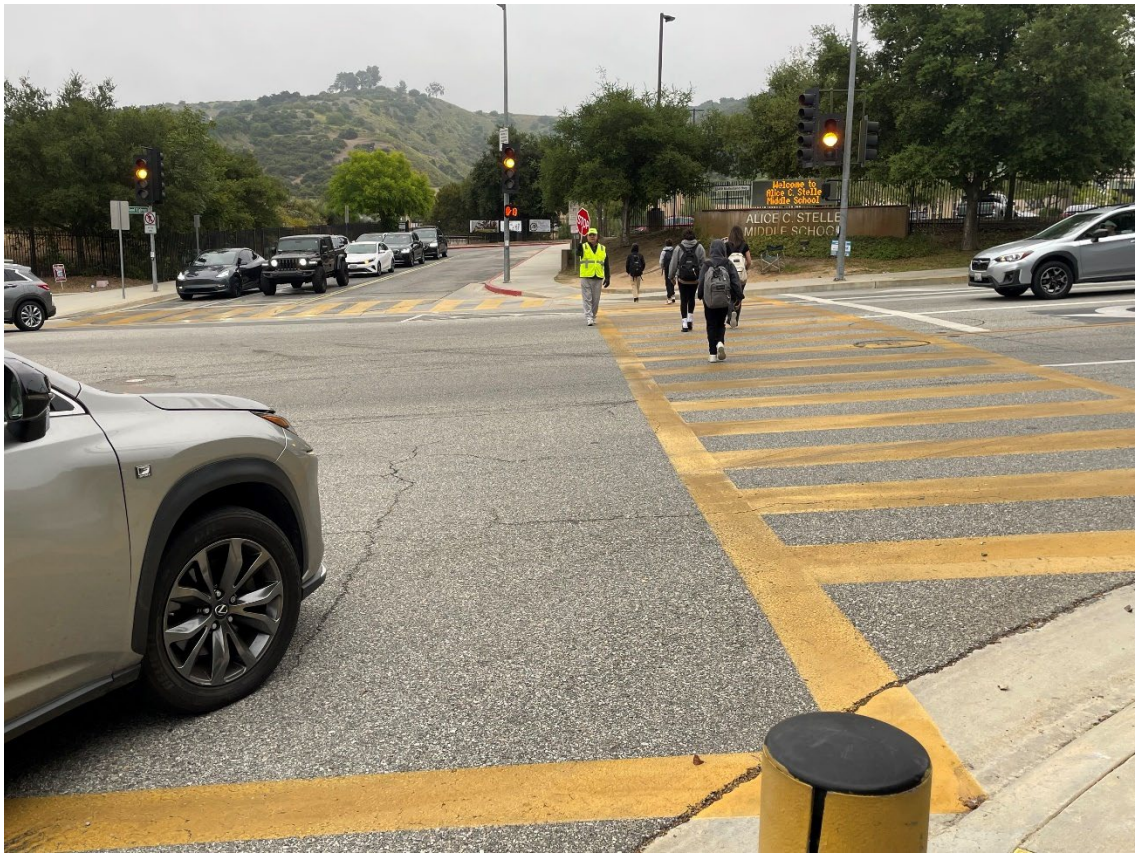
Berkeley Safe Transportation Research and Education Center

City of Calabasas Complete Streets Safety Assessment

Issues, Opportunities, and Suggested Strategies



Final Report
September 2024

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Acknowledgments

The CSSA team thanks the agency staff and community members from City of Calabasas who provided invaluable contributions to the benchmarking review and field audit to make the Complete Streets Safety Assessment in this community a success. Their knowledge and insight were instrumental to the completion of this project.

Disclosures

This report was developed with the best information available to the authors at that time.

This report summarizes crash data reported in the Statewide Integrated Traffic Records System (SWITRS) retrieved from the Transportation Injury Mapping System (TIMS). The current version of 2022 and 2023 SWITRS data is provisional and is subject to change when it is finalized.

The benchmarking analysis aims to provide the City of Calabasas with information on current best practices and how the City of Calabasas compares. Cities have differing physical, demographic, and institutional characteristics that may make certain goals or policies more appropriate in some jurisdictions than others. Ultimately, the City of Calabasas staff will need to determine where resources and efforts are best utilized to meet local development and infrastructure goals for people walking and biking.

The recommendations presented in this report are based on limited field observations and limited time spent in the City of Calabasas by the CSSA technical evaluators. These recommendations are based on general knowledge of best practices in pedestrian and bicycle design and safety and are intended to guide local staff in making decisions for future safety improvement projects. The recommendations might not incorporate all factors that may be relevant to the pedestrian and bicyclist safety issues.

As this report is conceptual in nature, conditions may exist in the focus areas that were not observed and may not be compatible with recommendations in this report. Before finalizing and implementing any physical changes, staff may need to conduct more detailed studies or further analysis to refine or discard the recommendations in this report if they are found to be contextually inappropriate or appear not to improve pedestrian and bicyclist safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume, high speeds, physical limitations on space or sight distance, or other potential safety concerns.

Executive Summary

The City of Calabasas requested that the Safe Transportation Research and Education Center at the University of California, Berkeley, conduct a Complete Streets Safety Assessment (CSSA) study. The CSSA is organized into three core activities:

1. Reviewing historical crash data and trends with an emphasis on crashes involving people walking and biking;
2. Conducting a benchmarking assessment of policies, programs, standards, and guidelines; and
3. Conducting a complete streets field audit of specific locations with suggestions to enhance conditions for people walking and biking.

The objectives of the CSSA are to improve safety and access for people walking and biking. The City of Calabasas's goals for the CSSA are the following:

- To reduce speed and improve safety along major arterials
- To improve access for people walking and bicycling in neighborhoods along major corridors that connect to open spaces
- To improve access to campus communities for people in all modes
- To advance the goals of the City of Calabasas's General Plan Draft Circulation Plan, which include the following transportation system goals:
    - Provide easy and convenient access to all areas of the community.
    - Maintain and improve present traffic flows while maintaining Calabasas' rural, small-town sense of place.
    - Protect significant environmental features.
    - Reduce dependence on single occupant automobile travel by providing a high level of pedestrian, bicycle, and public transit travel opportunities.
    - Consider the movement of people and vehicles in the design and operation of transportation systems.
    - Recognize the special mobility needs of seniors, youth, and persons with disabilities.
    - Provide opportunities for recreation activities to increase community health and well-being.
    - Preserve a sense of comfort and well-being throughout the community by minimizing the intrusiveness of commercial/business park and regional traffic on neighborhood streets and quality of life.
    - Contribute to a reduction in vehicle miles traveled.
    - Facilitate emergency evacuation in an efficient and timely manner.

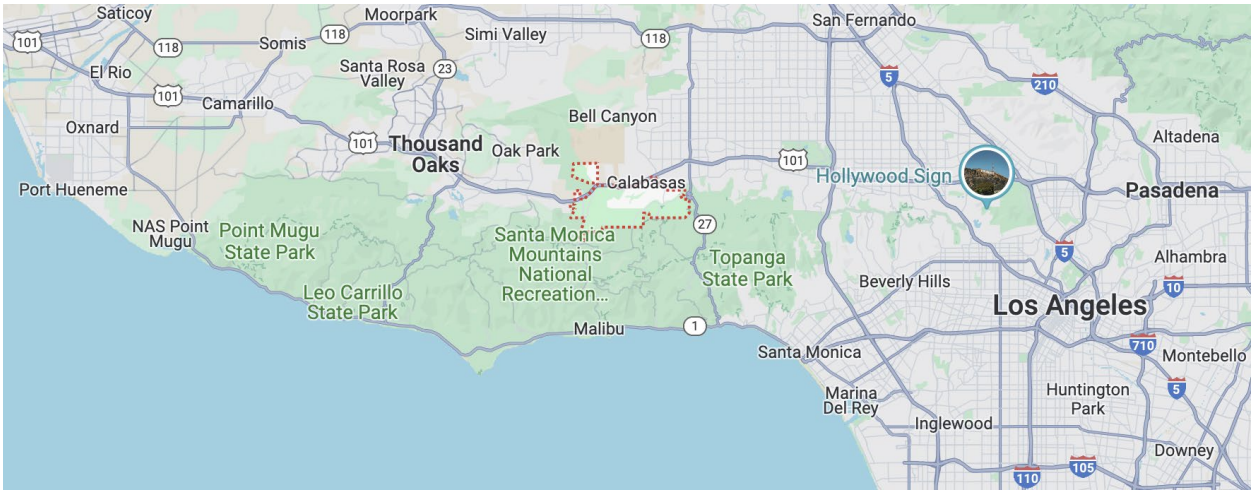
A field audit was conducted on May 23, 2024, to observe and document field conditions with City of Calabasas Department of Public Works staff and consultants.

The report is organized into the following chapters:

1. Introduction
2. Safe System Approach
3. Background and Crash History
4. Benchmarking Analysis Results and Suggested Enhancements
5. Complete Streets Field Audit Results and Recommendations

Background

Calabasas is located in Los Angeles County with a population of approximately 22,227. Of its residents, the majority, with 74% percent, identified as White and about 9% identified as Hispanic or Latino.[1] The median household income in Calabasas in 2022 was $154,079, higher than the statewide median household income of $91,551.[2] It had an estimated daily vehicle miles traveled on local roads of 159,040 in 2021.[3] The vicinity of Calabasas is shown in the figure below.



The Safe System Approach

The U.S. Department of Transportation, California Department of Transportation, and California Office of Traffic Safety have all adopted the Safe System Approach. The Safe System Approach considers five elements of a safe transportation system — safe road users, safe vehicles, safe speeds, safe roads, and post-crash care — in an integrated and holistic manner. Creating a Safe System means shifting a major share of the responsibility from individual road users to those who design, operate, and maintain the transportation network. The Safe System Approach anticipates human mistakes by designing and managing road infrastructure to keep the risk of mistakes low, and if a mistake does lead to a crash, reducing the impact to the human body to limit the potential for fatality or serious injury.

[1] QuickFacts. United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/
[2] Profiles. United States Census Bureau. Retrieved from https://data.census.gov/profile/
[3] California Office of Traffic Safety. OTS Crash Rankings. Retrieved from https://www.ots.ca.gov/media-and-research/crash-rankings/.

The CSSA project team identified two main arterials, Calabasas Road and Mulholland Highway, for walk audits based on crash history and conversations with the applicant to understand local safety concerns. During the field assessment, the CSSA project team integrated the Safe System elements into a discussion with participants to prompt safety improvements at the study locations. To develop comprehensive recommendations that address the Safe System Approach, the CSSA project team also reviews responses from local agency staff to the benchmarking survey, especially those related to local plans and policies that are already in place or underway.

The CSSA focuses primarily on infrastructure-related countermeasures, with an emphasis on improving the safety of people walking and biking. Prioritizing safe target speeds and changing road geometry to manipulate crash angles can help reduce the risk of fatal and severe injuries. Through the benchmarking assessment, the CSSA team also provides some non-infrastructure insight on safety countermeasures such as education, outreach, and post-crash care. All elements of the Safe System Approach can be applied to corridor and intersection studies moving forward to create an approach that creates layers of protection for all road users.

Benchmarking Analysis and Potential Improvements

To assess pedestrian and bicyclist safety conditions in City of Calabasas, the CSSA team conducted a benchmarking analysis to understand how the existing conditions compared to national best practices. Through an electronic benchmarking survey conducted with City of Calabasas staff, the CSSA team identified their active transportation policies, programs, and practices and categorized these into three groups:

- Areas where the City is exceeding national best practices
- Areas where the City is meeting national best practices
- Areas where the City appears not to meet national best practices

While suggestions are provided for each category, local agencies have differing physical, demographic, and institutional characteristics that may make certain goals or policies more appropriate in some jurisdictions than others. Ultimately, county or local agency staff may determine where resources and efforts are best utilized for meeting local development and infrastructure goals for pedestrians and bicyclists.

Suggestions for potential improvement or further enhancement to City of Calabasas's existing programs and policies are presented in Chapter 4.

Complete Streets Audit and Potential Improvements

The major corridors of Mulholland Highway and Calabasas Road were chosen based on the City of Calabasas' concern over pedestrian and bicyclist safety due to elevated vehicular, bicycle, and pedestrian activity in each area.

The following four locations were selected for analysis:

1. Mulholland Highway & Paul Revere Drive located near Alice C. Stelle Middle School
2. Mulholland Highway & Eddingham Avenue
3. Calabasas Road & 101 Freeway On/Off-ramp
4. Calabasas Road & Parkway Calabasas

Positive practices, as well as pedestrian and bicycle safety and accessibility issues were identified during the field audit. Many of the strategies suggested in this report are appropriate for grant applications, including Office of Traffic Safety (OTS) or Active Transportation Program (ATP) funding. The strategies may also be incorporated into a bicycle or pedestrian master plan, which set forth bicycle, pedestrian, and streetscape policies for the City of Calabasas, or can help identify, and prioritize capital improvement projects.

The suggestions presented in this report are based on limited field observations and time spent in the community by the CSSA team. These suggestions, which are based on general knowledge of best practices in traffic engineering and planning in pedestrian and bicycle design and safety, are intended to guide staff in making decisions for future safety improvement projects on the selected corridors and they may not incorporate all factors which may be relevant to walking and bicycling safety issues.

As this report is conceptual in nature, conditions may exist in the focus areas that were not observed and may not be compatible with suggestions in this report. Before finalizing and implementing any physical changes, City of Calabasas staff may choose to conduct more detailed studies or further analysis to refine or discard the suggestions in this report if they are found to be contextually inappropriate or appear not to improve bicycling safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume or speeds, physical limitations on space or sight distance, or other potential safety concerns.

1. Introduction

The Complete Streets Safety Assessment (CSSA) is a statewide program of the University of California, Berkeley Safe Transportation Research and Education Center (SafeTREC). Through this program, the CSSA project team conducts crash data analysis, a benchmarking review of local policies, programs and practices, and a transportation safety assessment of select sites to identify safety improvements that align with the Safe System Approach. The objective of the CSSA is to improve safety and accessibility for all people walking and biking in their communities.

The City of Calabasas requested a CSSA to study the following four locations:

1. Mulholland Highway & Paul Revere Drive located near Alice C. Stelle Middle School
2. Mulholland Highway & Eddingham Avenue
3. Calabasas Road & 101 Freeway On/Off-ramp
4. Calabasas Road &Parkway Calabasas

The City of Calabasas's goals for the CSSA are the following:

- To reduce speed and improve safety along major arterials
- To improve access for people walking and bicycling in neighborhoods along major corridors that connect to open spaces
- To improve access to campus communities for people in all modes
- To advance the goals of the City of Calabasas's General Plan Draft Circulation Plan, which include the following transportation system goals:
    - Provide easy and convenient access to all areas of the community.
    - Maintain and improve present traffic flows while maintaining Calabasas' rural, small-town sense of place.
    - Protect significant environmental features.
    - Reduce dependence on single occupant automobile travel by providing a high level of pedestrian, bicycle, and public transit travel opportunities.
    - Consider the movement of people and vehicles in the design and operation of transportation systems.
    - Recognize the special mobility needs of seniors, youth, and persons with disabilities.
    - Provide opportunities for recreation activities to increase community health and well-being.
    - Preserve a sense of comfort and well-being throughout the community by minimizing the intrusiveness of commercial/business park and regional traffic on neighborhood streets and quality of life.
    - Contribute to a reduction in vehicle miles traveled.
    - Facilitate emergency evacuation in an efficient and timely manner.

The CSSA project team facilitated a kickoff telephone meeting with local staff on April 16, 2024 to better understand the community's needs. The CSSA technical evaluators conducted a site visit with local staff on May 23, 2024, to observe and document field conditions. Following the field audit, the CSSA technical evaluators shared with the local agency staff their preliminary recommendations for site-specific improvements based on their observations and current best practices for designing transportation systems for people walking and biking.

This report provides an overview of the Safe System Approach and summarizes the findings of the crash data assessment, the benchmarking analysis, and the observations and recommendations from the field audit. Additionally, this report includes four appendices covering pedestrian and bicyclist improvement options, a resource list, and street connectivity.

2. The Safe System Approach

Traffic crashes can irreversibly change the course of human lives, touching victims, their families and loved ones, and society overall. The costs of traffic crashes include substantial economic and societal impacts, such as medical costs, lost productivity, and reduced quality of life. Cities, counties, and tribes need to work to solve the complex problem of traffic safety in their communities to reduce the number injuries and deaths. The Complete Streets Safety Assessment (CSSA) program provides an opportunity to integrate the Safe System Approach (SSA) into programs, policies, and design decisions related to active transportation improvements to address the underlying road safety concerns in communities statewide. Moreover, the goal of a Complete Street is to ensure the safe and adequate accommodation of all road users.

The Safe System Approach to road safety started internationally as part of the Vision Zero proclamation that no one should be killed or seriously injured on the road system.[4, 5] It is founded on the principle that people make mistakes and that the road system should be adapted to anticipate and accommodate human mistakes and the physiological and psychological limitations of humans.[6] The Safe System Approach acknowledges the vulnerability of the human body — in terms of the amount of kinetic energy transfer a body can withstand — when designing and operating a transportation network to minimize serious consequences of crashes and ensures that if crashes occur, they "do not result in serious human injury."[7]

Countries that have adopted the Safe System Approach have had significant success reducing highway fatalities, with reductions in fatalities between 50% and 70%.[8] The Safe System Approach is the foundation for the National Roadway Safety Strategy released by the United States Department of Transportation in 2022. Statewide, the California Office of Traffic Safety and Caltrans have both adopted the Safe System Approach and a Vision Zero goal for road safety planning. The principles and elements of the Safe System Approach can be seen in Figure 2.1.

[4] Johansson, R. (2009). Vision Zero - Implementing a policy for traffic safety. Safety Science, 47, 826-831.
[5] Tingvall, C., & Haworth, N. (1999). An Ethical Approach to Safety and Mobility. Paper presented at the 6th ITE International Conference Road Safety and Traffic Enforcement. 6-7 September 1999, Melbourne, Australia.
[6] Belin, M.-Å., Tillgren, P., & Vedung, E. (2012). Vision Zero - a road safety policy innovation. International Journal of Injury Control and Safety Promotion, 19, 171-179.
[7] World Health Organization (2011). Retrieved on: June 3, 2024 Decade of Action for Road Safety 2011-2020 (PDF).
[8] World Resources Institute (2018). Sustainable and Safe: A Vision and Guidance for Zero Road Deaths. Retrieved on June 3, 2024 https://www.wri.org/publication/sustainable-and-safe-vision-and-guidance-zero-road-deaths
6 World Health Organization (2011). Decade of Action for Road Safety 2011-2020. Retrieved on: June 3, 2024 Decade of Action for Road Safety 2011-2020 (PDF).
7 World Health Organization (2011). Decade of Action for Road Safety 2011-2020. Retrieved on: June 3, 2024 Decade of Action for Road Safety 2011-2020 (PDF).

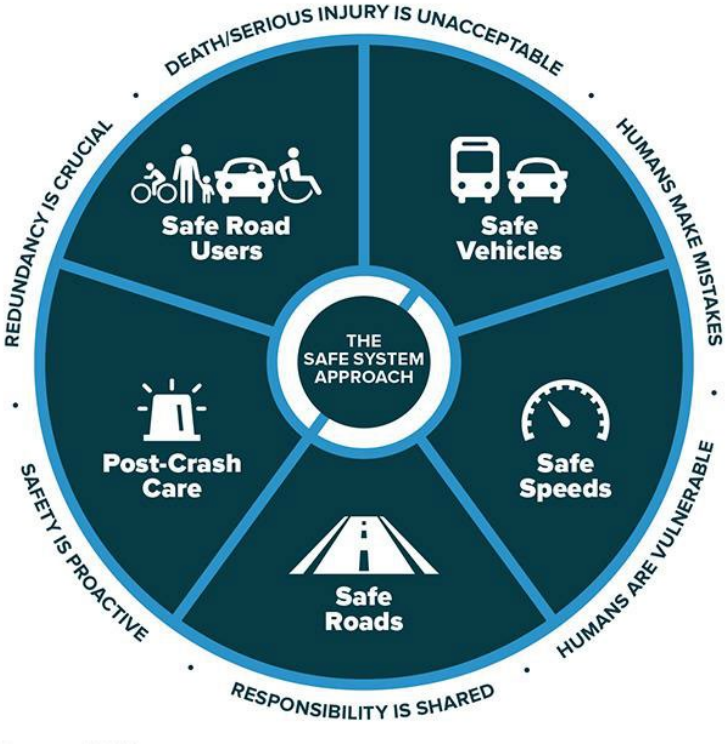


Figure 2.1 U.S. Department of Transportation Safe System Approach Graphic

Preliminary Statewide Integrated Traffic Records System (SWITRS) crash data for 2022 suggests that traffic crashes caused nearly 4,500 preventable deaths and over 200,000 injuries in California. People walking, biking, and rolling are especially vulnerable to death or serious injuries when a crash occurs. Through collective action on the part of all roadway system stakeholders — from traffic engineers, planners, public health professionals, and vehicle manufacturers to law enforcement and everyday users — we can move to a Safe System Approach that anticipates human mistakes, with the goal of eliminating fatal and serious injuries for all road users.

2.1 Influence on Roadway Design and Operation

Kinetic energy has long been identified as the cause of injury, such that if a crash occurs, the peak forces at the point of contact determine the degree of injury.[9] [10] [11] Managing the forces of kinetic energy to a level that the human body can tolerate is critical to the Safe System Approach[12].

[9] Haddon, W. (1980). Advances in the epidemiology of injuries as a basis for public policy. Public Health Reports, 95(5), 411–421.
[10] De Haven, H. (1942). Mechanical analysis of survival in falls from heights of fifty to one hundred and fifty feet. Reproduced in Injury Prevention, 6(1), 62–68 (2000).
[11] Gangloff, A., 2013. Safety in accidents: Hugh DeHaven and the development of crash injury studies. Technol. Cult. 54 (1), 40–61.
[12] Tools like the Safe System Project-Based Alignment Framework developed by the Federal Highway Administration provide practitioners to assess and compare roadway locations and potential improvements through a SSA lens.

In the transportation system, kinetic energy risk is present based on three factors:

1. Exposure: the presence (or potential presence) of two or more users or a user and a fixed object
2. Likelihood: the chance that a conflict occurs between those users/objects based roadway design, intersection control, or other contextual conditions
3. Severity: the intensity of the energy should the conflict occur (driven by speed, mass, and angle), which is not mitigated by other factors (such as in-vehicle occupant protection)

Systemic assessments of roadway networks can identify and proactively address when these risk factors are high, meaning the consequence of a mistake could be severe.

The Institute of Transportation Engineers (ITE) and the Road to Zero Coalition articulate that to anticipate human mistakes, best practices for a Safe System seek to:

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

Recent guidance from the Federal Highway Administration (FHWA) characterizes engineering and infrastructure countermeasures and strategies along a hierarchy to help transportation practitioners prioritize efforts that will facilitate increased application of the Safe System Approach principles as seen in Figure 2.2. Specifically, the Safe System Roadway Design Hierarchy breaks down efforts into four tiers and seeks to: (1) eliminate severe conflicts through physical separation; (2) reducing vehicle speed; (3) manage conflicts in time; and (4) increase attentiveness and awareness.[13] The FHWA further clarifies a combination of strategies from multiple tiers would be the most effective, reinforcing the Safe System principle that redundancy is crucial.

[13] Hopwood, C., Little, K., and D. Gaines. (2024). Safe System Roadway Design Hierarchy: Engineering and Infrastructure-related Countermeasures to Effectively Reduce Roadway Fatalities and Serious Injuries (FHWA-SA-22-069). US Department of Transportation, Washington, D.C.

Figure 2.2: Federal Highway Administration Safe System Roadway Design Hierarchy Graphic

Nearly one in three – 31.7% of the 4,428 – traffic fatalities in California in 2022 was associated with excessive speed or traveling at speeds deemed unsafe for the driving conditions.[14] In 2021 through AB43, California authorized local governments to reduce speed limits on many roads, including state highways, in business and residential areas and other roads identified as "safety corridors" without following the "85th percentile rule" which often caused transportation agencies to raise speed limits. This new authority aligns with the Safe System approach and allows local jurisdictions to target speeds based on user context. Moreover, Caltrans issued Design Information Bulletin (DIB) 94 in 2024 related to "complete streets" which provides local agencies with more flexibility to design context-sensitive facilities to better serve the needs of all travelers, including guidance for selecting treatment tools based on speed and volume context.

For vulnerable users, such as people walking, biking, or otherwise not in a vehicle, speed is a determining factor in survivability. Figure 2.2 depicts how a person's chance of surviving being struck by a vehicle increases from 20% at 40 miles per hour (mph) to 60% at 30 mph to 90% at 20 mph. Moreover, as drivers increase the speed of the vehicle, their peripheral vision narrows. This results in decreased depth perception and a reduced ability to notice others on the road, such as people walking and biking. Reducing speed in the presence of vulnerable users is a key Safe System strategy. Approaches include:

- Physical roadway designs (width, horizontal alignment) to limit speeds;
- Traffic calming treatments that induce slower speeds;
- Traffic signal timing that minimizes high-speed flow; and
- Traditional or automated enforcement[15] that discourages speeding

[14] National Highway Traffic Safety Administration (2023). Traffic Safety Facts: California 2018-2022.
[15] Assembly Bill (AB) 645 was signed into law in October 2023 authorizing six California cities (Glendale, Long Beach, Los Angeles, Oakland, San Francisco, and San Jose) to pilot automated speed cameras for five years.

Figure 2.3 Increasing driver vehicle speed reduces vulnerable road user crash survivability and narrows the driver's field of vision.

Many traffic safety efforts continue to lean on individuals to "do the right thing" to stay safe rather than apply lessons learned from the public health sector to invest in system-wide safety interventions. Ederer (2023) proposed the Safe Systems Pyramid[16], which acknowledges kinetic energy as the root cause of injury and introduces a public health-based intervention framework to address this cause with strategies that require the least individual effort and have the broadest population impact. For example, interventions that require more individual effort (e.g., driver education programs, educational campaigns) have the least impact on improving system-wide safety, and those that change the context of transportation have the largest impacts on safety (e.g., affordable housing near transit, zoning reform). This framework provides guidance when transportation decision-makers cannot do it all, giving priority towards projects and interventions that will most impact safety outcomes.[17]

[16] Ederer, D., Thompson Panik, R., Botchwey, N., & Watkins, K. (2023). Adaptation of the Health Impact Pyramid into the Safe System Pyramid. *Transportation Research Interdisciplinary Perspectives. Vol. 21.* https://doi.org/10.1016/j.trip.2023.100905.

[17] Mitman, M. et al, (2024). Why and How to Focus on Kinetic Energy Risk, *ITE Journal: The Journey to Safer Communities.* 39-45. https://ite.ygsclicbook.com/pubs/itejournal/2024/march-2024/live/index.html#p=38

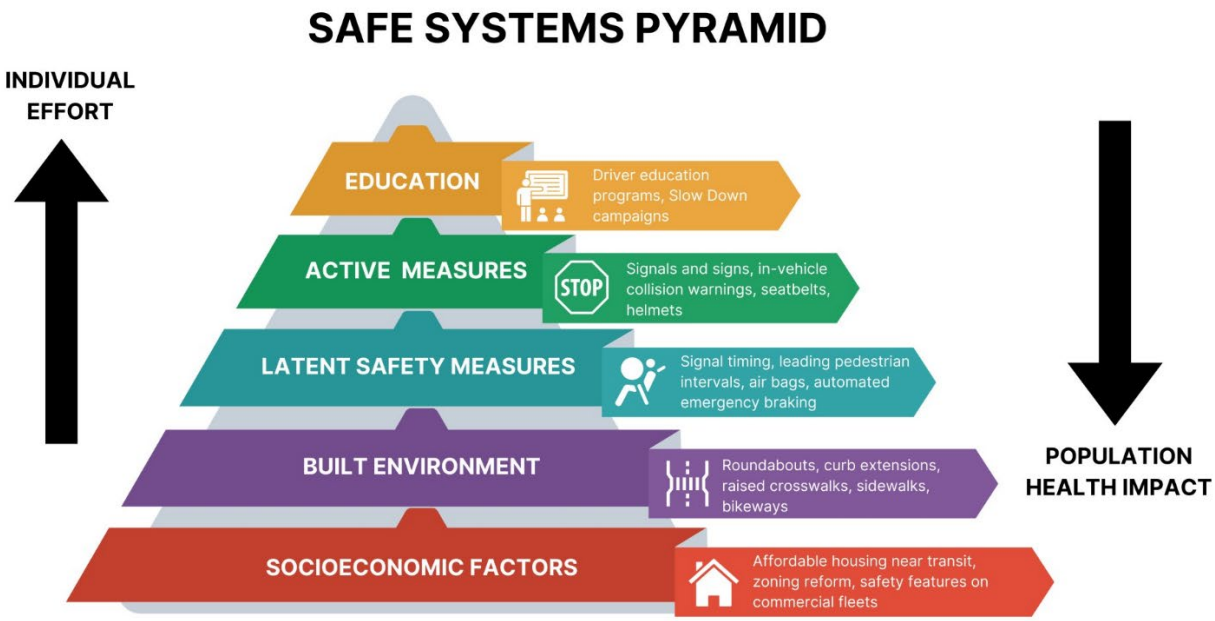


Figure 2.4 The Safe Systems Pyramid

Figure 2.4 Safe Systems Pyramid adapts public health principles, like the Health Impact Pyramid and Hierarchy of Controls, to more fully address roadway safety needs.

Strategies at the base of this pyramid focus on reducing and limiting exposure upstream that affect where, when, and how people enter the transportation system and become exposed to risk. This includes Vehicle Miles Traveled (VMT) mitigation, in terms of both the duration of travel as well as the location and mode. Middle-of-the-pyramid strategies look for opportunities, on top of exposure mitigation, to limit conflicts through the separation of users in space and time, and limit severity through speed management and reduced angles of crashes. Less preferred strategies in this framework focus on educational interventions that are conditional on individual behavior change. In alignment with the SSA, education can be effective when they are combined with efforts from other tiers in the pyramid to strengthen redundancies.

Conventional safety practice is primarily reactive, largely based on data provided to engineers and planners in crash reports. However, the primary purpose of crash reports is to document the moment of the crash and the time immediately preceding it to determine “fault” across the involved parties (such as needed for insurance claims). As such, it shifts the responsibility for the crash to an individual, rather than assessing opportunities to intervene at the system level. The Safe Systems Pyramid recommends focusing on root causes of the crash by considering the W’s of safety:

- Who was involved; what is their personal story?
- Where were they traveling from and to? Why were they on this road?
- Why were they traveling on that day, at that time?
- Why did they use their selected travel mode?
- Why was the road they were traveling on designed the way it is?

Creating a Safe System means shifting a major share of the responsibility from individual road users to those who design the road transport system. "Individual road users have the responsibility to abide by laws and regulations" [18] and do so by exhibiting due care and proper behavior in the transportation system. While road users are responsible for their own behavior, a safe system requires a shared responsibility with those who design, operate, and maintain the transportation network: including the automotive industry, law enforcement, elected officials, and government bodies.[19] In a Safe System, roadway system designers and operators take on the highest level of ethical responsibility to look at crashes holistically and systemically, and recognize that crashes are not only caused by a driver's error.

2.2 Integrating the Safe System Approach into the CSSA

The Safe System Approach involves anticipating human mistakes by designing and managing road infrastructure to keep the risk of mistakes low, and if a mistake does lead to a crash, reducing the impact to the human body, so it does not lead to a fatality or serious injury. The first step in incorporating the Safe System Approach into the CSSA is a benchmarking analysis. The benchmarking analysis, based on the Safe System elements, evaluates the local agency's programs and policies and how their existing efforts incorporating best practices related to access and comfort for people walking and biking compare to national best practices. The aim is to fully institutionalize SSA in the local agency's program, practices, and policies, rather than on a case-by-case basis, and by identifying and removing barriers to its adoption.

The CSSA project identified focus areas (i.e., intersections and corridors) to conduct a comprehensive walk audit based on crash history and conversations with the applicant to understand local safety concerns. During the field assessment, the CSSA project team integrated the Safe System elements into discussions with participants to prompt safety improvements at the study locations, considering the "Ws" of safety noted above.

The CSSA field assessment focuses primarily on infrastructure-related countermeasures, with an emphasis on improving the safety of people walking and biking. Specifically, the CSSA seeks to reduce speeds to a target speed for the road context, separate road users in space and time

[18] World Health Organization (2011). Decade of Action for Road Safety 2011-2020. Retrieved on: June 3, 2024 Decade of Action for Road Safety 2011-2020 (PDF).
[19] World Health Organization (2011). Decade of Action for Road Safety 2011-2020. Retrieved on: June 3, 2024 Decade of Action for Road Safety 2011-2020 (PDF).

for that context, and change road geometry to manipulate crash angles as proactive strategies to address kinetic energy risk for fatal and serious injuries.

This CSSA report compiles considerations for the local agency to institutionalize a Safe System Approach into programs, practices, and policies and to directly apply the SSA lens through field assessments and countermeasure selection.

3. Background on the City of Calabasas

Calabasas is in Los Angeles County with a population of about 22,227 people. The majority of its residents – 74 percent – identified as White and about 9 percent identified as Hispanic or Latino.[20] The median household income in Calabasas in 2022 was $154,079, higher than the statewide median household income of $91,551.[21] The City of Calabasas had an estimated daily vehicle miles traveled on local roads of 159,040 in 2021.[22] The vicinity of Calabasas is shown in Figure 3.1.

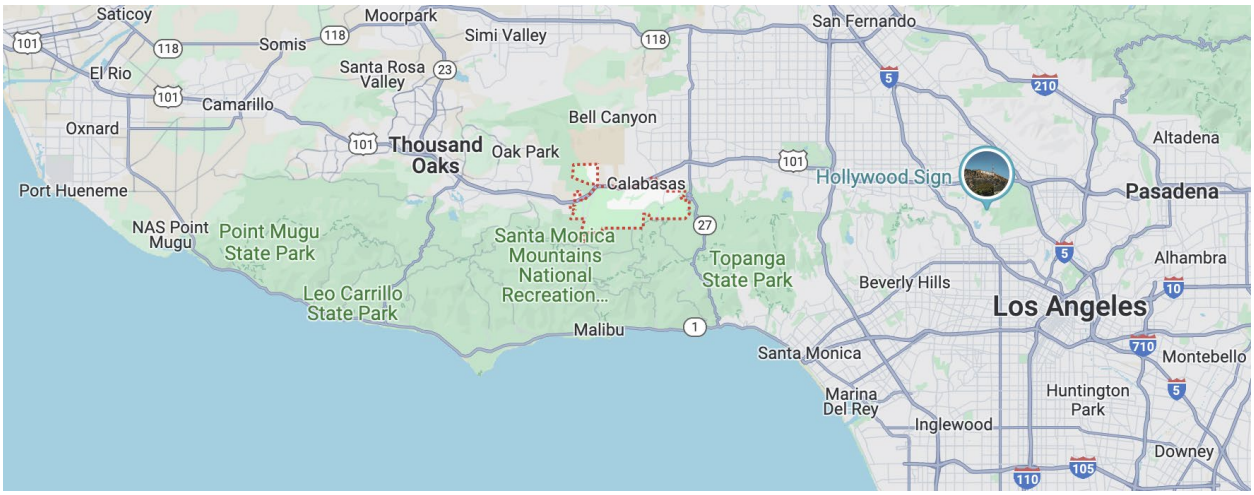


Figure 3.1 Calabasas Vicinity Map

3.1 Overview of Pedestrian and Bicyclist Safety

One of the goals of the Complete Streets Safety Assessments is to make walking and biking safer and more accessible for all residents and visitors in Calabasas. In this section, we provide a summary of traffic crashes by statewide ranking, detailed analyses of crashes involving pedestrians and bicyclists to determine high-risk groups, high-priority locations and behaviors that need to be addressed, when crashes are occurring, as well as discuss the importance of underreported and near-miss crashes.

Office of Traffic Safety Ranking for Pedestrian and Bicycle Crashes

The California Office of Traffic Safety (OTS) maintains crash rankings to facilitate comparison between cities with populations of similar size and to identify and address potential emerging or ongoing traffic safety issues. The rankings are based on the Empirical Bayesian (EB) Ranking Method that gives weights to many different factors, such as population, vehicle miles traveled, and crash counts. Rankings are available for incorporated cities and only include local streets

[20] QuickFacts. United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/
[21] Profiles. United States Census Bureau. Retrieved from https://data.census.gov/profile/
[22] California Office of Traffic Safety. OTS Crash Rankings. Retrieved from https://www.ots.ca.gov/media-and-research/crash-rankings/.

and state highways within the city limits. Counties are also assigned a statewide ranking. Data for the OTS rankings are taken from the Statewide Integrated Traffic Records System (SWITRS), the California Department of Transportation, and the California Department of Finance. The most current OTS statistics (2021) grouped Calabasas within group E, as compared to 101 cities in California with a population between 10,001-25,000.

OTS crash rankings are only indicators of potential problems, and there are many external factors that may either understate or overstate a city's ranking. Per the OTS rankings, in 2021, Calabasas was ranked 34 out of 101 cities of similar population size for people killed or injured in a traffic crash (with a ranking of "one" indicating the worst). For pedestrians and bicyclists killed or injured in a crash, Calabasas ranked 76/101 and 32/101, respectively. Calabasas ranked 19/101 for alcohol-related crashes, with similar rankings for drinking related crashes for drivers under age 21 and drinking-related crashes for drivers ages 21 to 34. For nighttime (9 p.m. – 2:59 a.m.) crashes, Calabasas ranked 19/101. Calabasas ranked 48/101 for speed related crashes and 46/101 for DUI arrests.

3.2 Pedestrian and Bicycle Crash Data

Crash data is vital to compete for funding at the state and federal levels to implement safety improvements. SWITRS, maintained by the California Highway Patrol, is the state's official traffic records database. It captures reported crashes that resulted in injury or death. The 2022-2023 SWITRS data used is provisional as of May 2024 and subject to change before it is finalized. The CSSA project team retrieved SWITRS crash data for Calabasas from the Transportation Injury Mapping System (TIMS) database for 2019 through 2023. TIMS is a tool developed by SafeTREC to provide quick, easy, and free access to SWITRS which has been geo-coded by SafeTREC to make it easy to map crashes. The data presented below includes police-reported crashes that occurred within the city limits. Note that two of the reported crashes occurred within city limits on or near ramps of US-101 and therefore may be under the jurisdiction of Caltrans and not of the city.

In the five-year period 2019 to 2023, there were 19 crashes involving pedestrians and bicyclists in Calabasas, including one fatal crash and two serious injury crashes. Of these 19 crashes, one crash occurred on a state road.

Pedestrian Crashes

From 2019 to 2023, there were eight crashes involving pedestrians in Calabasas. Among the nine victims of these pedestrian crashes, there was one person killed and one person seriously injured. The majority of pedestrian crashes resulted in minor injury[23] with 75% of total crashes.

About half, 56%, of pedestrian crash victims were male. Age demographics of pedestrian crash victims varied, including two victims 14 or younger. The top Primary Collision Factor (PCF)

[23] Minor injury is the sum of two victim degree of injury categories: suspected minor injury and possible injury.

violations include pedestrian right of way (63%), pedestrian violation (25%), and unsafe starting or backing (12%).

Figure 3.2 shows the spatial distribution of pedestrian crashes by severity. Due to the low number of fatal and serious injury crashes, no pattern appears in crash distribution. The one fatal pedestrian crash occurred on US-101 southbound, a state-owned highway, and Las Virgenes Canyon Road. It is unclear if this crash occurred on US-101, on a US-101 ramp, or near a US-101 ramp. If the crash occurred on US-101 or on a US-101 ramp, Caltrans has jurisdiction over those roads and not the City of Calabasas. The one serious injury pedestrian crash occurred at Park Granada & Parkway Calabasas.

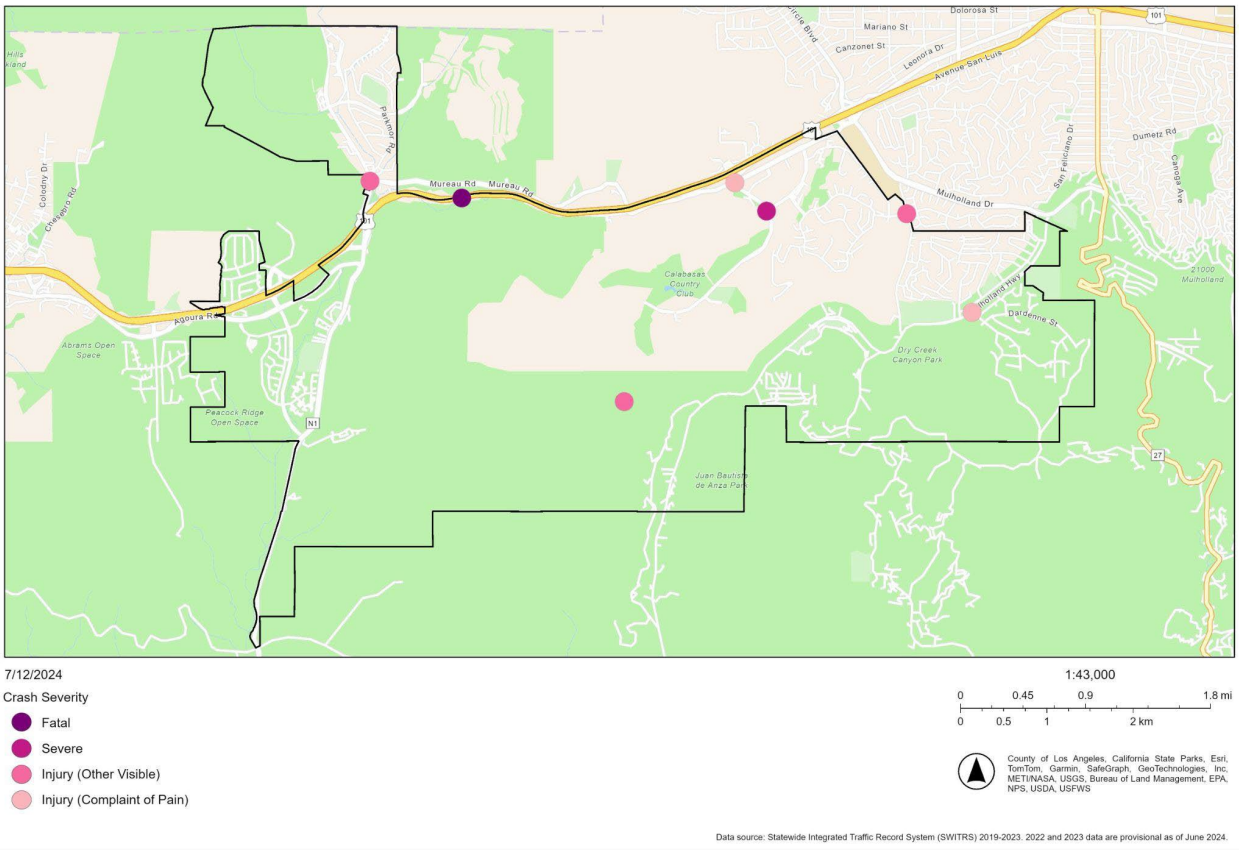


Figure 3.2 Map of Pedestrian Crashes in Calabasas (2019-2023)

Figure 3.3 and Figure 3.4 show an analysis of pedestrian-related crashes in Calabasas. Figure 3.3 shows the distribution of when pedestrian crashes occurred. The majority of crashes occurred in the window of 6 a.m. – 9 a.m. Monday to Wednesday, or 3 p.m. – 6 p.m. Wednesday and Thursday. Due to a limited number of pedestrian crashes, it is difficult to determine a pattern. The majority of crashes occurred in the dark with 50% of pedestrian crashes occurring in the dark with no streetlights and 13% occuring in the dark with street lights not functioning. The remaining 38% of crashes occurred in daylight.

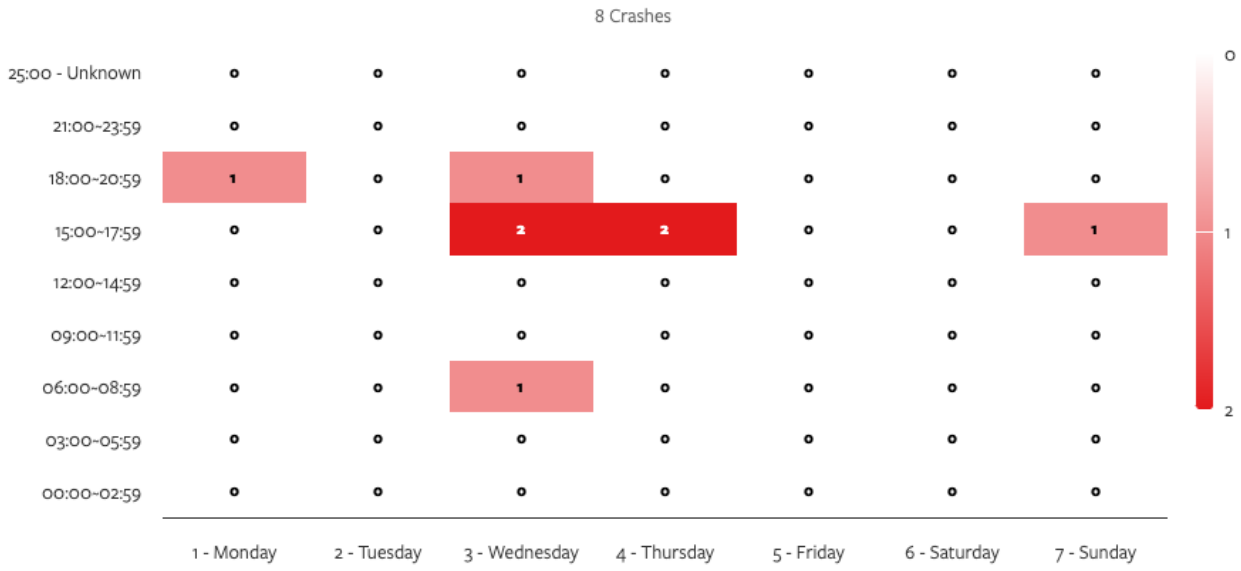


Figure 3.3 Pedestrian Crashes by Day of Week and Time of Day in Calabasas (2019-2023)

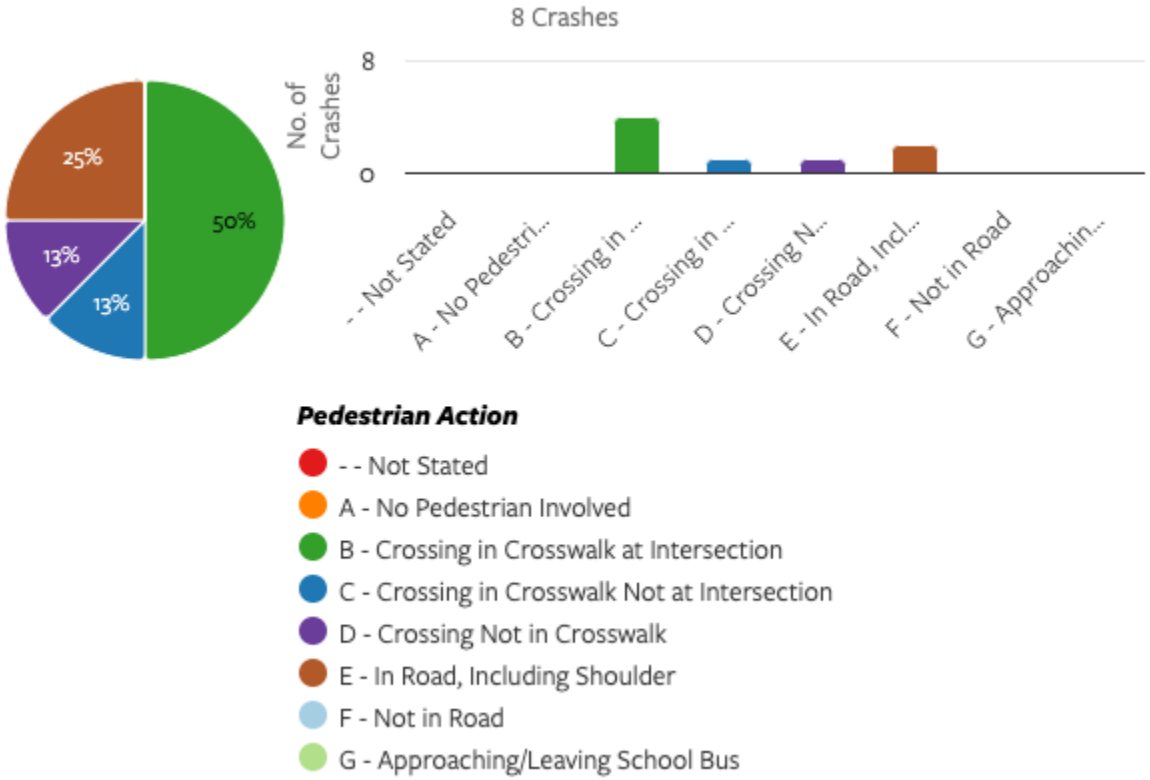


Figure 3.4 Pedestrian Crashes by Pedestrian Action in Calabasas (2019-2023)

Figure 3.4 shows the distribution of where pedestrian crashes occurred. The majority of pedestrian crashes, 75%, occurred when crossing the road with four crashes happening when the pedestrian was crossing an intersection in the crosswalk. The remaining 25% of crashes occurred in the road, including the shoulder.

Bicycle Crashes

Within the five-year period of data analyzed from TIMS, 11 crashes involving bicyclists occurred in Calabasas. Among the 11 victims of these bicycle crashes, there was no one killed and one person seriously injured. The majority (91%) of bicycle crashes resulted in minor injury[24]. The ages of bicycle crash victims varied, with one school-aged student between age 15 and 19. Of bicycle crash victims, 82% were male. The top Primary Collision Factor (PCF) violations were improper turning (50%) followed by unsafe speed (20%).

Figure 3.5 shows the spatial distribution of bicycle crashes by severity. A serious injury bicycle crash occurred at Calabasas Road & Parkway Calabasas, at the northern border of Calabasas. Bicycle crashes were clustered along major arterials including Mulholland Highway (four crashes), Calabasas Road (one crash), Las Virgenes Road (one crash), and Lost Hills Road (one crash).

[24] Minor injury is the sum of two victim degree of injury categories: suspected minor injury and possible injury.

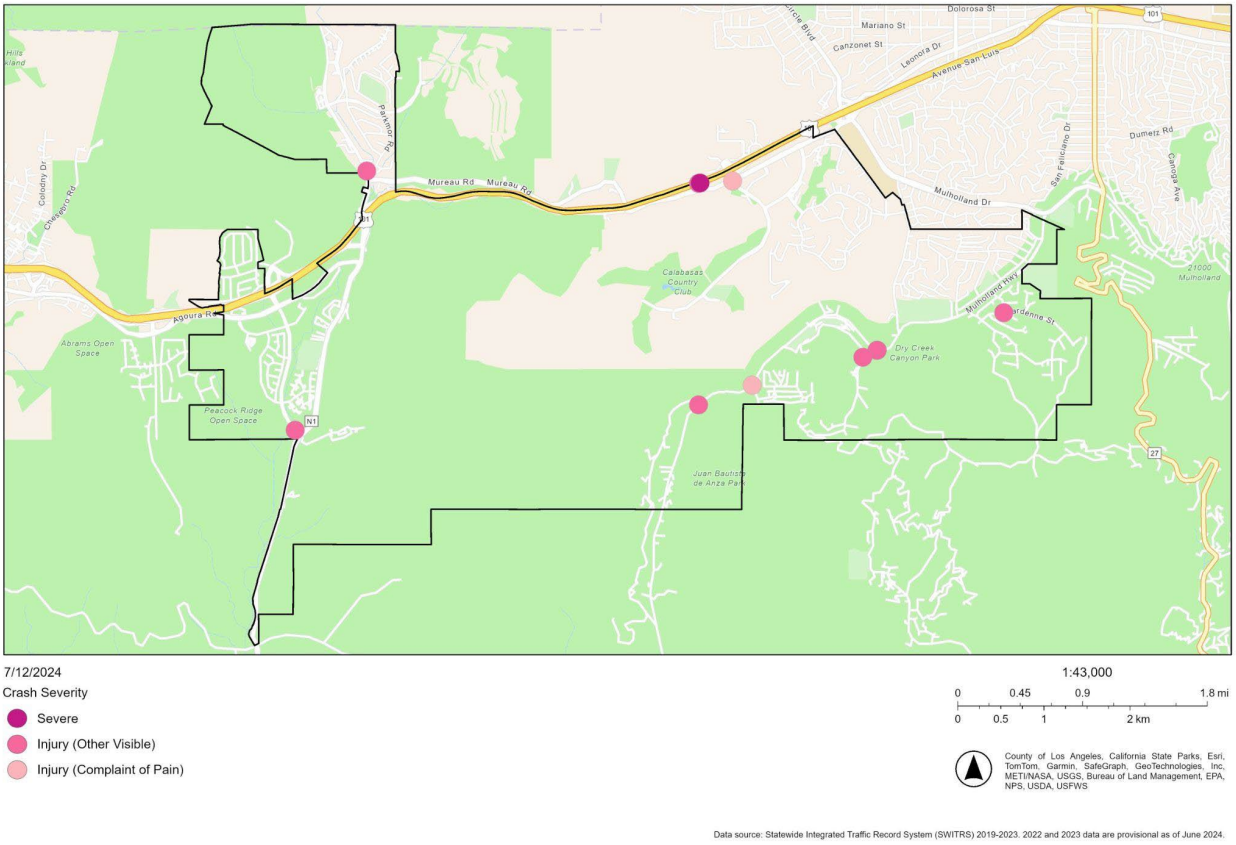


Figure 3.5 Map of Bicycle Crashes in Calabasas (2019-2023)

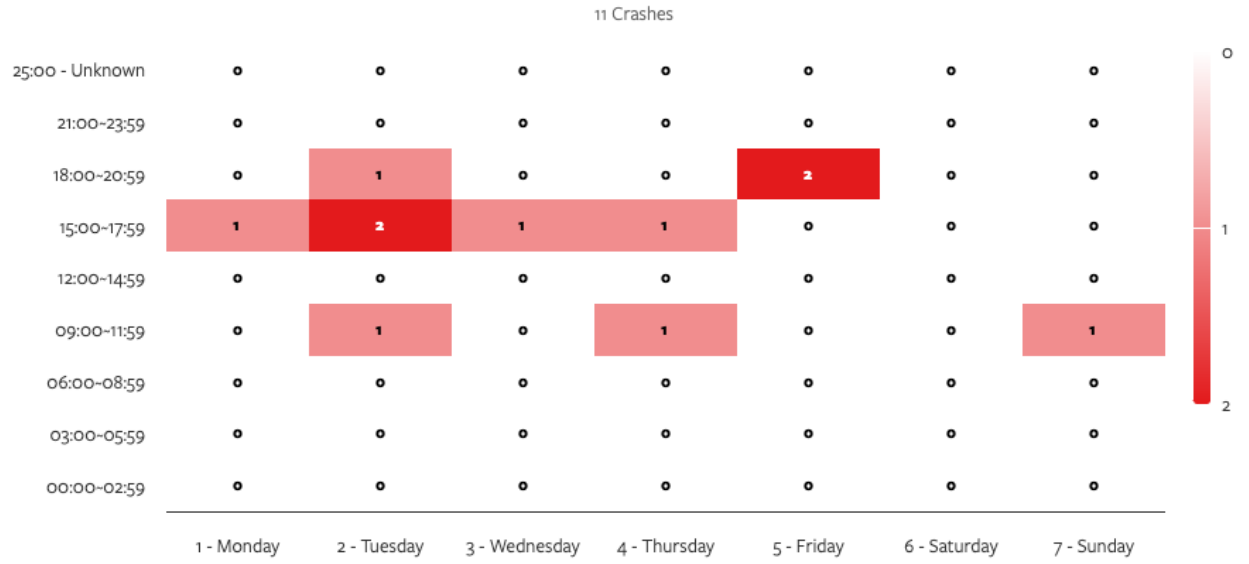


Figure 3.6 Number of Bicycle Crashes per Day of Week per Time in Calabasas (2019-2023)

Figure 3.6 shows the distribution of when bicycle crashes occurred. The majority of crashes occurred in the window of 3 p.m. – 6 p.m. Monday to Thursday, with the highest number of crashes occurring Tuesday between 3 p.m. and 6 p.m. and Friday between 6 p.m. and 9 p.m. Out of the 11 bicycle crashes, 10 occurred in daylight and one occurred in the dark in areas with street lights.

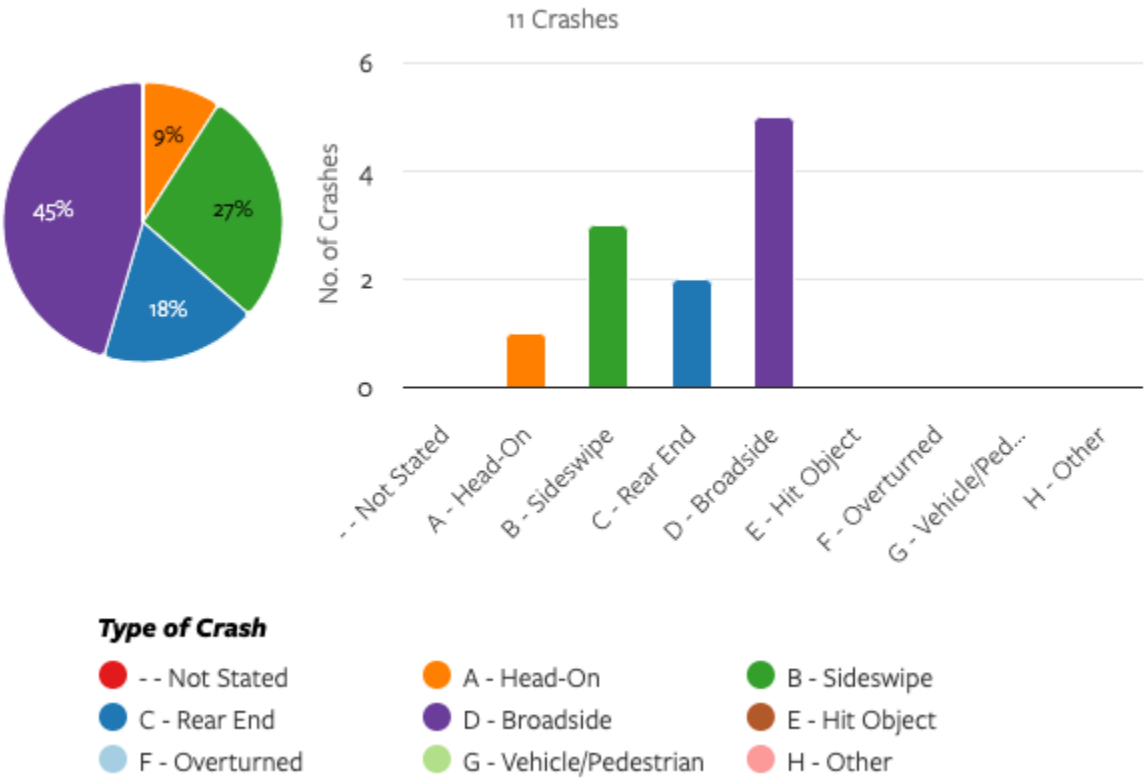


Figure 3.7 Number of Bicycle Crashes by Type of Crash in Calabasas (2019-2023)

Figure 3.7 shows the distribution of types of bicycle crashes that occurred. Approximately 45% of bicycle crashes were broadside crashes, 27% occurred from a sideswipe, and 8% occurred from a rear-end crash.

3.3 Areas of Focus

The areas of focus for the Calabasas CSSA study include the intersections and approaches of Calabasas Road at Parkway Calabasas and at the US-101 Freeway, and the intersections and approaches of Mulholland Highway at Paul Revere Drive and at Eddingham Avenue.

Pedestrian Crashes in and around the Study Focus Areas

Figures 3.8 and 3.9 depict the pedestrian crashes that happened in the focus areas of this study.

Figure 3.8 depicts one serious pedestrian crash at Parkway Calabasas & Park Granada, and one injury crash at Calabasas Road & Parkway Calabasas.

Figure 3.9 depicts one injury crash at Eddingham Avenue & Mulholland Highway.

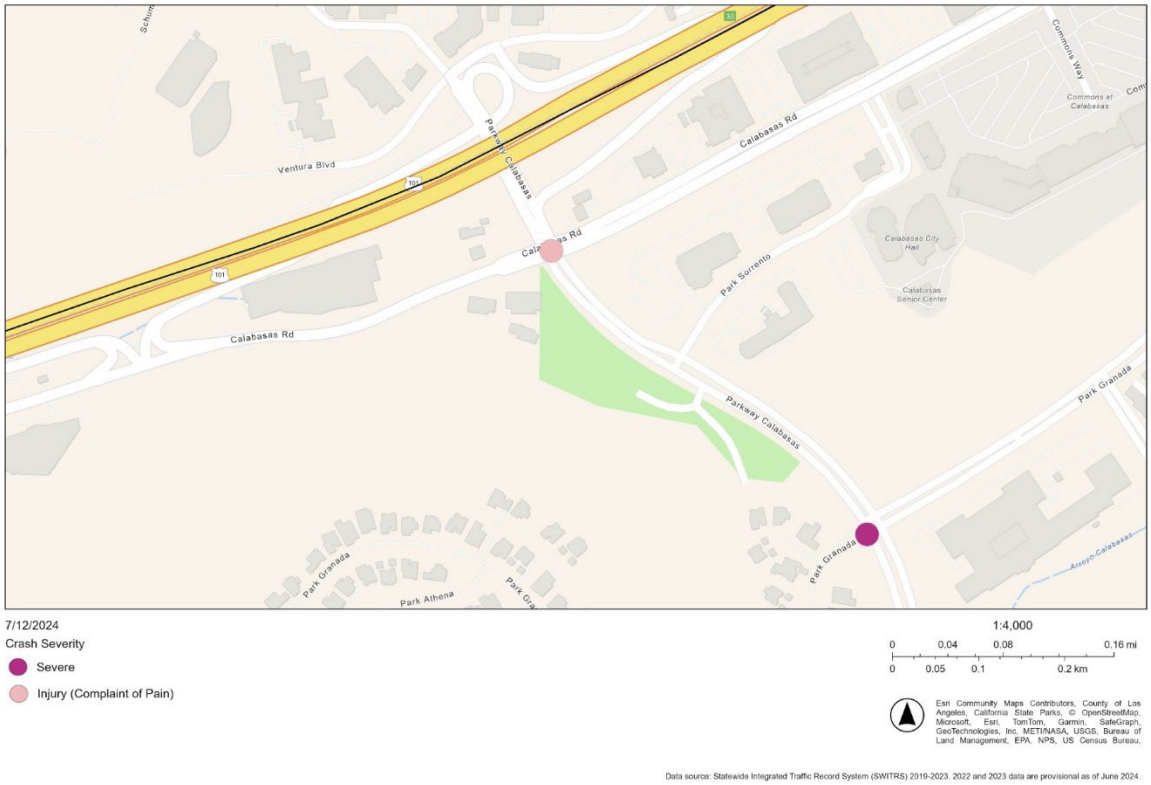


Figure 3.8 Pedestrian Crashes in and around Focus Areas of US-101 and Parkway Calabasas (2019-2023)

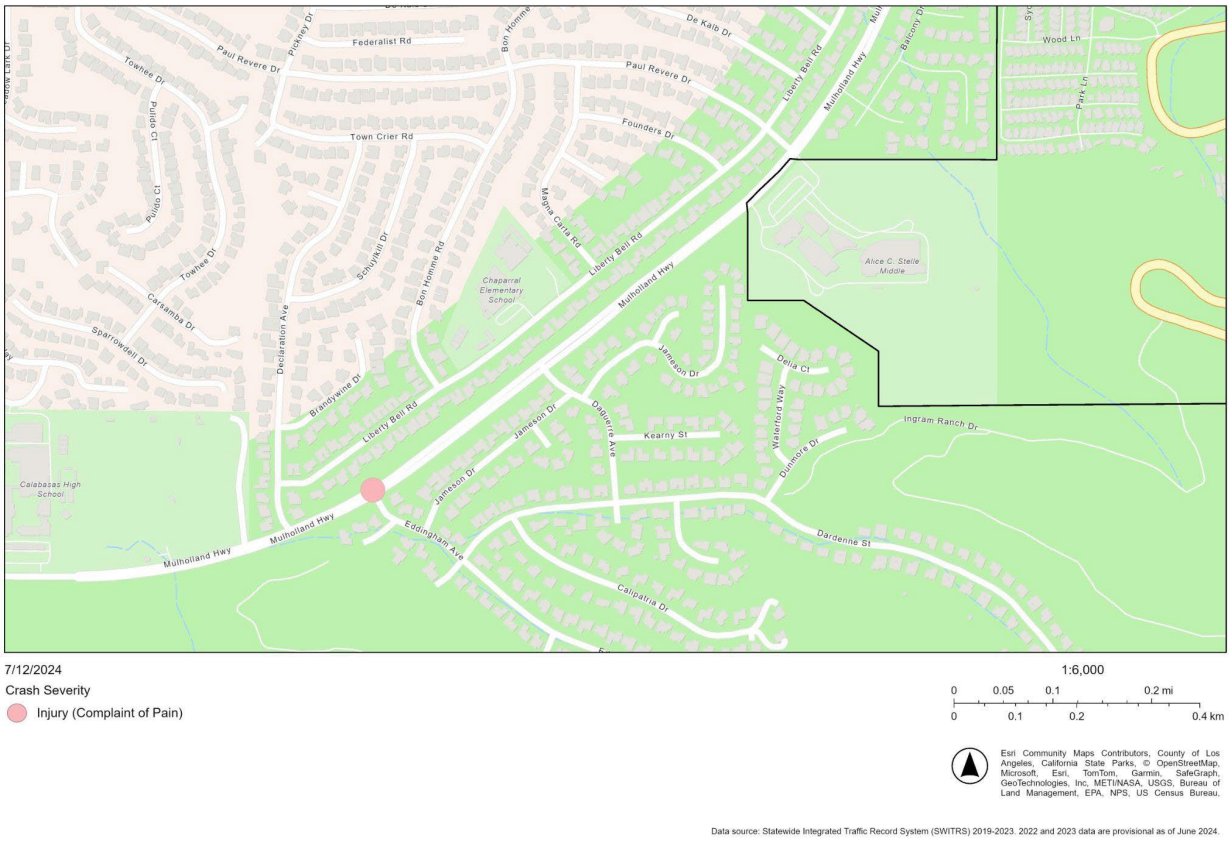


Figure 3.9 Pedestrian Crashes in and around Focus Areas of Paul Revere Drive & Eddingham Avenue (2019-2023)

Bicycle Crashes in and around the Study Focus Areas

Figure 3.10 and 3.11 depict the bicycle crashes that happened in the focus areas of this study between 2019 and 2023.

Figure 3.10 shows one serious injury crash and one injury crash at the Calabasas Road & US-101 Onramp, where Caltrans has jurisdiction and not the City of Calabasas. The serious injury pedestrian crash occurred at the intersection of Park Granada & Parkway Calabasas.

Figure 3.11 shows no bicycle crashes on focus corridors. There was one bicycle crash on Daguerre Avenue & Dardenne Street, near the focus area.

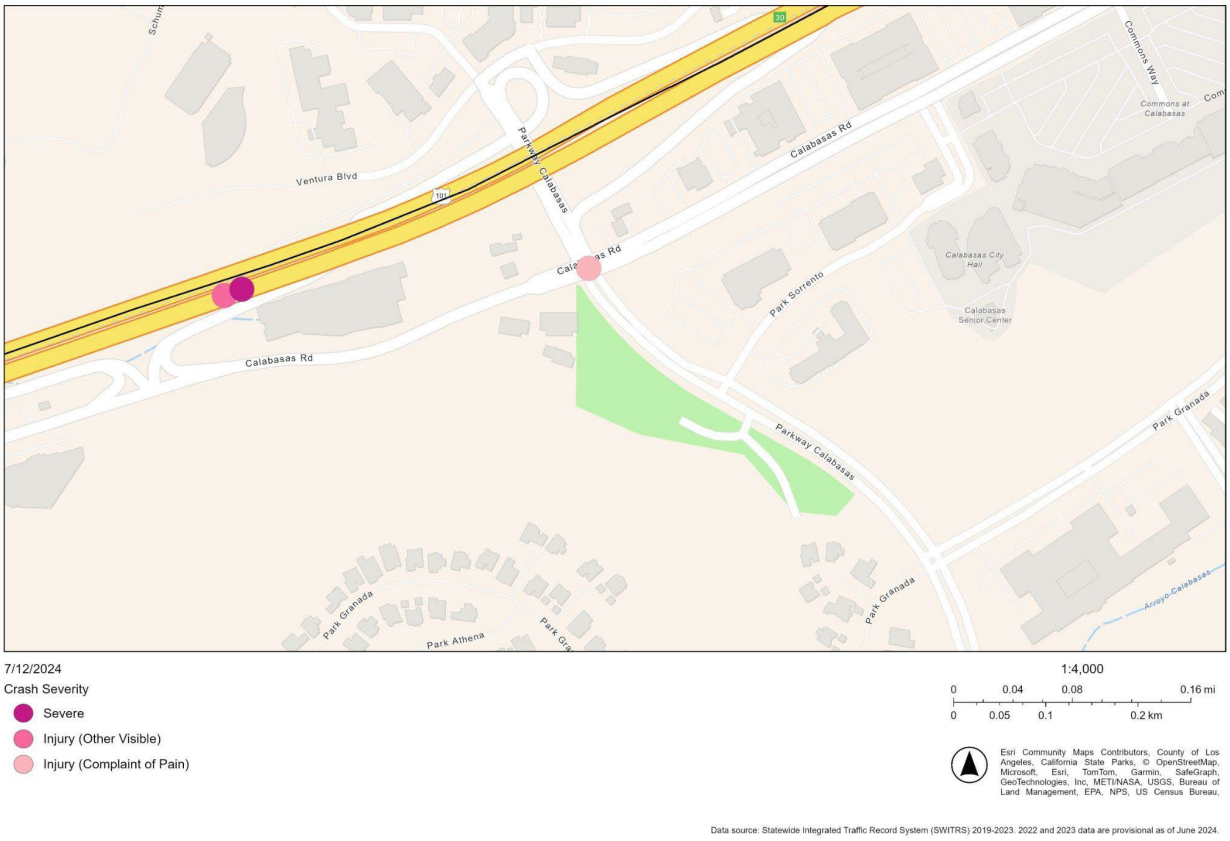


Figure 3.10 Bicycle Crashes in and around Focus Areas of US-101 & Parkway Calabasas (2019-2023)

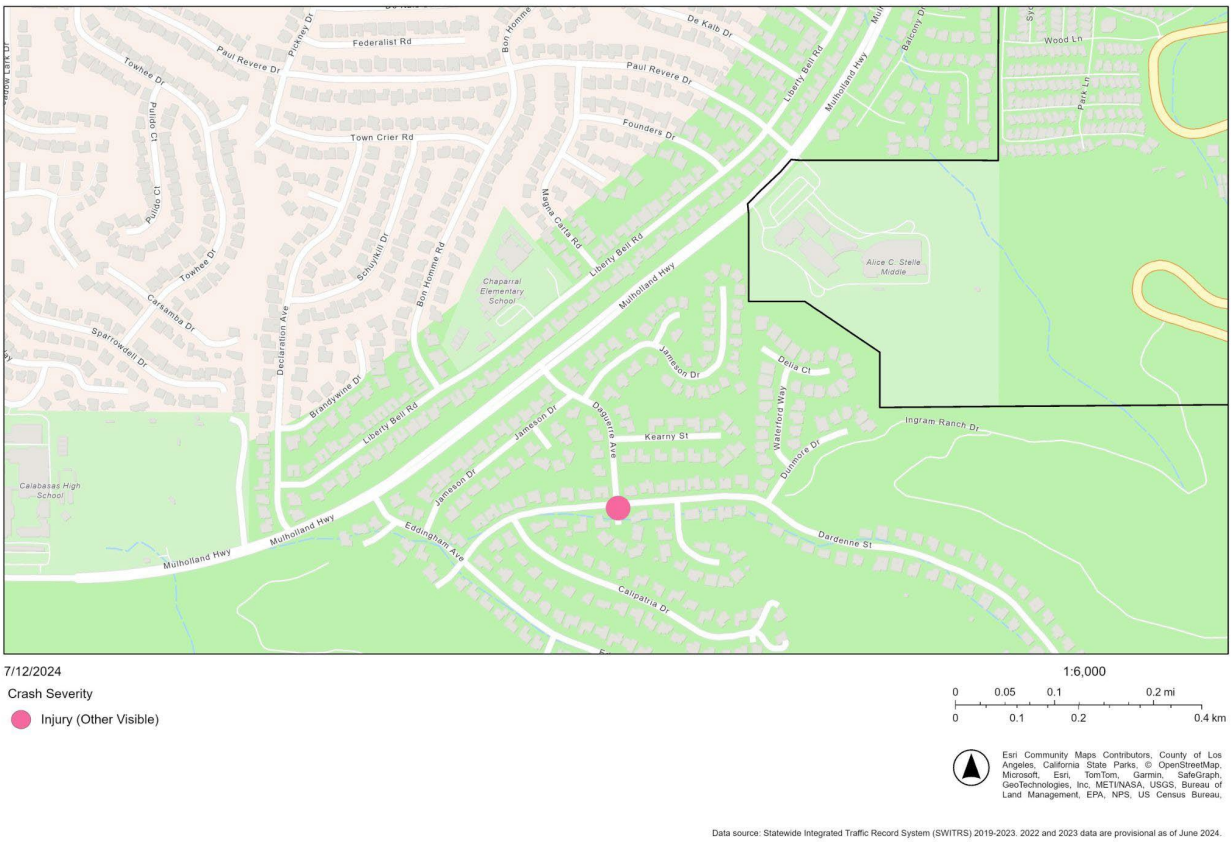


Figure 3.11 Bicycle Crashes in and around Focus Areas of Paul Revere Drive & Eddingham Avenue (2019-2023)

3.4 Street Story

Despite our best efforts, pedestrian and bicycle crash underreporting is common. Research suggests that a crash is less likely to be reported if there is no injury, little property damage, or only one party is involved.[25, 26, 27] Street Story (https://streetstory.berkeley.edu/) is a crowdsourced community engagement tool developed by UC Berkeley SafeTREC that allows residents, community groups, and agencies to collect information about traffic crashes, near-misses, general hazards, and safe locations to travel. Once a record has been entered, the information is added to a map and aggregate table of publicly accessible data.

[25] Stutts, J.C. and W.W. Hunter (1998). Police reporting of pedestrians and bicyclists treated in hospital emergency rooms. Transportation Research Record J. Transportation Research Board. 1998 (1635), 88-92. Available at: https://safety.fhwa.dot.gov/ped_bike/docs/00144.pdf.

[26] Sciortino, S. et al (2005). San Francisco pedestrian injury surveillance: mapping, ,under-reporting, and injury severity in police and hospital records. Accident Analysis & Prevention, 37(6), 1102-1113. doi: 10.1016/j.aap.2005.06.010.

[27] Loo, B.P. and K. Tsui (2007). Factors affecting the likelihood of reporting road crashes resulting in medical treatment to the police. Injury Prevention, 13(3), 186-189. doi: 10.1136/ip.2006.013458

Staff can use this free tool to collect information from residents for local needs assessments, transportation safety planning efforts, safety programs, and project proposals.

Jurisdictions can create custom boundaries through the Street Story tool to collect data for local needs assessments or to support local traffic safety planning efforts, safety programs, and project proposals. At the time of this report, 0 reports were input in Street Story for Calabasas.

4. Benchmarking Analysis Results and Recommendations

To assess pedestrian and bicycle safety conditions in Calabasas, the CSSA team conducted a benchmarking analysis to understand how the site's existing conditions compares to current national best practices, including consistency with the Safe System approach. Through a holistic view of first anticipating human mistakes and keeping impact energy levels to the human body at tolerable levels, the Safe System Approach aims to eliminate fatal and serious injuries for all road users.[28]

An electronic questionnaire was sent to the CSSA site's staff with an optional interview. Their responses are denoted by the yellow fill in the benchmarking matrix seen in Tables 4-1 through Table 4-5. The benchmarking questionnaire was separated into five categories:

- Enhancing Safety through Accessibility
- Policies and Programs
- Safety Data Collection and Assessment
- Pedestrian and Bicycle Network Planning and Design
- Pedestrian and Bicycle Support Programs

Each benchmarking category addresses one or more of the Safe System Approach elements (Safe Road Users, Safe Vehicles, Safe Speeds, Safe Roads, and Post-Crash Care) while also incorporating best practices related to access and comfort for people walking and biking. Suggestions for better aligning each topic with best practice benchmarks are also noted for the the City of Calabasas' consideration.

The CSSA team compared staff's benchmarking questionnaire responses for each category against national best standards. The CSSA team also reviewed the city's website and relevant documents to identify the city's pedestrian and bicycle policies, programs, and practices. Based on these findings, the CSSA team assigned one of three ratings to each category:

- Exceeds national best practices;
- Meets national best practices; or
- Does not meet national best practices.

The CSSA team did not assign a rating if the city did not provide a response to a question.

[28] Goughnouor, E. et a. (2021). Primer on Safe System Approach for Pedestrians and Bicyclists. FHWA-SA-21-065. = Federal Highway Administration, Washington, D.C. Available at: https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa21065.pdf.

Suggestions are provided for each category. However, the City of Calabasas has differing physical, demographic, and institutional characteristics that may make certain goals or policies more appropriate in some jurisdictions compared to others. Ultimately, City of Calabasas staff may determine where resources and efforts are best placed for meeting local development and infrastructure goals for pedestrians and bicyclists.

4.1 Enhancing Safety through Accessibility

In order to improve traffic safety, it is important to consider the needs of all road users. This may include removing obstacles that prevent people with disabilities from traveling safely and comfortably by separating users in time and space, designing road networks to make road users more visible, or improving driver education and vehicle technologies. Key areas to consider in this category are safe road users and safe roads.

Table 4.1 Benchmarking Analysis for Enhancing Safety through Accessibility

Benchmarking Topic	Exceeds National Best Practices	Meets National Best Practices	Does Not Meet National Best Practices
1. Implementation of Americans with Disabilities Act (ADA) Improvements	Uses Public Right-of-Way Accessibility Guidelines (PROWAG) for ADA improvements with consistent installation practices	Has clear design guidelines but no regular practices for ADA compliance	Has minimal design guidelines and practices related to ADA requirements
2. ADA Transition Plan for Streets and Sidewalks	Has an ADA transition plan in place and an ADA coordinator	Partial or outdated ADA transition plan or an ADA coordinator	No transition plan or ADA coordinator

4.1.1 Implementation of Americans with Disabilities Act (ADA) Improvements

Implementation of ADA improvements is key to making walking accessible and safe for everyone, regardless of ability or age. U.S. Access Board Public Right-of-Way Accessibility Guidelines

Suggestions for Potential Improvement

- Continue adding ADA ramps at intersections that currently lack them and upgrade non-compliant ramps.
- Develop an ADA improvement program for items such as dual curb ramps, truncated domes, and audible pedestrian signals that apply consistent treatments. The program may provide an inventory, prioritization plan, and funding source for such improvements.

- Consider contracting with grant application and management consultant to help research, apply for, and manage grants for ADA improvements.

4.1.2 ADA Transition Plan for Streets and Sidewalks

ADA Transition Plans identify gaps and issues in the city's current ADA infrastructure, prioritize projects for implementation, and set forth the process for bringing public facilities into compliance with ADA regulations. Transition Plans typically include a range of locations, such as public buildings, sidewalks, ramps, and other pedestrian facilities. Some cities also have ADA Coordinators, who are responsible for administering the Plan and reviewing projects for accessibility considerations.

The City of Calabasas submits an ADA Annual Certification Form to Caltrans.

Suggestions for Potential Improvement

- Consider prioritizing sub-areas within the city that exhibit the greatest pedestrian activity.
- Expand the ADA Transition Plan to include the public right-of-way, particularly the downtown area, other priority development areas, bus stops, and schools.
- Consider having a part-time, trained ADA coordinator to review projects for accessibility and implement the ADA Transition Plan.
- Provide ADA standards and best practice training for engineering staff at all levels.
- Ensure safety for all users is prioritized and accessibility is maintained during construction and road maintenance projects. It is vital to ensure that dedicated space is maintained for vulnerable users during construction and road maintenance projects.
- Create a policy that details how to maintain accessibility and provide designated space for pedestrians and bicyclists through a Construction Management Plan (CMP).

4.2 Policies and Programs, Safety Implementation Plans and Policies

Policies, programs, and plans play a critical role in keeping people safe on California roadways. Collectively, they signal a proactive approach to identifying risks and strategies to mitigate them. Key areas to consider in this category are safe road users, safe roads, and safe vehicles.

Table 4.2 Benchmarking Analysis for Policies and Programs, Safety Implementation Plans and Policies

Benchmarking Topic	Exceeds National Best Practices	Meets National Best Practices	Does Not Meet National Best Practices

1. Transportation Advisory Committee	Has a formal, active/ on-going Transportation Advisory Committee guided by a charter or mission that includes the safety of vulnerable road users and whose activities focus on improving pedestrian and bicycle safety.	Has an ad-hoc Transportation Advisory Committee or one not guided by a charter or mission that specifically includes safety of vulnerable road users. Note: City's Planning Commission may act as Transportation Advisory Committee	Does not have a Transportation Advisory Committee
2. Traffic Calming or Speed Management Program	Has a speed management program that is reviewed annually alongside the CIP project list. Major arterials and neighborhood corridors include proactive speed management strategies and countermeasures are implemented to reach safe target speeds.	Has a traffic calming program but funding and implementation of countermeasures are ad-hoc and reactive.	Explores traffic calming features other than speed humps. Does not have a traffic calming or speed management program
3. Speed Limit Setting	Regularly surveys speed and identifies locations with high deviation from target speeds. The agency uses best practices for speed management in combination with allowances from AB 43 to lower speed limits. Lower speed limits are implemented using a consistent approach that prioritizes areas with historic underinvestment. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB43	Seeks to include 15 mph speed limits in school zones or commercial corridors.	Continues to use the 85th percentile to set speed limits.

4. Safe Routes to Schools	Has an ongoing Safe Routes to Schools program that is included as part of the agency's safety monitoring and is integrated with other policies and programs.	Has obtained funding for recent projects but has no communitywide Safe Routes to Schools program.	Does not have a Safe Routes to Schools program and has not obtained recent funding.
5. Systemic Signalized Intersection Enhancements	Has a systemic signalized intersection enhancement program that follows a Safe System-based framework and proactively implements FHWA's Proven Safety Countermeasures to manage speed and crash angles and to consider risk exposure.	Reactively implements Proven Safety Countermeasures at signalized intersections.	Does not routinely implement proven safety countermeasures (LPIs, protected left turns, roundabouts, medians, countdown signals, etc.) at signalized intersections.
6. Systemic Enhancements for Unsignalized and Uncontrolled Crossings	Has a crosswalk enhancement program that proactively implements a Safe Transportation for Every Pedestrian (STEP)-consistent countermeasure at uncontrolled crossings.	Has a crosswalk policy that is STEP-consistent but is only reactive to implementing Proven Safety Countermeasures.	Does not have a policy or set practices for addressing crosswalk installation or enhancements using Proven Safety Countermeasures.
7. Safe System Policy	Has a Safe System policy with redundancy built in for transportation projects with a checklist for the full set of incorporation of the Safe System elements. The policy includes all users and modes, affects new construction and maintenance, considers local context, and provides guidance for implementation.	Has a Safe System policy, but does not identify how redundancy can be incorporated through the Safe System elements.	Does not have a Safe System policy.

4.2.1 Transportation Advisory Committee

Advisory committees serve as important sounding boards for new policies, programs, and practices. Responding to public concerns through public feedback mechanisms represents a more proactive and inclusive approach to bicycle and pedestrian safety compared with a conventional approach of reacting to crashes.

The City of Calabasas has a Traffic and Transportation Commission, which is formally established by ordinance and is advisory to the City Council and staff on matters related to traffic and transportation.

Suggestions for Potential Improvement

Enhance the Traffic and Transportation Commision's role as it related to active transportation and overall traffic safety. 4.2.1 Traffic Calming or Speed Management Program

Traffic calming programs and policies set forth a consensus threshold for neighborhood requests and approvals, as well as standard treatments and criteria.

Suggestions for Potential Improvement

- Increase the amount of dedicated funding available for traffic calming each year.
- Expand the city's traffic calming toolbox to include other tools, such as raised crosswalks, raised intersections, chicanes, and traffic diverters. The city should review their speed management program annually alongside the CIP project list to identify major arterials and neighborhood corridors for proactive speed management.
- Expand the city's practices to include proactive traffic calming measures instead of only responding to community requests. The city could consider allocating a portion of funding to proactive traffic calming, such as on bicycle boulevard streets or safe routes to schools, and then allocate the remaining funding to react to specific community requests.
- The following resources offer traffic calming best practices:
    - Traffic Calming to Slow Vehicle Speeds | US Department of Transportation
    - Traffic Calming Guidelines from the City of Danville (PDF)
    - Neighborhood Traffic Management Program from the City of Anaheim
    - ITE Technical Resources — Traffic Calming Measures:

4.2.3 Speed Limit Setting

Agencies should regularly survey speeds and identify locations with high deviations from target speeds. Local municipalities use best practices for speed management from AB 43 to lower speed limits. Implementing lower speed limits is accomplished by using a consistent approach that prioritizes areas with historic underinvestment.

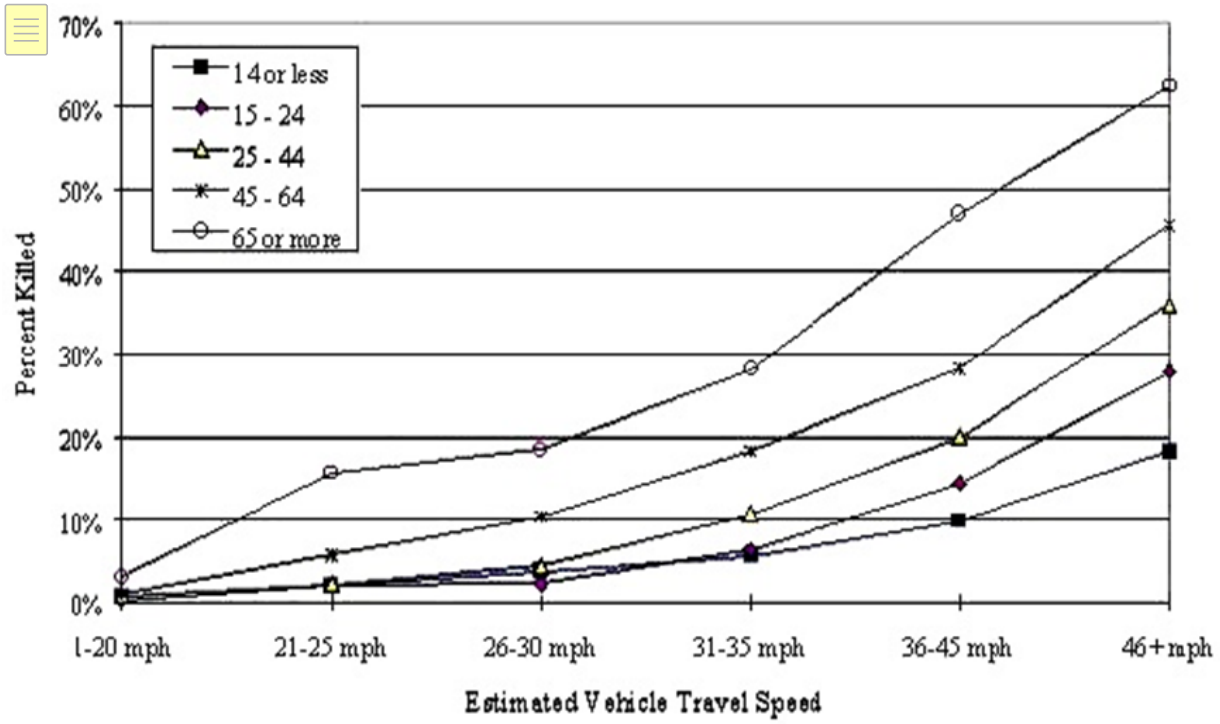


Figure 4.1 Relationship between Vehicle Speed, Victim Age, and Fatalities

Suggestions for Potential Improvement

- Install traffic calming measures, signal coordination, and similar tools to maintain slower speeds appropriate for an urban community, particularly on streets that will be reviewed in the next speed survey.
- After complete streets improvement and other safety measures are installed, conduct off-cycle speed surveys to review the speed limit and determine whether it needs to be reduced based on the improvements.
- Consider pedestrian volumes and known complete streets safety issues when setting speed limits and employ traffic calming strategies in locations where speed surveys suggest traffic speeds are too high for pedestrian and bicyclist safety.
- Ensure complete streets design standards have appropriate target design speeds for urban areas and do not contribute to a routine need for traffic calming.
- Consider the use of 15 MPH school zones.
- Update a Complete Streets policy and/or design standards to reflect teh new speed management policies.
- Additional information on AB 43, such as San Francisco's Speed Limit Setting in Business Districts: News Release: San Francisco Lowers Speed Limits in Targeted Business Districts Under New State Law

4.2.4 Safe Routes to Schools

Safe Routes to School (SRTS) programs encourage children to safely walk or bicycle to school. The Marin County Bicycle Coalition was an early champion of the concept, which has spread nationally (refer to best practices at https://www.saferoutesinfo.org). SRTS programs are important both for increasing physical activity (and reducing childhood obesity) and for reducing morning traffic associated with school drop-off (as much as 30% of morning peak hour traffic).

Suggestions for Potential Improvement

- Form an ongoing steering committee for the program (or each school) composed of city staff, school district staff, PTA leaders, and other stakeholders that meet regularly to monitor efforts and identify new opportunities.
- Consider a safe routes to school plan for all schools that are integrated with other policies and programs to conduct walk audits, identify recommended safety improvements, and secure funding for those improvements.

4.2.5 Systemic Signalized Intersection Enhancements

A systemic signalized intersection enhancement program follows a Safe System-based framework and proactively implements FHWA's proven safety countermeasures to manage speed and crash angles and to consider risk exposure. Proven safety countermeasures at signalized intersections include Leading Pedestrian Intervals (LPIs), protected left turns, roundabouts, medians, and countdown signals,

Suggestion for Potential Improvement

Consider establishing a systemic signalized intersection enhancement program that follows a Safe System-based framework. FHWA resources include:

- Federal Highway Administration: Safe System-Based Framework and Analytical Methodology for Assessing Intersections
- Federal Highway Administration: Proven Safety Countermeasures (PDF)
- Federal Highway Administration: Safe Transportation for Every Pedestrian (STEP)National Cooperative Highway Research Program: Application of Pedestrian Crossing Treatments for Streets and Highways

4.2.6 Systemic Enhancements for Uncontrolled and Unsignalized Intersection Crossings

A systemic crosswalk enhancement program proactively implements a Safe Transportation for Every Pedestrian (STEP)-consistent countermeasure at uncontrolled crossings

Suggestions for Potential Improvement

- Develop a citywide crosswalk policy for the installation, removal, and enhancement of crosswalks at controlled and uncontrolled locations. Ensure that it is consistent with best practices and recent research. This includes removing crosswalks only as a last resort and providing midblock crossings where they serve pedestrian desire lines.
- Consider developing a treatment selection "tool" to assist staff with the identification of applicable treatments in a given context.
- When crosswalk enhancements are identified, add them to a prioritized list that will be upgraded over time as funding is available.
- Federal Highway Administration STEP Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (PDF)

4.2.7 Safe System Policy

A Safe System policy with redundancy built in for transportation projects includes all users and modes, affects new construction and maintenance, considers local context, and provides guidance for implementation.

Suggestions for Potential Improvement

Consider adopting a Safe System Approach, based on the following resources:

- National Safety Council: Safe System Approach
- California Office of Traffic Safety: What is a Safe System Approach
- SafeTREC: Safe System Strategies for Bicyclists and Pedestrians Toolkit (PDF)
- SafeTREC: Conducting Community Engagement with a Safe System Lens (PDF)
- Vision Zero Network: Demystifying the Safe System Approach
- California Active Transportation Safety Information Pages (CATSIP): Safe System Approach to Road Safety
- U.S. Department of Transportation Federal Highway Administration: Zero Death and Safe System
- U.S. Department of Transportation: Safe Streets and Road Users for All (SS4A) Grant Program

4.3 Safety Data Collection and Assessment

Collecting and assessing data improves effectiveness, efficiency and overall system performance. Data can inform how to build safer roads for all modes of travel, including walking, biking, rolling, and driving. Key areas to consider in this category are safe road users.

Table 4.3 Benchmarking Analysis for Safety Data Collection and Assessment

Benchmarking Topic	Exceeds National Best Practices	Meets National Best Practices	Does Not Meet National Best Practices

1. Collection of Pedestrian and Bicyclist Volumes	Collects pedestrian and bicyclist volumes routinely with intersection counts and has a GIS database of counts. The database identifies key origin and destination locations that identifies patterns and needs in agencies policies and programs, especially in underserved communities	Collects pedestrian and bicyclist volumes on a project-by-project basis, but not routinely. Key origins and destinations are identified in a Bike, Pedestrian, or Active Transportation Plan but need to be updated	Does not collect pedestrian and bicycle volumes
2. Inventory of Bikeways, Parking, Informal Pathways, and Key Bicycle Opportunity Areas	Maintains and routinely updates an AI-based inventory of missing and existing bikeways in GIS and includes bikeway projects in the CIP	Has a partial, static inventory of missing facilities and opportunity areas through Bike, Pedestrian, or Active Transportation Plans	Does not have an inventory of missing/existing bikeways, parking, informal pathways, or key bicycle areas
3. Inventory of Sidewalks, Informal Pathways, and Key Pedestrian Opportunity Areas	Maintains and routinely updates an AI-based inventory of missing and existing sidewalks and crosswalks in GIS and includes sidewalk and crosswalk projects in the CIP	Maintains an inventory of missing sidewalks, crosswalks, informal pathways, or pedestrian opportunity areas	Does not have an inventory of missing sidewalks, crosswalks, informal pathways, or pedestrian opportunity areas
4. Inventory of Traffic Control Equipment (Signs, Markings, and Signals)	Maintains and updates an inventory of signs, markings, other countermeasures, and signals (including phasing) in GIS	Has some GIS-based inventories of signs, markings, other countermeasures, and signals	Does not have a GIS-based inventory of signs, markings, countermeasures, and signals
5. Crash History and Crash Reporting Practices	Employs a data-driven systemic safety or Vision Zero approach to regularly analyze crash data. Crash reporting is shared to key stakeholders in real-time and reporting details are consistent through the agency	Reviews data only following fatalities or other high-profile incidents	Does not have set practices for data review

6. Safety Action Plan	Has an LRSP that identifies routine data collection and assessment. Prioritized project list is updated based on crash data assessment	Completes crash data assessment on a project-by-project basis. Does not have an action plan that identifies regularity of assessment	Crash data assessment is ad-hoc and dependent on grant funded projects Does not have an LRSP or other Caltrans-approved safety plan

4.3.1 Collection of Pedestrian and Bicyclist Volumes

Pedestrian and bicyclist volume data and a GIS database are important for understanding where people walk and bike. This establishes baseline data prior to project implementation and can help in prioritizing projects, developing crash rates, and determining appropriate bicycle and pedestrian infrastructure. The database helps to identify patterns and needs of underserved communities in local jurisdictions policies and programs.

Pedestrians and bicyclists are counted when Turning Movement Counts (TMC) vehicle counts are taken. However, counts are not taken very often.

Suggestions for Potential Improvement

- Routinely collect pedestrian and bicycle volumes by requiring them to be counted in conjunction with manual intersection turning movement counts.
- Metropolitan Transportation Commission: Traffic Data Collection in the San Francisco Bay Area (PDF)
- Geocode pedestrian volume data with GIS software along with other data such as pedestrian control devices and crashes to analyze data for trends or hotspots related to pedestrian safety.

4.3.2 Inventory of Bikeways, Parking, Informal Pathways, and Key Bicycle Opportunity Areas

A GIS-based inventory of bikeways, parking, informal pathways, and key bicycle opportunity areas enables project identification and prioritization, as well as project coordination with new development, roadway resurfacing, etc. This data set can be made available on a city's website for knowledge sharing with the public as well as agencies.

Suggestions for Potential Improvement

- Migrate the inventory of bikeways, bike parking, and future bike improvements into a GIS format for quick mapping and sharing.
- Identify a staff person responsible for maintaining the GIS data set.

4.3.3 Inventory of Sidewalks, Informal Pathways, and Key Pedestrian Opportunity Areas

A GIS-based sidewalk inventory enables project identification and prioritization, as well as project coordination with new development, roadway resurfacing, etc. This data set can be made available on a city's website for knowledge sharing with the public as well as agencies.

Suggestions for Potential Improvement

- Create a citywide inventory of existing and missing sidewalks, informal pathways and key pedestrian opportunity areas in GIS.
- Consider establishing a program to help property owners repair damaged sidewalks outside their property.

4.3.4 Inventory of Traffic Control Equipment (Signs, Markings, and Signals)

Cities have a wide variety of traffic control devices that regulate how bicyclists and pedestrians should use the street and interact safely with drivers. However, some cities do not have inventories of how, when, and where these are installed. Creating a database of this information allows city staff to know where infrastructure may be out of date or in need of updates. For example, countdown signals are an important pedestrian safety countermeasure. The 2012 California *Manual of Uniform Traffic Control Devices* (MUTCD) requires the installation of countdown pedestrian signals for all new signals. The CA MUTCD also requires the installation of bike detection at all actuated signals. Bike detection is a basic building block of the bike network that makes sure that bikes can trigger traffic signals. Inventorying bike detection and countdown signals allows city staff to approach safety from a systems perspective and develop projects to close gaps in biking and walking infrastructure over time.

Suggestions for Potential Improvement

- Develop a city crosswalk inventory in GIS and maintain it over time. This would allow for a systemic safety approach to enhancing crosswalks and allow the city to prioritize all crosswalk enhancement projects citywide for implementation over time and as money is available.
- Ensure that locations with pedestrian desire lines have safe crosswalks. An updated crosswalk policy can help determine the appropriate crossing treatment at uncontrolled locations without marked crosswalks.
- Include retroreflectivity field review within maintenance. Include maintenance records within the GIS inventory of signs, markings and signals.
- Develop a proactive monitoring program to ensure the quality and proper functioning of traffic control devices.

4.3.5 Crash History and Crash Reporting Practices

Safety is typically approached through both proactive and reactive measures. Identifying and responding to crash patterns on a regular basis and in real-time is an important reactive

approach to bicycle and pedestrian safety, which may be combined with other proactive measures. This is the traditional way most cities have approached safety. However, many are now looking to proactive safety to address safety issues on a systemwide basis. This is often paired with a policy goal of getting to zero fatality or serious injury crashes (commonly referred to as “Vision Zero”).

Suggestions for Potential Improvement

- Adopt a data driven systemic safety approach policy, which would include a systems approach to identifying, prioritizing, and ultimately implementing safety countermeasure and/or a formal commitment to Vision Zero.
- Work with elected officials and department heads to adopt a Vision Zero policy formally stating the city’s commitment to reducing the number of traffic-related fatalities and severe injuries to zero.
- Additionally, with sufficient pedestrian volume data, the city could prioritize crash locations based on crash rates (i.e., crashes/daily pedestrian volume), a practice that results in a complete safety needs assessment. Treatments could then be identified for each location and programmatic funding allocated in the city’s Capital Improvements Program (CIP).

4.3.6 Safety Action Plan

A Local Road Safety Plan (LRSP) or Caltrans-approved safety report identifies dedicated, annual funding streams for bicycle and pedestrian projects within underserved communities. Bicycle and pedestrian projects can also be integrated into the other work that the city does, including repaving and other routine roadway network maintenance.
Dedicated annual funding streams may include general city funds, local and regional impact fees, county tax measure funds, and local tax measure funds. Some grant opportunities include the Highway Safety Improvement Program (HSIP), Congestion Mitigation and Air Quality Improvement Program (CMAQ), Active Transportation Program (ATP), Safe Routes to School Grant (SRTS), TDA Article 3 (SB 821), and Safe Streets for All (SS4A).

The City of Calabasas has a Local Road Safety Plan.

Suggestions for Potential Improvement

- Implement recommendations from the LRSP.
- Partner with other agencies and continue applying for grant funding for both infrastructure and non-infrastructure projects.
- Integrate bicycle and pedestrian projects into the site plan review process for new development.
- Secure additional funding for repaving projects to allow for “quick build” projects and other bicycle and pedestrian safety improvements to be integrated into those projects.
- Establish a dedicated funding source for pedestrian and bicycle projects.

4.4 Pedestrian and Bicycle Network Planning and Design

Safe, comfortable, and connected pedestrian and bicycle networks allow people of all ages and abilities to navigate roads to get where they want to go. Key areas to consider in this category are safe road users and safe roads.

Table 4.4 Benchmarking Analysis for Pedestrian and Bicycle Network Planning and Design

Benchmarking Topic	Exceeds National Best Practices	Meets National Best Practices	Does Not Meet National Best Practices
1. Complete Streets Policy	Has a Complete Streets policy that includes all users and modes, affects new construction and maintenance, considers local context, and provides guidance for implementation	Has a Complete Streets policy that is narrow in scope or applies only to public works projects	Does not have a Complete Streets policy
2. Active Transportation Plan	Has a recently updated Active Transportation Plan (or similar) with a strategic prioritized list of projects that reflects current best practices (e.g., Level of Traffic Stress analysis, inclusion of Class IV protected bicycle facilities)	Has a Pedestrian or Bicycle Master Plan, but it may be outdated, and/or no recent projects from the Plan have been completed	Does not have a Pedestrian or Bicycle Master Plan
3. Existing bike network	Existing bike network includes best practice low stress facilities such as protected bikeways, bike boulevards, and protected intersections citywide or countywide	Bike network primarily includes Class I, II, and III facilities. There are gaps within the bike network and facilities do not accommodate all users	Existing bike network includes only bicycle routes
4. Existing pedestrian facilities	Existing pedestrian facilities includes low-stress facilities and frequent use of landscape strips, medians, frequent crosswalks, and roadways are primarily two-to-four lane roads	Narrow sidewalks or sidewalk gaps, crosswalks with few or no safety enhancements, crosswalks are minimal, and roadways are primarily arterials	Missing key marked crosswalks and sidewalks, with few ADA improvements and no safety enhancements, and no pedestrian countdown signals
5. Bike Network Implementation Practices	Age 8 to 80 bicyclist considerations are included in the agency's policies and level of traffic stress is considered. A Bike or Other Safety Plan identifies low-stress networks and funding mechanisms to implement	Spot locations have been identified through safety plan(s) for a low-stress network. Plan also identifies additional proven countermeasures to be implemented as part of the project	Treatments are where they implemented fit within the right-of-way, and vehicle LOS is not affected

	a low-stress network city/countywide		
6. Pedestrian Network Implementation Practices	Pedestrian priority areas (PPA) are identified in a safety plan and the agency has policies prioritizing PPAs, crosswalk spacing, and design enhancements.	Spot PPA locations have been identified through safety plan(s). The plan also identifies additional proven countermeasures to be implemented as part of the project	Treatments are implemented on a project-by-project basis
7. Design guidelines and standards	Uses national best practices focused on bicycle and pedestrian safety for roadway and facility design guidelines and standards	Local standards reference national best practices, but are static or out of date, with minimal customized design policies for pedestrian and bicycle accommodations	Does not have comprehensive design guidelines or standards for pedestrian or bicyclist treatments
8. Attention to Bicycle Crossing Barriers	Separated bikeways and other innovative treatments, including geometric enhancements, are provided at intersections and interchanges	Higher-stress bike treatments are installed at some intersections and interchanges	Bike treatments are not installed at intersections or through interchanges
9. Attention to Pedestrian Crossing Barriers	Has a recently updated policy and comprehensive inventory of barriers. Has design guidelines and funding in place for addressing barriers	Has no policy, but has identified some barriers and taken steps to improve pedestrian access	Does not have a policy or practices for addressing barriers to walking
10. Intersection Control Evaluations	Uses intersection control evaluations to assess alternative traffic control (e.g., roundabout, signal, stop signs) performance (safety, ped/bike, etc.) and select appropriate control based on desired performance.	Uses relaxed warrants for traffic signals and/or all-way stops. If asked to by community or stakeholder may consider a roundabout or neighborhood traffic circle.	Uses MUTCD Warrants and/or does not have a practice of using Intersection Control Evaluations

4.4.1 Complete Streets Policy

Complete Streets Policies are formal statements showing a city's commitment to planning and designing for all modes of travel and travelers of all ages and abilities.

Suggestions for Potential Improvement

Consider adopting a Complete Streets Policy. The following jurisdictions have established practices for complete streets, including implementation of these policies through multimodal level of service thresholds, and may serve as models:

- Boston, Massachusetts: Boston's Complete Streets
- Philadelphia, Pennsylvania: Philly Free Streets (Facebook)

4.4.2 Active Transportation Plan

This type of plan includes a large menu of policy, program, and practice suggestions, as well as site-specific (and prototypical) engineering treatment suggestions. Bicycle and Pedestrian Master Plans document a jurisdiction's vision for improving walkability, bikeability, and bicycle and pedestrian safety; establish policies, programs, and practices; and outline the prioritization and budgeting process for project implementation.

The City of Calabasas only has a Bike Master Plan, and does not have a Pedestrian Master Plan.

Suggestions for Potential Improvement

- Consider the development of an Active Transportation Plan that includes both bicycle and pedestrian priorities.
- Implement the low-hanging projects in the Bicycle and Pedestrian Master Plan and seek grant funding for major projects.
- Pursue additional funding opportunities for programs identified by the Plan.
- Provide regular updates to the Plan, including bicycle and pedestrian facilities and design guidelines that address the needs of bicyclists and pedestrians of all ages and abilities.
- Develop high injury networks for walking and biking to identify routes with the highest incidences of fatal and severe injuries for pedestrians and bicyclists. This will create a systematic safety analysis that can help in prioritizing limited resources.
- Consider identifying existing and missing bicycle and pedestrian infrastructure for safety improvement.

4.4.3 Existing bike network

Innovative features such as protected bikeways, bike boulevards, and protected intersections citywide or countywide can decrease the level of traffic stress experienced by bicyclists, make biking more comfortable, and, in so doing, appeal to a wide range of bicyclists. Level of traffic stress refers to the level of comfort or discomfort a bicyclist might experience. Research conducted by the Mineta Institute in San Jose establishes levels of traffic stress on a scale of 1 to 4 with LTS 1 at the level that most children can tolerate and LTS 4 at the level characterized by "strong and fearless" cyclists (see: http://transweb.sjsu.edu/project/1005.html). A bicycle network that is attractive to the majority of the population would have low stress and high connectivity.

Suggestions for Potential Improvement

- Continue to identify funding sources and implement the proposed projects identified in the Bicycle Master Plan and/or future Active Transportation Plan.
- Develop design standards for bike boulevards, trails, paths, and landscaping for bicycle networks.
- Create a GIS data for the existing bike network to identify gaps and opportunities for improvements.

4.4.4 Existing Pedestrian Facilities

Installation of pedestrian facilities that include low- stress facilities and frequent use of landscape strips, medians, and frequent crosswalks are best practices. Narrow sidewalks or sidewalk gaps, crosswalks with few or no safety enhancements, and minimal number of crosswalks discourage people from walking as a means of transportation.

Suggestions for Potential Improvement

- Continue to identify funding sources and implement the proposed projects identified in the Bicycle Master Plan and/or future Active Transportation Plan.
- Create a GIS database for existing pedestrian infrastructure to identify gaps, inventory assets, and create opportunities for systemic safety analysis of all crosswalks.

4.4.5 Bike Network Implementation Practices

Considering the safety and comfort of people biking leads to better projects that can encourage new biking trips and enhance safety for active transportation users today and in the future.

Bicycle Level of Traffic Stress (LTS) was originally developed by researchers at the Mineta Transportation Institute. LTS assesses the comfort and connectivity of bicycle networks.

Suggestions for Potential Improvement

- Prioritize bicycle projects to align with roadway resurfacing and projects that are near school sites.
- Secure enough funding for repaving and other complete streets projects to allow for installation of protected bike and pedestrian facilities and intersection improvements.
- Prioritize Use Level of Traffic Stress (LTS) to strategically implement bikeways and traffic calming treatments that would improve LTS of existing bikeways.

4.4.6 Pedestrian Network Implementation Practices

Considering the safety and comfort of people walking leads to better projects that can encourage new walking trips and enhance safety for active transportation users today and in the future.

Suggestions for Potential Improvement

- Prioritize pedestrian projects to align with roadway resurfacing and projects that are near school sites.
- Identify pedestrian priority areas and have a policy in place for crosswalk spacing and design enhancements
- Secure enough funding for repaving and other complete streets projects to allow for installation of protected bike and pedestrian facilities and intersection improvements.

4.4.7 Design Guidelines and Standards

Design guidelines and development standards create a clear set of documents that guide how all transportation improvements should be installed citywide. As a result, they can create a consistent, high-quality biking and walking experience.

Suggestions for Potential Improvement

Consider adopting national bicycle and pedestrian safety best practices for roadway and facility design guidelines and standards:

- NACTO Urban Street Design Guide (PDF)
- CROW Design Manual for Bicycle Traffic
- FHWA Separated Bike Lane Planning and Design Guide (PDF)
- MassDOT Separated Bike Lane Planning & Design Guide
- ITE Recommended Practice for Accommodating Pedestrians and Bicyclists at Interchanges
- AASHTO Guide for the Development of Bicycle Facilities (PDF)
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities (PDF)

4.4.8 Attention to Bicycle Crossing Barriers

Crossing barriers — such as railroads, freeways, and major arterials — may discourage or even prohibit bicycle access and are often associated with vehicle-bicycle crashes. Large intersections and interchanges and uncontrolled crossings can often deter bicyclists due to high speeds, high number of conflict points with vehicles, and high level of exposure. Identifying and removing barriers and preventing new barriers is essential for improving bicyclist safety and access.

Suggestions for Potential Improvement

- Use green routinely to highlight conflict zones at large intersections and interchanges.
- To slow speeds at critical intersections, use smaller corner radii utilizing small design vehicles appropriate for urban areas and updated standard plans to reflect this.
- Review design of slip/trap-right lanes at intersections and implement improvements.
- Implement best practice guidance on bicycle accommodation through interchanges and expressways, as appropriate, using the ITE's Recommended Practice: Guidelines to Accommodate Bicyclist and Pedestrians at Interchanges plus consideration of protected bike lane design.

- Consider pedestrian barriers and needs when conducting bicycle barriers assessment.

4.4.9 Attention to Pedestrian Crossing Barriers

Similar to bicyclists crossing deterrence, crossing barriers may also discourage or even prohibit pedestrian access and can create safety challenges for pedestrians. These can be similar to the biking barriers or present additional challenges.

Suggestions for Potential Improvement

- To slow speeds at critical intersections, use smaller corner radii utilizing small design vehicles appropriate for urban areas and updated standard plans to reflect this.
- Review design of slip/trap-right lanes at intersections and implement improvements.
- Identify and create an inventory of pedestrian barriers with targeted recommendations for phased improvements.
- Consider pedestrian barriers and needs in conducting bicycle barriers assessment.

4.4.10 Intersection Control Evaluations

Providing alternative traffic controls such as roundabouts, signals, and stop signs may improve pedestrian and bicycle safety by reducing speeds and controlling vehicle conflicts. Installing bicycling signals and limiting stop signs on bicycle routes may enhance bicycle mobility and safety. The CA MUTCD defines warrants for installing signals and stop signs.

The City of Calabasas is considering roundabouts for intersection control, and is currently designing one.

Suggestions for Potential Improvement

- Develop specific signal and stop sign warrants that are pedestrian- and bicycle-friendly.
- Develop a policy that the city considers roundabouts when updating intersection control.

4.5 Pedestrian and Bicycle Support Program

Key areas to consider in this category are safe road users, safe speeds, and post-crash care.

Table 4.5 Benchmarking Analysis for Safety Data Collection and Assessment

Benchmarking Topic	Exceeds National Best Practices	Meets National Best Practices	Does Not Meet National Best Practices
1. Pedestrian and Bicycle Safety Education Program	Pedestrian and bicycle education programs are data-driven and focused on local safety context; education programs are customized for different groups. The program includes education for drivers/motorists.	Has some traffic safety education programs that address pedestrians and bicyclists	Does not have pedestrian and bicycle safety education programs
2. Enforcement	Police Department applies for annual OTS funding, and conducts sustained and data-driven enforcement efforts focused on education, behavior, and locations related to most severe bicycle and pedestrian crashes; enforcement is effective is KSI crashes decrease and there is lower racial disproportionality in traffic citations	Police Department conducts some data-driven enforcement activities related to bicyclist and pedestrian safety	Enforcement is not data-driven or Police Department does not have Traffic Safety Officer(s) Not sure
3. Pedestrian Walking Audit Program	Has significant and ongoing programs that include regular walking audits	Has no safety program, but has conducted walking audits sporadically	Does not have a pedestrian safety program and has not conducted a walking audit
4. Bicycling Safety Audit Program	Has significant and ongoing programs which include bicycling audits	Has no safety program, but has conducted biking audits	Does not have bicycling safety audit programs
5. Vehicle Miles Traveled (VMT) Mitigation Strategies	Has a VMT Mitigation Strategy that uses the most recent guidance from CAPCOA to measure potential impacts of pedestrian and bicycle facilities	Mitigation measures identified in CAPCOA are used independently on a project-by-project basis	Does not use CAPCOA mitigation strategies

6. Coordination with Emergency Response	Emergency response is involved in all aspects of bicycle/pedestrian facility planning and design (including pilot testing), and they balance response times with bicyclist/pedestrian safety. Agency also works with emergency response to implement policies providing information on traffic incident management	Emergency response is involved in some aspects of bicycle/pedestrian facility planning and design	Emergency response is not involved in bicycle/pedestrian facility planning and design
7. Coordination with Health Agencies	Coordinates regularly with health agencies in the planning of bicycle and pedestrian facilities and/or programs and collection of crash data	Health agencies have programs to promote healthy lifestyles through active transportation	Health agencies are not involved in bicycle/pedestrian safety or active transportation
8. Coordination with Transit Agencies	Bicycles are accommodated on all transit vehicles with overflow capacity available. The agency partners with transit providers to ensure safe and comfortable routes for biking and walking to transit stops and stations, including on roadways with both frequent bus service and bicycle facilities	Bicycles are accommodated on buses only, with accommodation limited to rack capacity. Some transit stops and stations safe and comfortable routes for biking and walking access	Bicycles are not accommodated on transit. There are few bicycle and pedestrian accommodations for accessing transit stops and stations

4.5.1 Pedestrian and Bicycle Safety Education Program

Engineering treatments are often not enough on their own to realize full safety benefits associated with the treatment. Safety education programs complement engineering treatments and increase compliance. Education campaigns target drivers and people of all ages, especially school-age children where safe walking and biking habits may be instilled as lifelong lessons.

Suggestions for Potential Improvement

- Conduct a formal education campaign about street safety targeting drivers, pedestrians, and bicyclists. This includes advertisements on buses and bus shelters, an in-school

curriculum, community school courses, public service announcements, and a range of other strategies. Consider focusing on speed and safe driving.

4.5.2 Enforcement

Enforcement of pedestrian and bicycle right-of-way laws and speed limits is an important complement to engineering treatments and education programs.

Suggestions for Potential Improvement

- Implement sustained pedestrian safety enforcement efforts and involve the media. Use enforcement as an opportunity for education by distributing pedestrian safety pamphlets in lieu of, or in addition to, citations.
- Train officers in pedestrian safety enforcement principles.
- Establish a radar gun check-out program for trained community volunteers to record speeding vehicles' license plate numbers and send letters and/or document occurrences.

4.5.3 Pedestrian Walking Audit Program

Walking audits provide an interactive opportunity to solicit feedback from key stakeholders about the study area and to discuss the feasibility of potential solutions. The audits can be led by city staff, advocacy groups, neighborhood groups, or consultants.

Suggestions for Potential Improvement

- Include regular walking audits in citywide pedestrian safety programs, based on the suggestions of this CSSA. This effort may complement other "green" or health-oriented programs within the city.

4.5.4 Bicycling Safety Audit Program

Consensus is more readily reached on a vision and action plan for safety enhancements when city staff and key stakeholders ride along study corridors and experience key route and crossing challenges and best practices.

Suggestions for Potential Improvement

- Include regular bicycling audits in the citywide bicycle safety programs. Encourage interdepartmental participation.
- Routinely conduct bicycle safety audits of key corridors throughout the city, including those with recent improvements, those with heavy bicycle demand, and those with high crash rates.
- Collaborate with schools on projects beyond the school district boundaries.

4.5.5 Vehicle Miles Traveled (VMT) Mitigation Strategies

A VMT mitigation strategy should use the most recent guidance from California Air Pollution Control Officers Association (CAPCOA) to measure potential impacts of pedestrian and bicycle facilities.

Suggestions for Potential Improvement

- CAPCOA Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity (PDF)

4.5.6 Coordination with Emergency Response

Emergency response requires special roadway design considerations that sometimes conflict with bicycle and pedestrian treatments. One example is the design of turning radii at intersections. Bicyclists and pedestrians benefit from the reduced vehicle speeds of smaller radii, but larger vehicles, such as fire trucks, have more difficulty performing the turn within the smaller space. These conflicts require consensus building between the city and the respective departments. Consensus building could include pilot testing of alternative treatments, such as a model traffic circle in an open field.

Suggestions for Potential Improvement

- Include the Fire Department early in the process as a stakeholder.
- Balance the trade-off between traffic calming safety treatments such as roundabouts or partial street closures and longer emergency response times.
- Encourage emergency and transit responders to participate in test runs of roadway designs that are aimed to reduce speed and improve bicycling access.
- Implement policies providing information on tragic incident management.

4.5.7 Coordination with Health Agencies

Involving non-traditional partners such as public health agencies, pediatricians and others in the planning or design of pedestrian and bicycle facilities may create opportunities to be more proactive about pedestrian and bicycle safety, identify pedestrian and bicycle safety challenges and education venues, and secure funding. Additionally, underreporting of pedestrian-vehicle and bicycle-vehicle crashes could be a problem that may be partially mitigated by involving the medical community in pedestrian and bicycle safety planning.[29]

Suggestion for Potential Improvement

Consider coordinating with the health agencies in your community.

[29] Sciortino, S., Vassar, M., Radetsky, M. and M. Knudson, “San Francisco Pedestrian Injury Surveillance: Mapping, Underreporting, and Injury Severity in Police and Hospital Records,” *Accident Analysis and Prevention*, Volume 37, Issue 6, November 2005, Pages 1102-1113

4.5.8 Coordination with Transit Agencies

Providing safe and comfortable biking and walking routes to transit stops and stations, and the ability to take bicycles on-board transit vehicles increases the likelihood of multi-modal trips.

Suggestion for Potential Improvement

Work with transit agencies, Caltrans, and other relevant partners to improve access and safety to stations and bus stops.

4.6 Additional Areas to Consider for Safety Improvements

The following topics were not included in the 2024 benchmarking survey. However, they remain important strategies to consider in improving safety for people walking and biking

4.6.1 Surrogate Safety Measures for Proactive Monitoring

Innovative data collection techniques such as hard braking, speed, and near miss data can provide additional insights into crashes. Community feedback tools such as Street Story can assist local jurisdictions to collect data. Street Story: A Platform for Community Engagement

4.6.2 Roadway Surfaces for Bicycle Facilities

The quality of a roadway surface along bikeways is an important consideration when choosing to bike. Rough surface in a bike lane creates an uncomfortable bicycling experience and may also pose safety hazards.

Suggestions for Potential Improvement

- Prioritize maintenance of roadways where bicycle facilities are present, particularly for closing gaps in the bikeway network or where improved pavement quality is needed on popular bicycle routes.
- Prioritize debris removal on roadways where bicycle facilities are present.
- Assess the need for new and enhanced crosswalks and curb ramps with each repaving project. Include consideration of lane reductions and quick build projects such as paint and plastic median refuges and sidewalk extensions, high-visibility crosswalks, and advanced yield markings.

4.6.3 Sidewalk Furniture or Other Sidewalk Zone Policies

Street furniture encourages walking by accommodating pedestrians via benches to rest on along the route or wait for transit; trash receptacles to maintain a clean environment; street trees for shade, etc. Uniform street furniture requirements also enhance the design of the pedestrian realm and may improve economic vitality.

Suggestion for Potential Improvement

- Adopt a Street Furniture Ordinance to include locations and furniture amenities other than those associated with transit stops, as appropriate.

4.6.4 Street Tree Requirements

Street trees enhance the pedestrian environment by providing shade and a buffer from vehicles, which increase pedestrian safety. Street trees may also enhance property values, especially in residential neighborhoods. However, street trees, when improperly selected, planted, or maintained, may cause damage to adjacent public utilities.

Suggestion for Potential Improvement

- Develop a Street Tree Ordinance to provide guidance on permissible tree types and permitting requirements, also specifying a requirement for new tree plantings associated with development projects.

4.6.5 Bicycling Supportive Amenities and Wayfinding

In addition to designating roadway or paths in a bicycle network, supportive amenities (including parking, water fountains, and maintenance stations) can encourage bicycling. Wayfinding can both encourage bicycling and enhance safety by guiding cyclists to facilities that have been enhanced for bicyclist use or to local retail opportunities for economic growth.

Suggestions for Potential Improvement

- Create and deploy a bicycle wayfinding strategy citywide.
- Develop a Biking Guide that includes a bike map and bicycle locker and rack locations.

4.6.6 Bicycle Parking Requirements

Safe and convenient bicycle parking is essential for encouraging bicycle travel (especially in lieu of vehicle travel). Bicycle parking can also facilitate last-mile connections between two modes, such as bicycle parking at a transit station. To be effective, bicycle parking needs to be visible and secure and have enough capacity to accommodate bicycle demand, both long-term and short-term. Long-term and short-term parking can be implemented through a bicycle parking ordinance.

Suggestions for Potential Improvement

- Implement short-term and long-term, secure bicycle parking at all new development, consistent with the APBP Bicycle Parking Guidelines, 2nd edition.
- Locate bicycle racks to be convenient for bicyclists, out of the way of pedestrians, and with good visibility for security, consistent with the *APBP Bicycle Parking Guidelines, 2nd edition.*
- Consider implementation of “branded” racks for the city (with a unique design or city’s symbol).

4.6.7 General Plan: Provision for Pedestrian and Bicycle Nodes

Planning principles contained in a city's General Plan can provide an important policy context for developing pedestrian-oriented, walkable areas. Transit-oriented development, higher densities, and mixed uses are important planning tools for pedestrian-oriented areas. The General Plan identifies pedestrian priority areas, which are zones in which high volumes of pedestrian traffic are encouraged and accommodated along the sidewalk.

Suggestions for Potential Enhancement

- Create an overlay district for pedestrian priority areas with special pedestrian-oriented guidelines, such as relaxing auto Level of Service standards and prioritizing pedestrian improvements. Prioritize sidewalk improvement and completion projects in these nodes.
- Utilize vehicle miles traveled (VMT) for future transportation impact analysis.

4.6.8 General Plan: Safety Element

SB 99 and AB 747 involve safety evacuation during natural disasters. Local jurisdictions should identify creative solutions on how to evacuate residents safely and efficiently while maintaining and implementing low-stress pedestrian and bicycle facilities.

On safety evacuation routes, agencies should identify creative solutions for evacuating residents safely and efficiently while maintaining and implementing low-stress pedestrian and bicycle facilities.

4.6.9 General Plan: Densities and Mixed-Use Zones

Planning principles contained in a city's General Plan can provide an important policy context for developing bicycle-oriented and walkable areas. Transit-oriented development, higher densities, and mixed uses are important planning tools for pedestrian-oriented areas.

Suggestions for Potential Improvement

- Utilize vehicle miles traveled (VMT) for future transportation impact analysis.
- Consider allowing moderate to high densities in the downtown and mixed-use zones as well as progressive parking policies, such as shared parking and demand-based pricing.
- Consider multi-modal trade-offs in the transportation impact analysis for new development, so that the safety and needs of people walking and biking are weighed heavily and vehicular delay is not the primary performance measure.
- Ensure that wide sidewalks, high quality, protected bike lanes, and intersection safety improvements are included in all new development projects, particularly where densities are higher.
- Strongly weigh walking and biking performance measures as well as safety metrics in determining appropriate intersection improvements and street design.

4.6.10 Specific Plans, Overlay Zones, and Other Area Plans

When specific plans, overlay zones, or any other area plans are being developed, the City/County can specifically request the bicyclist and pedestrian-oriented design, walkability, or placemaking be stressed in these plans.

Suggestion for Potential Improvement

- Emphasize bicyclist and pedestrian-oriented design, walkability, and/or placemaking in all new specific plans, overlay zones, and other area plans.

4.6.11 Historic Sites

Historic walking routes or bike trails, such as the famous Freedom Trail in Boston, encourage active transportation and enhance economic vitality.

Suggestions for Potential Improvement

- Continue to implement the goals, policies and programs that support walking trips included in the Historic Preservation and Community Design Element of the General Plan to showcase natural or local sites of interest, and link key features of the city. Maps of the tour route and historic documentation materials could be made available online or as a mobile app in addition to wayfinding signs, maps, and plaques throughout the city. Consider other areas of the city for walking tours and historic signs.
- Consider upgrading History Walk signs with larger text to improve legibility and wayfinding.

4.6.12 Economic Vitality

Improving bicycle and pedestrian safety and walkability can enhance economic vitality. Similarly, enhancing economic vitality through innovative funding options such as Business Improvement Districts (BIDs), parking management, and facade improvement programs can lead to more active areas and encourage walking and bicycling.

Suggestions for Potential Improvement

- Activate the built environment in business areas through BIDs and façade improvement programs.
- Use wayfinding, walking routes, and events to direct pedestrians to commercial areas throughout the area.
- Install bicycle parking in commercial areas and provide safe, comfortable bike facilities in commercial areas to make it convenient and fun to get to local businesses.

4.6.13 Post-Crash Care

An agency’s adopted LRSP or Caltrans-approved Safety Plan should include resources for the agency to implement identified countermeasures for medical rehabilitation, on-going advocacy

group engagement, and resources for the adjudication process to ensure offenders receive proper sentencing and treatment.

Suggestions for Potential Improvement

Consider reviewing your agency's LRSP and add resources for implementing identified countermeasures for medical rehabilitation, on-going advocacy group engagement, and resources for the adjudication process to ensure offenders receive proper sentencing and treatment

4.6.14 Proactive Approach to Institutional Coordination

Institutional coordination associated with multiple agencies and advocacy groups is a critical part of the work of any municipality. Non-local control of right-of-way and differing policies regarding pedestrian and bicyclist accommodation can make the work complex.

Suggestions for Potential Improvement

- Work with local school districts to establish a policy on neighborhood-sized and oriented schools as part of a Safe Routes to School policy.
- Work with the school districts to establish suggested walking routes and address potential barriers to pedestrian or bicycle access.

5. Complete Streets Audit Results and Recommendations

5.1 Overview

This chapter presents the observations and recommendations made during the walking audit conducted in the City of Calabasas on May 23, 2024. City staff from the Department of Public Works participated in the walk audit. The suggestions are based on best practices and discussions regarding local needs and feasibility with the participant group.

The walk audit was conducted to understand the needs, issues, and opportunities associated with walking and biking in the study area. During a walking audit, positive practices are observed, and issues and opportunity areas are noted. Observations are based on how motorists behave around pedestrians and bicyclists and how pedestrians and bicyclists behave, especially at intersections. Anecdotal stories shared by participants related to road users' behavior issues are also noted.

The suggestions in this report are based on general knowledge of best practices in complete street design and safety. These conceptual recommendations were presented by City staff to the City of Calabasas Transportation Commission on July 23, 2024. As this report is conceptual, the City may conduct more detailed studies before finalizing and implementing any physical

changes. Conditions may exist in the focus areas that were not observed and incompatible with suggestions in this report. City staff may conduct further analysis to refine or discard the suggestions in this report if they are contextually inappropriate or do not improve pedestrian safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume or speeds, physical limitations on space or sight distance, or other unsafe conditions.

5.2 General Citywide Suggestions

The City of Calabasas aims to provide greater connectivity of bicycle and pedestrian infrastructure to residents, particularly near its school communities. While the City has invested in bikeway infrastructure along Mulholland Hwy, which connects residents to major open spaces in the City, there are opportunities to build out a more complete bicycling network across the City. In addition to the recommendations included in Chapter 4, there are further opportunities to standardize all major intersections with pedestrian enhancements, including, as appropriate:

- Crosswalk markings that clearly define where people are crossing
- Signage that indicates the presence of a crosswalk
- Lighting that adequately illuminates the crosswalk
- Bi-directional curb cuts to improve accessibility of intersections
- Leading pedestrian intervals that give pedestrians a head start when crossing a roadway and improve visibility of pedestrians to drivers
- Advanced stop bars to improve driver visibility of blind spots for people walking
- Restricting right-turn movements to eliminate conflicts

Where applicable, specific plans for corridors should be updated to reflect a Safe System approach and an emphasis on pedestrian and cyclist connectivity.

Further, there are opportunities to improve amenities at transit stops, especially at high use intersections. This should include completed sidewalk infrastructure near key destinations. The study team found that a sample of transit stops did not have sidewalks in the major paths of travel to and from the transit stop. Finally, there are opportunities to connect biking and walking networks in and around school campuses to improve circulation and connectivity for people walking and bicycling.

5.3 Focus Areas

The major corridors of Mulholland Highway and Calabasas Rd were chosen based on the City of Calabasas' review of pedestrian and bicyclist safety due to elevated vehicular, bicycle, and pedestrian activity in each area.

Figure 5.1 shows the study areas within the City. The following four locations selected for analysis were:

1. Mulholland Highway & Paul Revere Drive located near Alice C. Stelle Middle School

1. Mulholland Highway & Eddingham Avenue
2. Calabasas Road & 101 Freeway On/Off-ramp
3. Calabasas Road & Parkway Calabasas

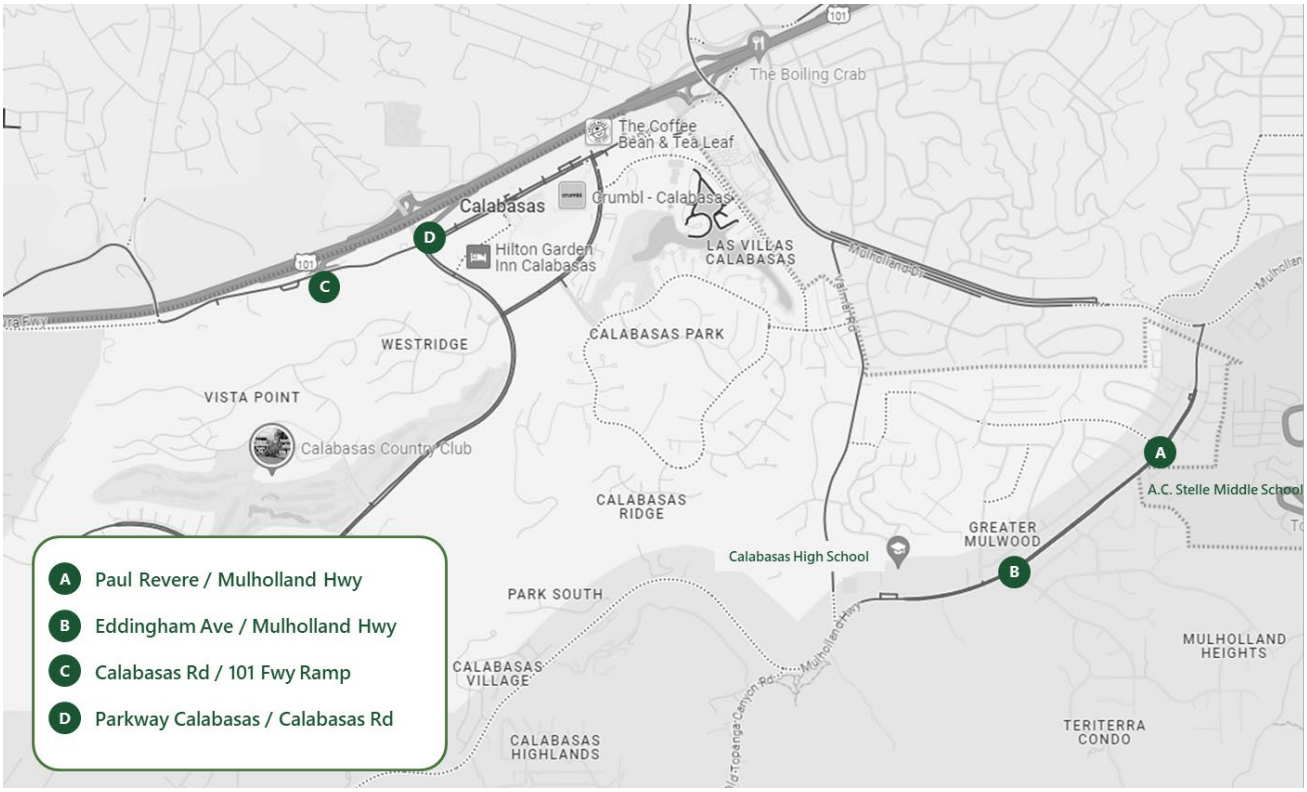


Figure 5.1 City of Calabasas Study Areas

The following sections present the key issues identified during the walking audits and suggested projects responding to the issues at each site.

5.3.1 Mulholland Highway and Paul Revere Drive located near Alice C. Stelle Middle School

Existing Conditions

Mulholland Highway is a major arterial roadway within the study area. The study corridor extends east of Paul Revere Drive to the passenger loading zone and west to Daguerre Road. At the midblock, the roadway generally consists of one travel lane in each direction, divided by a landscaped median. The road width at the midblock is approximately 56 feet. Approaching the intersection of Paul Revere Drive, the roadway widens to approximately 76 feet before the crosswalk. In the eastbound direction, the roadway consists of a dedicated left-turn lane onto Paul Revere Drive and a dedicated right-turn lane into the Alice C. Stelle Middle School Campus, which converts to a private roadway. In the westbound direction towards Daguerre Road, the roadway consists of a dedicated left-turn lane into the school campus, one through lane, and one shared through/right-turn lane, which merge down to one lane beyond the intersection. The speed limit along the corridor is 40 mph. In the presence of school children, the school zone speed limit applies, and the speed limit drops to 25 mph.

The intersection of Mulholland Highway & Paul Revere Drive is fully signalized, with yellow, high visibility crosswalks customary to school zones on three of four legs of the intersection. No pedestrian crossings are allowed on the east side of Paul Revere Drive towards the school campus. During pick-up and drop-off windows, a crossing guard is stationed at the intersection. The crossing guard was observed routinely managing improper vehicle movements to ensure pedestrian safety. The intersection also includes ADA-compliant curb ramps, though not bidirectional, as well as one landscaped curb extension on the southeast corner. The northwest corner of the intersection includes a bench and some landscaping, with permanent concrete bollards to channelize pedestrian flow.

Sidewalk infrastructure exists on both sides of the roadway, is smooth and well maintained, and buffered from vehicular traffic by a wide parkway with shady street trees along most of the parkway. Part of the parkway includes a wooden fence, which appears to serve a generally aesthetic purpose though may also be in place to discourage pedestrian crossings at the midblock. The distance between crossing opportunities along the study corridor is over 3,000 feet, which may serve to encourage excessive speeding along the corridor. A Class II bike facility runs along both portions of the roadway and it is understood that this infrastructure was installed over 10 years ago. The roadway is bisected by a concrete median that runs along the entire study corridor, tapering at each intersection. The median varies in width and is landscaped and well maintained.

The land uses on Mulholland Highway are almost exclusively residential, with access on parallel minor neighborhood streets. Driveway access is limited to non-existent on the study corridor, which results in very little egress and ingress on the study corridor outside of intersections. Most of the activity observed during the walk audit by the evaluation team on the corridor was vehicular activity. During school drop-off periods, several dozen students were observed crossing the roadway at Paul Revere Drive into the school campus, along with a number of people running and walking dogs. It was assumed that most students walking across Mulholland Highway were dropped off in the nearby residential areas to avoid the congestion within the campus.

A few transit routes operate along the corridor by the City of Calabasas. Less than 5 students were observed using transit infrastructure for school arrival. The transit stop on the far side of the intersection includes two bus benches and trash cans.

Paul Revere Drive is designated as a minor neighborhood street within the study area, which extends from Liberty Bell Road to the Alice C. Stelle Middle School campus. The street is approximately 40 feet wide, consists of a travel lane in the northbound direction, and requires a forced left or right turn in the Southbound direction. Vehicular travel is not permitted from Paul Revere Drive into the school campus to prevent congestion beyond Liberty Bell Road. At the intersection of Liberty Bell Road & Paul Revere Road, the City installed a traffic circle to improve traffic flow and safety. There are sidewalks on both sides of the roadway with no bicycle infrastructure. The speed limit is 25 mph and surrounding land uses are exclusively residential.

Suggestions for Improvements

Figure 5.2 provides a comprehensive overview of recommended improvements for the study area to improve pedestrian access into the school campus, to improve transit access, and to improve bicycle safety and connectivity.

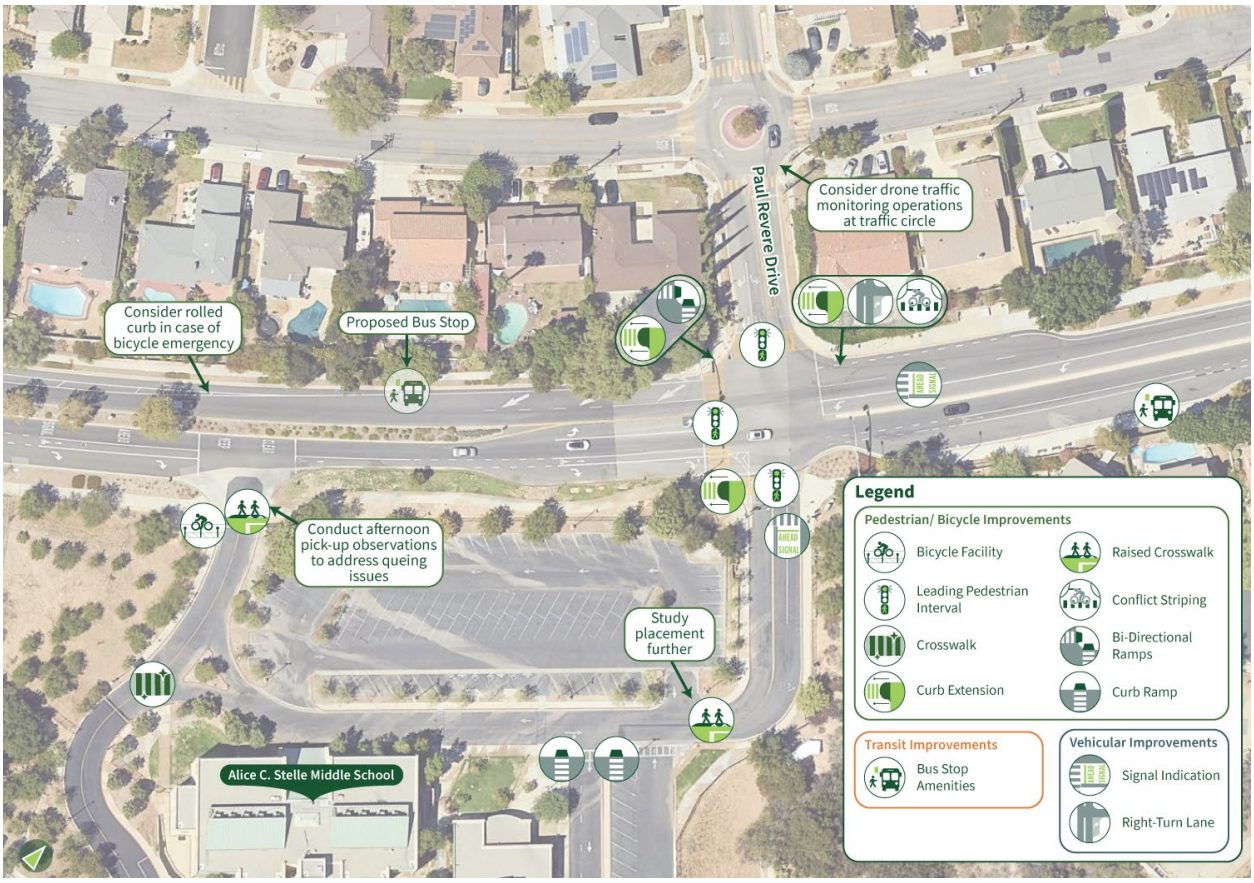


Figure 5.2 Mulholland Highway and Paul Revere Drive Recommendations

The figure summarizes recommendations for enhancing pedestrian, bicycle, and vehicular safety and convenience. Of note, the evaluation team recommends:

1. **Adding a Bus Stop** – westbound on Mulholland Highway to mirror the eastbound farside bus stop, as well as adding additional transit amenities to both the existing and planned transit stop.
- **Pedestrian and Bicycle Improvements**: additional safety modifications to the Class II Bicycle Facility, adding Leading Pedestrian Intervals at all crosswalk legs, adding Curb Extensions to all crosswalk legs, adding a raised crosswalk inside the campus to improve safety and visibility for students, while slowing vehicles
- **Restricting vehicular movements**: additional signal indication signage, dedicated right-turn lane to reduce bicycle conflicts at the intersection and vehicles merging beyond the intersection
- **Signage**: additional signage to indicate speed limits, crosswalks, and restricted turn movements

Figure 5.3 below provides additional details for the additional transit stop and bicycle facility upgrades.

Figure 5.3 Class II Bike Lane Modifications on Mullholland Highway at Paul Revere Drive

This design is a short-term bicycle improvement to manage conflicts between cyclists and people driving. The City may wish to explore long-term improvements to the bicycle facility, which would move the facility from curbside to the parkway where the parkway widens.

This short-term design recommends that the City:
- Convert shared through/right-turn lane into a right-turn pocket with arrow and striping
- Shift the bike lane to run adjacent to the travel lane to reduce conflicts between people walking and turning vehicles
- Add in curb extensions to shorten the pedestrian crossing distance at Mulholland Highway

- Add green paint to conflict zones (areas where cyclists, buses, and vehicles will be sharing road space) on both sides of the street
- Add bollards to curb extensions and striped roadways

5.3.2 Mulholland Highway & Eddingham Avenue

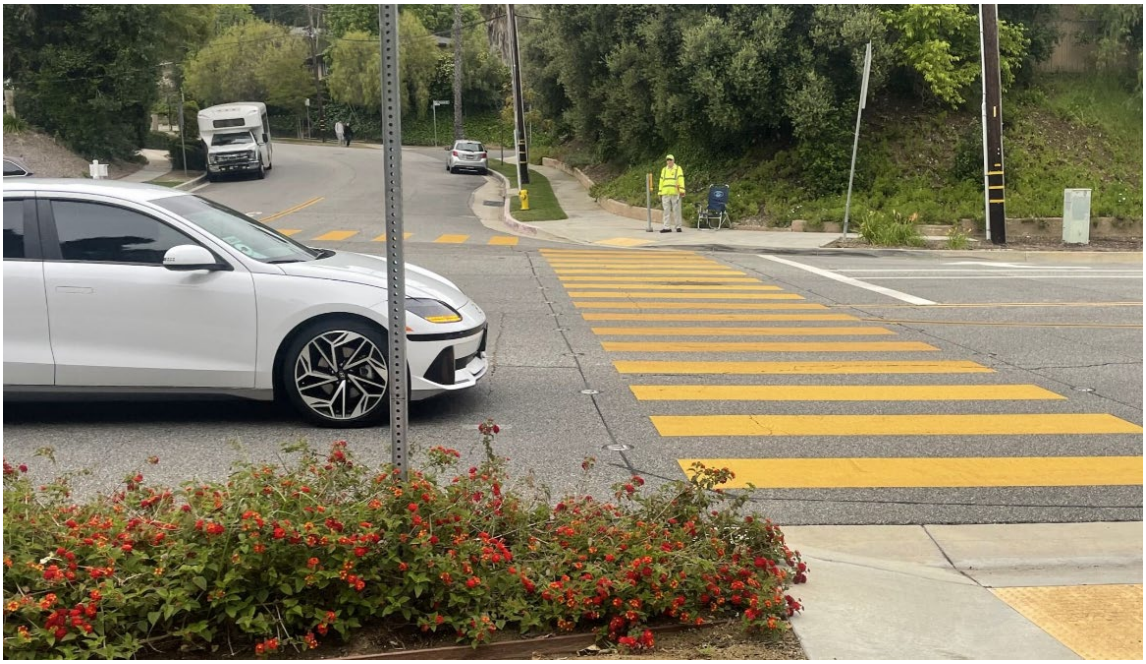
Existing Conditions

Mulholland Highway is a major arterial roadway within the study corridor. The study corridor includes the surrounding roadway of Mulholland Highway at Eddingham Avenue. At the midblock, the roadway generally consists of one travel lane in each direction, divided by a landscaped median. The road width at the midblock is approximately 56 feet. Approaching the intersection of Eddingham Avenue, the roadway widens to approximately 66 feet before the crosswalk. In the eastbound direction, the roadway consists of a through lane and a dedicated right-turn lane onto Eddingham Avenue. In the westbound direction, the roadway consists of a through lane and dedicated left-turn lane onto Eddingham Avenue. The speed limit along the corridor is 40 mph. In the presence of school children, the school zone speed limit applies, and the speed limit drops to 25 mph.

The intersection of Mulholland Highway & Eddingham Avenue is currently unsignalized, with yellow, high visibility crosswalks customary to school zones on two of three legs of the intersection. During pick-up and drop-off windows, a crossing guard is stationed at the intersection, though only some pedestrian traffic was observed. The intersection also includes ADA-compliant ramps. As Eddingham Avenue ends at Mulholland Highway, the parkway at the intersection is well maintained and landscaped.

Sidewalk infrastructure exists on both sides of the roadway, is smooth and well maintained, and buffered from vehicular traffic by a wide parkway with shady street trees along most of the parkway. Part of the parkway includes a wooden fence, which appears to serve a generally aesthetic purpose though may also be in place to discourage pedestrian crossings at the midblock. A Class II bike lane runs along both portions of the roadway and it is understood that this infrastructure was installed over 10 years ago and has not been upgraded. The roadway is bisected by a concrete median that runs along the entire study corridor, tapering at each intersection. The median varies in width and is landscaped and well maintained.

Similar to land uses to the east of this study corridor, the land uses on Mulholland Highway are almost exclusively residential, with access on parallel minor neighborhood streets. Driveway access is limited to non-existent on the study corridor, which results in very little egress and ingress on the study corridor outside of intersections. Most of the activity observed during the walk audit by the evaluation team on the corridor was vehicular activity, though a handful of students were observed walking from residential areas to Calabasas High School.



There is no parking in the study corridor, though parking picks up to the west of the study corridor east of the high school. The evaluation team observed that parking spaces were all full before the first bell of the high school. The evaluation team also observed that traffic backed up from the high school into Eddingham Avenue well before the first bell, signaling congestion due to high peak period vehicle activity near the high school.

Eddingham Avenue is designated as a minor neighborhood street within the study area. The street is approximately 40 feet wide, maintains a travel lane in the northbound direction, with a stop sign. The speed limit is 25 mph and surrounding land uses are exclusively residential.

Suggestions for Improvements

Figure 5.4 provides a comprehensive overview of recommended improvements for the study area to improve pedestrian access, transit access, and bicycle safety and connectivity.

Figure 5.4 Mulholland Highway and Eddingham Avenue Overview of Recommendations

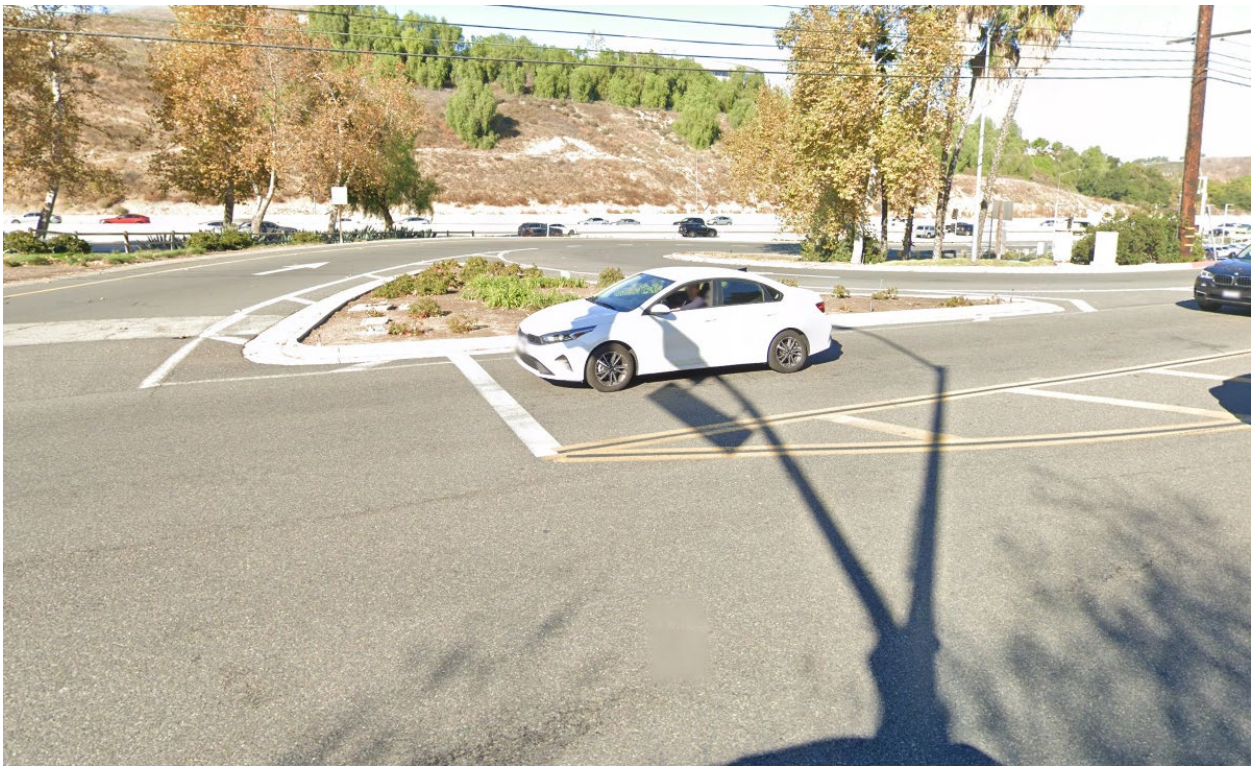
Principally, the evaluation team recommends:

- Extending the median in striping to the crosswalk, serving as a pedestrian refuge island
- Making modifications to the existing Class II bike lane to be reconstructed within the parkway as a Class IV protected bikeway where the curb extends into the roadway, and transitioning the bike lane from roadway to parkway with an access ramp

5.3.3 Calabasas Road & US-101 On/Off-ramps

Existing Conditions

Calabasas Road is a major arterial roadway within the study corridor. The study corridor extends east to Parkway Calabasas (which is discussed in the next section) and west to Mureau Road. The primary focus of this study area is at the intersection with the 101 Freeway Interchange. The road width varies widely, ranging from 40 feet on the approach to Mureau Road to 70 feet at the 101 On/off-ramps. The roadway consists of one travel lane in each direction with a dedicated left-turn lane onto US-101 in the eastbound direction and a right-turn lane in the westbound direction, with a concrete median demarcating a free right –turn onto US-101. The roadway also includes a striped median island along most portions of the study corridor. The speed limit along the corridor is 40 mph. There is little speed limit signage along the corridor.



The intersection of Calabasas Road & US-101 On/off-ramps is signalized. No pedestrian crosswalk markings exist within the intersection and signage indicates that pedestrians cannot cross at the intersection. The sidewalk on the south side of the corridor ends at the intersection, where pedestrians may not cross and are forced to walk in the bicycle lane or cross outside of a marked area. Sidewalk infrastructure picks up on the north side of the corridor at the Mercedes Benz dealership. There is no parkway between the sidewalk and the corridor. There are very few trees along the corridor. There are no pedestrian crossing opportunities on the corridor until Parkway Calabasas.

A faintly marked Class II bicycle lane runs along the corridor outside of the intersections, where bike lane striping disappears. For much of the corridor on the eastbound side towards Parkway Calabasas, the bike lane runs along an unimproved hillside. Rock debris from the hillside has crumbled into the bike lane. One cyclist was observed in the bike lane during the walk audit period.

The land uses on Calabasas Road to the south are almost exclusively automobile oriented, including several dealerships and a gas station. The western end of the corridor provides trailhead access, while the eastern end of the corridor leads to the civic center and shopping amenities. There are multiple driveways along the corridor to car dealerships, some of which have been recently improved and included some but limited pedestrian amenities.

Calabasas Road maintains a few transit routes operated by the City of Calabasas. The Los Angeles Department of Transportation (LADOT) runs Commuter Express service along the corridor (423 to Downtown USC). The Los Angeles Metropolitan Transit Authority runs line 161 to Canoga.

Suggestions for Improvements

Figure 5.5 provides a comprehensive overview of recommended improvements for the study area.

Figure 5.5 Calabasas Road and 101 Freeway Interchange Recommendations Overview

Of note, the evaluation team recommends:

2. **Adding a signalized crosswalk** on the north side of Calabasas Road
- **Adding a Roundabout** to balance traffic flow off the freeway with bicycle and pedestrian access to the intersection
- **Adding a retaining wall** to the bike lane to protect the lane from hillside debris

In addition, the evaluation team recommends exploring opportunities to convert the Class II bike lane into a Class IV bike lane through a lane reconfiguration, which would be consistent with the LA Metro Active Transportation Plan.

There is some potential for residential use along the study corridor. In this case, the evaluation team recommends updating the corridor specific plan to increase pedestrian amenities around the new development to improve access to the surrounding area. This would include completing sidewalk infrastructure, adding crossing opportunities, and exploring ways to better connect to transit infrastructure.

5.3.4 Calabasas Road & Parkway Calabasas

Existing Conditions

Calabasas Road is a major arterial roadway within the study corridor. The study corridor extends west just beyond Parkway Calabasas (which is discussed in the section above) to the midblock before Park Sorrento. The road width ranges from 96 feet to 86 feet. In the westbound direction, the roadway consists of a dedicated right-turn lane onto Parkway Calabasas towards the freeway entrance, two through lanes, and a dedicated left-turn lane. A Class II bike lane exists at the midblock but striping drops toward the intersection. The same configuration exists on the eastbound side of the road, with a dedicated bike lane at the intersection. No cyclists were observed in the bicycle facilities during the walk audit period. The roadway also includes a narrow five-foot concrete median island along most portions of the study corridor. The speed limit along the corridor is 40 mph. There is very little speed limit signage along the corridor.

The intersection of Calabasas Road & Parkway Calabasas is signalized. Pedestrians may cross three of the four legs of the intersection but are not permitted to cross the north side of Calabasas Road. Sidewalk infrastructure exists on all legs of the study section. On Parkway Calabasas, sidewalks end after transit infrastructure at the midblock. There are no high visibility crosswalks on any of the intersection legs. There is limited shading along the sidewalks. While the evaluation team made observations on an overcast day during daytime hours, the evaluation team observed that little shade or natural tree canopy may make the intersection particularly uncomfortable for people walking. Lane markings are somewhat faded.

The land uses in the surrounding area are civic and automobile oriented. Calabasas Road maintains a few transit routes operated by the City of Calabasas. The Los Angeles Department of Transportation (LADOT) runs Commuter Express service along the corridor (423 to Downtown USC). The Los Angeles Metropolitan Transit Authority runs line 161 to Canoga.

Suggestions for Improvements

Figure 5.6 provides a comprehensive overview of recommended improvements for the study area.

Figure 5.6 Calabasas Road and Parkway Calabasas Recommendations Overview

The primary recommendations for this intersection include upgrades to the existing Class II bike lane, which would require a lane reconfiguration and may support slower speeds and a more welcoming environment to people walking, biking, and taking transit. Upgrades to pedestrian infrastructure should be made to all existing pedestrian legs of the intersection. The sidewalk on Parkway Calabasas should be extended to major destinations for people using transit. Existing transit stops should be standardized with amenities like benches, shelter, and lighting.

The evaluation team also recommends that the City investigate the following recommendations:

- Leading pedestrian interval (LPI) at all crosswalks
- Remove split phasing
- Consider protective signal backings or a traffic signal backplate to improve the visibility of the signal

Figure 5.7 provides greater detail to a roadway configuration to accommodate a Class IV protected bikeway.

Figure 5.7 Class IV Protected Bikeway Details on Calabasas Road at Parkway Calabasas

The evaluation team recommends that the City consider the following:

- Extend existing bike lane on Calabasas Rd to a Class IV protected bikeway
- Shift the bike lane to run adjacent to the curb
- Shift parking adjacent to the travel lane, which adds an additional level of protection for cyclists and helps to make the street feel calmer and slow down excessive speeding
- Use a bike signal to separate westbound right cars and westbound though bikes
- Add green paint to conflict zones (areas where cyclists and vehicles will be sharing road space), including in driveway areas
- Add bollards to striped roadways to prevent vehicles from driving in excess roadway space

5.4 Conclusion

The evaluation team recommends several improvements in line with the Complete Streets Safety Assessment program and with a Safe Systems Approach. Key suggestions include adding a westbound bus stop on Mulholland Highway, enhancing transit amenities, and implementing pedestrian and bicycle improvements such as upgraded Class II bike facilities, leading pedestrian intervals, curb extensions, and raised crosswalks. To reduce conflicts between vehicles and bicycles, additional signage, signal indications, and forced right-turn lanes are proposed. Further recommendations focus on long-term bicycle facility upgrades, such as shifting bike lanes adjacent to travel lanes and adding green paint to conflict zones.

Long term improvements focus on ways to add additional concrete barriers to unimproved hillside areas, completing sidewalk infrastructure, and upgrading Class II bike lanes to Class IV protected bikeways.

Appendix A: Glossary of Pedestrian Improvement Measures

PEDESTRIAN IMPROVEMENT MEASURES

Measure	Description	Benefits	Application
Traffic Control Countermeasures			
Traffic Signal or All-Way Stop	Conventional traffic control devices with warrants for use based on the Manual on Uniform Control Devices (MUTCD).	Reduces pedestrian-vehicle conflicts and slows traffic speeds.	Must meet warrants based on traffic and pedestrian volumes; however, exceptions are possible based on demonstrated pedestrian safety concerns (Crash history).
Pedestrian Hybrid Beacon	PHBs (Pedestrian Hybrid Beacons) are pedestrian-actuated signals that are a combination of a beacon flasher and a traffic control signal. When actuated, PHBs display a yellow (warning) indication followed by a solid red light. During pedestrian clearance, the driver sees a flashing red "wig-wag" pattern until the clearance interval has ended and the signal goes dark.	Reduces pedestrian-vehicle conflicts and slows traffic speeds.	Useful in areas where it is difficult for pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied. Appropriate for multi-lane roadways.
Overhead Flashing Beacons	Flashing amber lights are installed on overhead signs, in advance of the crosswalk or at the entrance to the crosswalk.	The blinking lights during pedestrian crossing times increase the number of drivers yielding for pedestrians and reduce pedestrian-vehicle conflicts.	Best used in places where motorists cannot see a traditional sign due to topography or other barriers.

		This measure can also improve conditions on multi-lane roadways.	
Rectangular Rapid Flashing Beacon	A Rectangular Rapid Flashing Beacon (RRFB) is a pedestrian-actuated enhancement that improves safety at uncontrolled, marked crossings.	FHWA states that research indicates RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks. Solar panels reduce energy costs associated with maintenance of the device.	Appropriate for multi-lane roadways.
In-Roadway Warning Lights	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light. The lights may be push-button activated or activated with pedestrian detection.	This measure provides a dynamic visual cue and is increasingly effective in bad weather.	Best in locations with low bicycle ridership, as the raised markers present a hazard to bicyclists. May not be appropriate in areas with heavy winter weather due to high maintenance costs. May not be appropriate for locations with bright sunlight. The lights may cause confusion when pedestrians fail to activate them and/or when they falsely activate.
High-Visibility Signs and Markings	High-visibility markings include a family of crosswalk striping styles including the "ladder" and the "triple four." One style, the zebra-style crosswalk pavement markings, were once popular in Europe, but have been phased out because the signal-controlled puffin is more effective (see notes). High-visibility fluorescent yellow green signs are made of the approved fluorescent yellow-green color and posted at crossings to increase the visibility of a pedestrian crossing ahead.	FHWA recently ended its approval process for the experimental use of fluorescent yellow crosswalk markings and found that they had no discernible benefit over white markings.	Beneficial in areas with high pedestrian activity, as near schools, and in areas where travel speeds are high and/or motorist visibility is low.
In-Street Pedestrian Crossing Signs	This measure involves posting regulatory pedestrian signage on lane edge lines and road centerlines. The In-Street Pedestrian Crossing sign may be used to remind	This measure is highly visible to motorists and has a positive impact on pedestrian safety at crosswalks.	Mid-block crosswalks, unsignalized intersections, low-speed areas, and two-lane roadways are ideal for this pedestrian treatment. The STOP FOR legend shall

	road users of laws regarding right of way at an unsignalized pedestrian crossing. The legend STATE LAW may be shown at the top of the sign if applicable. The legends STOP FOR or YIELD TO may be used in conjunction with the appropriate symbol.		only be used in states where the state law specifically requires that a driver must stop for a pedestrian in a crosswalk.
Pedestrian Crossing Flags	Square flags of various colors, which are mounted on a stick and stored in sign-mounted holders on both side of the street at crossing locations; they are carried by pedestrians while crossing a roadway.	This measure makes pedestrians more visible to motorists.	Appropriate for mid-block and uncontrolled crosswalks with low visibility or poor sight distance.
Advanced Yield Lines	Standard white stop or yield limit lines are placed in advance of marked, uncontrolled crosswalks.	This measure increases the pedestrian's visibility to motorists, reduces the number of vehicles encroaching on the crosswalk, and improves general pedestrian conditions on multi-lane roadways. It is also an affordable option.	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers, as advance limit lines will help prevent drivers from encroaching on the crosswalk. Addresses the multiple-threat Crash on multi-lane roads.
Geometric Treatments			
Pedestrian Overpass/ Underpass	This measure consists of a pedestrian-only overpass or underpass over a roadway. It provides complete separation of pedestrians from motor vehicle traffic, normally where no other pedestrian facility is available, and connects off-road trails and paths across major barriers.	Pedestrian overpasses and underpasses allow for the uninterrupted flow of pedestrian movement separate from the vehicle traffic.	Grade separation via this measure is most feasible and appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials. This measure should be considered a last resort, as it is expensive and visually intrusive.
Road Diet (aka Lane Reduction)	The number of lanes of travel is reduced by widening sidewalks, adding bicycle and parking lanes, and converting parallel parking to angled or perpendicular parking.	This is a good traffic calming and pedestrian safety tool, particularly in areas that would benefit from curb extensions but have infrastructure in the way. This measure also improves	Roadways with surplus roadway capacity (typically multi-lane roadways with less than 15,000 to 17,000 ADT) and high bicycle volumes, and roadways that would benefit from traffic calming measures.

		pedestrian conditions on multi-lane roadways.	
Median Refuge Island	Raised islands are placed in the center of a roadway, separating opposing lanes of traffic with cutouts for accessibility along the pedestrian path.	This measure allows pedestrians to focus on each direction of traffic separately, and the refuge provides pedestrians with a better view of oncoming traffic as well as allowing drivers to see pedestrians more easily. It can also split up a multi-lane road and act as a supplement to additional pedestrian tools.	Suggested for multi-lane roads wide enough to accommodate an ADA-accessible median.
Staggered Median Refuge Island	This measure is similar to traditional median refuge islands; the only difference is that the crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then must walk towards traffic to reach the second half of the crosswalk. This measure must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Benefits of this tool include an increase in the concentration of pedestrians at a crossing and the provision of better traffic views for pedestrians. Additionally, motorists are better able to see pedestrians as they walk through the staggered refuge.	Best used on multi-lane roads with obstructed pedestrian visibility or with off-set intersections.
Sidewalk Extension	Also known as curb extension or a pedestrian bulb-out, this traffic-calming measure is meant to slow traffic and increase driver awareness. It consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider.	Curb extensions narrow the distance that a pedestrian has to cross and increases the sidewalk space on the corners. They also improve emergency vehicle access and make it difficult for drivers to turn illegally.	Due to the high cost of installation, this tool would only be suitable on streets with high pedestrian activity, on-street parking, and infrequent (or no) curb-edge transit service. It is often used in combination with crosswalks or other markings.
Reduced Curb Radii	The radius of a curb can be reduced to require motorists to make a tighter turn.	Shorter radii narrow the distance that pedestrians have to cross; they also reduce traffic speeds and increase driver awareness (like curb extensions), but are less difficult and expensive to implement.	This measure would be beneficial on streets with high pedestrian activity, on-street parking, and no curb-edge transit service. It is more suitable for wider roadways and roadways with low volumes of heavy truck traffic.

Curb Ramps	Curb ramps are sloped ramps that are constructed at the edge of a curb (normally at intersections) and are bi-directional (if applicable), as a transition between the sidewalk and a crosswalk.	Curb ramps provide easy access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, and also for pedestrians with mobility impairments who have trouble stepping up and down high curbs.	Curb ramps must be installed at all intersections and mid-block locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act and 1990 Americans with Disabilities Act). Where feasible, separate curb ramps for each crosswalk at an intersection should be provided rather than having a single ramp at a corner for both crosswalks.
Raised Crosswalk	A crosswalk whose surface is elevated above the travel lanes.	Attracts drivers' attention; encourages lower travel speeds by providing visual and tactile feedback when approaching the crosswalk.	Appropriate for multi-lane roadways, roadways with lower speed limits that are not emergency routes, and roadways with high levels of pedestrian activity, such as near schools, shopping malls, etc.
Chicanes	A chicane is a sequence of tight serpentine curves (usually an S-shape curve) in a roadway, used on city streets to slow cars.	This is a traffic-calming measure that can improve the pedestrian environment and pedestrian safety.	Chicanes can be created on streets with higher volumes, given that the number of through lanes is maintained; they can also be created on higher-volume residential streets to slow traffic. Chicanes may be constructed by alternating parallel or angled parking in combination with curb extensions.
Pedestrian Access and Amenities			
Marked Crosswalk	Marked crosswalks should be installed to provide designated pedestrian crossings at major pedestrian generators, crossings with significant pedestrian volumes (at least 15 per hour), crossings with high vehicle-pedestrian Crashes, and other areas based on engineering judgment.	Marked crosswalks provide a designated crossing, which may improve walkability and reduce jaywalking.	Marked crosswalks alone should not be installed on multi-lane roads with more than about 10,000 vehicles/ day. Enhanced crosswalk treatments (as presented in this table) should supplement the marked crosswalk.
Textured Pavers	Textured pavers come in a variety of materials (for		Appropriate for areas with high volumes of pedestrian

	example, concrete, brick, and stone) and can be constructed to create a textured pedestrian surface such as a crosswalk or sidewalk. Crosswalks are constructed with the pavers, or can be made of stamped concrete or asphalt.	Highly visible to motorists, this measure provides a visual and tactile cue to motorists and delineates a separate space for pedestrians, as it provides a different texture to the street for pedestrians and motorists. It also aesthetically enhances the streetscape.	traffic and roadways with low visibility and/or narrow travel ways, as in the downtown area of towns and small cities.
Anti-Skid Surfacing	Surface treatment is applied to streets to improve skid resistance during wet weather. This is a supplementary tool that can be used to reduce skidding in wet conditions.	Improves driver and pedestrian safety.	Appropriate for multi-lane roadways and roadways with higher posted speed limit and/or high vehicle volumes or Crash rates.
Accessibility Upgrades	Treatments such as audible pedestrian signals, accessible push buttons, and truncated domes should be installed at crossings to accommodate disabled pedestrians.	Improves accessibility of pedestrian facilities for all users.	Accessibility upgrades should be provided for all pedestrian facilities following a citywide ADA Transition Plan.
Pedestrian Countdown Signal	Displays a "countdown" of the number of seconds remaining for the pedestrian crossing interval. In some jurisdictions the countdown includes the walk phase. In other jurisdictions, the countdown is only displayed during the flashing don't walk phase.	Increases pedestrian awareness and allows them the flexibility to know when to speed up if the pedestrian phase is about to expire.	The forthcoming 2009 MUTCD is expected to require all pedestrian signals to incorporated countdown signals within ten years. The signals should be prioritized for areas with pedestrian activity, roadways with high volumes of vehicular traffic, multi-lane roadways, and areas with elderly or disabled persons (who may walk slower than others may).
Transit			
High-Visibility Bus Stop Locations	This measure should include siting bus stops on the far side of intersections, with paved connections to sidewalks where landscape buffers exist.	Provides safe, convenient, and inviting access for transit users; can improve roadway efficiency and driver sight distance.	Appropriate for all bus stops subject to sight distance and right-of-way constraints.

Transit Bulb	Also known as a sidewalk extension or a bus bulb/nub, curb extensions, or bus bulges are a section of sidewalk that extends from the curb of a parking lane to the edge of the through lane.	Creates additional space at a bus stop for shelters, benches, and other passenger amenities.	Appropriate at sites with high patron volumes, crowded city sidewalks, and curbside parking.
Enhanced Bus Stop Amenities	Adequate bus stop signing, lighting, a bus shelter with seating, trash receptacles, and bicycle parking are desirable features at bus stops.	Increase pedestrian visibility at bus stops and encourage transit ridership.	Appropriate at sites with high patron volumes.

Appendix B: Glossary of Bicycling Improvement Measures

BICYCLING IMPROVEMENT MEASURES

Measure	Description	Benefits	Application
LINKS /ROADWAY SEGMENTS			
A. Road Design and Operations to Slow Traffic			
Traffic Calming	There are a variety of measures too numerous to list here. See ITE Institute of Transportation Engineers, "Traffic Calming: State of the Practice".	Reduces motor vehicle speeds, which improves safety for all modes and increases bicyclist's comfort.	Urban and suburban settings; suggested for urban major streets with prevailing speeds of 35 mph and higher and for suburban major streets with prevailing speeds 45 mph or higher; and for all local streets with speeds of 30+ mph.
Bicycle Boulevard	A minor street on which traffic control devices are designed and placed to encourage cycling; these include: unwarranted stop signs along bike route are removed; crossing assistance at major arterials is provided (see examples in Nodes-Section E below).	Allows cyclists to maintain their travel speeds, significantly reducing their travel time; provides cyclists with a low volume, low speed street where motorists are aware that it is a bicycle-priority street.	On minor streets with less than 3000 vehicles per day especially useful when Bike Blvd is parallel to and within ¼ mile of a major arterial with many desirable destinations.
Signal Coordination at 15 -25 mph	The signal timing along a corridor is set so that traffic which receives a green light at the first intersection will subsequently receive a green light at all downstream intersections if they travel at the design speed; aka a "green wave."	Encourages motorists to travel at slower speeds, provides a more comfortable experience for cyclists and increases overall traffic safety; also allows cyclists to hit the green lights, so that they can maintain their travel speeds, significantly reducing their travel time.	Urban settings, typically downtown and other areas with relatively short blocks and with traffic signals at every intersection.
Woonerf/Shared Space	A shared space concept where the entire public right of way is available for all modes, often with no sidewalks, and with no	Access for motor vehicles is maintained, unlike a pedestrian zone, but motor vehicle speeds are constrained to 5 mph by design and the presence of other modes.	Low volume residential streets where families can gather, and children are encouraged to play; also commercial areas with high pedestrian volumes, bicyclists and transit.

	lane striping, and little if any signage.	Safety for all modes is improved.	
B. Road Design to Provide Bicycle Infrastructure			
Bike Lanes	A painted lane for the exclusive use of bicyclists; it is one-way and is 5 feet minimum in width. They can be retrofitted onto an existing street by either a) narrowing existing wide travel lanes; b) removing a parking lane; c) removing a travel lane, or d) widening the roadway. A common method to retrofit bike lanes is described below.	Provides cyclists with their own travel lane so that they can safely pass and be passed by motor vehicles.	Roadways with over 4000 vehicles per day (if less than 4000 vehicles per day see Bicycle Boulevards above).
Road Diet (aka Lane Reduction)	One to two travel lanes are replaced with a bike lane in each direction, and in most cases by also adding left-turn lanes at intersections or a center two-way left-turn lane; variations include widening sidewalks, and replacing parallel parking with angled or perpendicular parking.	Improves traffic safety for all modes by: a) eliminating the double-threat to pedestrians posed by the two or more travel lanes in each direction; b) providing bike lanes for cyclists; c) providing a left-turn pocket for motorists, reducing rear-end Crashes and improving visibility to oncoming traffic.	Classic application is a four-lane undivided roadway with less than 15,000 to 17,000 ADT though conversions of four-lane streets may work up to 23,000 ADT. Also applies to three-lane roadways and to 5 or 6-lane undivided roadways
Buffer adjacent to bike lanes	A three to five-foot buffer area is provided on one or both sides of the bike lane.	Right-side buffer (between bike lane and on-street parking): Removes cyclists from the door zone; Left-side (between bike lane and adjacent travel lane): provides greater separation from passing motor vehicle traffic.	This measure is particularly beneficial in the following conditions: Right-side: on streets with parallel on-street parking particularly in cities with a Crash history of dooring; Left-side: on streets with traffic with prevailing speeds of 40 mph and higher.
Cycle Tracks	A bikeway within the roadway right of way that is separated from both traffic lanes and the sidewalks by either a parking lane, street furniture, curbs or other physical means.	Reduces sidewalk riding, provides greater separation between motorists and cyclists.	Urban settings with parallel sidewalks and heavy traffic.
Left-Turn Staging Box	This roadway treatment provides bicyclists with a means of safely making a left turn at a multi-lane signalized	Bicyclists are protected from the flow of traffic while waiting to turn.	Appropriate for multilane roadways. Can also be mirrored for right-turns

	intersections from a bike lane or cycle track on the far-right side of the roadway.		from a one-way street with a left-side bikeway.
C Other Traffic Control Devices			
Except Bicycles placard	A Regulatory sign placard for use with other regulatory signs.	Increases or maintains the access and circulation capabilities of bicyclists.	Used at locations where the restriction in question does not apply to bicyclists, such as No Left Turn or Do Not Enter.
Sharrows	A pavement legend that indicates the location within the travel lane where bicyclists are expected to occupy.	The sharrow encourages cyclists to ride outside of the door zone and studies have shown that sharrows reduce the incidence of cyclists riding on the sidewalk and wrong-way riding.	Two or more lane city streets where the right-most lane is too narrow for a motor vehicle to safely pass a cyclist within the travel lane.
Bike Lanes May Use Full Lane sign (MUTCD R4-11)	Regulatory Sign	Informs motorists and cyclists that cyclists may be travelling in the center of a narrow lane.	Two or more lane city streets where the right-most lane is too narrow for a motor vehicle to safely pass a cyclist within the travel lane.
Share the Road sign (MUTCD W-11/ W16-1p)	Warning sign and placard	Informs motorists to expect cyclists on the roadway.	Two-lane roads particularly in rural areas where shoulders are less than four feet.
Bike Directional Signs (MUTCD D1 series or similar)	Informational signs indicating place names and arrows, with distances as a suggested option (D1-2C)	Informs bicyclists of the most common destination served by the bike route in question.	Particularly useful to direct cyclists to a facility such as a bike bridge or to use a street to access a major destination that might not otherwise be readily apparent.
D. New infrastructure to improve bicycle connectivity			
Bike Path	A paved pathway for the exclusive use of non-motorized traffic within its own right of way;	Provides additional connectivity and route options that otherwise would not be available to bicyclists.	Wherever a continuous right of way exists, typically found along active or abandoned railroad ROW, shorelines, creeks, and river levees.
Pathway connections	Short pathway segments for non-motorized traffic, for example, that join the ends of two cul-de-sacs or provide other connectivity not provided by road network.	Provides short-cuts for bicyclists that reduce their travel distance and travel time.	Varies by community; suggested at the end of every newly constructed cul-de-sac.
Bicycle Overpass/ Underpass	A bicycle overpass or underpass is a bridge or tunnel built for the exclusive use of non-motorized traffic and is typically built where at-	A bike bridge / tunnel complements a local roadway system that is discontinuous due to man-made or natural barriers. They reduce the distance traveled by cyclists,	Grade separation via this measure is most feasible and appropriate when it would provide direct access to major bicyclist destinations such as a school or college, employment

	grade crossings cannot be provided such as to cross freeways, rivers, creeks and railroad tracks. They can also be built to cross major arterials where, for example, a bike path must cross a major roadway.	and provide a safer conflict-free crossing, particularly if it is an alternative to a freeway interchange.	site, major transit station or would reduce the travel distance by one mile or more.
NODES / INTERSECTIONS			
E. Intersection Design for Motor Vehicles			
Reduced Curb Radii	The radius of a curb is reduced to require motorists to make the turn at slower speeds and to make a tighter turn.	Shorter curb radii reduce the speed of turning traffic thereby enabling a more comfortable weave between through cyclists and right-turning motorists.	This measure is suitable for downtown settings, at all cross streets with minor streets, all residential streets and all roadways that are not designated truck routes.
Remove/Control Free Right-Turn Lanes	Where a separate right-turn lane continues as its own lane after the turn, it may be redesigned to eliminate the free turn. A short-term solution is to control the turning movement with a stop sign or signal control and to redesign the island as discussed below.	Improves bicyclist safety since this design forces through cyclists on the cross street to end up in between two lanes of through motor vehicle traffic.	All locations where there are free right-turn lanes except those leading onto freeway on-ramps.
Remove/Redesign Right-Turn Slip-Lane Design	Right-turn slip lanes (aka channelized right-turn lanes) are separated from the rest of the travel lanes by a pork chop-shaped raised island which typically is designed to facilitate fast right turns, and right-turning vehicles are often not subject to the traffic signal or stop sign.	Improves bicyclist safety by slowing right-turning motorists and facilitates the weave between through bicyclists and right-turning motorists.	All locations with a channelized right-turn.
Remove Optional Right-Turn Lane in Combination with a Right-Turn Only Lane	At locations where there is an optional right-turn lane in combination with a right-turn only lane, convert the optional right-turn lane to a through-only lane.	Improves bicyclist safety since cyclists have no way of knowing how to correctly position themselves in the optional (through /right turn) lane.	All locations where there is an optional right-turn lane in combination with a right-turn only lane per HDM 403.6(1) (except on freeways).
Redesign Ramp Termini	Redesign high speed free flow freeway ramps to intersection local streets	Improves bicyclist and pedestrian safety on	All freeway interchanges with high speed ramps

	as standard intersections with signal control.	intersections of local streets with freeway ramps.	
F. Intersection Design Treatments - Bicycle-Specific			
Bicycle Signal Detection and Pavement Marking	Provide signal detectors that also detect bicyclists in the rightmost through lane and in left-turn lanes with left-turn phasing. Provide pavement marking to indicate to cyclists where to position themselves in order to activate the detector.	Enables cyclists to be detected when motor vehicles are not present to trigger the needed signal phase. Improves bicyclists' safety.	Per CA MUTCD 4D.105 and CVC 21450.5, all new and modified traffic detection installations must detect bicyclists; All other traffic-actuated signals may be retrofitted to detect bicyclists as soon as feasible.
Bicycle Signal Timing	Provides signal timing to account for the speed of cyclists to cross an intersection.	Improves bicyclists' safety by reducing the probability of a bicyclist being in an intersection when the phase terminates and being hit by traffic that receives the next green phase.	Signal timing that accounts for cyclists is particularly important for cyclists on a minor street approach to a major arterial which crosses a greater distance due to the width of the arterial, hence requiring a longer time interval.
Bicycle Signal Heads	A traffic signal indication in the shape of a bicycle, with full red, yellow green capability.	Improves bicyclist safety by providing a bicycle -only phase, where appropriate, given the geometry and phasing of the particular intersection.	Where intersection geometry is such that a bicycle-only phase is provided and/or bicycle signal heads would improve safety at the intersection. See also CA MUTCD for warrants for bicycle signal heads.
Widen Bike Lane at Intersection Approach	Within the last 200 feet of an intersection, widen the bike lane and narrow the travel; for example from 5 foot bike lane and 12 feet travel lane would become a 7 foot bike lane and 10 foot travel lane.	Improves cyclist safety by encouraging right-turning motorists to enter the bike lane to turn right, (as required by the CVC), which reduces the chance of a right-turn hook Crash in which a through cyclist remains to the right of a right-turning motorist.	On roads with bike lanes approaching an intersection without a right-turn only lane and there is noncompliance with right-turning vehicles merging into the bike lane as required by the CVC and UVC.
Bike Lane inside Right-Turn Only Lane ("Combined Bicycle/Right-Turn Lane")	Provide a bike lane line inside and on the left side of a right-turn only lane.	Encourages cyclists to ride on the left side of the right-turn only lane thus reducing the chance of a right hook Crash, where a cyclist remains to the right of a right-turning motorist.	On roads with bike lanes approaching an intersection with a right-turn only lane and there is not enough roadway width to provide a bike lane to the left of the right-turn lane.
Bike Boxes	Area between an Advance Stop Line and a marked crosswalk which is designates as the queue	Primary benefits are to reduce conflicts between bicyclists and right-turning traffic at the onset of the green signal	Locations where there are at least three cyclists at the beginning of the green phase

	space for cyclists to wait for a green light ahead of queued motor vehicle traffic; sometimes painted green.	phase, and to reduce vehicle and bicyclist encroachment in a crosswalk during a red signal phase.	and moderate to high pedestrian volumes.
Marked Crosswalk with Distinct Marked Area for Bicyclists separate from Pedestrians	A marked crosswalk that has two distinct areas, one for pedestrians and one for bicyclists.	Reduces conflicts between bicyclists and pedestrians by indicating the part of the crosswalk intended for the two different modes.	At a typical intersection, cyclists would not be riding within the crosswalk, so this measure is intended for those few locations where the intersection design is such that bicyclists are tracked into a crosswalk such as at a midblock bike path crossing or possibly a cycle track.
Pedestrian Countdown Signal	Displays a "countdown" of the number of seconds remaining for the pedestrian crossing interval. In some jurisdictions the countdown includes the walk phase. In other jurisdictions, the countdown is only displayed during the flashing don't walk phase.	While designed for pedestrians, this measure also assists bicyclists in knowing how much time they have to left to cross the intersection.	The 2012 MUTCD requires all pedestrian signals to incorporated countdown signals within ten years
G. Geometric Countermeasures to Assist crossing a Major Street			
Median Refuge Island	A raised island placed in the center of a roadway, separating opposing lanes of traffic, with ramps for cyclists and ADA accessibility	This measure allows bicyclists to cross one direction of traffic at a time; it allows drivers to see bicyclists crossing from the center more easily.	Suggested for multilane roads at uncontrolled crossings where an 8-foot (min.) wide by 15-foot (min.) long median can be provided.
Staggered Refuge Pedestrian Island	This measure is similar to traditional median refuge islands; the only difference is that the crosswalk is staggered such that a pedestrian crosses one direction of traffic street and then must turn to their right facing oncoming to reach the second part of the crosswalk. This measure must be	Benefits of this measure include forcing the bicyclists and pedestrians to face the oncoming motorists, increasing their awareness of the impending conflict. Additionally, can improve motorists' visibility to those persons in the crosswalk.	Best used on multilane roads with obstructed pedestrian visibility or with off-set intersections

	designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.		
Raised Crosswalk/Speed Table	A crosswalk whose surface is elevated above the travel lanes at the same level as the approaching sidewalk. For bicyclists, a typical location would be at a bike path crossing, where the bike path elevation would remain constant while roadway cross traffic would experience a speed-hump type effect.	Attracts drivers' attention to the fact there will be non-motorized users crossing the roadway and slows traffic by providing a speed-hump effect for motorists approaching the crosswalk.	Appropriate for multi-lane roadways, roadways with lower speed limits that are not emergency routes, and roadways with high levels of pedestrian activity, such as near schools, shopping malls, etc.
H. Traffic Control Countermeasures to Assist Crossing a Major Street			
Traffic Signal or All-Way Stop Sign	Conventional traffic control devices with warrants for use based on the Manual on Uniform Control Devices (MUTCD)	Provides the gap needed in traffic flow so that cyclists can cross the street, reducing bicycle-vehicle conflicts and risk-taking by cyclists to	Must meet warrants based on traffic/ pedestrian / bicycle volumes, Crash history, and/ or other factors.
Modern Roundabout	A traffic circle combined with splitter island on all approaches and entering traffic must YIELD to traffic within the roundabout; typically designed for traffic speed within the roundabout of between 15 and 23 mph.	Slows traffic on cross street so that cyclists can more easily cross.	Roundabouts are a better alternative than an All-Way Stop signs when the side street volume is approximately 30 % of the total intersection traffic volume and total peak hour volume is less than 2300 vehicles per day.
Pedestrian Hybrid Beacon	PHBs (Pedestrian Hybrid Beacon) are pedestrian-actuated signals that are a combination of a beacon flasher and a traffic control signal. When actuated, PHBs display a yellow (warning) indication followed by a solid red light. During pedestrian	Reduces pedestrian-vehicle conflicts and slows traffic speeds.	Useful in areas where it is difficult for pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied. Appropriate for multi-lane roadways.

	clearance, the driver sees a flashing red "wig-wag" pattern until the clearance interval has ended and the signal goes dark.		
Rectangular Rapid Flashing Beacon	A Rectangular Rapid Flashing Beacon (RRFB) is a pedestrian-actuated enhancement that improves safety at uncontrolled, marked crossings.	FHWA states that research indicates RRFBs can result in motorist yielding rates as high as 98 percent at marking crosswalks. Solar panels reduce energy costs associated with maintenance of the device.	Appropriate for multi-lane roadways.
In-Roadway Warning Lights	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light. The lights may be push-button activated or activated with pedestrian detection.	This measure provides a dynamic visual cue of the uncontrolled crosswalk and is especially effective at night and in bad weather.	Locations not controlled by any measures listed above. Best in locations with low bicycle ridership on the cross street, as the raised markers may present difficulty to bicyclists. May not be appropriate in areas with heavy winter weather due to high maintenance costs. May not be appropriate for locations with bright sunlight.
Bicycle Crossing Sign (MUTCD W11-1) or Trail Crossing sign (MUTCD W11-15/W11-15p)	Warning Sign and placard.	Alerts motorists to a location where bicyclists or bicyclists and pedestrians will be crossing the roadway at an	Typical application is at bike path crossing of a roadway. (At a typical pedestrian crosswalk at an intersection, use the Pedestrian warning sign W11-2)

		uncontrolled location.	
In-Street Pedestrian Crossing Signs (MUTCD R1-6)	This measure involves posting this regulatory sign on road centerlines that read, "YIELD for Pedestrians in crosswalk". (Depending on state law, the word STOP may replace the word YIELD).	This measure improves the visibility of the crossing to motorists and has a positive impact on pedestrian safety at crosswalks.	Mid-block crosswalks, unsignalized intersections, low-speed areas, and two-lane roadways.
Advanced Yield Lines	Standard white stop or yield limit lines are placed 20-50 feet in advance of marked, uncontrolled crosswalks.	This measure increases the pedestrian's visibility to motorists, reduces the number of vehicles encroaching on the crosswalk, and improves general pedestrian conditions on multi-lane roadways. It is also an affordable option.	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers, as advance limit lines will help prevent drivers from encroaching on the crosswalk. Addresses the multiple-threat Crash on multi-lane roads.
Transit			
Bike Racks on Buses	A rack on the front of the bus that typically holds two or three bicycles.	Increases the trip length distance that a person can make.	Appropriate for all buses; most urban transit agencies have already implemented this measure.
Bikes allowed inside buses when bike rack is full	A policy adopted by a transit agency that allows passengers to bring bicycles inside the bus when the bike rack is full and there is room inside.	Prevents cyclists from needless being left behind to wait for the next bus if the bike rack is full yet there is room inside the bus.	Appropriate for all buses; most urban transit agencies have already implemented this measure.

Folding bikes allowed inside buses	A policy adopted by a transit agency that treats a folding bicycle as luggage, thereby allowing it inside the bus at all times.	Removes cyclists' uncertainty as to whether they will be able to fit their bike either on the bike rack or inside the bus; thus, they can reliably plan on being able to catch their intended bus.	Appropriate for all buses; most urban transit agencies have already implemented this measure.

Appendix C: Resource List and References

RESOURCE LIST
A Guide for Reducing Collisions Involving Pedestrians (NCHRP Report 500) http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v10.pdf
Pedestrian and Bicycle Information Center http://www.walkinginfo.org/
National Center for Safe Routes to School http://www.saferoutesinfo.org/
Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations (HRT-04-100) http://www.thrc.gov/safety/pubs/04100/index.htm
How to Develop a Pedestrian Safety Action Plan (FHWA-SA-05-12) http://www.walkinginfo.org/pp/howtoguide2006.pdf
Improving Pedestrian Safety at Unsignalized Crossings (NCHRP Report 562) http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf
Road Safety Audits: Case Studies (FHWA-SA-06-17) http://safety.fhwa.dot.gov/rsa/rsa_cstudies.htm
Pedestrian Road Safety Audit Guidelines and Prompt Lists http://drusilla.hsrc.unc.edu/cms/downloads/PedRSA.reduced.pdf
PEDSAFE: The Pedestrian Safety Guide and Countermeasure Selection System (FHWA-SA-04-003) http://www.walkinginfo.org/pedsafe/
Pedestrian and Bicycle Crash Analysis Tool (PBCAT) http://www.bicyclinginfo.org/bc/pbcat.cfm
FHWA, A Resident's Guide for Creating Safe and Walkable Communities http://safety.fhwa.dot.gov/ped_bicycle/ped/ped_walkguide/index.htm
FHWA, Pedestrian Safety Guide for Transit Agencies (FHWA-SA-07-017) http://safety.fhwa.dot.gov/ped_bicycle/ped/ped_transguide/
FHWA Pedestrian Safety Training Courses:
Developing a pedestrian safety action plan (two-day course) *next California course:* http://www.google.com/calendar/embed?src=lssandt@email.unc.edu
Designing for pedestrian safety (two-day course) *next California course:* http://www.google.com/calendar/embed?src=lssandt@email.unc.edu
Planning and designing for pedestrian safety (three-day course) *next California course:* http://www.google.com/calendar/embed?src=lssandt@email.unc.edu
Adapted from FHWA Pedestrian Road Safety Audit Guidelines and Prompt Lists

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Pedestrian and Bicycle Information Center. "El Cajon's Road Diet Case Study." http://www.walkinginfo.org/library/details.cfm?id=3967

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CROW, Design Manual for Bicycle Traffic, The Netherlands
http://www.crow.nl/nl/Publicaties/publicatiedetail?code=REC25
From the CROW English website, http://www.crow.nl/English
CROW is The Netherlands technology platform for transport, infrastructure and public space. It is a not-for-profit organization in which the government and businesses work together in pursuit of their common interests through the design, construction and management of roads and other traffic and transport facilities. Active in research and in issuing regulations, CROW focuses on distributing knowledge products to all target groups.

Transport for London, London Cycling Design Standards, UK
http://www.tfl.gov.uk/businessandpartners/publications/2766.aspx

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Fundamentals of Traffic Engineering, 16th Edition, Chapter 21: Bicycle Facilities; UC Berkeley Institute of Transportation Studies, 2007

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Appendix D: Street Connectivity

Importance of Street Connectivity

Providing direct paths for bicyclists and pedestrians via well-connected street networks is important for encouraging bicycling and walking by helping people overcome real and perceived senses of distance.

Street connectivity is also associated with public health benefits. The SMARTRAQ Project analysis in Atlanta, Georgia, found that doubling the current regional average intersection density, from 8.3 to 16.6 intersections per square kilometer was associated with a reduction in average per capita vehicle mileage of about 1.6 percent. Furthermore, the Frank et al. (2006) study of King County, Washington, found that per-household VMT declines with increased street connectivity, all else held constant.

Policies for Street Connectivity

A network of safe, direct, and comfortable routes and facilities: A 2004 PAS report suggests that pedestrian (and bicycle) path connections to be every 300 to 500 feet; for motor vehicles, they suggest 500 to 1,000 feet.[1] [2] For new development, such standards can be implemented through ordinances, like those of the regional government of Portland Oregon, Metro, which requires street connectivity in its Regional Transportation Plan and in the development codes and design standards of its constituent local governments.[3]

Measuring Connectivity

The following discussion of measuring street connectivity is provided as a resource and not officially a part of regular BSA processes. However, individuals are certainly encouraged to make such calculations. Jennifer Dill (2004) presents the following measures of street connectivity:

Intersection density

Street density

Average block length

Link/node ratio

Connected node ratio = intersections/ (intersections + cul-de-sacs)

Alpha index = number of actual circuits/ maximum number of circuits

Where a circuit is a finite, closed path starting and ending at a single node

Gamma index = number of links in the network/ maximum possible number of links between nodes

Effective walking area = number of parcels within a one-quarter mile walking distance of a point/ total number of parcels within a one-quarter mile radius of that point

Route directness = route distance/ straight-line distance for two selected points

Dill suggests that route directness (RD) is perhaps the best connectivity measure to reflect minimizing trip distances, but may be difficult to use in research and policy. However, it may be applied in practice by randomly selecting origin-destination pairs and calculating a sample for the subject area.

Susan Handy, Robert G. Paterson, and Kent Butler, 2004, *Planning for Street Connectivity: Getting from Here to There,* PAS Report #515 (Chicago: APA Planners Press).

For more information on this topic, see American Association of State Highway and Transportation Officials (AASHTO), *AASHTO Guide for the Design of Pedestrian Facilities* (Washington, D.C., AASHTO, 2004); *AASHTO Guide for the Development of Bicycle Facilities* (Washington, D.C., AASHTO, 1999; updated 2009); Institute of Traffic Engineers (ITE), Traffic Calming Guidelines and ITE *Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*? (Washington, D.C.: ITE, 2006), http://www.ite.org/bookstore/RP036.pdf (accessed September 3, 2008).

The regional government of Portland Oregon, Metro, requires street connectivity in its Regional Transportation Plan and in the development codes and design standards of its constituent local governments as follows: local and arterial streets be spaced no more than 530 feet apart (except where barriers exist), bicycle and pedestrian connections must be made (via pathways or on road right of ways) every 330 feet, Cul de sacs (or dead-end streets) are discouraged and can be no longer than 200 feet, and have no more than 25 dwelling units.

Berkeley SafeTREC

About the Program

The Complete Streets Safety Assessment (CSSA) conducts comprehensive transportation safety assessments that focus on pedestrian and bicycle safety. The aim of the CSSA is to help communities identify and implement traffic safety solutions that lead to improved safety and accessibility for all users, especially people walking and biking, on California's roadways.

The Safe Transportation Research and Education Center (SafeTREC) is a University of California, Berkeley research center affiliated with the Institute of Transportation Studies and the School of Public Health. Our mission is to inform decision-making and empower communities to improve roadway safety for all. We envision a world with zero roadway fatalities or serious injuries and a culture that prioritizes safe mobility.

For more information, visit: https://safetrec.berkeley.edu or email us at safetrec@berkeley.edu.

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