IMPORTANT NOTICE ABOUT PUBLIC COMMENTS AND MEETING PARTICIPATION

Due to concerns with security of the Zoom format, effective October 10, 2023, Remote Public Comment will not be accepted. Public comment may be provided in-person or via email, as set forth below. Members of the public desiring to provide comments as a part of the meeting are encouraged to either submit written comments or attend the meeting in person.

How to Participate:

IN PERSON: Members of the public are invited to attend and participate in person: **City of Hercules Council Chambers, 111 Civic Drive, Hercules, CA.**

VIA ZOOM: **At this time remote public comment is suspended and will not be accepted. To watch and listen only**: Download the Zoom mobile app from the Apple Appstore or Google Play. If you are using a desktop computer, you can test your connection to Zoom by clicking here or go to: https://www.zoom.us/join. Zoom also allows you to join by phone at 1-669-900-6833
Zoom Webinar ID: 879 1630 5468 **Zoom Passcode:** 193015

EMAIL: Public comments can also be submitted via email to **emelendez@ci.hercules.ca.us** up to 3pm the day of the meeting. Please note that emailed comments will not be read aloud by staff.

6:30 p.m. – Special Meeting
Public Safety / Traffic Subcommittee
March 27, 2024

Council Chambers
City Hall
111 Civic Drive
Hercules, CA. 94547

PUBLIC SAFETY / TRAFFIC SUBCOMMITTEE AGENDA

IN-PERSON IN COUNCIL CHAMBERS OR TO WATCH OR LISTEN ONLY:
ZOOM ID: 879 1630 5468
PASSCODE: 193015
ZOOM PHONE 1-669-900-6833

I. ROLL CALL – CALL TO ORDER

1. **Council Member Dion Bailey**
2. **Council Member Tiffany Grimsley**

II. PLEDGE OF ALLEGIANCE

III. INTRODUCTIONS/PRESENTAITONS – None

IV. AGENDA ADDITIONS/DELETIONS

V. **PUBLIC COMMUNICATIONS**

VI. INFORMATION ITEMS – None

VII. CONSENT CALENDAR – None

VIII. DISCUSSION AND/OR ACTIONS ITEMS

1. Development of the Draft Local Road Safety Plan
   - **a.** Presentation
   - **b.** Draft plan

IX. SUBCOMMITTEE ANNOUNCEMENTS

This is the time for brief announcements on issues of interest to the community. In accordance with the provisions of the Brown Act, matters which do not appear on this agenda but require Sub Committee discussion may be either (a) referred to Staff or other resources for factual information, or (b) placed on a future meeting agenda.

X. ADJOURNMENT

Agendas are posted in accordance with Government Code Section 54954.2(a) or Section 54956. Members of the public can view electronic agendas and staff reports by accessing the City website at www.ci.hercules.ca.us and can receive e-mail notification of agenda and staff report postings by signing up to receive an e-notice from the City's homepage. Agendas and staff reports may also be obtained by contacting the City Clerk at (510) 799-8208. (**Posted: March 21, 2024**)

STAFF REPORT TO THE CITY COUNCIL PUBLIC SAFETY/TRAFFICSUBCOMMITTEE

DATE: Special Meeting of March 27, 2024

TO: Members of the City Council Public Safety/Traffic Subcommittee

SUBMITTED BY: Mike Roberts, Public Works Director/City Engineer

SUBJECT: Development of the Draft Local Road Safety Plan

RECOMMENDED ACTION:

Conduct the second of two City Council Public Safety/Traffic Subcommittee workshops to develop the Draft Local Roadway Safety Plan with the guidance and technical expertise of the City's consultant, Kittelson & Associates.

BACKGROUND:

The City is developing a Local Roadway Safety Plan (LRSP) to identify strategies to improve roadway safety performance for all people in the City. The LRSP will identify focus areas and high-priority locations based on historical crashes, stakeholder collaboration, and community feedback. This plan will develop recommendations to address the focus areas and proven engineering and non-engineering solutions to improve safety performance at priority locations throughout the City.

The LRSP will be prepared to comply with the State and Federal guidelines for eligibility to apply for Highway Safety Improvement Program (HSIP) and Safe Streets and Roads for All (SS4A) grant funding for safety improvements. The plan will be developed in collaboration with engineering, enforcement, education, and emergency service strategies.

The process typically entails assembling a core group of stakeholders including community leaders (i.e. Councilmembers), police, fire, and engineering; then reviewing crash, traffic, and roadway data; engaging the community for input on safety issues/locations; and culminates in a list of prioritized safety improvements.

ANALYSIS:

It is anticipated 2 meetings of the Council Subcommittee will be needed to develop the Draft LRSP:

- Workshop #1: Introduction to the LRSP and safety management process, discussion of stakeholder roles, discussion of crash analysis results, and initial priority locations. ***Completed in October 2023***

- Workshop #2: Review of Draft LRSP and priority projects and strategies, identify any needed changes ahead of full City Council review.

The workshops are in a hybrid format. Community members can attend either in person or remotely by Zoom. Public comment may be provided in-person or via email. Previously community members used an interactive map to share their safety concerns and personal experiences walking, biking, driving, and taking transit in Hercules. The interactive closed on November 10, 2023. Kittelson also conducted a pop-up event at the Community Trunk or Treat event in October 2023 to solicit input from the public, with the date to be determined. Community input is a critical part of the development of a successful LRSP.

Once developed, the Draft LRSP will be brought to the full City Council for review and ultimately final approval.

FISCAL IMPACT:

In 2022 the City applied for a $36,000 grant from Caltrans to develop a LRSP and was awarded the full amount, which requires a $4,000 match. This funding will cover the cost of Kittelson's $39,948 contract, which is billed on a time & materials basis. Kittelson was selected by the CCTA (Contra Costa Transportation Authority) to provide support to West County Cities with the development of their respective LRSPs. Utilizing Kittelson will allow Hercules' Plan to be seamlessly integrated into CCTA Countywide Safety Action Plan that is under development. CCTA intends to apply for roadway safety grants for regional projects, which if successful would benefit individual jurisdictions such as Hercules.

Attachment:

1. LRSP Presentation
2. Draft LRSP

City of Hercules
Draft Local Roadway Safety Plan

Traffic Safety Subcommittee Meeting

March 27, 2024

KITTELSON & ASSOCIATES

Agenda for this meeting

01 Introduction

02 Update on Project Status

03 Discuss Community Engagement Efforts

04 Discuss Priority Locations and Concepts

05 Discuss Vision, Goals, Evaluation, and Implementation

06 Next Steps

Introduction/Recap

What is an LRSP?

A comprehensive safety plan with strategies, actions, and projects focused on reducing crashes, specifically fatal and severe injury crashes in the City of Hercules.

Using the Safe System Approach:

1. Prevent Death & Severe Injury
2. Design for Human Mistakes
3. Reduce System Kinetic Energy
4. Shared Responsibility
5. Proactively Identify and Address Risk

Source: FHWA

Project Purpose

- Improve roadway safety for everyone in the City
- Develop an implementable plan of safety improvement projects meeting eligibility for grant funds
- Establish vision and goals for roadway safety improvement

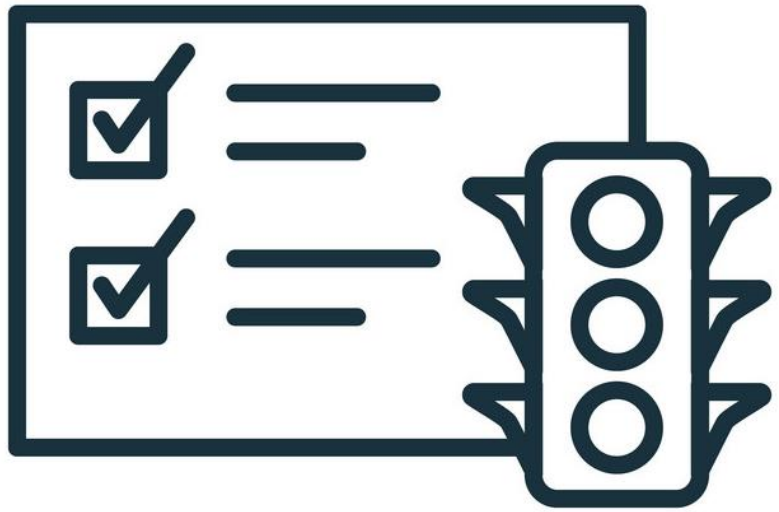
Source: FHWA

Project Status

Project Status

Project Status

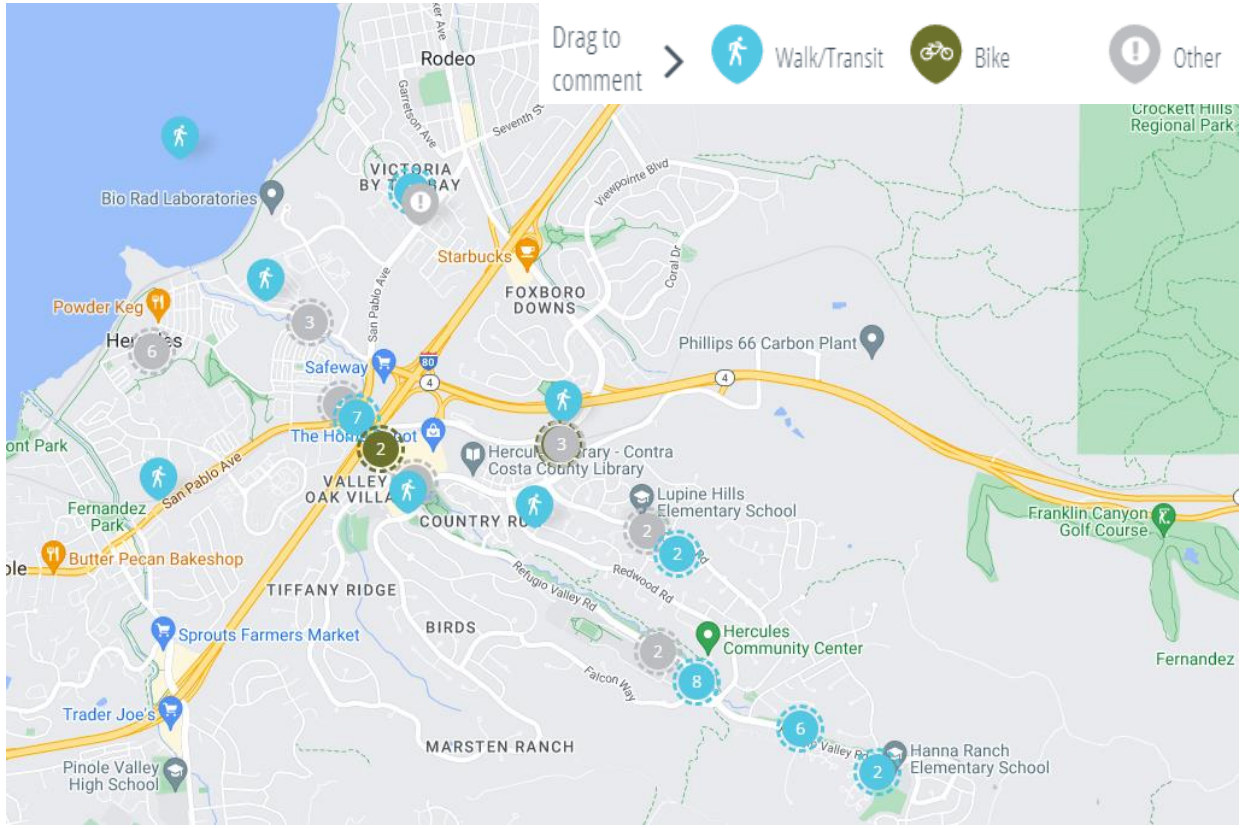
- Completed
  - Data Analysis and Findings
  - Community Engagement Efforts
  - Countermeasures and Safety Strategies
  - Prioritized Locations and Draft Concepts
- Ongoing
  - Finalizing Local Roadway Safety Plan



Community Engagement Efforts

CCTA Safety Plan – Interactive Map

- Received most public comments, **totaling 62**, during October and November 2023
- Feedback:
  - Need for wider sidewalks and improved traffic, notably near school zones.
  - Address speeding, illegal parking, and poor visibility at crosswalks.
  - Desire for enhanced bicycle infrastructure, including protected bike lanes and improved connectivity.



https://cctasafetyplan.wpengine.com

Pop Up: Trunk or Treat

October 2023

Key Themes

Pedestrian
- Widen sidewalks
- Visibility concerns
- Improved access

Biking
- Connected bike network
- Widen bike lanes
- Conflict markings across intersections
- Bike lockers

Roadway Infrastructure
- Converting intersections to roundabouts
- Roadway maintenance

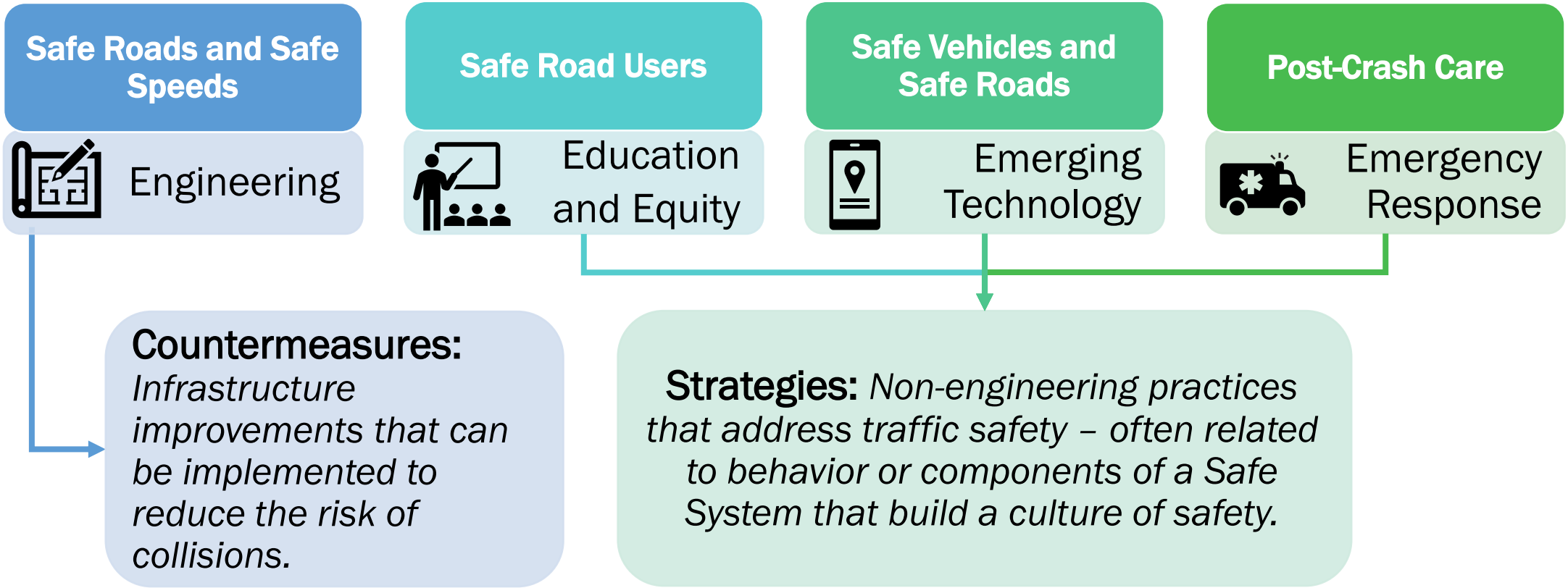
Traffic Enforcement
- Speeding, improper turning, and running stop signs are common concerns

School Zone
- Congestion during pick up/drop off
- Unsafe speeds

Emergency Vehicle Access
- Overgrown trees block site lines
- Cars parked blocking fire hydrants

Are there key themes missing that you would like to see?

Addressing Key Themes

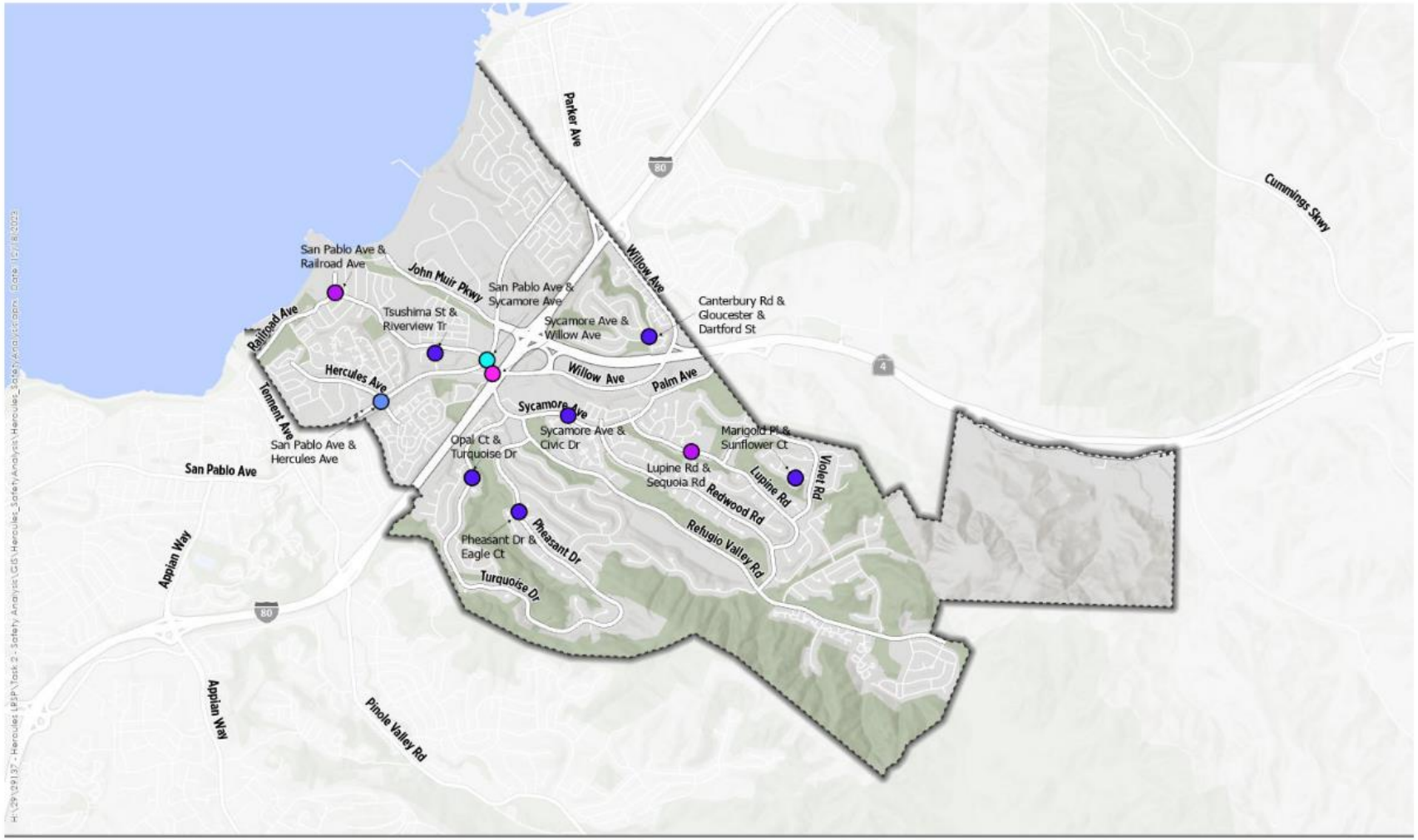


Priority Locations and Concepts

Priority Intersections

#	Location	Control Type	Collision Severity Score
1	Sycamore Avenue & Willow Avenue	Signalized	52.55
2	Sycamore Avenue & Railroad Avenue	Unsignalized	42.51
3	Lupine Road & Sequoia Road	Unsignalized	41.29
4	Canterbury Road & Gloucester & Dartford Street	Unsignalized	39.15
5	Sycamore Avenue & Civic Drive*	Unsignalized	39.15
6	Tsushima Street & Riverview Terrace	Unsignalized	39.15
7	Pheasant Drive & Eagle Court	Unsignalized	39.15
8	Marigold Place & Sunflower Court	Unsignalized	39.15
9	Opal Court & Turquoise Drive	Unsignalized	39.15
10	San Pablo Avenue & Hercules Avenue	Signalized	31.002
11	San Pablo Avenue & Sycamore Avenue	Signalized	28.85

*: The City recently enhanced the intersection with crosswalks on the west side of the intersection. The City should monitor and evaluate this location for safety performance.



KITTELSON & ASSOCIATES

Figure 17

Priority Intersections
City of Hercules Local Roadway Safety Plan
Hercules, CA

Priority Corridors

#	Location	Limits	Collision Severity Score
1	San Pablo Avenue	South of State Route 4 to Hercules City Limits	48.438

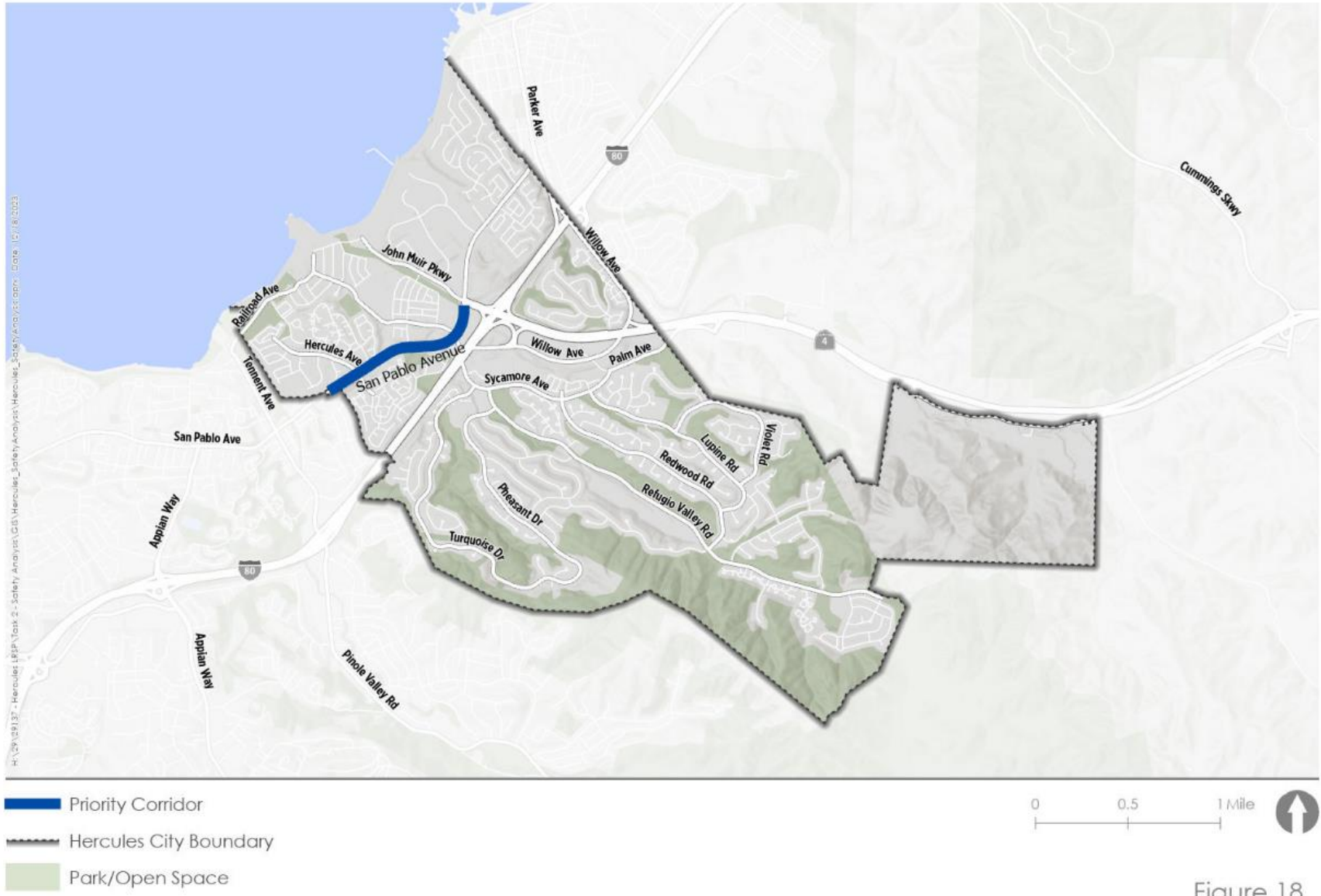


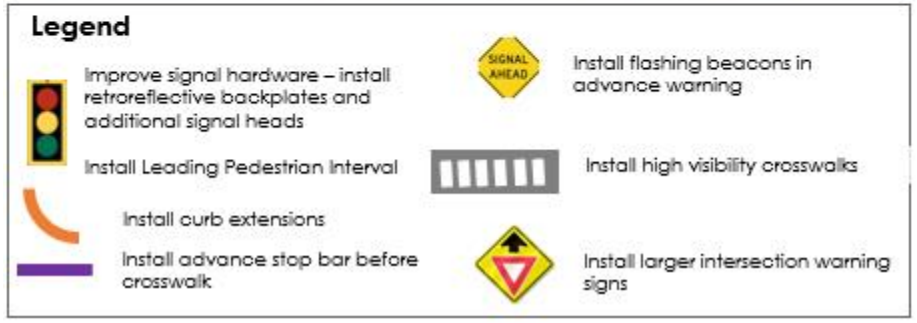
Figure 18

Priority Corridors
City of Hercules Local Roadway Safety Plan
Hercules, CA

KITTELSON & ASSOCIATES

Example Countermeasure Identification

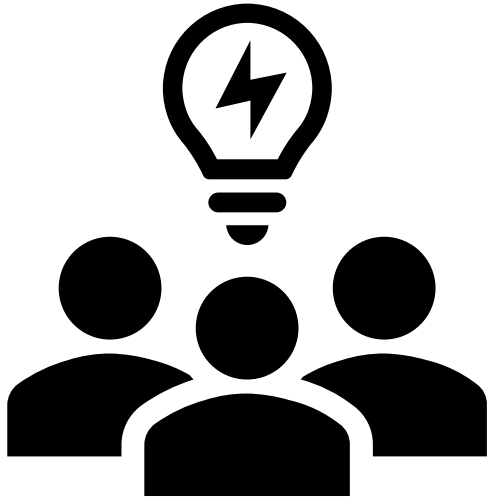
- Sycamore Avenue & Willow Avenue
- 5 injury crashes
- Interactive map comments:
  - Dangerous crossing with two right turn lanes; concurrent green signals for turning and walking exacerbate the danger.
  - Slip lane poses visibility issues for pedestrians due to obstructed view by pillar.



Vision and Goals

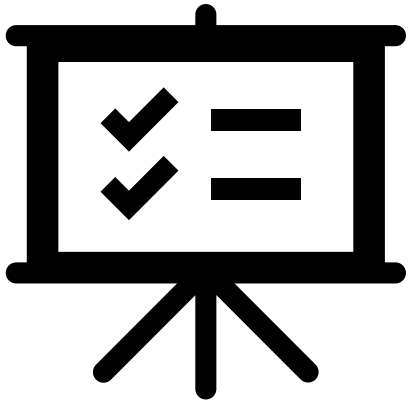
Vision Statement

The City of Hercules will prioritize safety in all projects that will serve to reduce the number of fatal and severe injury collisions for all road users as the City continues to grow.



Goals

- Analyze data to identify and prioritize opportunities to improve roadway safety using proven safety countermeasures and strategies.
- Implement proven and innovative safety countermeasures to reduce the risk of future collisions.
- Educate and promote safe travel practices in the City of Hercules



Goals

- Are there any changes you would like to see to the goals?
- Do these goals meet the City's safety needs?
- Is anything missing?

Commitments

The City is committed to using data and Safe System principles recommended by FHWA and SHSP to promote safety in all actions.

The City is committed to reaching its goal of eliminating all preventable roadway fatalities and severe injuries by 2050.

Evaluation and Implementation

Evaluation and Implementation

- Performance Measures:
  - Number of ***fatal and severe injury collisions*** by emphasis areas and citywide.
  - Summary of ***safety-related feedback*** received (quantity, type, location).
  - Number of ***safety improvements*** implemented at priority locations.
  - Number of ***safety evaluations*** conducted at priority or potential systemic safety locations.

Evaluation and Implementation

- Updating the Plan:
  - Review crash data to track progress every three to five years.
  - Revisit safety plan for broader updates every three to five years.
  - Additional updates as determined with safety partners due to new trends, technologies, or strategies.

Evaluation and Implementation

- Are there performance metrics missing that you would like to see?
- Are there other implementation steps we should be including in the LRSP?

Next Steps

Next Steps

April 2024

✓ City Council

✓Final LRSP

THANK YOU!

Local Roadway Safety Plan

DRAFT

March 2024

Contents

INTRODUCTION

A Commitment to Safety

The City of Hercules (City) is committed to reducing fatalities and severe injuries on its roadways. To advance this mission, the City initiated a citywide Local Roadway Safety Plan (LRSP). The LRSP outlines a plan to ensure Hercules residents, visitors, and those who travel through the community get home safely.

The City of Hercules' LRSP should be considered a living document that evolves as the City works toward achieving a safer roadway system. The LRSP focuses on addressing the diverse needs of the City based on roadway characteristics and collision history available at the time of development and is intended to evolve as the City changes over time.

What is an LRSP?

An LRSP provides an assessment of roadway safety for the City, identifying locations for improvements and a range of strategies to implement that address safety from engineering countermeasures to educational safety campaigns. An LRSP is a multi-disciplinary approach to traffic safety that creates the opportunity for the City to partner with stakeholders and other agencies who may have a role in implementing recommendations. These stakeholders include representatives from law enforcement, fire department, neighboring jurisdictions, public health services, emergency response providers, community organizations, and the broader community.

The Federal Highway Administration (FHWA) considers LRSPs a proven safety countermeasure that provide crosscutting efforts to prioritize investments. The Highway Safety Improvement Program (HSIP) and Safe Streets and Roads for All (SS4A) are Federal funding programs that support implementation of engineering strategies and countermeasures that address road safety challenges on public roads. To pursue HSIP grant funds in California, a local agency must have an LRSP or equivalent planning document. **To be eligible for federal SS4A funding, a local agency must have a safety action plan equivalent to an LRSP, provided that it incorporates a comprehensive implementation framework that aligns actions with specified timing, funding allocations, and designated responsible parties.** Access to these funds assists the City in funding engineering-related solutions that make its roads safer for all road users.

Aligning with the California's Strategic Highway Safety Plan

LRSPs across the state complement California's 2020-2024 Strategic Highway Safety Plan (SHSP), by intentionally and continually assessing and improving roadway safety. The SHSP identifies key safety needs and guides investment decisions toward strategies and countermeasures with the most potential to save lives and prevent injuries.

The SHSP identified California's 16 challenge areas, or areas that should be the focus for roadway safety in California. As discussed in greater detail in the California Office of Traffic Safety Ranking and SHSP Challenge Areas Comparison discussion in the Summary of Citywide Safety Performance section, the items bolded on this list were identified as high priority challenge areas for Hercules, meaning improvements in these areas has the greatest opportunity to reduce death and severe injury.

- **Pedestrians**
- **Bicyclists**
- Aging Drivers
- **Commercial Vehicles**
- **Distracted Driving**
- Driver Licensing
- Emergency Response
- Emerging Technologies
- Impaired Driving
- **Intersections**
- Lane Departures
- **Motorcyclists**
- **Occupant Protection**
- **Speed Management / Aggressive Driving**
- Work Zones
- Young Drivers

Historically, the SHSP has used the five E's (education, enforcement, engineering, emergency response, and emerging technologies) to organize strategies. In 2021, state transportation officials shifted focus and adopted guiding principles that integrate social equity, create a Safe System Approach, and encourage the use of proven countermeasures and emerging technologies.

Incorporating the Safe System Approach

In January 2022, the United States Department of Transportation (USDOT) released its National Roadway Safety Strategy[1] that adopted the Safe System Approach as its core strategy. In February 2022, Caltrans released Director's Policy 36[2] which commits to adopting the Safe System Approach to achieve its vision to eliminate fatalities and severe injuries on California's roadways by 2050 and provide safer outcomes for all communities. These efforts build from the Federal Highway Administration's education of the Safe System Approach as a strategy to eliminate all traffic fatalities.

The Safe System Approach aims to eliminate fatal and severe injuries for all roadway users. It works towards eliminating roadway deaths using six principles, as stated by Caltrans DP-36:

- Deaths and severe injuries are unacceptable.
- Humans make mistakes.
- Humans are vulnerable.
- Responsibility is shared.
- Safety is proactive and reactive.
- Redundancy is critical.

[1] National Roadway Safety Strategy, United States Department of Transportation, January 2022
https://www.transportation.gov/sites/dot.gov/files/2022-02/USDOT-National-Roadway-Safety-Strategy.pdf

[2] California Department of Transportation Director's Policy 36, February 15, 2022
https://dot.ca.gov/-/media/dot-media/programs/safety-programs/documents/policy/dp_36-a11y.pdf

There are five elements (or layers) to a Safe System (see Figure 1 on the following page):

- **Safe Roadway Users** – All roadway users, including bicyclists, pedestrians, and transit riders, should be able to travel safely.
- **Safe Vehicles** – Vehicles should be designed and regulated to reduce the frequency and severity of collisions.
- **Safe Speeds** – The faster a vehicle is traveling, the greater its risk to human life. Safe speeds are speeds that reduce impact forces, improve stopping time, and improve visibility.
- **Safe Roadways** – Roadway design can accommodate human mistakes and improve injury tolerances through strategies, such as physically separating those traveling at different speeds or using signage to alert drivers to hazards.
- **Post-Collision Care** – If a collision does occur, first responders must assess, stabilize, and transport those who were injured. Forensic investigation or incident management teams are also important parts of post-collision care.

Figure 1: FHWA's Safe System Elements

Source: FHWA, 2022
https://safety.fhwa.dot.gov/zerodeaths/zero_deaths_vision.cfm

This LRSP uses a Safe System Approach to identify ways that Hercules and its safety partners can create layers to help protect all roadway users – even when they make mistakes. The City is the driving force behind implementing engineering-related safety measures such as speed management or roadway design combined with education and enforcement activities to reduce unwanted road user behaviors. Commitment from City staff and road safety partners to prioritize safety in their efforts and to implement both proven and innovative ideas are key to advancing road safety. However, state and federal policy – like legislation to allow automated speed enforcement and continued regulation of vehicle safety standards will be essential to complete the Safe System.

Plan Overview

This LRSP uses historical collision data and an understanding of local context to assess existing roadway safety conditions in Hercules, identify areas for improvement, and provide recommended actions and an implementation plan. Ultimately, this LRSP creates a data-driven decision-making framework to reduce the number of fatal and severe injury collisions on local roadways.

The plan is organized into five main sections:

1. **Vision and Goals –** Establishes a larger vision for transportation safety in Hercules and sets goals for how to get there.
2. **Plan Development –** Details the collaborative and data-driven planning process.
3. **Existing Conditions –** Provides an analysis of collisions in Hercules.
4. **Emphasis Areas and Countermeasures –** Details the emphasis areas and lists proven countermeasures that can improve roadway safety.
5. **Recommendations and Implementation –** Prioritizes short- and long-term projects and sets a strategy for assessing progress toward established goals.

VISION AND GOALS

Vision

The City of Hercules will prioritize safety in all projects to support the reduction of fatal and severe injury collisions for all road users as the City continues to grow.

Goals

The following goals will guide collaborative planning efforts with the City Council, the Traffic Safety Sub-Committee, City staff, and other safety related partners:

1. Analyze data to identify and prioritize opportunities to improve roadway safety using proven safety countermeasures and strategies.
2. Implement proven and innovative safety countermeasures to reduce the risk of future collisions.
3. Educate and promote safe travel practices in the City of Hercules.

Commitments

The City is committed to using data and Safe System principles recommended by FHWA and SHSP to promote safety in all actions. The City is committed to reaching its goal of eliminating all preventable roadway fatalities and severe injuries by 2050.

PLAN DEVELOPMENT PROCESS

The LRSP was developed in collaboration with City staff, the Traffic Safety Sub-Committee, and the City Council using collision data and best practices resources. The FHWA LRSP development process is captured in Figure 2, with four primary steps:

1. Identify Stakeholders
2. Use Safety Data (Analyze Safety Data and Identify Collision Types and High-Crash Risk Locations)
3. Choose Proven Solutions
4. Implement Solutions

Figure 2: FHWA LRSP Planning Process

Source: FHWA, 2022, https://safety.fhwa.dot.gov/LRSPDIY/downloads/LRSP_FinalBuild_Infographic_508.pdf

Working Together

The following three bodies have been valued partners that represent a unique set of experiences, needs, and views on roadway safety in the City of Hercules.

Police Services

Hercules Police Services forms enforcement location priorities based on its review of collision history and information. Continued dialogue between the stakeholders will help keep them informed of emphasis areas and high-risk locations for roadway users.

Engineering Services of Public Works Department

Engineering Services oversees the City's Capital Improvement Program, conducts evaluations and inspections of public improvements on private developments, and assesses traffic engineering. Capital improvement projects include new road construction and traffic improvements. The Engineering Services will help identify public concern and development projects, enhancing all public improvements and facilities.

City Council/Traffic Safety Subcommittee

The City Council consists of five members who are responsible for establishing City policies, approving ordinances and resolutions, making land use decisions, approving agreements and contracts, and hearing appeals on decisions made by City staff or advisory committees. The City Council also appoints residents to serve as the City's representative to numerous regional committees and boards. The Traffic Safety Subcommittee includes representatives from the City Council. Each committee member represents a unique set of experiences, needs, and views of the transportation system and roadway safety in the City of Hercules.

Meeting Dates and Topics

The Traffic Safety Subcommittee met in October 2023 and February 2024, twice over the course of the LRSP's development, to discuss and inform the LRSP, as summarized below.

Meeting 1 | October 2023

- Define LRSP purpose and scope.
- Present and gather feedback on preliminary data analysis.
- Present network screening results.
- Discuss potential emphasis areas based on data findings.

Meeting 2 | March 2024

- Discuss vision of LRSP outcomes and related actions and performance measures.
- Review Draft LRSP recommendations.
- Discuss implementation and responsibilities.

The Traffic Safety Subcommittee meetings were also attended by the community members. At this meeting, City staff and project team members received input on street lighting, crosswalk visibility, overgrown trees obstructing sight distances for large vehicles such as firetrucks, and the City's policy regarding the use of e-bikes on City streets.

EXISTING SAFETY CONDITIONS

The LRSP builds on existing plans, policies, and programs that support safe, accessible, equitable, and multimodal transportation. The most relevant documents pertaining to local roadway safety in Hercules are included below, along with an explanation of how their policies, programs, and recommendations inform the LRSP.

Existing Safety Practice and Culture

Hercules General Plan (2018)

The Circulation Element of Hercules General Plan serves as a guiding framework for the City's transportation system, encompassing vehicular, pedestrian, bicycle, and transit modes of travel with a planning horizon of at least 20 years.

The goals of the circulation element of Hercules General Plan that are relevant to the LRSP include:

- **Goal 1:** Maintain and enhance the city's multimodal circulation system.
  - **Policy 2:** Implementation of needed circulation improvements
  - **Policy 3:** Comprehensive pedestrian and bicycle system
  - **Policy 5:** Accommodate emergency response providers
  - **Policy 6:** Accessibility
- **Goal 2:** Reduce reliance on automobiles.
  - **Policy 3:** Bus service
  - **Policy 4:** Pedestrian/bicycle
- **Goal 3:** Reduce vehicular traffic generation and greenhouse gas emissions in Hercules.
  - **Policy 1:** Transportation demand management (TDM)
  - **Policy 2:** Flexible parking requirements

The Plan for Central Hercules (2000)

The Plan for Central Hercules seeks to achieve pedestrian orientation and walkability through mixed retail, residential, and office uses, encourage safer places through "eyes on the street", reduce car dependency by supporting walking commute trips, reduce parking demand, provide amenities for pedestrians and facilities for bicyclists, promote carpooling and transit usage, and create a park-and-ride lot. Pursuant to the plan, the Hercules Transit Center was relocated to its current site, which is owned by the Bay Area Rapid Transit (BART) District, in 2009 to facilitate the development of the Safeway center. The Central Hercules urban design concept is planned to be implemented gradually through phased development. This plan helps inform the LRSP through its focus creating an interconnected street and pedestrian network. It is noted crosswalks should be provided at all intersections and should be clearly delineated, as well as that streets should be well lit for safety at night.

Equity Analysis

This section presents the results of a roadway safety equity analysis for the City of Hercules, which is a required component of a Local Road Safety Plan, in order for the plan to meet the Safe Streets and Roads for All (SS4A) grant funding requirements. Equity is a fundamental consideration of the Safe System Approach, particularly given that pedestrian and bicyclist fatality rates on a per-capita basis vary largely by race,[3] as well as by income, age, and gender to varying degrees in varying places[4]. These outcomes underscore the need to explicitly examine correlations between sociodemographic and risk factors related to roadway infrastructure and operations. Furthermore, equity analysis ideally encompasses more than just safety analysis, given known limitations of crash data (e.g., underreporting, near misses) and the lack of systemic exposure estimates to contextualize risk.

For the development of this LRSP, the following data sources were looked at for information on priority equity areas in the City of Hercules:

- SS4A Underserved Communities Census Tracts (Historically Disadvantaged Communities and Areas of Persistent Poverty) and
- Metropolitan Transportation Commission's (MTC) Equity Priority Communities (EPC).

None of the above-identified disadvantaged populations or historically underrepresented communities are present in the City at the census tract level.

Demographic Analysis

This section presents a demographic analysis, showing a comparison of demographics from American Community Survey (ACS) 5-Year (2017-2021) estimates and crash-involved party data from Statewide Integrated Traffic Records System (SWITRS) (2018-2022) to understand the relationship between the demographic characteristics and crash history in the City of Hercules. Analyzing reported demographic characteristics of involved party members can help the city better understand which groups of individuals may bear disproportionate burdens from crashes and how to address these needs most effectively through safety strategies. The following demographics were analyzed for this LRSP based on available crash and census data:

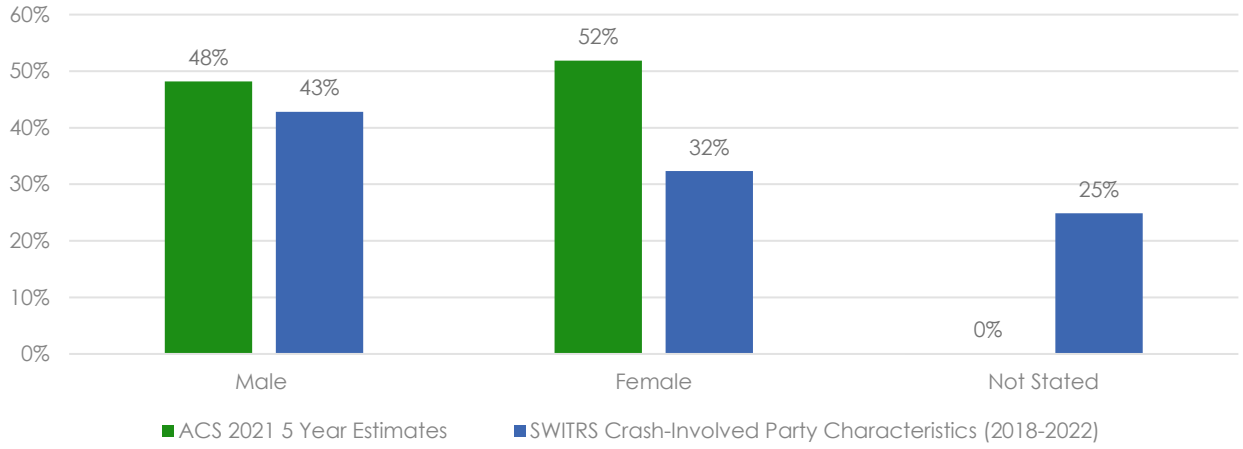
1. Gender
2. Age
3. Race/Ethnicity

3 Federal Highway Administration. "Integrating Equity into the Safe System Approach" Presentation. Accessed Apr. 17, 2023: https://highways.dot.gov/safety/zero-deaths/integrating-equity-safe-system-approach-presentation.
4 Vision Zero Network. N.d. Equity Strategies for Practitioners. Accessed April 17, 2023: https://visionzeronetwork.org/wp-content/uploads/2017/05/VisionZero_Equity.pdf

Gender

Figure 3 compares demographics from ACS 2021 5-Year estimates against SWITRS crash-involved party gender for the city.

Figure 3: SWITRS Party Gender Compared Against Citywide Population Shares



Source: ACS 2021 5-Year Census Data, SWITRS, Kittelson & Associates, Inc., 2023

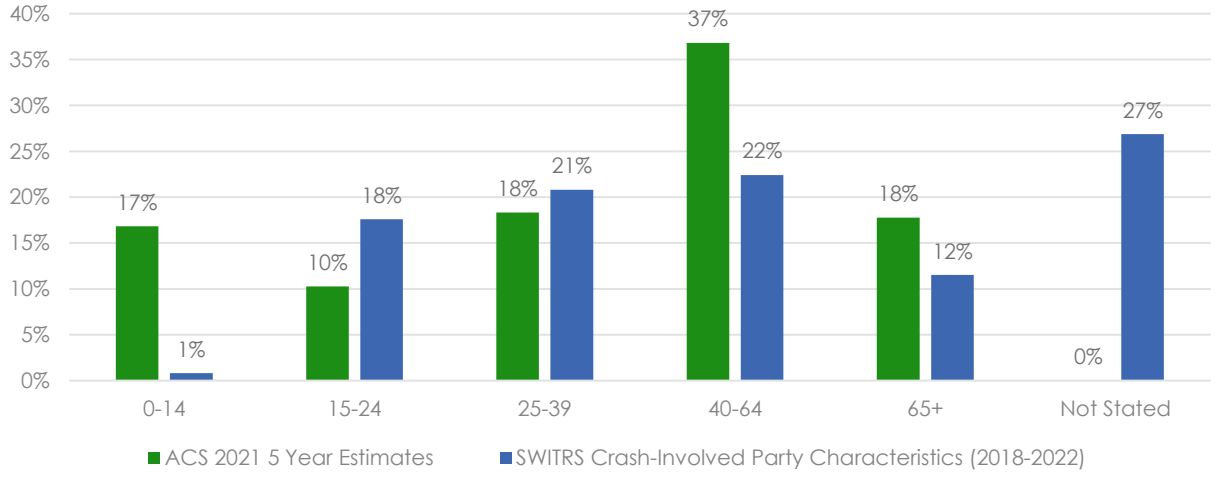
Findings

- Almost one-fourth of crashes identified the party gender as "Not Stated" which does not allow for a definitive correlation to be made on crash risk for this comparison.

Age

Figure 4 compares the demographics of the city from ACS 2021 5-Year estimates against SWITRS crash-involved party age for the city.

Figure 4: SWITRS Party Age Compared Against Citywide Population Shares



Source: ACS 2021 5-Year Census Data, SWITRS, Kittelson & Associates, Inc., 2023

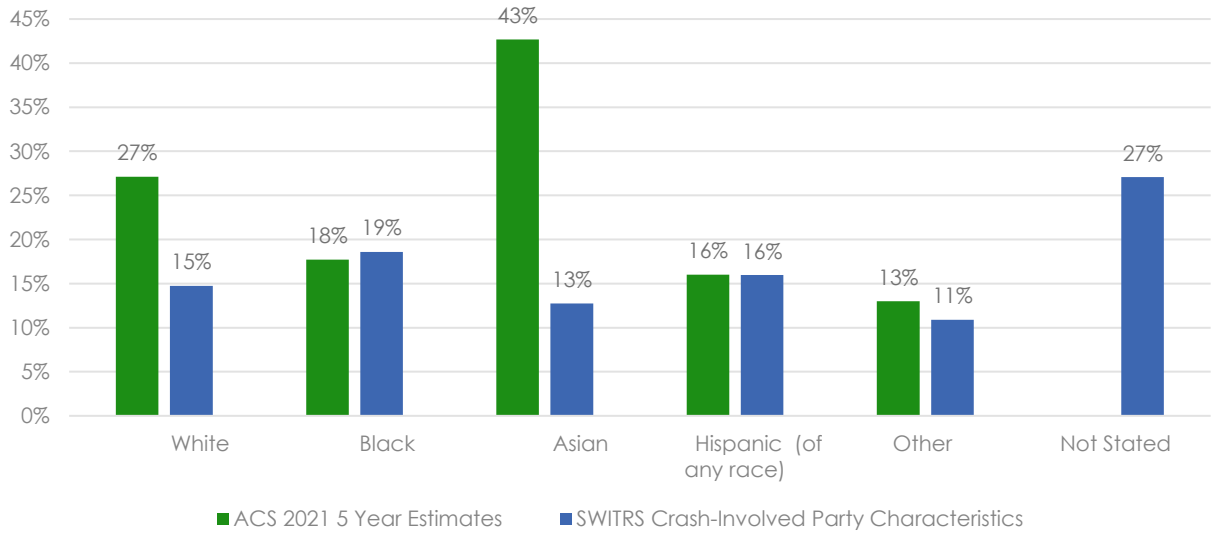
Findings

- Crash-involved parties below 14 years of age primarily included bicyclists and pedestrians.
- 9% of crash-involved parties in the 65 years and above age group were pedestrians/bicyclists.
- More than one-fourth of crashes identified the age as "Not Stated" which does not allow for a definitive correlation to be made on crash risk for this comparison.

Race/Ethnicity

Figure 5 compares the demographics of the city from ACS 2021 5-Year (2017-2021) estimates against SWITRS crash-involved party race for the city.

Figure 5: SWITRS Party Race Compared Against Citywide Population Shares



Findings

- Almost one-fourth of crashes identified the party race as "Not Stated" which does not allow for a definitive correlation to be made on crash risk for this comparison.

Engagement and Outreach

This LRSP was developed concurrently with the ongoing Contra Costa County Transportation Authority's (CCTA) Comprehensive Transportation Safety Action Plan (CTSAP). Because safety is central to both plans' recommendations, the public activities and feedback inform locations, priorities, and input for both safety plans. The CCTA CTSAP team developed a project website, interactive map, and survey that has been leveraged to support the Hercules LRSP. The LRSP project team conducted a community outreach/pop-up event during the City's Trunk or Treat event in October 2023. Based on the interactive map, survey responses and public comments during the pop-up event, the project team identified general themes in community safety concerns, summarized below:

Pedestrian Concerns

- Multiple requests to widen sidewalks near business centers such as San Pablo Avenue/Sycamore Avenue.
- Pedestrian visibility concerns observed during early morning hours.
- Calls to enhance crosswalk visibility at multiple locations including Sycamore Avenue, Pheasant Drive/Swallow Way, and Refugio Valley Road/Coronado Street.
- Request to improve pedestrian access to Pinole and Rodeo via San Pablo Avenue by adding wider sidewalks on both sides of the roadways and enforcing speed limits.

Biking Concerns

- Requests for a more connected bike network in the city, especially connecting key destinations such as Hercules Transit Center and schools.
- Calls to improve existing bike infrastructure such as widening bike lanes and adding intersection crossing markings to safely navigate bikes through intersections.
- Desire to add new bike infrastructure such as protected bike lanes and bike lockers at business parks.
- Desire to improve biking facilities on Sycamore Avenue, especially under Interstate 80.

Roadway Infrastructure Concerns

- Request to add an extra right turn lane for Park Lake Plaza to accommodate vehicles turning right from Sycamore Avenue to Refugio Valley Road.
- Requests to convert intersections to roundabouts, specifically on Palm Avenue.
- General roadway maintenance issues. Promenade Street/Main Street intersection was highlighted as cracking and crumbling and requiring general maintenance.

Traffic Enforcement Concerns

- Concerns regarding drivers frequently violating traffic rules, including speeding, improper turning, running stop sign, double parking, and parking in no parking zones.
- Noted locations include Refugio Valley Road, Coronado Street, Promenade Street, Lupine Road/Redwood Road, Pepperwood Street/Redwood Road, Railroad Avenue/Main Street and San Pablo Avenue/Sycamore Avenue.

School Zone Concerns

- Congestion during school pick up and drop off hours.
- Speeding and traffic volumes near school zones make walking/biking to school unsafe.
- Noted locations include Lupine Road, Refugio Valley Road, and Falcon Way.

Emergency Vehicle Access Concerns

- Overgrown trees in the city block sight lines for emergency vehicles such as fire trucks.
- Cars parked along the roads block emergency vehicle access and fire hydrants. Noted locations include Refugio Valley Road.

By incorporating the data analysis findings and listening directly to community needs, this LRSP reflects data-driven and community-informed desires to improve safety and encourages multimodal transportation choices on the City of Hercules's local roadway system.

Summary of Citywide Safety Performance

Descriptive Trends Analysis

To assess citywide safety performance, Kittelson developed a database of the most recent five years of reported collisions, representing January 1, 2018, through December 31, 2022. At the time of the analysis, 2022 was the most recent year for which the complete collision data was available. Kittelson utilized the California Statewide Integrated Traffic Records System (SWITRS) and UC Berkeley's Transportation Injury Mapping System (TIMS). The final dataset for this analysis includes 262 collisions from SWITRS/TIMS.

Collisions that occurred on grade-separated freeways in the City, (i.e., Interstate 80 and State Route 4) have been excluded from the collision data. However, collisions reported at the ramp terminal intersections that are associated with grade-separated freeways and highways in the City are included in the analysis database. The following section describes regional roadway safety performance in two ways:

- **Citywide Collision Patterns and Trends,** which identifies relevant collision factors such as collision types, primary collision factors, and users involved.
- **Network Screening**, which spatially locates collisions and identifies intersections and segments with the highest collision frequency and severity to determine locations where improvements may have the highest impact.

Understanding Collision Severity

Collision severity is coded according to the highest degree of injury experienced. Defined below is the injury classification scale and definitions in California[5].

Fatal: Death because of injured sustained in a crash or an injury resulting in death within 30 days of the crash.

Severe Injury: An injury other than a fatal injury which results in broken bones, dislocated or distorted limbs, severe lacerations, or unconsciousness at or when taken from the collision scene. It does not include minor laceration.

Other Visible Injury: This includes bruises (discolored or swollen); places where the body has received a blow (black eyes and bloody noses); and abrasions (areas of the skin where the surface is roughened or blotchy by scratching or rubbing which includes skinned shins, knuckles, knees, and elbows).

Complaint of Pain: This classification could contain authentic internal or other non-visible injuries and fraudulent claims of injury. This includes: 1. Persons who seem dazed, confused, or incoherent (unless such behavior can be attributed to intoxication, extreme age, illness, or mental infirmities). 2. Persons who are limping but do not have visible injuries; 3. Any person who is known to have been unconscious because of the crash, although it appears he/she has recovered; 4. People who say they want to be listed as injured do not appear to be so.

Property Damage Only (PDO): A noninjury motor vehicle traffic crash which results in property damage.

5 *https://safety.fhwa.dot.gov/hsip/spm/conversion_tbl/pdfs/kabco_ctable_by_state.pdf*

Citywide Collision Patterns and Trends Summary

The following is a summary of key findings from the reported collisions in the City of Hercules from 2018 to 2022:

-- Overall, there were 262 reported collisions on City roadways. Collisions resulting in a fatality or severe injury represented about 5 percent of these, with 2 being fatal and 11 being severe injury.

-- Pedestrians and bicyclists are overrepresented in fatal and serious injury collisions. Pedestrians and bicyclists are each involved in 5 percent and 2 percent of reported collisions but are involved in 23 percent and 8 percent of fatal and severe injury collisions, respectively.

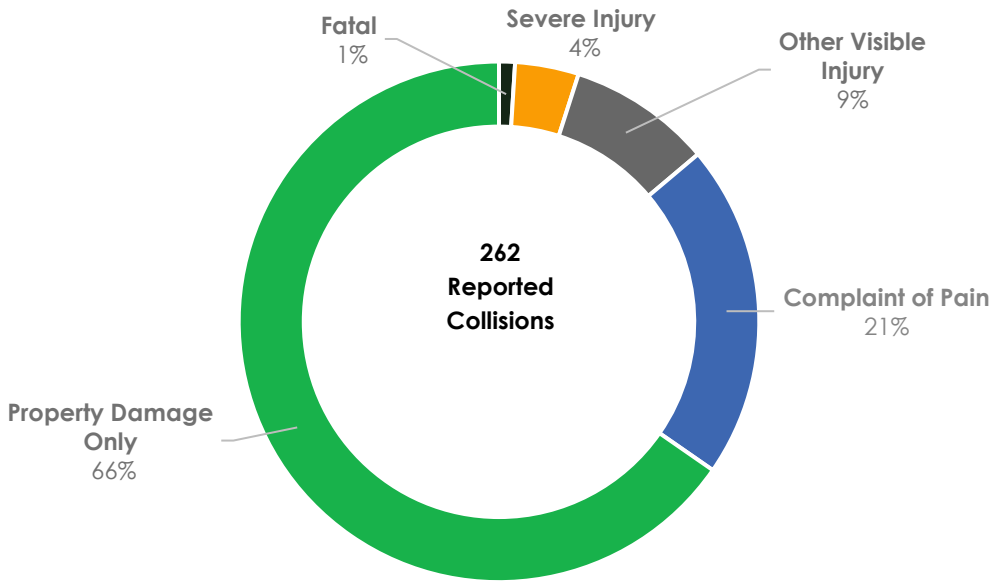
-- The top three most cited collision types for fatal and severe injury collisions are rear end (23 percent), head-on (23 percent), and vehicle/pedestrian (23 percent).

-- The two most cited primary collision factors for fatal and severe injury collisions are unsafe speed (31 percent) and pedestrian violation (23 percent). Improper turning, driving or bicycling under the influence, traveling on wrong side of road, following too closely, and other improper driver or hazardous violations are all attributed to one fatal and severe injury collision (8 percent each).

There are a total of 13 (5%) reported fatal and severe injury collisions, which account for 2.6 collisions per year on average. In this analysis, fatal and severe injury collisions are generally grouped together because the difference between a fatality and a severe injury can depend on factors such as emergency response time or the victim's health rather than the collision severity itself. Additional collision statistics are summarized on the following pages.

Figure 6 and Table 1 summarize the reported collisions by severity in the City of Hercules. Table 1 also shows a breakdown of City collisions by road users involved.

Figure 6: City of Hercules Collisions by Severity (2018-2022)



Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Table 1: Collision Severity by Road User Involved (2018 - 2022)

Road Users Involved	Fatal (% of column)	Severe Injury (% of column)	Other Visible Injury (% of column)	Complaint of Pain (% of column)	Property Damage Only (% of column)	Total (% of column)
Pedestrian-Involved	1 (50%)	2 (18%)	5 (22%)	5 (9%)	2 (1%)	15 (6%)
Bicycle-Involved	0 (0%)	1 (9%)	1 (4%)	4 (7%)	0 (0%)	6 (2%)
Vehicle Only or Vehicle-Fixed Object	1 (50%)	8 (73%)	17 (74%)	45 (84%)	170 (99%)	241 (92%)
Reported Collisions	2 (100%)	11 (100%)	23 (100%)	54 (100%)	172 (100%)	262 (100%)
Severity Share of Reported Collisions	<1%	4%	9%	21%	66%	100%

Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Figure 7 shows the collision tree with injury collisions broken down by collision location (intersection/roadway segment) and road user involved (pedestrian/bicycle/motorcycle/motor vehicle).

TOTAL INJURY COLLISIONS

TOTAL INJURY COLLISIONS	90
FATAL/SEVERE INJURY COLLISIONS	13

INTERSECTION

TOTAL INJURY COLLISIONS	78	87%
FATAL/SEVERE INJURY COLLISIONS	12	92%

SEGMENT

TOTAL INJURY COLLISIONS	12	13%
FATAL/SEVERE INJURY COLLISIONS	1	8%

PEDESTRIAN

TOTAL INJURY COLLISIONS	13	14%
FATAL/SEVERE INJURY COLLISIONS	3	23%

PEDESTRIAN

TOTAL INJURY COLLISIONS	0	0%
FATAL/SEVERE INJURY COLLISIONS	0	0%

BICYCLE

TOTAL INJURY COLLISIONS	5	6%
FATAL/SEVERE INJURY COLLISIONS	1	8%

BICYCLE

TOTAL INJURY COLLISIONS	1	1%
FATAL/SEVERE INJURY COLLISIONS	0	0%

MOTOR-CYCLE

TOTAL INJURY COLLISIONS	4	4%
FATAL/SEVERE INJURY COLLISIONS	3	23%

MOTOR-CYCLE

TOTAL INJURY COLLISIONS	0	0%
FATAL/SEVERE INJURY COLLISIONS	0	0%

MOTOR VEHICLE

TOTAL INJURY COLLISIONS	56	62%
FATAL/SEVERE INJURY COLLISIONS	5	38%

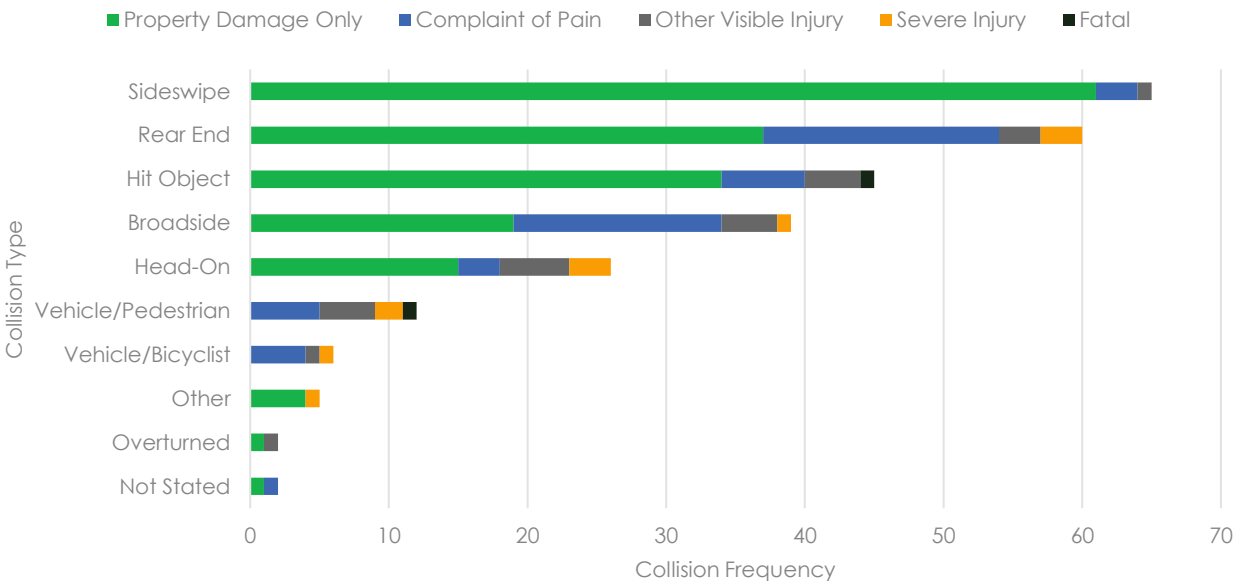
MOTOR VEHICLE

TOTAL INJURY COLLISIONS	11	12%
FATAL/SEVERE INJURY COLLISIONS	1	8%

Collision Types and Factors

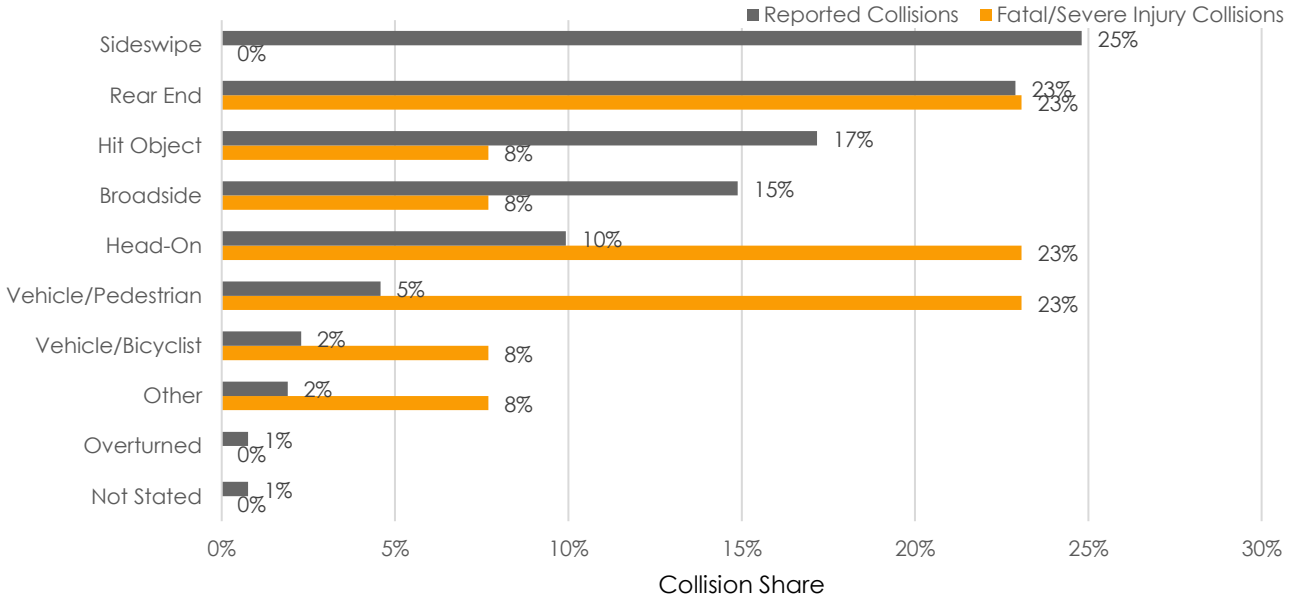
Figure 8 and Figure 9 show the most frequency collision types that were reported in the City. Of all the reported collisions, the three most common collision types include sideswipe, rear end, or hit object collisions. The most common collision types that resulted in fatal and severe injury collisions include rear-end, head-on, and vehicle/pedestrian collisions.

Figure 8: Collision Severity by Collision Type (2018-2022)



Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Figure 9: Share of Collisions by Collision Type and Severity (2018-2022)

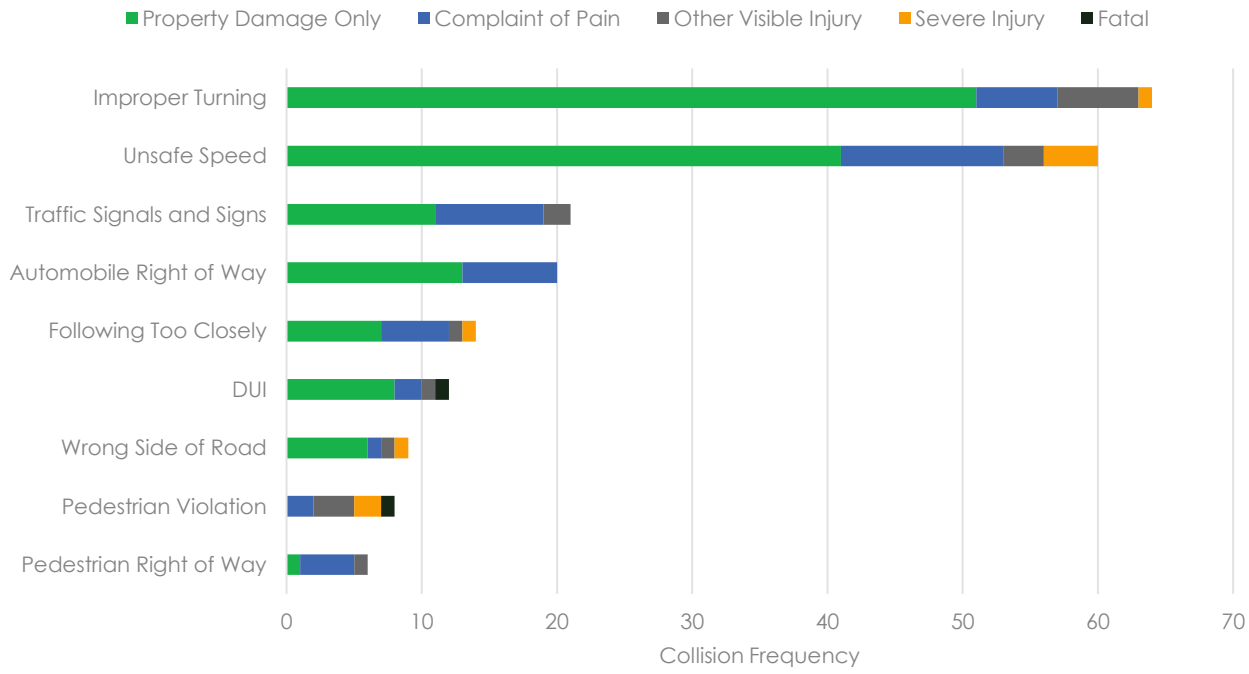


Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Reported primary collision factors (PCFs) convey the violation or the underlying causal factor for a collision. Reporting officers identify a primary collision factor (PCF) for every collision. There are several different PCFs from which they can select. It is up to the officer's judgement and information available at the scene for them to select the factor that is most relevant to the collision. Officers select one from among a list of PCFs based on violations[6] and road user behavior. There may be multiple PCFs that are appropriate for a given collision, but the PCF is the factor identified by the officer as the primary contributing violation/action for the collision.

Figure 10 shows that improper turning[7] and unsafe speed[8] are the factors determined by the investigating officer that have been reported most frequently as the primary cause of a collision. Together these account for more than 47% of all reported collisions. Figure 11 shows the share of all reported collisions and fatal and severe injury collisions by primary collision factor. The most frequent primary collision factors associated with fatal and severe injury collisions are unsafe speed and pedestrian violation[9].

Figure 10: Collision Severity by Primary Collision Factors (2018-2022)



Source: SWITRS, TIMS, compiled by Kittelson, 2023.

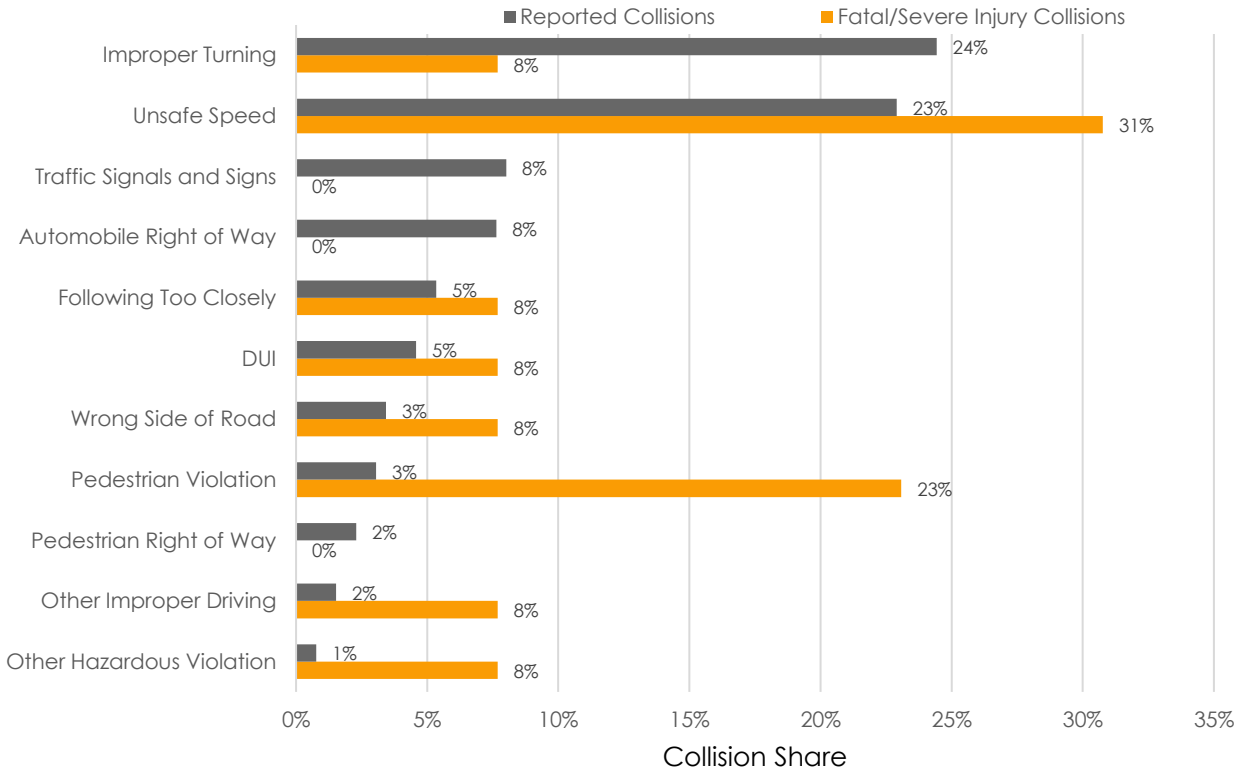
6 California Vehicle Code (CVC)

7 Improper Turning: Turning at a distance unnecessarily far from the curb, turning without using turn signals, or making a type of turn prohibited by signage.

8 Unsafe Speed: Driving at a speed unsafe for the conditions.

9 Pedestrian Violation: Making a maneuver as a pedestrian without respecting the right-of-way of a motor vehicle.

Figure 11: Share of Collisions by Primary Collision Factor and Severity (2018-2022)

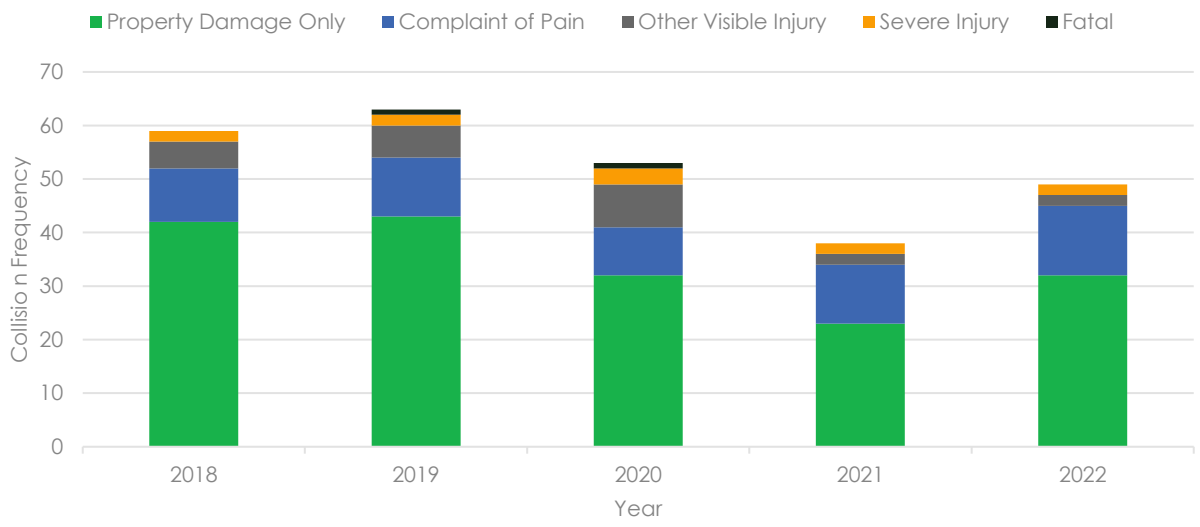


Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Temporal Collision Factors

Figure 12 shows the collision severity patterns across the five study years (2018-2022). The year 2019 had the highest number of total reported collisions followed by 2020. Overall, we see a decrease in the total crashes in 2020 and 2021. The share of fatal and severe injury collisions is highest in 2020 (7.5%), followed by 2021 (5.3%). The results show a change in travel patterns during the COVID-19 pandemic. Pandemic and work from home generally led to fewer vehicles on the roadway. Overall, the number of collisions in 2020 and 2021 were lower compared to pre-pandemic levels in 2019. However, more severe crashes occurred in 2020 and 2021 as a percentage of total reported crashes during the study period.

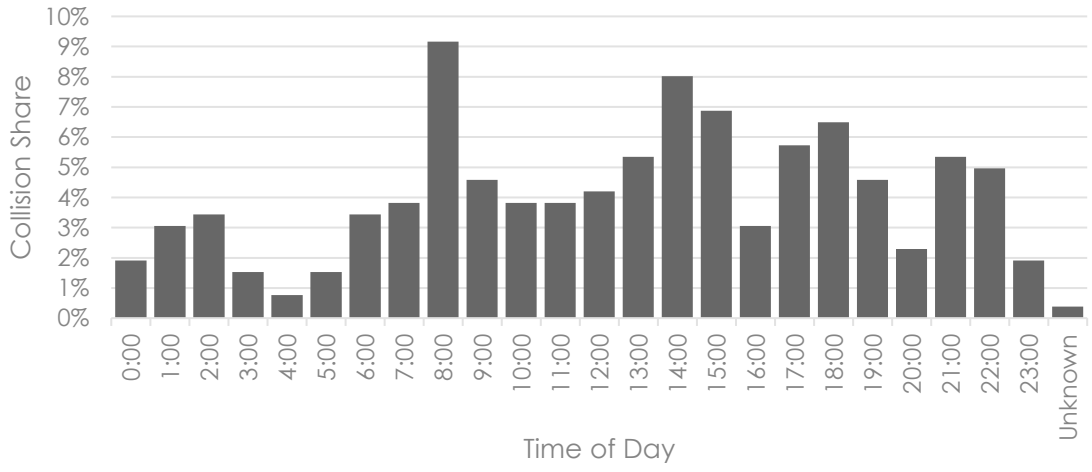
Figure 12: Collision Severity by Year (2018-2022)



Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Figure 13 shows the reported collisions distribution through a 24-hour period. The greatest share of collisions occur at 8:00AM, typically during the morning commute period. Collisions, however, overall occur more frequently in the evening than in the mornings.

Figure 13: Total Reported Collision Shares by Hour of Day



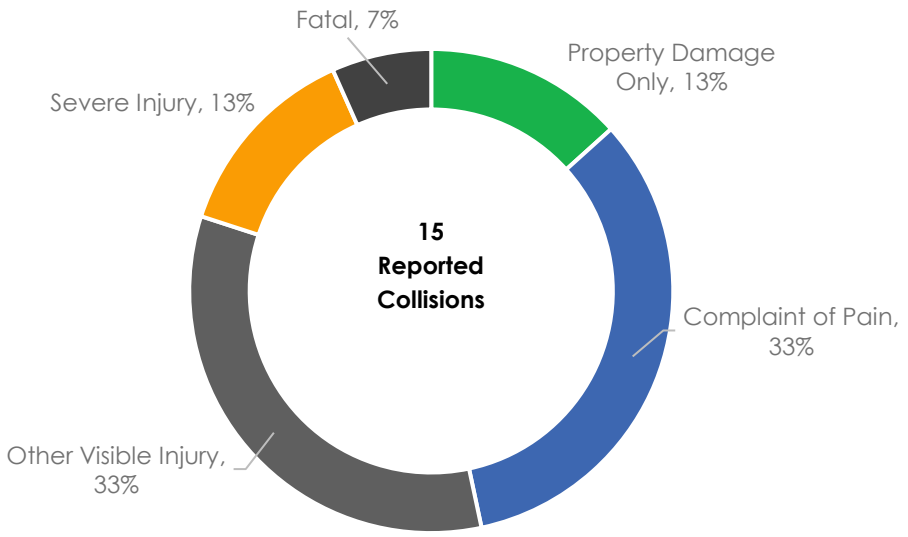
Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Pedestrian-Involved Collisions

Across the five study years (2018-2022) there were a total of 15 pedestrian-involved collisions as shown in Figure 14. Of these collisions, three were fatal and severe injury collisions Pedestrian-involved collisions comprised 5% of all reported collisions but accounted for 23% of fatal and severe injury collisions. Pedestrian-involved collisions are over-represented in fatal and severe injury collisions.

50% of all reported pedestrian-involved collisions and 67% of fatal and severe injury collisions occurred when the pedestrian was crossing not in a crosswalk.

Figure 14: Pedestrian-Involved Collisions by Severity (2018-2022)



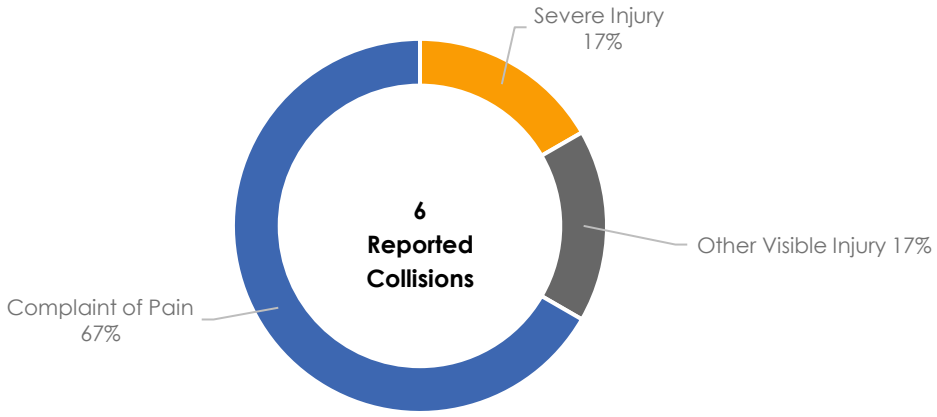
Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Bicyclist-Involved Collisions

Across the five study years (2018-2022) there was a total of 6 bicyclist-involved collisions. Of these, one resulted in a severe injury. Figure 15 summarizes the reported bicyclist-involved collisions by severity in the City of Hercules. Most bicyclist-involved collisions result in complaints of pain. Bicyclist-involved collisions comprised 2% of all reported collisions but accounted for 8% of severe injury collisions.

*The most common collision type for bicyclist-involved collisions is **Broadside**, accounting for 50 percent of all reported bicyclist-involved collisions.*

Figure 15: Bicyclist-Involved Collisions by Severity



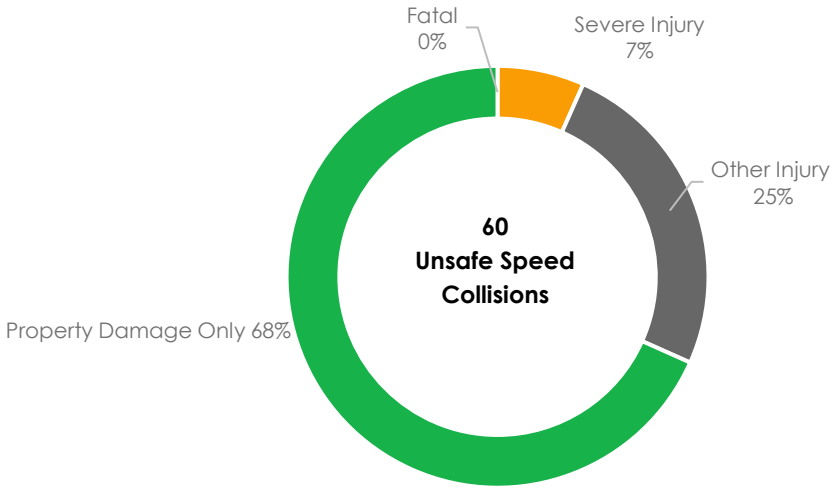
Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Unsafe Speed Collisions

Across the five study years (2018-2022) there was a total of 60 unsafe speed collisions. Of these collisions, 4 resulted in a severe injury and 15 resulted in other visible injury or complaint of pain. Figure 16 summarizes the reported unsafe speed collisions by severity in the City of Hercules.

Unsafe speed collisions represent 31 percent of the total reported fatal and severe injury collisions.

Figure 16: Unsafe Speed Collisions by Severity



Source: SWITRS, TIMS, compiled by Kittelson, 2023.

Pedestrian Violation Collisions

Across the five study years (2018-2022) there was a total of 8 pedestrian violation collisions. Of these collisions, 3 resulted in a fatal or severe injury. Pedestrian violation collisions comprise 3% of all reported collisions but accounted for 23% of fatal and severe injury collisions.

California Office of Traffic Safety Rankings and SHSP Challenge Areas Comparison

The California Office of Traffic Safety (OTS) provides comparative crash rankings for cities statewide. For 2021, the most recent year comparisons are available, Hercules ranked 33 out of 93 for cities with population between 25,001-50,000 in California. Number one in the rankings is considered the worst.[10] The OTS Rankings were developed so that individual cities could compare their city's traffic safety statistics to those of other cities with similar-sized populations. Cities could use these comparisons to see what areas they may have problems in and which they were doing well in. It should be noted that OTS rankings are only indicators of potential problems; there are many factors that may either understate or overstate a city/county ranking that must be evaluated based on local circumstances.

The California 2020-2024 Strategic Highway Safety Plan (SHSP)[11] is a statewide roadway safety plan that provides guidance to influence development of statewide goals, strategies, and performance measures for local agencies and stakeholders statewide.

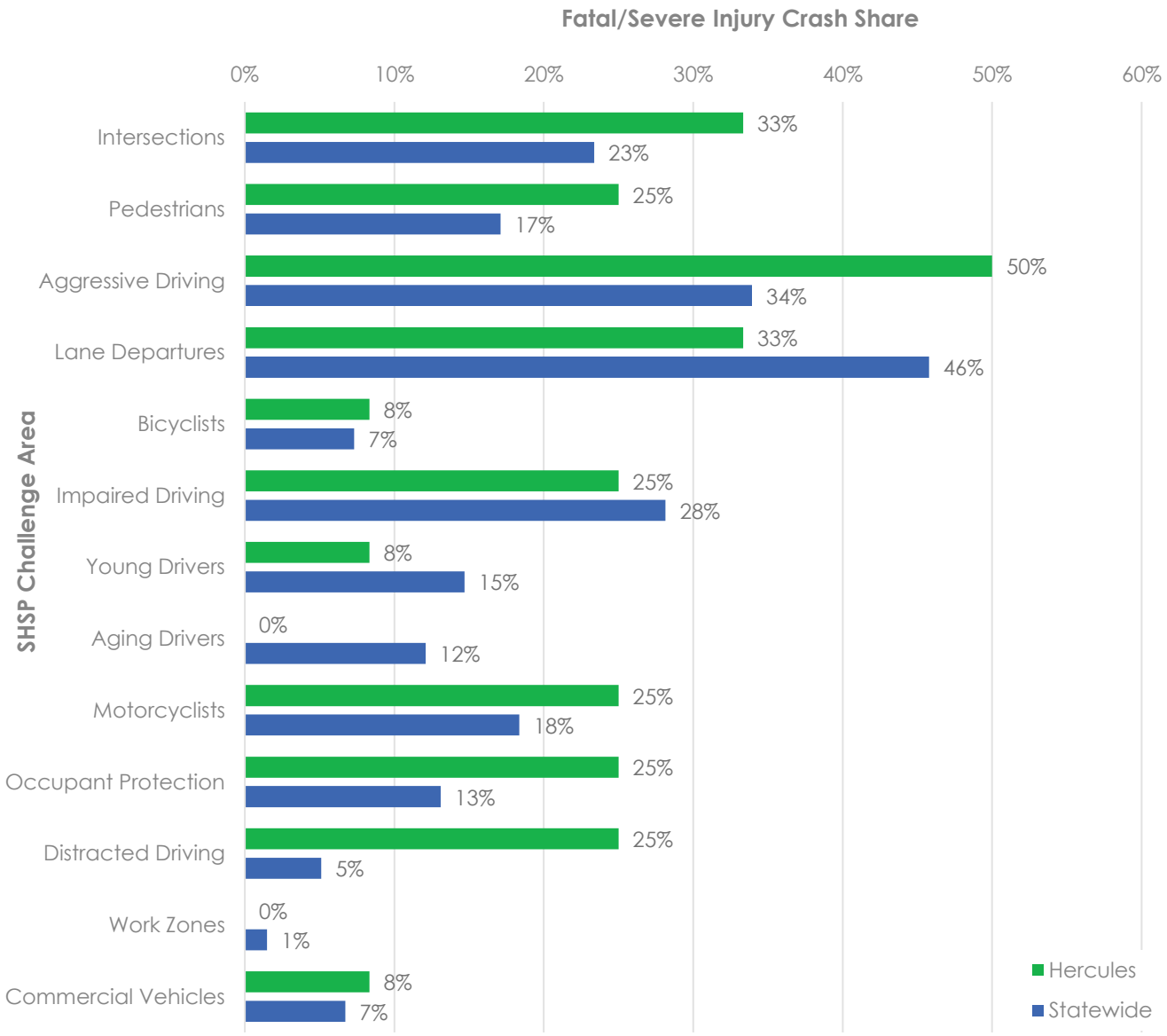
The SHSP focuses on 16 challenge areas. 13 of the challenge areas are compared below to City of Hercules collision history. The remaining three are not compared because the data available for this project is not readily and reliably provided for these challenge areas. Figure 17 shows a collision share comparison between City's collision statistics between 2018-2022 and the statewide data between 2008-2017 for each challenge area posed in the SHSP[12]. The City of Hercules has higher fatal/severe injury shares than Statewide for the following SHSP challenge areas:

- Commercial Vehicles (8% vs 7%)
- Distracted Driving (25% vs 5%)
- Occupant Protection (25% vs 13%)
- Motorcyclists (25% vs 18%)
- Bicyclists (8% vs 7%)
- Aggressive Driving (50% vs 34%)
- Pedestrians (25% vs 17%)
- Intersections (33% vs 23%)

Aligning with the findings already presented in the sections above, these challenge areas were considered while developing the emphasis areas and used in the goal development for the City of Hercules.

[10] Number 1 in the rankings is the highest, or "worst." So, for Group D, a ranking of 1/93 is the highest or worst, 47/93 is average, and 93/93 is the lowest or best.
[11] https://dot.ca.gov/-/media/dot-media/programs/safety-programs/documents/shsp/2023-shsp-full-report-2020-2024-a11y.pdf
[12] Driver Licensing, Emergency Response, and Emerging Technologies cannot be compared using the collision data since they are not readily and reliably available at this time.

Figure 17: Citywide Fatal/Severe Injury Collision Shares by Challenge Area Compared to Statewide Statistics



Safety Performance Network Screening

Collision Severity Score Results

The project team performed an intersection and roadway segment network screening analysis based on the collision severity score methodology (discussed in Appendix A). Collision severity scores help the City identify priority intersections and priority roadway segments for safety improvement projects. Table 2 and Table 3 show the list of priority intersections and priority roadway segments in the City of Hercules.

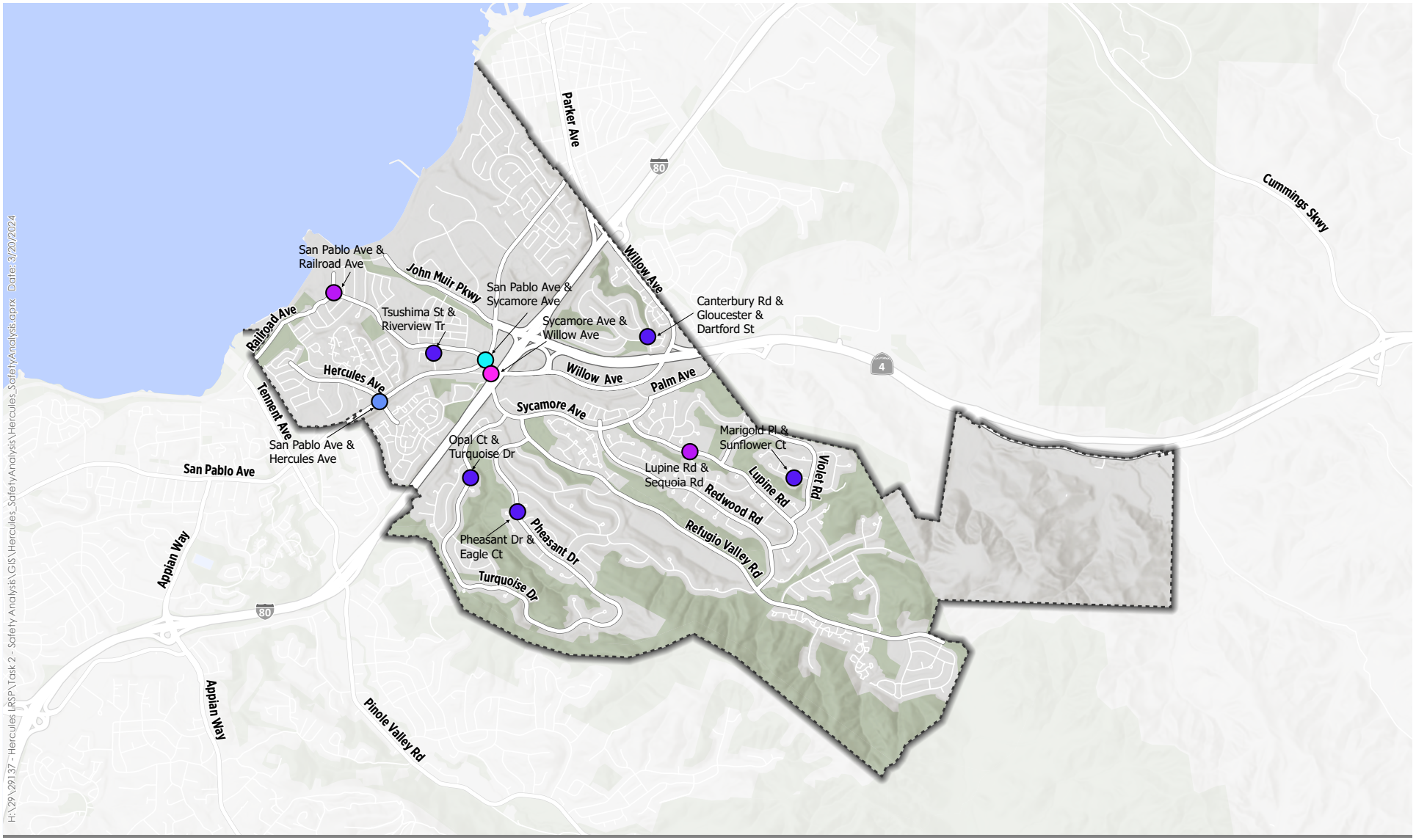
Table 2 Priority Intersections

#	Location	Control Type	Collision Severity Score
1	Sycamore Avenue & Willow Avenue	Signalized	52.55
2	Sycamore Avenue & Railroad Avenue	Unsignalized	42.51
3	Lupine Road & Sequoia Road	Unsignalized	41.30
4	Canterbury Road & Gloucester & Dartford Street	Unsignalized	39.15
5	Sycamore Avenue & Civic Drive*	Unsignalized	39.15
6	Tsushima Street & Riverview Terrace	Unsignalized	39.15
7	Pheasant Drive & Eagle Court	Unsignalized	39.15
8	Marigold Place & Sunflower Court	Unsignalized	39.15
9	Opal Court & Turquoise Drive	Unsignalized	39.15
10	San Pablo Avenue & Hercules Avenue	Signalized	31.00
11	San Pablo Avenue & Sycamore Avenue	Signalized	28.86

*: The City recently enhanced the intersection with crosswalks on the west side of the intersection. The City should monitor and evaluate this location for safety performance.

Table 3 Priority Roadway Segments

#	Location	Limits	Collision Severity Score
1	San Pablo Avenue	State Route 4 to South City Limits	48.44



Crash Severity Score

- 28.858
- 28.859 - 31.002
- 31.003 - 39.152
- 39.153 - 42.514
- 42.515 - 52.552

Hercules City Boundary

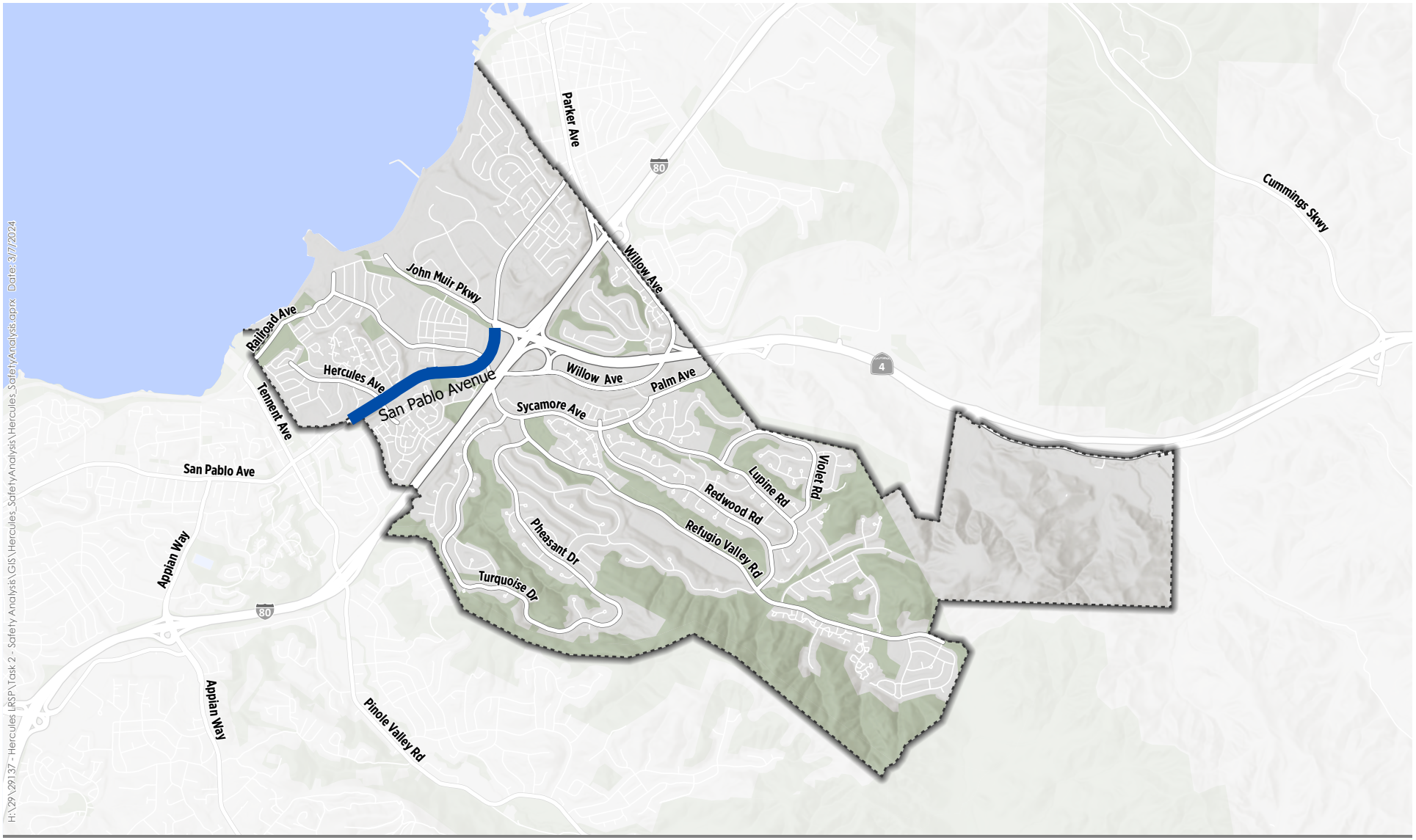
Park/Open Space

0 0.5 1 Mile

Figure 18

Priority Intersections
City of Hercules Local Roadway Safety Plan
Hercules, CA

KITTELSON & ASSOCIATES



Priority Corridor

Hercules City Boundary

Park/Open Space

0 0.5 1 Mile

Figure 19

Priority Corridors
City of Hercules Local Roadway Safety Plan
Hercules, CA

KITTELSON & ASSOCIATES

EMPHASIS AREAS

According to Hercules's collision patterns identified in the descriptive trends analysis, the greatest opportunity to improve roadway safety is to target the following emphasis areas:

- **Pedestrians and Bicyclists:** Pedestrian-involved collisions comprised 5% of all reported collisions but accounted for 23% of fatal and severe injury collisions. Pedestrian-involved collisions are over-represented in fatal and severe injury collisions. Bicyclist-involved collisions comprised 2% of all reported collisions but accounted for 8% of severe injury collisions. Bicyclist-involved collisions are over-represented in fatal and severe injury collisions.
- **Intersections:** 86% of all fatal and injury collisions occurred at intersections.
- **Unsafe Speed:** 23% of all reported collisions and 31% of fatal and severe injury collisions are unsafe speed collisions.
- **Drivers in the 15-24 Years Age Group:** People in the 15-24 years age group comprised 10% of the citywide population (ACS 5-Year 2017-2021 estimates) but accounted for 18% of SWITRS collision involved party characteristics. 97% of the collision-involved parties in the 15-24 years age group were drivers.

These four emphasis areas guide the recommended actions and implementation strategies identified in this LRSP.

STRATEGIES AND RECOMMENDATIONS

Improving safety and addressing emphasis areas will take a coordinated effort and a combination of the available strategies presented in this section. This section presents multidisciplinary recommendations for the City to consider as they make investments and advancements in improving roadway safety across the City.

Countermeasures vs. Strategies

Countermeasures: A term used for engineering infrastructure improvements that can be implemented to reduce the risk of collisions.

Strategies: A term used for non-engineering practices that address traffic safety – often related to behavior or components of a Safe System that build a culture of safety.

Available Countermeasures

These engineering countermeasures are proven effective treatments to reduce collision risk. This set of countermeasure treatments have been grouped into the following three subcategories to align recommendations that most directly address specific collision patterns and trends or location types:

- Signalized intersections;
- Unsignalized intersections; and,
- Roadway segments.

For each of these groupings, priority countermeasures were identified and summarized based on the collision types addressed, quantitative effectiveness of the treatment document as crash reduction factors (CRFs) and implementation considerations. Combining these countermeasures with non-engineering strategies can also target road user characteristics and behavior.

Signalized Intersections

Countermeasure Name	Description	CM ID*	Collision Reduction Factor**	Cost Estimate***
Add intersection lighting	Boosts nighttime safety by increasing driver awareness, reducing reaction times, and improving visibility for all road users.	S01	40%	$
Improve signal hardware: back-plates with retroreflective borders	Enables drivers to see traffic signals sufficiently in advance to safety negotiate the intersection being approached.	S02	15%	$
Install flashing beacons as advance warning	Enhances driver awareness at intersections, reducing the risk of late reactions and potential crashes.	S10	30%	$
Install pedestrian crossing	Improves safety at signalized intersections with no marked crossing and pedestrian signal heads by addressing issues with turning vehicles, pedestrians crossing unexpectedly, and driver violations.	S18PB	25%	$
Install advance stop bar before crosswalk (Bike Boxes)	Enhances pedestrian and bicycle safety by creating a buffer for pedestrians and a dedicated space for bicyclists, improving visibility to drivers.	S20PB	15%	$
Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Improves pedestrian visibility, reduces conflicts with vehicles, increases the likelihood of motorists yielding, and enhances safety for slower-starting pedestrians. LPIs are recognized by Caltrans and FHWA as Proven Countermeasures, linked to a 13% decrease in vehicle-pedestrian crashes.	S21PB	60%	$
Install high visibility crosswalks	Improves visibility and safety for pedestrians and drivers with use of enhanced features such as bright paint and additional markings.	N/A	N/A	$

Unsignalized Intersections

Countermeasure Name	Description	CM ID*	Collision Reduction Factor**	Cost Estimate
Add intersection lighting	Boosts nighttime safety by increasing driver awareness, reducing reaction times, and improving visibility for all road users.	NS01	40%	$
Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	Enhances intersection visibility.	NS06	15%	$ - $$$
Improve sight distance to intersection (clear sight triangles)	Removing obstructions from sight triangles, such as vegetation or parked vehicles, enables drivers to make better decisions when entering the intersection.	NS11	20%	$
Traffic calming: speed humps	Slows down vehicle traffic by causing drivers to reduce speed as they pass over the elevated surface.	N/A	N/A	$
Install rectangular rapid flashing beacon (RRFB)	Enhances safety by increasing driver awareness at unsignalized intersections and crossings, reducing crashes, and improving other treatments' effectiveness.	NS22PB	35%	$
Crosswalk Visibility Enhancements: high visibility crosswalks, lighting, and signing and pavement markings	Increases awareness and reduces conflicts between pedestrians and vehicles.	N/A	N/A	$

Roadway Segments

Countermeasure Name	Description	CM ID*	Collision Reduction Factor**	Cost Estimate
Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	Uses fluorescent yellow sheeting to visually warn drivers and address crashes caused by inattention or non-compliance with roadway signs.	R22	15%	$
Install dynamic/variable speed warning signs	Targets crashes from speeding around sharp curves by visually warning drivers of their speed.	R26	30%	$ - $$
Install delineators, reflectors and/or object markers	Provides cost-effective warnings for approaching curves or fixed objects, guiding drivers without the need for additional roadside posts that could pose collision risks.	R27	15%	$ - $$
Traffic calming	Slows down vehicle traffic by causing drivers to reduce speed.	N/A	N/A	$
Install/upgrade pedestrian crossing (with enhanced safety features)	Enhances crosswalk visibility with high-visibility markings, improved sightlines, and warning elements, including but not limited to flashing beacons, curb extensions, and advance "yield" lines by complementing signing and striping at a crosswalk.	R35PB	35%	$ - $$

*CM ID refers to the Countermeasure ID from the Caltrans *Local Roadway Safety Manual* (April 2020, LRSM). If a CM ID is not listed, the countermeasure is not listed in the LRSM. Local Roadway Safety - A Manual for California's Local Road Owners

**Documented crash reduction factors are derived either from the *LRSM* or the FHWA's *Proven Safety Countermeasures* resource, unless otherwise noted. An "N/A" indicates that a documented, research-backed crash reduction factor does not exist.

*** Planning-level cost estimates vary depending on various factors, such as the length of countermeasure (where applicable), system installation, labor, materials, and maintenance costs. $ - $50,000 or less; $$ - $50,000 to $100,000; $$$ - $100,000 or more.

Available Strategies

This section discusses the non-engineering countermeasures to improve safety and reduce crashes on roadways in the City. Non-engineering countermeasures/strategies for the City are grouped into the following:

1. Education Strategies
2. Enforcement Strategies
3. Emergency Services
4. Emerging Technology Strategies

Education Strategies

Education strategies are focused on teaching road users the principles of traffic safety. These strategies can be developed to include interactive activities, comprehensive teaching notes and information on road safety messages and concepts that can be taught at school or in other community spaces. Public education and collaboration help bridge gaps in knowledge that influence roadway user behavior.

The following six education-related strategies were identified for the City of Hercules:

- Road Safety Education to Children
- Speed Monitoring Awareness Radar Trailer
- Conspicuity Enhancements and Education
- Vulnerable Road User Education
- High-Visibility Cell Phone and Text Messaging Media Campaign

Road Safety Education to Children

Road safety education to children includes strategies such as safe routes to school, walking school bus, and bicycle trains that promote road safety for all users, particularly for pedestrians and bicyclists. A 'safe routes to school' program would encourage and enable children to walk and bike to school. This can improve their health, well-being, and safety. This also results in less traffic congestion and emissions caused by school-related travel. Walking school buses and bicycle trains encourage groups of children walking or biking to school, with one or more adults.

Speed Monitoring Awareness Radar Trailer

The speed trailer is an educational device that helps drivers become more aware of their speed in relation to the posted speed. This awareness tool can also help residents survey the traffic speeds in their own neighborhood. This trailer is usually deployed in a street or neighborhood for a few days so the residents can monitor the speeds on their own streets and become aware of their own driving behaviors.

Conspicuity Enhancements and Education

The purpose of enhancing conspicuity for pedestrians is to increase the opportunity for drivers to see and avoid pedestrians, particularly when it is dark. Educating pedestrians to wear light colored or reflective clothing and walk in well-lit areas can be implemented as targeted campaigns. The use of high visibility

clothing and protective gear enhances safety. There is some limited evidence to suggest that a program aimed at increasing conspicuous and protective clothing could be successful.

Vulnerable Road User Education

The road safety education for vulnerable road users like pedestrians and bicyclists includes strategies involving education from police officers. If the driver encroaches into the bike lane or fails to yield to the pedestrian at the crossing, the police officer pulls the driver over and hands them a flyer that has the information for drivers to adapt their behavior towards all road users; this can be in addition to a citation.

High-Visibility Cell Phone and Text Messaging Media Campaign

The High Visibility Enforcement model combines dedicated law enforcement with paid and earned media supporting the enforcement activity. Paid media includes advertisements on TV, radio, online, and via billboards, while earned media includes things like press events and news releases covering the efforts. Both types of media support enforcement activities are needed to ensure the public is aware of the enforcement activity, and to create the impression that violators will be held accountable.

Equity in Enforcement

Even with engineering countermeasures in place, roadway users can fail to obey traffic laws and cause collisions of varying severity. Police enforcement has been traditionally used as a strategy to increase driver awareness, educate drivers on roadway violations, and reduce traffic collisions. However, if enforcement strategies are to improve overall safety in a community, there must be an awareness that traffic laws must be applied equitably. Directed enforcement strategies should be undertaken with due caution to avoid inequitable enforcement activities.

When rigorously evaluated for intent and impact, the following enforcement strategies can help provide equitable and successful outcomes:

- Progressive Ticketing
- Speed Enforcement in School Zones

Progressive Ticketing

Progressive ticketing is a method for introducing ticketing through a three-staged process. Issuing tickets is the strongest strategy of an enforcement program and it is usually reserved for changing unsafe behaviors that other strategies failed to change or that pose a real threat to the safety of road users. There are three main steps of an effective progressive ticketing program:

- Educating - Establish community awareness of the problem. The public needs to understand that drivers are speeding and the consequences of this speeding for road safety. Raising awareness about the problem will change some behaviors and create public support for the enforcement efforts to follow.
- Warning - Announce what action will be taken and why. Give the public time to change behaviors before ticketing starts. Fliers, signs, newspaper stories and official warnings from officers can all serve as reminders.

- Ticketing – After the "warning" period, hold a press conference announcing when and where the police operations will occur. If offenders continue their unsafe behaviors, officers issue tickets.

Speed Enforcement in School Zones

Strict enforcement of speed laws in school zones is one law enforcement tool that can improve the safety for children walking and bicycling to school as well as drivers. A 'zero tolerance' policy for speeders in school zones and even an increase in fines for drivers who violate the posted school zone speed limit are potential approaches.

Emergency Services

Emergency response is critical to reducing the severity of injuries sustained from collisions. The effectiveness of emergency response is tied closely to the time it takes for a person injured in a collision to receive medical care. Research indicates there is a "golden hour"—if pre-hospital time is under 60 minutes, the patient is more likely to live. The following considerations can help lead to more successful outcomes for these strategies.

- Implementing New Technology
- Partner with Local Hospitals or Outreach Groups
- Work with the Local 911 Team

Implementing New Technology

Technological developments are being applied to improve emergency response. Drones and roadway video are being explored to better understand the details of collisions in real-time to provide proper care as soon as possible. This can also maximize resources utilized for care at the collision.

Work with the Local 911 Team

The City can also improve emergency response time by working with the emergency medical services (EMS) and the local 911 team. Priorities in doing so include:

- Involving them in appropriate project planning and design review to identify opportunities to improve EMS access and location identification.
- Involving them in enforcement and EMS grant opportunities.
- Developing and purchasing a system that allows local 911 dispatchers to quickly input reported road issues and send the information to the appropriate agency.

Emerging Technologies

This section notes innovative approaches to improve roadway safety by accelerating road safety understanding using technology, thereby helping transition to safer transportation systems. Focus areas include but are not limited to:

- Artificial Intelligence and Deep Learning
- Big Data

The Road Safety Innovation List (2021) identified the following new technologies and approaches for safety management.

Artificial Intelligence and Deep Learning

This technology applies artificial intelligence and deep learning on traffic video feed (such as CCTV traffic cameras) to perform automated video analysis of traffic flow for effective and immediate road safety diagnosis and evaluation of conflicts. The combination of artificial intelligence and vehicle-to-everything (V2X) technology is designed to predict vehicles and pedestrians' intent and prevent conflicts that may result in crashes. This technology is being tested in autonomous vehicles and applications are being developed for use by jurisdictions to apply at intersections or networks.[13]

Big Data

New "Big Data" information measures all kinds of activity in streets including volumes, paths, speeds, and behaviors of pedestrians, bicycles, different types of vehicles, wheelchairs, and scooters on the roadway. These data platforms provide data on curb-level activity and help engineers and planners design safer and more efficient streets by helping to detect conflicts and address potential road user behaviors and patterns before crashes occur.

Mobile phone data and machine learning algorithms are being designed to identify high-risk driver behavior before a crash occurs. Using the smart phone sensors, the behavioral data provides actionable insights that improve safety for all road users.

[13] Video-Based Automatic Incident Detection on San-Mateo Bridge in the San Francisco Bay Area (https://trid.trb.org/view/772920)

RECOMMENDATIONS AND IMPLEMENTATION

These treatments represent improvements with the greatest potential to help reduce fatal and severe injury collisions and build a culture of safety in Hercules.

Systemic Treatments

The systemic safety approach to roadway safety involves selecting locations for countermeasures based on roadway characteristics that may be correlated with severe collision types rather than identify locations based on collision history. Identified sites may or may not have a history of frequent or severe collisions but will have roadway characteristics associated with collision risk factors. By selecting locations based on roadway characteristics instead of collision history, systemic treatments may help to proactively reduce the risk of fatal and serious injury collisions. Kittelson identified the following systemic treatments to address the risk factors that were identified through the data-driven and community-informed analysis documented in the Summary of Citywide Safety Performance, Emphasis Areas, and Equity Analysis sections of the LRSP. The list is not exhaustive and other opportunities may arise to implement low-cost countermeasures that may address other emphasis areas not described below (i.e., low-cost improvements from Road Safety Audits (RSAs)).

Speed Management

Speed management seeks to lower the vehicular speeds on the roadway, thereby reducing speeding related crashes. Speed management should be addressed comprehensively to encompass all the factors that may influence travel speeds, including road user/driver behavior, roadway design, surrounding land use context, traffic, roadway conditions, posted speed limits, and enforcement. The following two countermeasures were identified for the City:

1. Install Dynamic Speed Feedback Signs/Dynamic Speed Warning Signs (R26[14])
2. Traffic Calming

Install Dynamic Speed Feedback Signs

This treatment consists of installing dynamic or variable speed feedback signs on the roadway. Figure 20 shows an example of this treatment. Speed feedback signs provide drivers with feedback about their speed in relationship to the posted speed limit. These treatments provide a message to drivers exceeding a certain speed threshold (or posted speed limit). The intent of these treatments is to get drivers' attention and provide them with a visual warning that they may be traveling over the recommended speed on the roadway.

[14] Refers to the Countermeasure ID from the Caltrans *Local Roadway Safety Manual* (April 2020, LRSM).

Figure 20: Example of Roadway with Dynamic Speed Feedback Signs

Source: Kittelson and Associates, Inc.

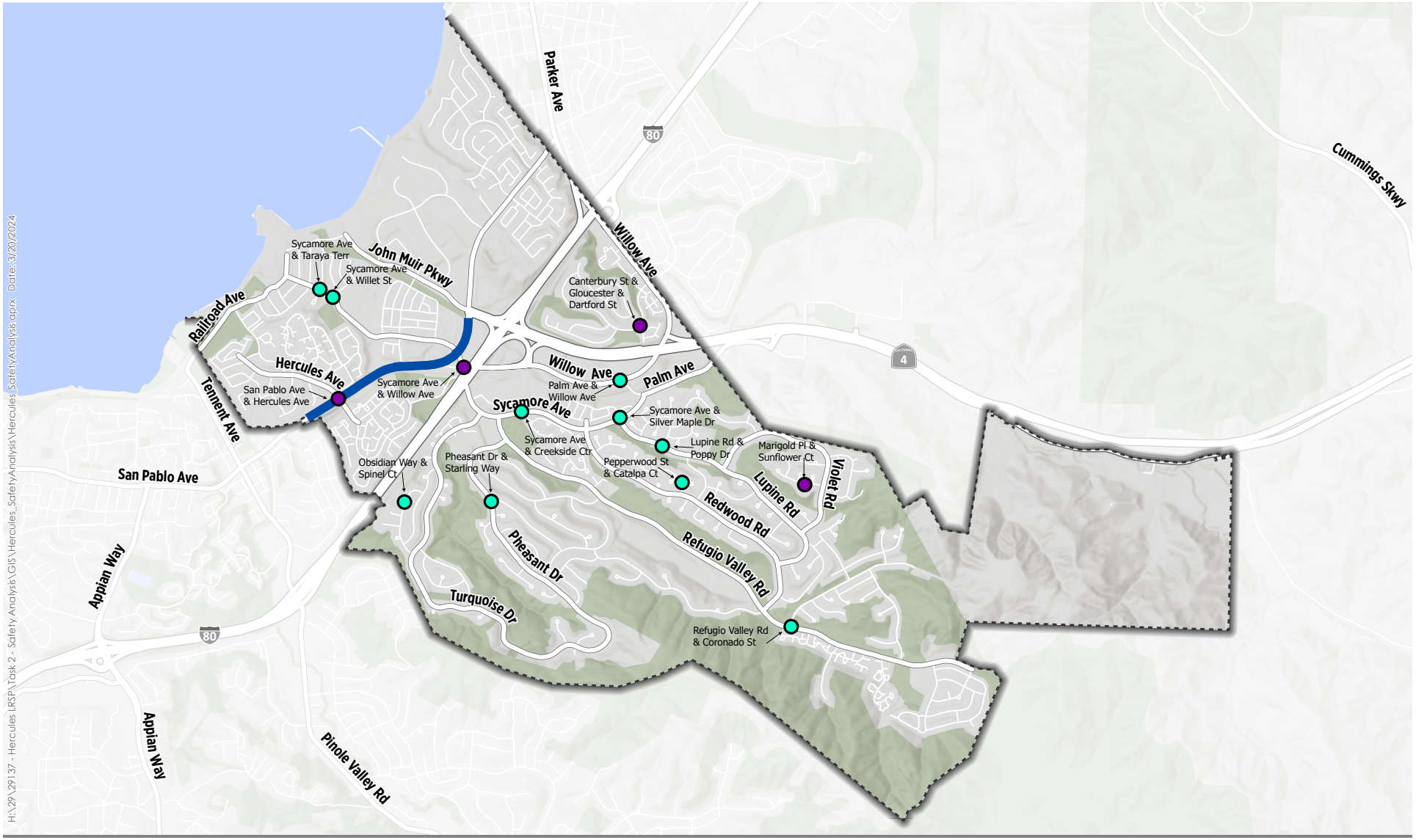
Traffic Calming

Traffic calming is the use of mainly physical roadway design measures to slow motor vehicles as they move through urban, commercial, and residential neighborhoods. These treatments also help to reduce cut-through traffic and improve the safety of non-motorized users by reducing the potential for higher speed and higher severity conflicts. This section describes additional engineering measures that can be used for traffic calming. Many pedestrian and bicycle related treatments also provide traffic calming benefits. Enforcement strategies such as speed feedback signs and high visibility saturation patrols can also be effective for traffic calming.

This group of treatments include Speed Hump, Chicane, Bulb-out, Raised intersections, Mid-block Pedestrian Crossing, and Choker/Pinch Point. The detailed explanation for each of the treatments is below:

- **Speed Hump**: Rounded (vertically along travel path) raised areas of pavement typically 12 to 14 feet in length and often placed in a series (typically spaced 260 to 500 feet apart).
- **Chicane**: Roadway treatment that creates shifting deviations in the street by the implementation of curb extensions or islands.
- **Bulb-out**: A bulb-out or curb extension visually or physically narrows the roadway to reduce vehicle speeds and create shorter crossings for pedestrians.
- **Raised Intersection**: Raised area for an entire intersection used to reduce vehicle speeds and create additional awareness of pedestrians at the intersection.
- **Mid-block Pedestrian Crossing**: Designated space for pedestrians to cross the street at locations where the nearest signalized intersection is too far to walk to and includes striping and physical features that reduce vehicle speeds.
- **Choker/Pinch Point**: Mid-block narrowing of roadway that requires drivers to slow down or yield to each other to maneuver through the area.

Figure 21 shows intersections where unsafe speed collisions are occurring in the city.



Intersections with Other Injury Collisions

Intersections with Fatal/Severe Injury Collisions

Priority Corridor

Hercules City Boundary

Park/Open Space

0 0.5 1 Mile

KITTELSON & ASSOCIATES

Figure 21

Intersections and Roadway Segments with Unsafe Speed Collisions
City of Hercules Local Roadway Safety Plan
Hercules, CA

Nighttime Visibility

Two key engineering countermeasures can help improve nighttime safety in Hercules: (1) roadway and pedestrian-scale lighting, and (2) signal visibility improvements.

Adding or supplementing lighting, specifically pedestrian-scale lighting at intersections may be required to adequately light the sidewalk, crossing locations and increase nighttime visibility.

The *2022 FHWA Pedestrian Lighting Primer* offers design criteria for pedestrian lighting and outlines a process for creating local pedestrian lighting standards based on pedestrian facility type and pedestrian activity. The American Association of State Highway and Transportation Officials (AASHTO) *Roadway Lighting Design Guide, 7th Edition* also offers roadway lighting guidelines and criteria. These processes and criteria are simply provided as examples.

Reviewing this guidance, considering potential amendments, adopting pedestrian lighting standards, or conducting a lighting review at locations identified in the LRSP will help promote pedestrian safety throughout the city. Figure 23 shows intersections where collisions are occurring at night.

Signal Visibility Improvements

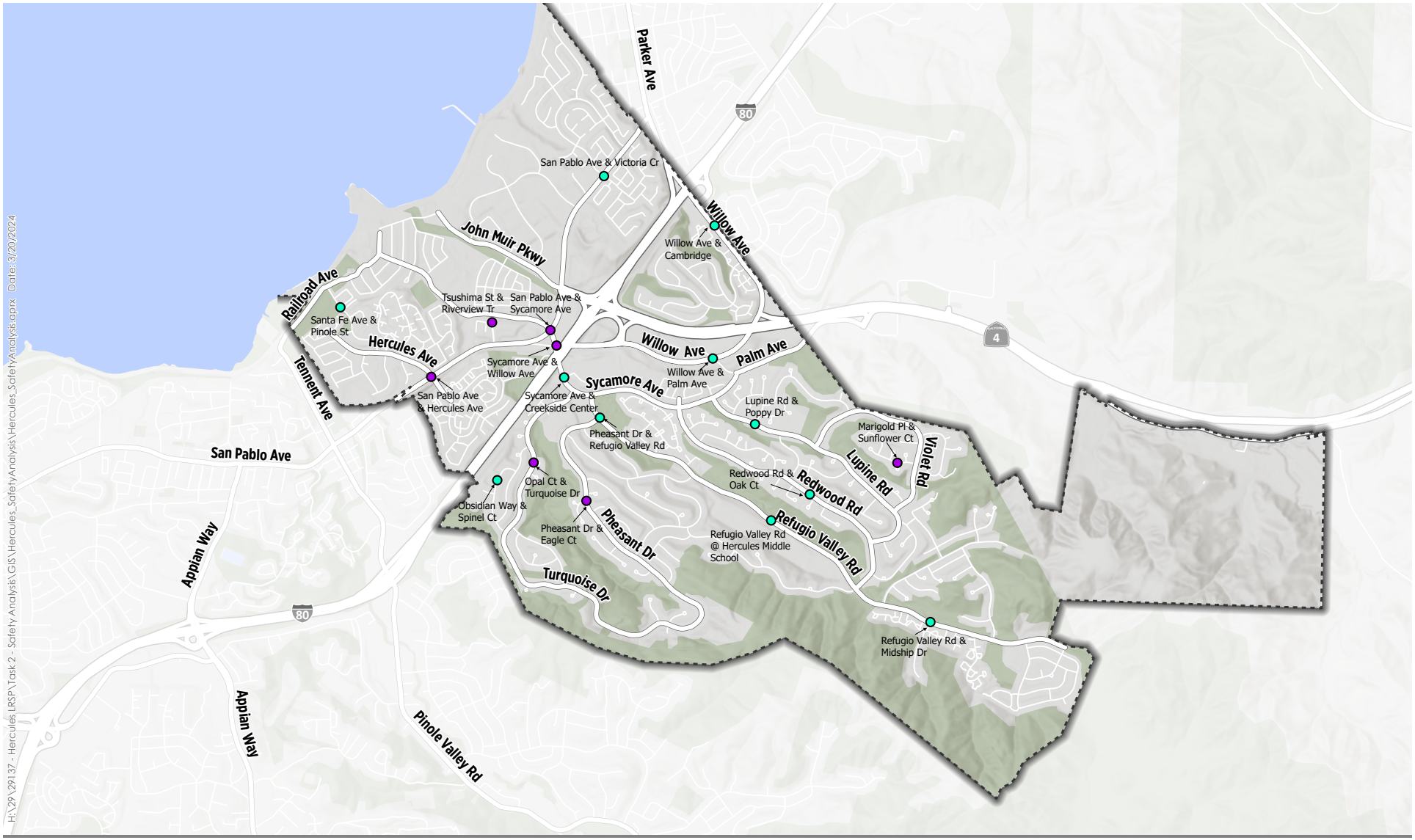
At signalized intersections, simple hardware improvements can improve signal visibility and address patterns of broadside, rear-end, nighttime, and red-light-running collisions (shown in Figure 24). These hardware upgrades improve signal visibility and have been shown to reduce related collisions by as much as 15 percent:

- **Lenses with LED lighting** increase traffic signal visibility.
- **Back-plates with retroreflective borders** improve signal head visibility during daytime and nighttime conditions.
- **Mounting** assemblies include mast arms, span wires, and side-mounted vehicular signals. Upgrading the mounting assembly may improve signal hardware longevity.
- **Larger lenses** may improve signal visibility.

Figure 25[15] shows the signalized locations in the city where these treatments can be proactively applied.

[15] Note that citywide data on signal visibility improvements at intersections was not available in a format to conduct this citywide analysis. As such, when implementing this countermeasure, the city will need to determine if signal visibility improvements have already been implemented.

Figure 22: Example Pedestrian-Scale Lighting (Source: NACTO)



Intersections with Other Injury Collisions

Intersections with Fatal/Severe Injury Collisions

Hercules City Boundary

Park/Open Space

0 0.5 1 Mile

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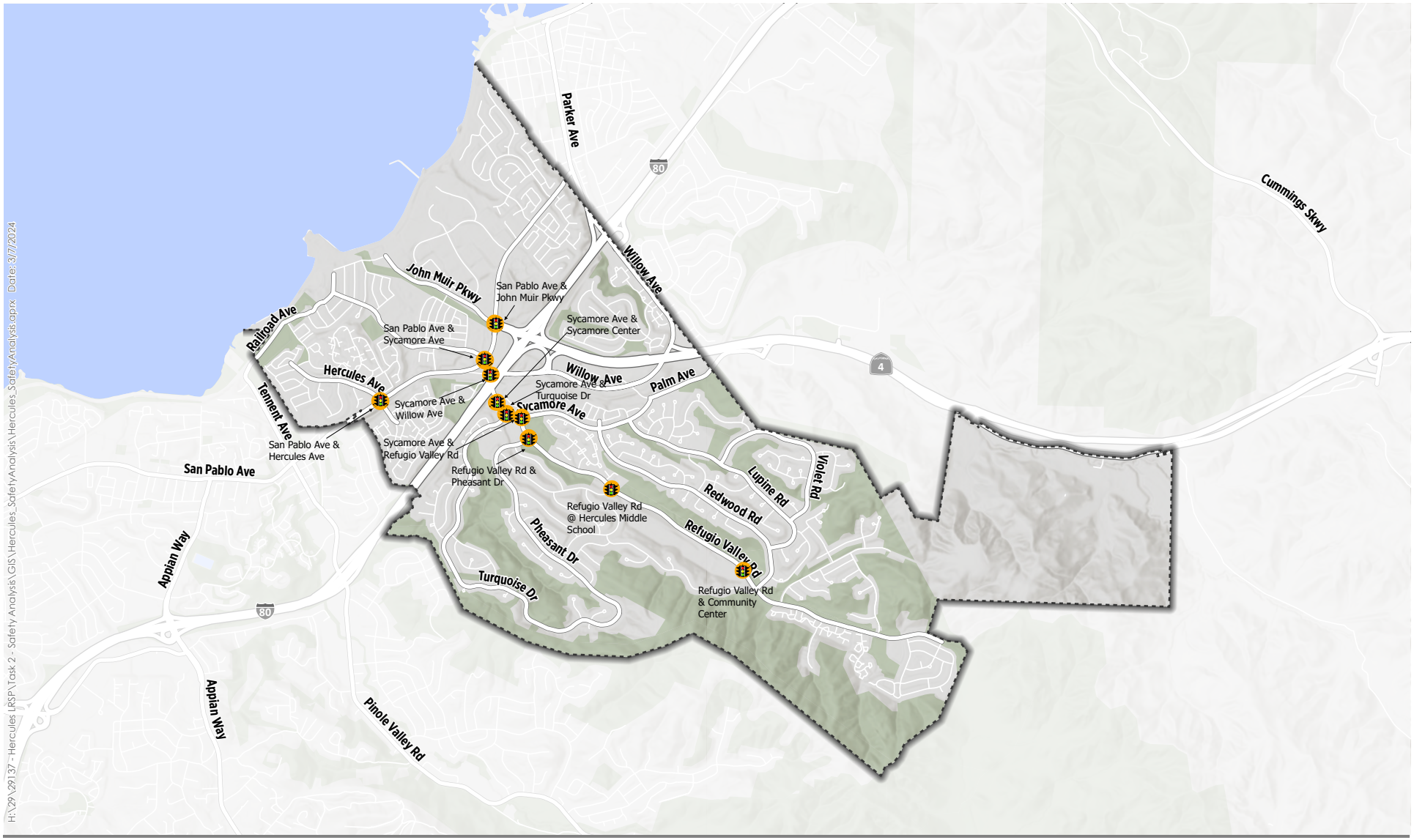
Figure 23

Intersections with Nighttime Collisions
City of Hercules Local Roadway Safety Plan
Hercules, CA

Figure 24: Retroreflective Backplates (Source: FHWA)



Signalized Intersection

Hercules City Boundary

Park/Open Space

0 0.5 1 Mile

Figure 25

Potential Signal Hardware Improvement Locations
City of Hercules Local Roadway Safety Plan
Hercules, CA

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Centerline Hardening

Centerline hardening is an intersection treatment that reduces the speed of turning vehicles and improves pedestrian visibility, an example is shown in Figure 26. The basic hardened centerline treatment consists of five pieces of rubber curb and bollards and/or rubber speed bumps installed on the centerline and extending at a maximum of six feet into the intersection. The treatment can be implemented in a low-cost fashion with quick build materials.

Because centerline hardening can calm left turns, this treatment can be proactively implemented at intersections with left-turn geometry that otherwise allow for high-speed left turns.

Figure 26: Centerline Hardening Example in Oakland, California (Source: Kittelson & Associates, Inc.)

Site Specific Treatments

These projects are identified based on collision history and road or traffic data at individual sites to identify and prioritize countermeasures for sites that have a high frequency of fatal and/or serious injury collisions. The priority location list identified in the Safety Performance Network Screening section provides the LRSP's initial location-specific project locations. This list will be updated at an interval determined appropriate by the City based on implementation (e.g., annually, every three to five years) using the collision severity score (equivalent property damage only), critical collision rates, or similar safety performance measure consistent with the AASHTO *Highway Safety Manual*. The City improved the Sycamore Avenue/Civic Drive intersection with new crosswalks on the west side, and ongoing monitoring is recommended. Table 4 lists the site-specific projects in Hercules.

The matrix is organized by short-term, medium-term, and long-term opportunities. This list is not exhaustive, as many of these treatments can be applied elsewhere in Hercules. Concept drawings of site-specific recommendations are provided in the Appendix B.

Table 4: Site-Specific Projects (and Countermeasures[16])

#	Location	Control Type	Low-Cost, Short-Term Countermeasures	Medium/High-Cost, Medium/Long-Term Countermeasures
1	Sycamore Avenue & Willow Avenue	Signalized	◆ S10: Install flashing beacons as advance warning. ◆ S20PB: Install advance stop bar before crosswalk (shark teeth). ◆ S21PB: Modify signal phasing to implement a Leading Pedestrian Interval (LPI). ◆ Restripe as high visibility crosswalk.	◆ S02: Improve signal hardware: back-plates with retroflective borders. ◆ Evaluate or consider installing curb extensions. ◆ Consider installing protected intersection elements. ◆ Consider realigning curb ramps so all marked crosswalks are perpendicular to travel lanes.
2	Sycamore Avenue & Railroad Avenue	Unsignalized	◆ Centerline hardening. ◆ Enforcement. ◆ Consider installing crosswalks.	◆ Consider change of traffic control (evaluate warrants and consider a mini-traffic circle). ◆ Evaluate and consider restricting parking 100 feet from the center of the intersection on all approaches to increase visibility.
3	Lupine Road & Sequoia Road	Unsignalized	◆ NS22PB: Install Rectangular Rapid Flashing Beacon (RRFB), midblock	◆ NS19PB: Install pedestrian refuge island. ◆ Consider installing "School-Ahead" signs.
4	Canterbury Road & Gloucester & Dartford Street	Unsignalized	◆ NS06: Upgrade larger stop signs or other intersection warning/regulatory signs.	◆ Install dynamic/variable speed warning signs. ◆ Consider speed management – traffic calming measures.
5	Tsushima Street & Riverview Terrace	Unsignalized	◆ Enforcement. ◆ NS07: Consider installing/upgrading pavement markings.	
6	Pheasant Drive & Eagle Court	Unsignalized	◆ NS11: Improve sight distance to intersection (clear sight triangles)	◆ Evaluate and consider restricting parking 100 feet from the center of the intersection on all approaches to increase visibility.
7	Marigold Place & Sunflower Court	Unsignalized	◆ NS01: Add intersection lighting. ◆ NS06: Upgrade larger stop signs or other intersection warning/regulatory signs.	◆ Install dynamic/variable speed warning signs. ◆ Consider speed management – traffic calming measures.
8	Opal Court & Turquoise Drive	Unsignalized	◆ NS01: Add intersection lighting (NS.I.) NS06: Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	◆ Consider speed management – traffic calming measures.
9	San Pablo Avenue & Hercules Avenue	Signalized	◆ S03, Improve signal timing (coordination, phases, or operation). ◆ S17PB Install pedestrian countdown signal heads. ◆ S21PB: Modify signal phasing to implement a Leading Pedestrian Interval (LPI). ◆ Evaluate or consider implementing no right-turn-on-red (RTOR) where right-turn conflicts with pedestrian crossing. ◆ Restripe as high visibility crosswalk.	◆ S02: Improve signal hardware: back-plates with retroflective borders. ◆ Consider installing protected intersection elements.
10	San Pablo Avenue & Sycamore Avenue	Signalized	◆ S03: Improve signal timing (coordination, phases, or operation). ◆ S21PB: Modify signal phasing to implement a Leading Pedestrian Interval (LPI).	◆ S02: Improve signal hardware: back-plates with retroflective borders. ◆ Consider installing protected intersection elements. ◆ Consider speed management – traffic calming measures. ◆ Consider installing a pedestrian refuge island.
11	San Pablo Avenue (South of State Route 4 to Hercules City Limits)	Corridor	◆ R26: Install speed feedback signs. ◆ Evaluate or consider implementing no right-turn-on-red (RTOR) where right-turn conflicts with pedestrian crossing.	◆ Combine right turn with through lanes and remove channelization at San Pablo Avenue/SR 4. ◆ Restripe as high visibility crosswalks and consider realigning curb ramps so all marked crosswalks are perpendicular to travel lanes at San Pablo Ave/SR 4. ◆ Corridor access management. ◆ Consider speed management – traffic calming measures.

[16] Countermeasure numbers refer to the Countermeasure ID from the Caltrans Local Roadway Safety Manual (April 2020, LRSM). If a CM ID is not listed, the countermeasure is not listed in the LRSM.

ACTION ITEMS AND PERFORMANCE MEASURES

Aligning action items with goals and identifying metrics for measuring success helps track progress towards a safer Hercules for everyone. The listed performance measures can be used in subsequent plan updates to assess progress.

Goal	Action Items	Performance Measures
Analyze data to identify and prioritize opportunities to improve roadway safety using proven safety countermeasures and strategies.	***Near-Term*** ◆ Review collision data in subsequent plan updates to evaluate progress on emphasis areas and for fatal and severe injury collision frequency. ◆ Compare the city's internal collision database with publicly available collision data in subsequent plan updates to identify potential missing collisions in either database. ***Medium-Term*** ◆ Continuously engage with the community to identify and document locations of concern, in recognition that the collision data does not tell the whole story. ***Long-Term*** ◆ Update the LRSP goals and emphasis areas with subsequent updates. ◆ Evaluate the need for traffic control change or additional crossing improvements at locations with anticipated growth.	◆ Number of fatal and severe injury collisions by emphasis areas. ◆ Summary of safety-related feedback received (quantity, type, location). ◆ Number of safety improvements implemented at priority locations. ◆ Number of safety evaluations conducted at priority or potential systemic safety locations.
Implement safety countermeasures to reduce the risk of future collisions.	***Near-Term*** ◆ Identify opportunities to implement short-term countermeasures at prioritized locations (see Site Specific Treatments). ◆ Pursue HSIP and Safe Streets and Roads for All (SS4A) grant funding. ◆ Develop an internal process to regularly collect data and information around the performance measures that can be used to assess changes citywide and at priority locations. ***Medium-Term*** ◆ Implement systemic and site-specific countermeasures and strategies using available funding. ◆ Begin implementation of equitable enforcement strategies and monitoring. ***Long-Term*** ◆ Explore funding opportunities to implement low-cost, high priority systemic strategies identified as part of this plan. ◆ Evaluate effectiveness of equitable enforcement strategies. ◆ Monitor and evaluate effectiveness of priority safety projects to determine local safety benefits. ◆ Revisit medium- and long-term countermeasures (see Site Specific Treatments) for inclusion in City's Capital Improvement Program or for future grant funding opportunities (see Funding section).	◆ Number of fatal and severe injury collisions by emphasis areas. ◆ Number of fatal and severe injury collisions citywide. ◆ Grant money received for safety projects. ◆ Annual expenditure on safety improvements.

Educate and promote safe travel practices in the City of Hercules.	***Near-Term*** ◆ Make the LRSP publicly available to share collision trends and recommended best practices. ◆ Partner with Hercules schools to promote and expand educational campaigns for roadway safety including walking and biking specific campaigns. ◆ Identify partners to develop safety messaging campaigns to reduce impaired driving. ◆ Partner with local law enforcement and partners to implement education campaigns to address safe speeds and impaired driving. ***Medium-Term*** ◆ Conduct educational training at schools on driving under the influence and distracted driving. ◆ Partner with enforcement or other organizations to work with alcohol and marijuana retailers/servers to deter selling to underage customers. ***Long-Term*** ◆ Develop multilingual comprehensive roadway safety education programs to develop a safety culture in the City. ◆ Revisit and revise educational campaign opportunities based on collision trends and patterns.	◆ Number of events hosted, and summary of educational activities led by the city. ◆ Frequency of communication with identified partners on safety initiatives. ◆ Summary of safety-related feedback received (quantity, type, location).

FUNDING

Funding for regional and local transportation projects, policies, and programs is available from various federal and state sources. The City may also choose to identify or develop regional programs that could be used by local agencies to enhance roadway safety. As funding changes over time, the information provided in this LRSP should be updated.

Funding Program	Managing Agency	Link
Federal Programs		
Congestion Management & Air Quality Management (CMAQ)	FHWA	https://www.transportation.gov/sustainability/climate/federal-programs-directory-congestion-mitigation-and-air-quality-cmaq
Surface Transportation Block Grant (STBG) Program	FHWA	https://www.fhwa.dot.gov/specialfunding/stp/
Land and Water Conservation Fund (LWCF)	National Park Service	https://www.nps.gov/subjects/lwcf/index.htm
Rivers, Trails, and Conservation Assistance (RTCA) Program	National Park Service	https://www.nps.gov/orgs/rtca/index.htm
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant	USDOT	https://www.transportation.gov/RAISEgrants
Safe Streets and Roads for All (SS4A)	USDOT	https://www.transportation.gov/grants/SS4A
State Programs		
Senate Bill 1 (SB 1)	Caltrans	http://rebuildingca.ca.gov/
Highway Safety Improvement Program (HSIP)	Caltrans	https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program
Office of Traffic Safety (OTS) Grants	California Office of Traffic Safety	https://www.ots.ca.gov/grants/
Active Transportation Program (ATP) Grants	California Transportation Commission (CTC)	https://catc.ca.gov/programs/active-transportation-program
State-Local Partnership Program (LPP)	California Transportation Commission (CTC)	https://catc.ca.gov/programs/sb1/local-partnership-program
Sustainable Transportation Grant Program	Caltrans	https://dot.ca.gov/programs/transportation-planning/regional-planning/sustainable-transportation-planning-grants
State Highway Operation and Protection Program (SHOPP)	Caltrans	https://dot.ca.gov/programs/financial-programming/state-highway-operation-protection-program-shopp-minor-program-shopp
State Transportation Improvement Program (STIP)	California Transportation	https://catc.ca.gov/programs/state-transportation-improvement-program

Funding Program	Managing Agency	Link
	Commission (CTC)	
Recreational Trails Program (RTP)	California Department of Parks and Recreation	https://www.parks.ca.gov/?page_id=24324
Affordable Housing and Sustainable Communities (AHSC) Program	California Strategic Growth Council	https://sgc.ca.gov/programs/ahsc/
Transformative Climate Communities (TCC) Program	California Strategic Growth Council	https://sgc.ca.gov/programs/tcc/
Urban Greening Grant Program	California Natural Resources Agency	https://files.resources.ca.gov/grants/urban-greening/
Environmental Justice (EJ) Small Grants Program	California Environmental Protection Agency	https://calepa.ca.gov/envjustice/funding/
Regional Programs		
One Bay Area Grant (OBAG)	Metropolitan Transportation Commission (MTC)	https://mtc.ca.gov/tags/one-bay-area-grant-obag

APPENDIX A – SAFETY PERFORMANCE NETWORK SCREENING METHODOLOGY

Methodology

Kittelson used the equivalent property damage-only score (EPDO score; hereafter referred to as *collision severity score*) performance measure from the American Association of State Highway and Transportation Officials, or AASHTO, *Highway Safety Manual (HSM)*, which assigns weighting factors to collisions by severity relative to PDO collisions. The collision severity score calculation was performed for all public intersections and roadway segments, not including state highway facilities. This performance measure is described below.

The collision severity score is calculated by multiplying each collision severity total by its associated weight and summing the results, using the following formula:

$$Annualized\ Collision\ Severity\ Score = \frac{\sum_{\forall\ collision\ severities} W_i * N_i}{T}$$

Where, W_i = Weight of specified collision severity
N_i = Total number of collisions throughout the time-period of analysis
T = Time-period of analysis (years)

The collision severity score is annualized by dividing the score by the number of years of collision data used in the analysis. The associated collision severity weights are based on the cost of PDO collisions, provided by the 2022 *Caltrans' Local Roadway Safety Manual*. These weights are shown in Table A1.

Table A1: Collision Weights by Severity and Location Type

Location Type	Collisions Weighting by Severity				
	Fatal	Severe Injury	Moderate Injury	Minor Injury	Property Damage Only
Signalized Intersection	119.93	119.93	10.73	6.10	1
Unsignalized Intersection	190.81	190.81	10.73	6.10	1
Roadway	165.17	165.17	10.73	6.10	1

Source: 2022 Caltrans' Local Roadway Safety Manual

As shown in Table A1, the collision weights prioritize fatal and severe injury collisions equally to recognize that a death versus a severe injury is often a function of the individual involved (i.e., age or physical fitness) or of emergency response time. Therefore, both outcomes represent locations where the region may equally value improvements. Moreover, collision weights vary by location due to the relative costs associated with the collision severity at the location types. Specifically, unsignalized intersections have a higher cost for fatal and severe collisions because fatal and severe collisions at these locations tend to result in more severely injured persons on average.

Intersection Analysis

Kittelson first identified signalized and unsignalized intersections in the City's roadway network and then defined collisions as intersection or segment collisions. An intersection collision is defined as a collision that occurs within 250 feet of the intersection. These collisions were spatially joined and summarized in ArcGIS to show the total number of collisions by severity and the respective annualized collision severity scores at

each intersection. Where intersections were less than 500 feet from each other, collisions were assigned to the nearest of the two intersections. Collisions occurring more than 250 feet from any intersection were separated to be used in the roadway segment analysis discussed below.

Roadway Segment Analysis

After completing the intersection analysis, Kittelson used the collisions reported more than 250 feet from the nearest intersection to conduct a separate segment analysis. A Python script in ArcGIS allowed for splitting the San Mateo roadway network into overlapping half-mile (0.5) segments, incrementing the segments by one quarter (0.25) of a mile. This methodology helps to identify portions of the roadway with the greatest potential for safety improvements.

Once the roadway segments were created, the Python script spatially joined collisions to the corridor segment (excluding those identified with intersections as described above). Like the intersection methodology above, collisions were summarized by severity, and the totals were multiplied by the collision severity weights for roadway segments. The weighted collision severity scores of the collisions were totaled and annualized by the number of years of collision data (five) to generate an annualized collision severity score.

Results

To meet the goals of the City of Hercules, Kittelson performed an intersection and roadway segment analysis based on collision severity score metrics. The results of the intersection and segment analysis helped create an initial list of intersections and corridors with high collision rates. This method highlights the sites that have high frequencies of fatal and/or severe injury collisions which typically warrant further investigation and countermeasure application. These locations are often the most competitive for HSIP, SS4A, and similar safety-related grant applications, discussed in Section – Recommendations and Implementation.

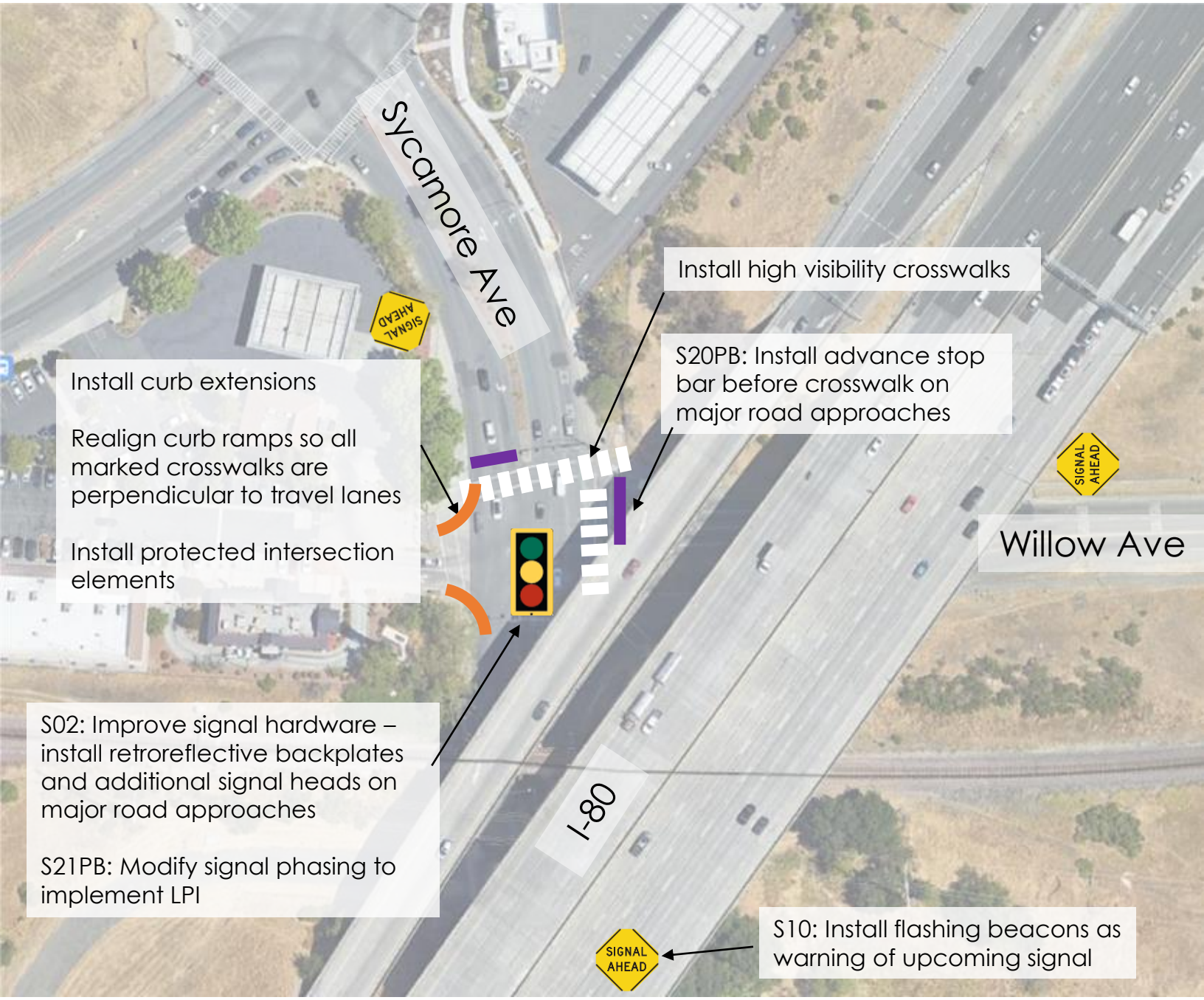
APPENDIX B – PROJECT CONCEPTS

Location 1

Sycamore Avenue & Willow Avenue

Project Layout, Existing Conditions, and Influence Area

N



Legend

- Improve signal hardware – install retroreflective backplates and additional signal heads
- Install Leading Pedestrian Interval
- Install curb extensions
- Install flashing beacons in advance warning
- Install high visibility crosswalks
- Install advance stop bar before crosswalk

Location 2

Sycamore Avenue & Railroad Avenue

Project Layout, Existing Conditions, and Influence Area

N

Legend

- Install high visibility crosswalks
- Install centerline hardening
- Restrict parking from site triangles
- Evaluate warrants and consider a mini-traffic circle

Location 3

Lupine Road & Sequoia Road

Project Layout, Existing Conditions, and Influence Area

N

Legend

Pedestrian refuge island

Install "School Ahead" signs

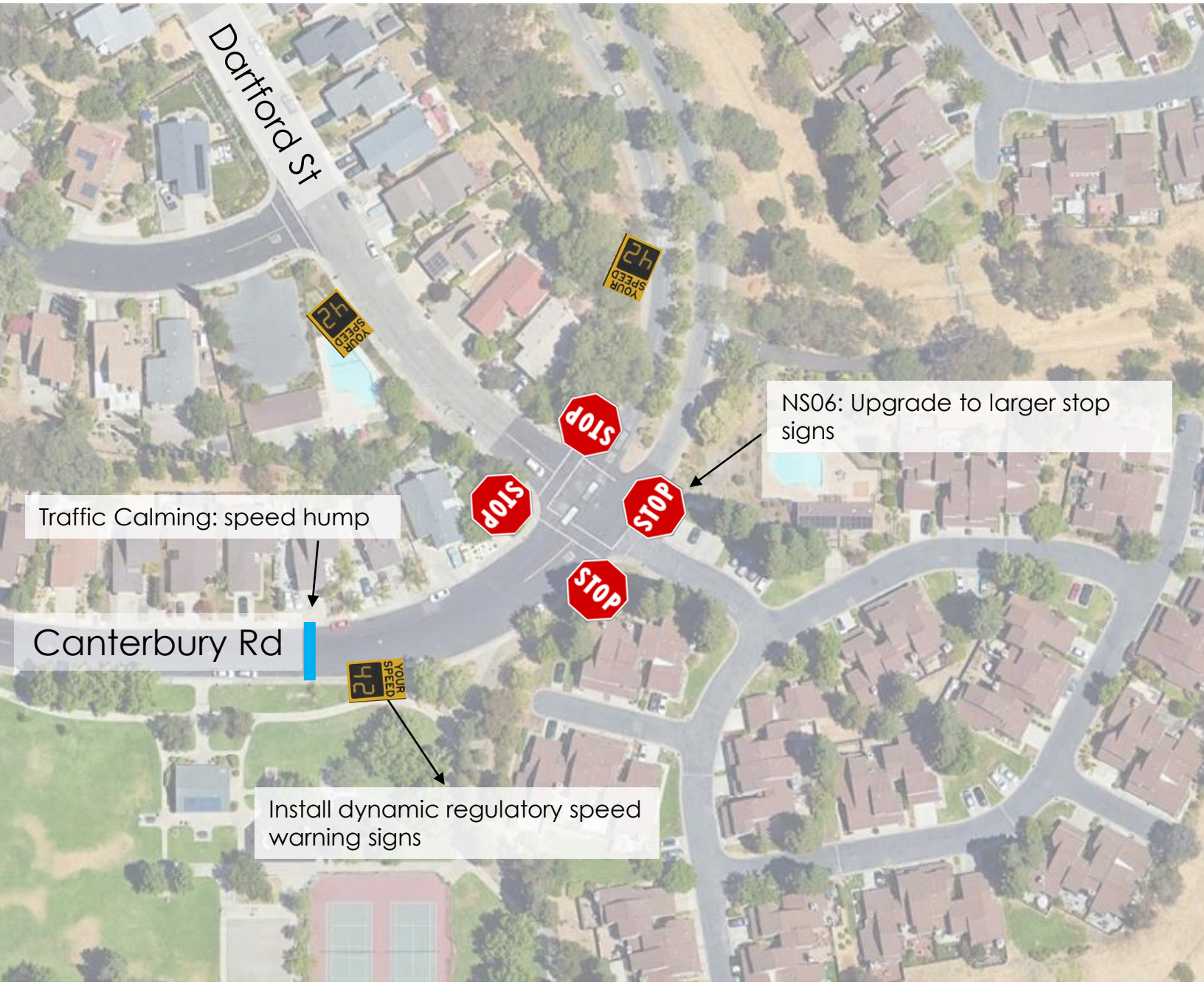
Install RRFB at midblock locations

Location 4

Canterbury Road & Dartford Street

Project Layout, Existing Conditions, and Influence Area

N



Legend

- Install dynamic regulatory speed warning signs
- Upgrade to larger stop signs
- Install speed humps

Location 5

Tsushima Street & Riverview Terrace

Project Layout, Existing Conditions, and Influence Area

N

Legend

- Install/upgrade pavement markings

Location 6

Pheasant Drive and Eagle Court

Project Layout, Existing Conditions, and Influence Area

N

Legend

Restrict parking and ensure sight triangle/clearance

Clear sight triangles

Location 7

Marigold Pl & Sunflower Ct

Project Layout, Existing Conditions, and Influence Area

N

Legend

Add intersection lighting

Install dynamic regulatory speed warning signs

Upgrade to larger stop signs

Install speed humps

Location 8

Turquoise Dr & Opal Ct

Project Layout, Existing Conditions, and Influence Area

N

Legend

Add intersection lighting

Install speed humps

Upgrade to larger stop signs

Location 9

San Pablo Ave & Hercules Ave

Project Layout, Existing Conditions, and Influence Area

N

Legend

Improve signal hardware, install pedestrian countdown signal heads, modify signal timing, and implement LPI

Install high visibility crosswalks

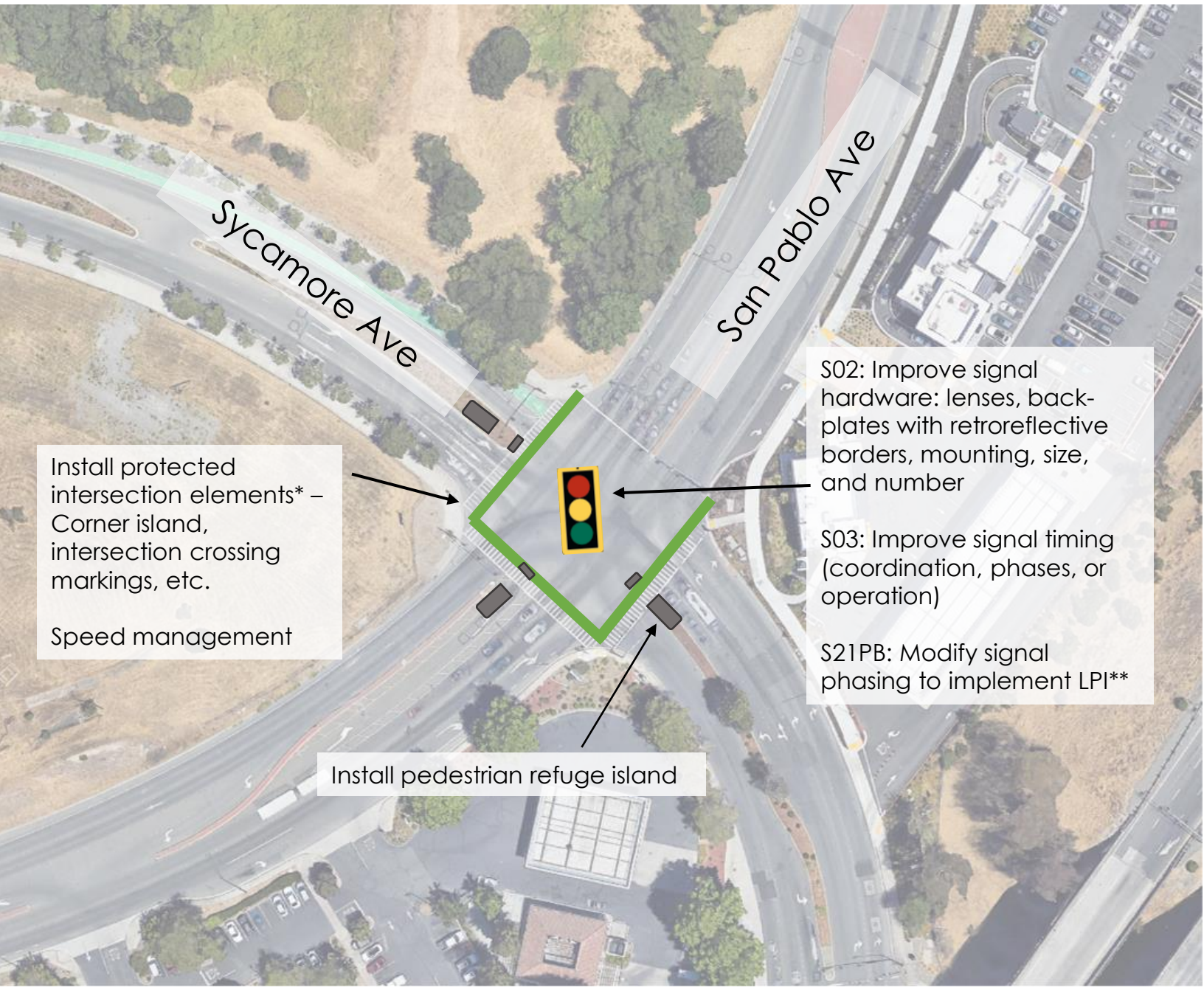
* Leading Pedestrian Interval: Improves pedestrian visibility, reduces conflicts with vehicles, increases the likelihood of motorists yielding, and enhances safety for slower-starting pedestrians.

Location 10

San Pablo Ave & Sycamore Ave

Project Layout, Existing Conditions, and Influence Area

N



Legend

Pedestrian refuge island

Improve signal hardware, modify signal timing, and implement LPI

* Source: NACTO, https://nacto.org/publication/dont-give-up-at-the-intersection/protected-intersections/
** Leading Pedestrian Interval: Improves pedestrian visibility, reduces conflicts with vehicles, increases the likelihood of motorists yielding, and enhances safety for slower-starting pedestrians.

Location 11

San Pablo Ave

Project Layout, Existing Conditions, and Influence Area

N

Legend

YOUR SPEED 42 — Install dynamic regulatory speed warning signs/radar speed feedback signs