of Web Map Unsafe Points
1	Olympic Boulevard	Reliez Station Road to East of Newell Court	3	37
2	Moraga Road	Mount Diablo Boulevard to Old Jonas Hill Road	1	220
3	Mount Diablo Boulevard (West)	Acalanes Road to Risa Road	1	66
4	Moraga Boulevard	Moraga Road to Victoria Avenue	1	49
5	School Street	Moraga Road to Topper Lane	1	46
6	Pleasant Hill Road	Mount Diablo Boulevard to Olympic Boulevard	1	45
7	Deer Hill Road	Happy Valley Road to Miller Drive	1	32
8	Pleasant Hill Road	Springhill Road to Taylor Boulevard	1	14
9	Mount Diablo Boulevard (East)	Willow Drive to Pleasant Hill Road	1	12
10	Reliez Valley Road	Gloria Terrace to Sterling Heights Lane	1	1

HIGH INJURY NETWORK PROJECTS

- Location specific safety improvements based on historical crashes on a HIN segments
- Analyze crash causes, context, and modes involved to determine best set of safety countermeasures to eliminate fatal and severe crashes

PROACTIVE SYSTEMIC ROADWAY IMPROVEMENTS

- Install certain safety countermeasures that are good for safety citywide or at least on the HIN first
- Does not require much further analysis or complex engineering to implement

SELECTING SAFETY COUNTERMEASURES

Once those crash causes, context, and modes involved have been analyzed on the HIN segment, safety countermeasures can be identified based on guidance in the Safety Countermeasure Toolbox. This tool includes information on how to select safety countermeasures based on the crash and context, through the Safe System Approach framework, and has crash modification factor (CMF) information to begin to assess the possible effectiveness of the safety countermeasures to reduce crashes. The Safety Countermeasure Toolbox provides additional detail on where specific improvements are considered applicable and most effective, along with instruction on how to analyze multiple CMFs used on the same HIN segment. The exact combination of the safety countermeasures used and the designs of each will be tailored to the corridor to prevent future fatal and severe injury crashes from occurring.

Using the Safety Countermeasures Toolbox

1. Evaluate crash causes, contributing factors, and roadway context that may have contributed to crashes.
2. Use the Lafayette LRSP Safety Countermeasure Toolbox to develop a list of possible roadway safety countermeasures to eliminate crash types.
3. Review countermeasure(s) through the lens of the Safe System Approach framework.
4. Use crash modification factors to estimate if the roadway safety countermeasures selected will eliminate KA crashes.
    a. Select a method to analyze multiple CMFs based on FHWA guidance
    b. Apply a method to analyze multiple CMFs based on FHWA guidance
5. Build safety improvements.
6. Implement evaluation to determine the effectiveness of safety improvements and document actual crash reductions.
7. Add additional countermeasures or make field adjustments based on actual crash data.

SAFETY IMPROVEMENT PROCESS ON MORAGA ROAD FROM MOUNT DIABLO BOULEVARD TO OLD JONAS HILL ROAD

Moraga Road is a four-lane roadway that connects to downtown Lafayette and is a main route for buses. The segment between Mount Diablo Boulevard and Old Jonas Hill Road is noted on the High Injury Network and lacks bicycle facilities and sidewalks for some extents.

Figure 23. A pedestrian walks along Moraga Road on a narrow sidewalk.

MORAGA ROAD CONTEXT

- Moraga Road is also a segment contained within the Stanley Middle School and Lafayette Elementary School Rapid Implementation School Safety Plans, which proposed project types such as protected left turn phases at School Street, leading pedestrian intervals, and enhanced biking and walking facilities.
- Received 220 “unsafe” points from web map respondents, the most of any location within the city
    - Community members suggested ideas such as more visible signage, hardened centerlines at turns, and new lights at bus stops.

EVALUATE CRASHES TO SELECT SAFETY COUNTERMEASURES ON MORAGA ROAD

- One fatal pedestrian collision occurred due to a failure to yield to the pedestrian at the signalized intersection

- Two other pedestrian crashes also took place along this corridor
- One rear-end motorist injury crash
- Violation types related to those collisions included the following:
    - Failure to yield
    - Unsafe passing
    - Other improper driving

POSSIBLE MORAGA ROAD SAFETY COUNTERMEASURES

- Additional lighting at intersections
- Curb extensions
- Leading Pedestrian Intervals
- Pedestrian refuge islands
- Pedestrian scramble treatments
- Prohibited right-turn-on-red
- Reduced corner radii and hardened centerlines to slow turns at intersections

PROGRAM EVALUATION

To achieve Vision Zero, it is important to prioritize roadway safety where need and impact are greatest until the goal of zero deaths and serious injuries on roadways across Lafayette is reached by 2033. Figure 24 charts a path to reducing deaths and serious injuries annually until Vision Zero is realized. Ideally, all involved partners should be striving for fewer fatal and serious injuries than the chart indicates.

Continued evaluation of overall trends and specific outcomes is key for meeting the City's goal and creating a Safe System for all roadway users.

On an annual basis, the City should track fatal and serious injury crashes compared to this chart to understand whether steps and projects being implemented are on track or need to be adjusted to reach the goal of Vision Zero by 2033. The path will look different than the graph below, but crashes should follow or be below this general trend over time. If the estimated number of fatal and serious injury crashes fall in the orange areas, goals are not being met and more resources and/or shifts in roadway safety decisions will need to be made.

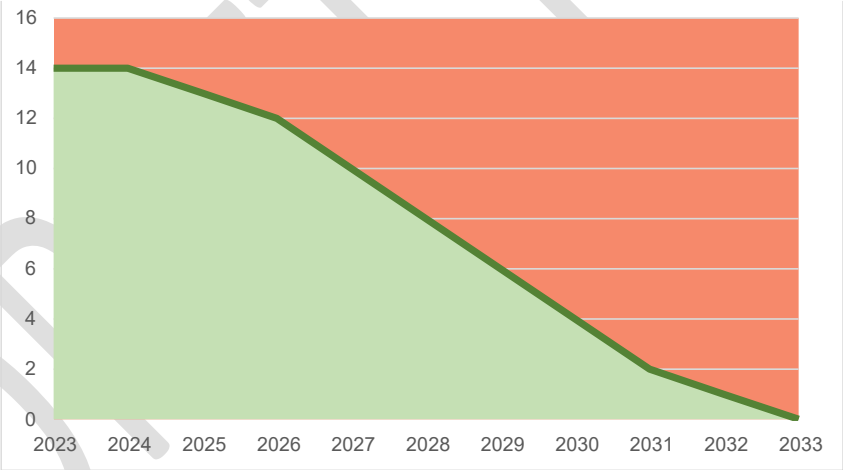

Figure 24. Path to Zero Fatal and Serious Injuries by 2033

It is important to measure the following key indicators to understand if the Lafayette community is on the path to reaching Vision Zero by 2033. The following evaluation criteria should be analyzed yearly and adjustments to the program should be outlined in the City's Vision Zero Annual Report:

- Fatal and serious injury crashes decrease annually until reaching zero by 2033

- Number of safety improvements implemented where need and impact are greatest, including on HIN segments and locations with similar conditions once effectiveness of safety countermeasures is confirmed
- Number of steps fully implemented and that are working to reduce fatal and serious injury crashes
- Number of crashes by type, modes involved, and locations are decreasing citywide
- Once zero fatal and serious injury crashes are reached, measure that all crashes should decrease annually
- Once safety strategies are implemented, they should be regularly evaluated to understand their effectiveness and determine any necessary refinements

The City of Lafayette will need to monitor the success of individual Actions and Steps presented in the Safety Strategies. Each action in the list includes evaluation criteria to guide implementation of that action. If certain actions are not successful, are not moving fast enough, or are not working for another reason, the City should assess and adjust. Steps that are completed, are in progress, or are being revised should also be included in the City's Vision Zero Annual Report.

MAINTAINING THE MOMENTUM

The process of Vision Zero is to prioritize roadway safety where need and impact are the greatest until the goal of zero roadway deaths and serious injuries by 2033 is realized in Lafayette. The following summarizes the core themes of the LRSP and offers next steps that extend the Safe System Approach into succeeding years. These themes should be reviewed and updated every two to five years.

SHIFTING THE PARADIGM FOR SAFE MOBILITY

Instead of assigning blame in the event of a crash, the Safe System framework first looks at the people involved in a crash by considering the severity of the crash. This means that instead of asking, "Why did that person crash?" we ask, "Why was that person so seriously injured in the crash and what can we do?" This change in thinking represents a significant shift from an individual or a department's responsibility (e.g., Public Works or Police Department) to a public health perspective.[24]

FORMALIZING THE PROCESS

While the City has already been progressively tackling projects with known safety concerns, this Plan formalizes the process and provides background to key stakeholders and community members by identifying what the safety issues are, where the focus should be, what should be done, and why these strategies are important. Formalizing the process puts everyone on the same page about what to expect next and creates transparency between the City and the public.

EXPANDING THE DATA COLLECTED

Data transparency is important to maintain accountability and generate public support for Vision Zero and safety projects. The City is committed to moving toward a data-driven approach.

The crash data collection process can be more equitable and should include more than just where and how crashes happen. The City must also consider additional data, such as the demographics of impacted communities, any enforcement inputs (such as speed cameras), and hospital injury reports, if available and identify any disproportionate impacts on certain communities.

COLLABORATION IS KEY

This LRSP represents a commitment to prioritizing roadway safety issues. Implementing these actions will require collaboration between all key stakeholders, as well as other supporting organizations and government agencies. It will also require the support of people who live in, work in, and visit Lafayette. In addition, to continue working on the strategies listed in Safety Strategies, the City is committed to

[24] "How does Vision Zero differ from the traditional traffic safety approach in U.S. communities?" *Vision Zero Network*, 2016, http://visionzeronetwork.org/wp-content/uploads/2016/03/VZN-Case-Study-1-What-makes-VZ-different.pdf.

updating the LRSP every five years. Another fundamental outcome of this plan was the City's establishment of a target zero in the year 2033.

INVOLVING THE PUBLIC IN VISION ZERO

We're all in this together. To carry out many of the actions presented in this Plan and to successfully eliminate roadway fatalities and serious injuries by 2033, we need everyone's help. We all have a personal responsibility to make the right choices and to spread the word about why roadway safety matters—making the City's efforts even more effective.

APPENDIX A: SAFETY COUNTERMEASURE TOOLBOX

ABOUT THE SAFETY COUNTERMEASURE TOOLBOX

Please note this is intended to be a framework for identifying the most effective safety countermeasures in initial planning. Actual application of each safety countermeasure should be further studied and designed on an actual project-by-project basis.

The safety countermeasures presented in the toolbox were identified based on targeting Lafayette's 10 emphasis areas. The safety countermeasure list references FHWA's Proven Safety Countermeasures, Contra Costa Countermeasure Toolbox, and then cross-references the Caltrans Local Road Safety Manual (Caltrans LRSM).
The toolbox contains additional information for each safety countermeasure and is grouped into the following sections: effectiveness, and relevant application.

The effectiveness section provides information on CRF, emphasis area, type, and guidance on how to use the Safe System Approach Framework to select safety countermeasures in a way that prevents a crash from resulting in a fatal or serious injury.
The relevant application section of the toolbox contains information related to applicable roadway type based on Lafayette street classification, safety countermeasures based on their appropriateness for signalized intersections, non-signalized intersections, and roadway segments based on Caltrans LRSM categorization.

HOW TO USE THE SAFETY COUNTERMEASURE TOOLBOX

When selecting safety countermeasures for a specific area in Lafayette, consider how the Safe System Approach Framework applies to the crashes that have occurred in that area. For example, if an area has a history of fatal crashes involving vehicles hitting pedestrians, separating users in time might be an important piece of the framework to consider. A safety countermeasure that separates users in time might be implementing leading pedestrian intervals.

1. Evaluate crash causes, contributing factors, and roadway context that may have contributed to crashes.
2. Use Lafayette LRSP Safety Countermeasure Toolbox to develop a list of possible roadway safety countermeasures to eliminate crash types.
3. Review countermeasure(s) through the lens of the Safe System Approach framework
4. Use crash modification factors (CMFs) to estimate if the roadway safety countermeasures selected will elimin
    4a. Selecting a Method to Analyze Multiple CMFs
    4b. Applying a Method to Analyze Multiple CMFs
5. Build safety improvements
6. Implement evaluation to determine the effectiveness of safety improvements and document actual crash red
7. Add additional countermeasures or make field adjustments based on actual crash data

TERMINOLOGY

CRASH REDUCTION FACTOR (CRF)

A CRF is the percentage crash reduction that might be expected after implementing a given countermeasure at a specific site. A CRF is the inverse of a CMF. The higher the CRF percentage is, the more effective the countermeasure is in improving safety.

A specific CRF should be determined for each unique scenario. For a selection of specific CRFs for specific locations in Lafayette, explore the CMF clearinghouse and apply all relevant factors.

SAFETY COUNTERMEASURE

An action taken to counteract a danger or threat. In the context of safety – a safety countermeasure is an action designed to counteract a threat to safety.

SYSTEMIC COUNTERMEASURE

The systemic approach considers multiple locations with similar risk characteristics, selecting the preferred countermeasure(s) appropriate and affordable for widespread implementation.

SAFE SYSTEM APPROACH

The Federal Highway Administration's (FHWA) Safe System Approach seeks to dramatically reduce serious injury and fatal crashes on our roadways through a systems-based approach to prioritizing safety. The Safe System Approach focuses on eliminating fatal and serious injury crashes instead of all crashes. This approach has been effective over the last decade in Sweden, the Netherlands, Australia, and New Zealand.

The Safe System Approach involves the following six principles:

Death/Serious Injury is Unacceptable
Humans Make Mistakes
Humans are Vulnerable
Responsibility is Shared
Safety is Proactive
Redundancy is Crucial

SAFE SYSTEM APPROACH FRAMEWORK

The Safe System Approach framework is critical to determining how to apply the Safe System Approach in practice. The framework includes the following as a lens to apply to projects to prioritize safety:

Anticipate Human Error
Separating Users in Space
Separating Users in Time
Increase Attentiveness and Awareness
Increasing Visibility
Increasing Attentiveness
Reducing Impairment
Accommodate Human Injury Tolerances
Reduce Speeds
Reduce Impact Forces

Lafayette LRSP Roadway Safety Countermeasure Toolbox

Countermeasure	Effectiveness				Relevant Application			
	Crash Reduction Factor (CRF)[1]	Emphasis Area[5]	Safe System Framework Metric Addressed[2]	Type[1]	Roadway Type[3]	Signal-ized	Non-Signalized	Seg-ments
Speed Management								
Radar Speed Signs	5%[4]	Speeds	Increasing Attentiveness Reduce Speeds		Arterial			x
Variable Speed Limits	30%	Speeds	Increasing Attentiveness Reduce Speeds	Operation/ Warning	Arterial			x
Coordinated Signal Operation	15%	Speeds	Increasing Attentiveness Reduce Speeds	Signal Mod.	Arterial, Collector	x		
Speed Humps	40%	Speeds	Reduce Speeds		Local			x
Road Diets (Roadway Configuration)	35%	Bicyclist Pedestrian Speeds	Increasing Attentiveness Reduce Speeds	Geometric Mod.	All			x
Lane Narrowing	24%[4] 48%[4]	Bicyclist Pedestrian Speeds	Increasing Attentiveness Reduce Speeds		All			x
Lane Departure								
Centerline Rumble Strips and Stripes	20%	Distracted Driving Lane Departure	Increasing Attentiveness	Operation/ Warning	Arterial			x
Edgeline Rumble Strips and Stripes	15%	Distracted Driving Lane Departure	Increasing Attentiveness	Operation/ Warning	Arterial			x
Install or Widen Edge Lines	25%	Lane Departure	Increasing Attentiveness	Operation/ Warning	Arterial			x
Chevron Signs at Curves	40%	Lane Departure	Increasing Attentiveness Increasing Visibility	Operation/ Warning	Arterial			x
Install Curve Advance Warning Signs	25%	Lane Departure	Increasing Attentiveness Increasing Visibility	Operation/ Warning	Arterial			x
Median Barriers	25%	Lane Departure	Increasing Attentiveness Reduce Impact Forces	Remove/ Shield Obstacles	Arterial			x
Cable Barrier or Guardrail at Curves	25%	Lane Departure	Increasing Attentiveness Reduce Impact Forces	Remove/ Shield Obstacles	Arterial			x
Lighting at Segements	35%	Bicyclist Lane Departure	Increasing Visibility	Lighting	All			x
All Intersections								
Reduce Corner Radii	44%[4]	Pedestrian Failure to Yield Unsignalized Intersections	Increasing Attentiveness Increasing Visibility Reduce Speeds		All	x	x	
Harden Centerlines	TBD	Failure to Yield Speeds Unsignalized Intersections	Increasing Attentiveness Increasing Visibility Reduce Speeds		Arterial, Collector	x	x	
Left Turn Lane	55%	Failure to Yield Improper Turning Unsignalized Intersections	Separating Users in Space Separating Users in Time	Signal Mod.	All	x	x	
Unsignalized Intersections								
Improve Sight Distance to Intersection	20%	Unsignalized Intersections	Increasing Visibility	Operation/ Warning	All		x	

Countermeasure	Effectiveness				Relevant Application			
	Crash Reduction Factor (CRF)[1]	Emphasis Area[5]	Safe System Framework Metric Addressed[2]	Type[1]	Roadway Type[3]	Signal-ized	Non-Signalized	Seg-ments
Convert Two-Way Stop to All-Way Stop	50%	Unsignalized Intersections	Increasing Visibility	Control	Collector, Local		x	
Convert Intersection to Roundabout (All Way Stop)	Varies	Improper Turning Speeds Unsignalized Intersections		Control	Not Specified		x	
Convert Intersection to Roundabout (Two-Way Stop)	Varies	Improper Turning Speeds Unsignalized Intersections	Increasing Attentiveness Reduce Speed	Control			x	
Convert Intersection to Mini-Roundabout	30%	Speeds Unsignalized Intersections Bicyclist		Control	Local		x	
Lighting at Unsignalized Intersections	40%	Bus Stop at Intersection Pedestrian Trail Crossing Unsignalized Intersections	Increasing Visibility	Lighting	All		x	
Signalized Intersections								
Dedicated Left Turn Phase	30%	Failure to Yield Improper Turning Pedestrian	Separating Users in Space Separating Users in Time	Signal Mod.	All	x		
Prohibit Right-Turn-on-Red	See equation on CMF Clearinghouse	Failure to Yield Improper Turning Pedestrian Bicyclist	Separating Users in Space Separating Users in Time		All	x		
Improve Signal Timing	15%	Pedestrian Speeds	Separating Users in Time	Signal Mod.	All	x		
Convert Intersection to Roundabout (Signalized)	Varies	Improper Turning Speeds Bicyclist	Increasing Attentiveness Reduce Speed	Geometric Mod.	All	x		
Lighting at Signalized Intersections	40%	Bus Stop at Intersection Pedestrian Trail Crossing	Increasing Visibility	Lighting	All	x		
Pedestrian Scramble	40%	Bus Stop at Intersection Pedestrian Bicyclist	Separating Users in Space Separating Users in Time Increasing Visibility	Ped and Bike	All	x		
Leading Pedestrian Interval	60%	Bus Stop at Intersection Pedestrian	Separating Users in Space Separating Users in Time	Ped and Bike	All	x		
Pedestrian Facilities								
High-Visibility Continental Crosswalks	35%	Bicyclist Bus Stop at Intersection Pedestrian Trail Crossing	Increasing Attentiveness Increasing Visibility	Ped and Bike	All	x	x	
Add Stop Bars in Advance of Crosswalks	15%	Bicyclist Bus Stop at Intersection Pedestrian	Increasing Attentiveness Increasing Visibility	Ped and Bike	All	x	x	
Pedestrian Refuge Islands	45%	Bus Stop at Intersection Pedestrian	Increasing Attentiveness Increasing Visibility	Ped and Bike	All	x	x	

Countermeasure	Effectiveness				Relevant Application			
	Crash Reduction Factor (CRF)[1]	Emphasis Area[5]	Safe System Framework Metric Addressed[2]	Type[1]	Roadway Type[3]	Signal-ized	Non-Signalized	Seg-ments
Curb Extensions	35%	Bus Stop at Intersection Pedestrian	Increasing Visibility Separating Users in Space	Ped and Bike	All	x	x	
Rectangular Rapid Flashing Beacons (RRFB)	35%	Bus Stop at Intersection Pedestrian Bicyclist	Increasing Attentiveness Increasing Visibility	Ped and Bike	All		x	x
Separation Between Pedestrians and Vehicles (ex. Walkways)	80%	Bus Stop at Intersection Pedestrian Trail Crossing Bicyclist	Increasing Visibility Reduce Impact Forces Separating Users in Space	Ped and Bike	All			x
Lighting	21%[4]	Bus Stop at Intersection Pedestrian Trail Crossing	Increasing Visibility		All	x	x	x
Bicycle Facilities								
Conventional Bike Lanes (Class II)	35%	Bicyclist	Increasing Visibility Reduce Impact Forces	Ped and Bike	All			x
Separated Bike Lanes (Class IV)	45%	Bicyclist	Separating Users in Space	Ped and Bike	All			x
Bicycle Box	15%	Bicyclist	Increasing Visibility Separating Users in Space	Ped and Bike	All			x
Access Management								
Consolidation/Minimization of Access Points	44%[4]	Improper Turning	Separating Users in Space		Arterial	x	x	x

1. Referenced the 2022 Caltrans Local Road Safety Manual (Caltrans LRSM)
2. Safe System Framework includes:
    - Separating Users in Space
    - Separating Users in Time
    - Increasing Visibility
    - Increasing Attentiveness
    - Reducing Impairment
    - Reduce Speeds
    - Reduce Impact Forces
3. Roadway type is based on Lafayette street classification
4. FHWA CMF Clearinghouse was referenced if safety countermeasure was not available in Caltrans LRSM
5. Lafayette's 10 Emphasis Areas
    - Bicyclist
    - Bus Stop at Intersection
    - Distracted Driving
    - Failure to Yield
    - Improper Turning
    - Lane Departure
    - Pedestrian
    - Speeds
    - Trail Crossing
    - Unsignalized Intersections

EXTERNAL COUNTERMEASURE REFERENCES	CATEGORY
FHWA CMF Clearinghouse	National
Safe System Approach	National
Safe System Approach Framework	National
FHWA Proven Safety Countermeasures	National
2022 Caltrans Local Road Safety Manual (Caltrans LRSM)	State
CCTA Countywide Toolbox for Designing Safer Travel for People Walking and Bicycling	Local