DUBLIN LOCAL ROADWAY SAFETY PLAN

JANUARY 2023

CONTENTS

GLOSSARY

Aggressive driving includes behaviors such as speeding, tailgating, running traffic signals or signs, and other reckless maneuvers.

Challenge areas represent types of roadway users, locations, or collisions identified by the California Department of Transportation's *Strategic Highway Safety Plan* (SHSP). These areas, when addressed, have the most potential to improve roadway safety.

Countermeasures are engineering infrastructure improvements that can be implemented to reduce the risk of collisions.

Emphasis areas represent types of roadway users, locations, or collisions with safety issues that deserve special focus in Dublin based on local trends.

Impaired driving describes operating a motor vehicle while under the influence of a substance, including alcohol, marijuana, illicit drugs, or some prescription medications.

Local roadway safety plans, or LRSPs, are documents that provide local-level assessments of roadway safety and identify locations and strategies to improve safety on local roadways.

Local roadways are all roadways not part of the State Highway System. Local roadways can be owned by cities or counties. In this plan, local roadways are Dublin owned.

Primary collision factors (PCFs) convey the violation or underlying causal factor for a collision. Although there are often multiple causal factors, a reporting officer at the scene of a collision indicates a single relevant PCF related to a California Vehicle Code violation.

Proven Safety Countermeasures are a series of 28 countermeasures and strategies promoted by the Federal Highway Administration (FHWA). These countermeasures can help address safety issues related to speed management, intersections, roadway departures, and pedestrians and bicyclists. For more, visit https://highways.dot.gov/safety/proven-safety-countermeasures.

The Safe System approach is a layered method for roadway safety promoted by the FHWA. This approach uses redundancies to anticipate mistakes and minimize injury. For more, visit https://safety.fhwa.dot.gov/zerodeaths/docs/FHWA_SafeSystem_Brochure_V9_508_200717.pdf.

Safety partners are agencies, government bodies, businesses, and community groups that Dublin can work with to plan, promote, and implement safety projects.

Strategies are non-engineering tools that can help address roadway user behavior, improve emergency services, and build a culture of safety.

Vulnerable roadway users are those at greater risk of death or serious injury from crashes because they lack the physical protection afforded by a motor vehicle. Bicyclists and pedestrians are vulnerable roadway users.

INTRODUCTION

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A Commitment to Safety

This Local Roadway Safety Plan, or LRSP, outlines a plan to ensure Dublin residents, visitors, and those who travel through the community get home safely. Dublin is among the fastest growing communities in the country. From 2010 to 2021, Dublin's population grew by 37 percent.[1] With increasing numbers of residents and visitors driving, walking, and biking along Dublin's roadways, it has never been more important to address transportation safety issues in the community.

Why Local Roadways Matter

Local roadways are all roadways not part of the State Highway System. Nationwide, local roadways are less traveled than State highways but have a higher rate of fatal and severe injury collisions.[2] Efforts to improve local roadway safety—such as this LRSP—play a crucial role in identifying where and why fatal and severe injury collisions happen and actions that can help eliminate them.

Because no two communities are exactly alike, this LRSP identifies and prioritizes safety improvements specifically for safety issues on Dublin roadways. This LRSP is a living document designed to be flexible and to respond to evolving community needs. It's recommended that this LRSP be revisited and updated every five years, consistent with best practices.

Improving Safety in Dublin and Beyond

Improving local roadway safety in Dublin is just one part of larger nationwide and statewide efforts to reduce fatal and severe injury collisions.

ALIGNING WITH THE CALIFORNIA'S STRATEGIC HIGHWAY SAFETY PLAN (SHSP)

The 2020–2024 California Strategic Highway Safety Plan (SHSP) sets out California's vision, goals, and objectives for reducing fatal and severe injury collisions on public roadways (local roadways and state highways). To draw this roadmap, the California Department of Transportation (Caltrans) led efforts to analyze collision data and collaborate with traffic safety partners across the state. As a result, the SHSP identified California's 16 challenge areas, or areas with the most potential to improve roadway safety. Of the challenge areas, six were identified as high-priority areas, or areas with the greatest opportunity to reduce death and severe injury.

Historically, the SHSP has used the five Es (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

[1] Pop-Facts Demographic Snapshot Summary, "Dublin, CA (city)" (2021), https://dublin.ca.gov/238/Community-and-Economic-Profile.

[2] Anderson et al. Noteworthy Practices: Addressing Safety on Locally-Owned and Maintained Roads A Domestic Scan, FHWA-SA-09-019, (2010).

approach, and encourage implementation of proven countermeasures and emerging technologies.

Local jurisdictions within the State have begun to implement strategies to eliminate traffic deaths and severe injuries using the SHSP's guiding principles and challenge areas.

CREATING A SAFE SYSTEM

The United States Department of Transportation adopted the Safe System approach as its core strategy in January 2022.[3] The following month, Caltrans released Director's Policy 36, which commits the state to the Safe System approach to achieve its vision of no fatalities and severe injuries on California's roadways by 2050 and safer outcomes for all communities.[4] These efforts build from the Federal Highway Administration's promotion of the Safe System approach as a strategy to eliminate all traffic deaths.

The Safe System approach aims to eliminate fatal and serious injuries for all roadway users. It works toward eliminating roadway deaths based on six key principles:

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

SHSP Challenge Areas

(High-priority areas for Dublin in bold)

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

[3] 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

[4] 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):

- **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 travelling, 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 travelling 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.

This LRSP uses a Safe System approach to identify ways that Dublin and its safety partners can create layers to help protect all roadway users—even when they make mistakes.

To build redundancy in the local transportation system, Dublin and its teaming partners can

- Establish a vision, goals, and partnerships to help implement the plan.
- Identify systemic engineering countermeasures and use them proactively rather than reactively.
- Provide educational materials to communicate key roadway safety information to residents, business owners, and visitors.
- Review policies, guidelines, and standards to prioritize safety.

Figure 1. Safe System Elements

- Overlap roadway stakeholder efforts to create a culture of traffic safety.
- Identify potential funding and coordination sources for project implementation.

(For more on Dublin's safety partners, see page 14.)

This plan and its recommendations can help create a Safe System in Dublin. 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 categories that local agencies cannot directly affect.

What is an LRSP?

An LRSP provides a local-level assessment of roadway safety and identifies locations, countermeasures, and strategies to improve safety on local roadways. An LRSP is a multi-disciplinary approach to traffic safety that creates partnership opportunities with safety partners (including other agencies) who can help implement recommendations.

LRSPs are one of FHWA's Proven Safety Countermeasures, and these plans provide crosscutting efforts to prioritize investments. To assist with implementation of engineering strategies, FHWA provides more than $2 billion each year in Highway Safety Improvement Program (HSIP) funds for States to address roadway safety challenges on all public roadways. To pursue HSIP grant funds in California (estimated at $210 million for Cycle 11 in 2022), a local agency must have an LRSP or equivalent planning document. Dublin's access to these funds will help make its roadways safer for all users. For more on the FHWA's safety strategy, visit https://www.transportation.gov/NRSS.

Plan Overview

This LRSP uses historical collision data and an understanding of local context to assess existing roadway safety conditions in Dublin, 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:

Vision & Goals—Establishes a larger vision for transportation safety in Dublin and sets goals for how to get there.

Plan Development—Details the collaborative and data-driven planning process.

Existing Conditions—Provides an analysis of collisions in Dublin.

Toolbox—Lists proven countermeasures and strategies that can improve roadway safety.

Recommendations and Implementation—Prioritizes short- and long-term projects and sets a strategy for assessing progress toward established goals.

Dublin's Safety Emphasis Areas

Like the State's SHSP challenge areas, **emphasis areas** guided this LRSP's development as well as its recommended actions and implementation strategies. From 2016 through 2020, there were 13 reported fatal and severe injury collisions in Dublin. The city has five emphasis areas that deserve special focus based on local trends:

Pedestrian Collisions
In Dublin, pedestrian collisions account for 28 percent of all fatal and severe injury collisions.

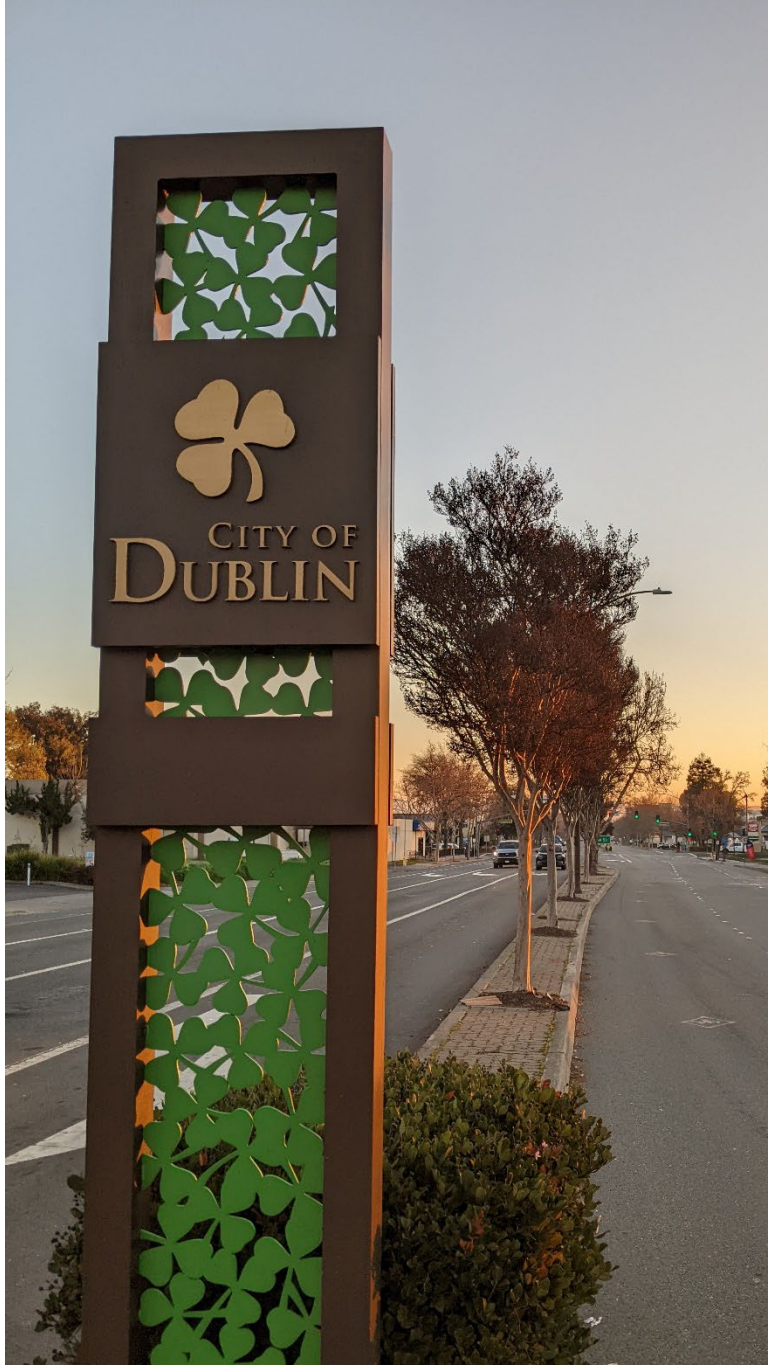
Nighttime Safety
Sixty percent of Dublin's fatal and severe injury pedestrian collisions occur in dusk, dawn, or dark conditions.

Aging Drivers
Collisions involving drivers 65 and older account for 22 percent of all fatal and severe injury collisions.

Signalized Arterial/Local Intersections
Nearly 45 percent of Dublin's fatal and severe injury collisions occur at intersections. These locations also see many rear end and broadside collisions. In Dublin, hit object collisions—the most frequent type of fatal and severe injury collision—primarily occur at signalized intersections.

Aggressive and Impaired Driving
Aggressive driving accounts for over 15 percent of fatal and severe injury collisions in Dublin and includes several behaviors, such as speeding, tailgating, running traffic signals or signs, and making other reckless maneuvers.

Impaired driving accounts for over 25 percent of fatal and severe injury collisions in Dublin and includes collisions in which the driver was using alcohol and/or illicit, prescribed, or over-the-counter drugs.



VISION & GOALS

VISION AND GOALS

Plan Vision

The City of Dublin will prioritize safety in all projects and will reduce the number of fatal and severe injury collisions even as the city continues to grow. The City will use data and Safe System principles recommended by FHWA and SHSP to promote safety in all actions.

Plan Goals

The following goals will guide collaborative planning efforts with the Traffic Safety Committee and other partners:

1 **Implement safety countermeasures to reduce the risk of future collisions.**

- Reduce the number of fatal and severe injury collisions in identified emphasis areas.[5]
- Reduce the number of fatal and severe injury collisions on all City roadways.
- Implement systemic engineering countermeasures at identified priority locations and other applicable locations along City roadways.

2 **Analyze data to identify and prioritize opportunities to improve roadway safety.**

- Monitor the number of fatal and severe injury collisions and review and summarize the number of fatal and severe injury collisions to see if total numbers are decreasing, increasing, or remaining constant.
- Maintain or increase annual safety expenditures to proactively implement proven countermeasures to target emphasis areas.
- Track and apply for safety-related grants to implement safety countermeasures in line with emphasis areas.
- Review FHWA's *Proven Safety Countermeasures*, updated Caltrans *Local Roadway Safety Manual,* and other resources to consider new countermeasures that can address emphasis areas.[6]
- Revisit and update this plan, including identified emphasis areas and priority locations, at least every five years.

3 **Promote a culture of roadway safety in Dublin's agencies, businesses, and residents.**

- Continue to collaborate with the Traffic Safety Committee and other partners to continue efforts to eliminate fatalities and severe injury collisions on public roadways within the city. (For more on Dublin's safety partners, see page 14.)

[5] Dublin is expected to continue its growth in the future. With a greater population and total vehicle miles traveled, the total exposure risk will increase. The City can monitor total and fatal and severe injury collisions and a number normalized by annual population to understand if fatal and severe injury collisions are increasing, decreasing, or staying constant. An absolute reduction in fatal and severe injury collisions is still desired.

[6] The *Local Roadway Safety Manual* is a technical resource published by Caltrans and updated with each HSIP funding cycle (approximately every two years). It includes research-backed information and funding eligibility for safety countermeasures. It is available online at https://dot.ca.gov/programs/safety-programs/shsp/resources.

- Continue to share resources on a regular basis with Dublin Police Services and the Office of Communications to maintain relevant information for non-engineering strategy implementation.
- Continue to coordinate safety improvements and non-engineering safety strategies across jurisdictions and through Alameda CTC, Tri-Valley Transportation Council, and other relevant committees.

Countermeasures & Strategies

To build a Safe System in Dublin, this LRSP provides **both engineering countermeasures** and **non-engineering strategies** promoted by the FHWA, the California SHSP, and Caltrans LRSP guidelines.

Engineering countermeasures include pavement markings, curb and median designs, signage, and traffic control, among others.

Non-engineering strategies use tools including education, equitable enforcement strategies, and emerging technology to improve roadway safety. Both countermeasure types work together, creating the layers of safety that are critical to a Safe System.

PLAN DEVELOPMENT

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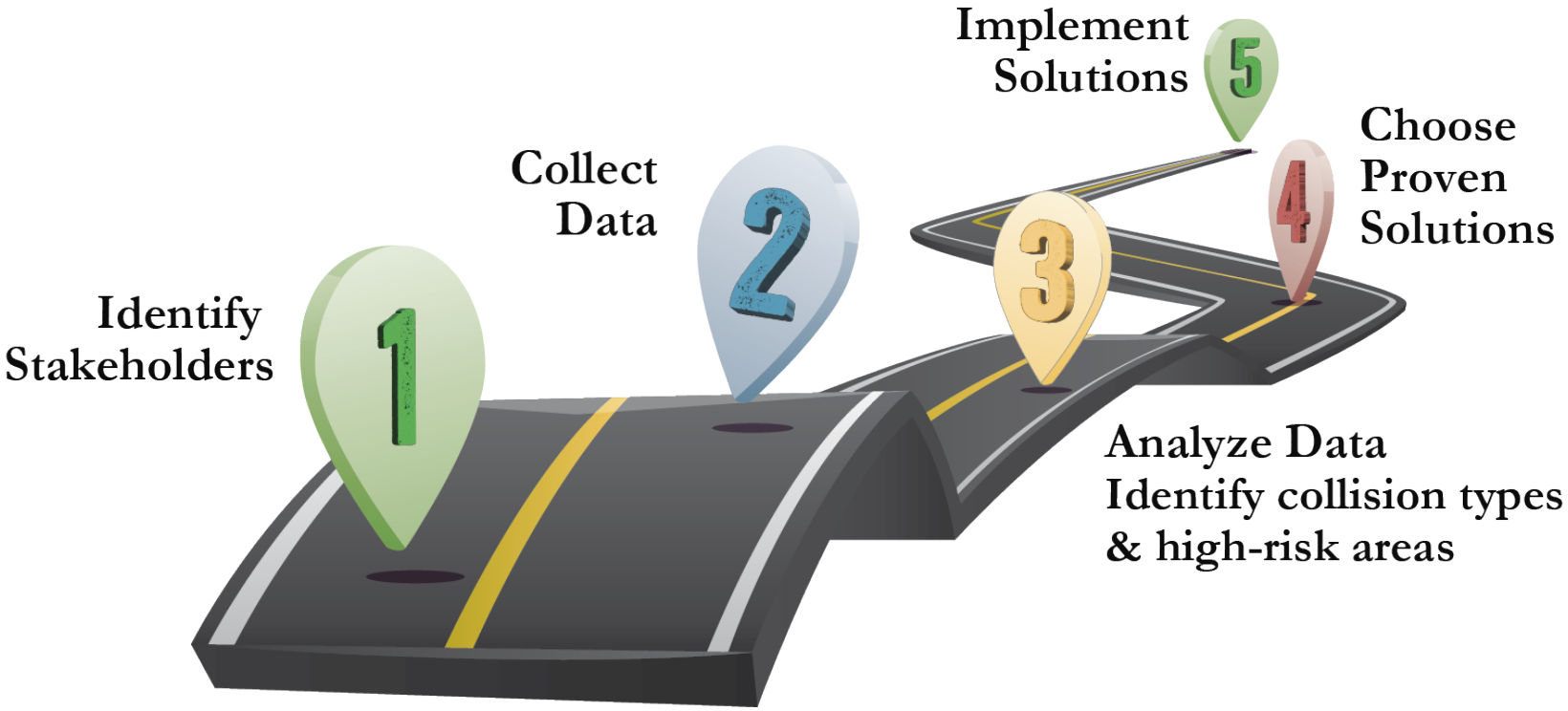
This plan was developed in collaboration with City staff and using collision data and best practices resources.

LRSP Roadmap



Source: FHWA, "Local Road Safety Plans," (January 2021), https://safety.fhwa.dot.gov/LRSPDIY/#

Working Together

Continuing longstanding partnerships with community organizations and building new ones will promote interagency collaboration and create a culture of roadway safety.

These agencies have been, or can be, valued partners:

Police Services
Dublin Police Services forms enforcement location priorities based on its review of collision history. Continuing to leverage City relationships with Dublin Police Services through the Traffic Safety Committee will help keep police services abreast of emphasis areas and high-risk locations for roadway users. Dublin Police Services could also help administer recommended programs like speed trailers.

Dublin Schools
Dublin schools can be partners in administering educational programs for students, staff, and families that encourage safe transportation behaviors. The Dublin Unified School District, Quarry Lane School, and other private schools, preschools, and after-school programs can also be valuable partners.

Transit Agencies
Transportation agencies and providers such as BART, Livermore-Amador Valley Transit Authority (LAVTA/Tri-Valley Wheels, and Contra Costa County Connection) can provide promotion for education campaigns and help identify engineering solutions at locations of shared interest or jurisdiction.

Recommended Safety Partners

City Manager's Office and Department of Public Information

City Council

Dublin Police Services

Alameda County Fire Department

Alameda County Department of Public Health

Dublin Unified School District

Bay Area Rapid Transit District (BART)

Livermore-Amador Valley Transit Authority

County Connection

Bike East Bay

Center for Independent Living (CRIL) Hayward

Other Community-based Organizations

Chamber of Commerce

Community Groups & Local Organizations
Community groups can provide feedback on safety issues and help encourage communication with the public about safety campaigns and future projects. Health advocacy or active transportation groups like Bike East Bay can help coordinate education classes through schools or at City-sponsored events. (For a full list of stakeholders identified collaboratively with the Dublin Bicycle and Pedestrian Plan Update (2022), see Appendix A.)

City Offices
This LRSP was primarily developed by the Public Works Department, and other departments will be essential to the plan's implementation. The City Manager's Office and the Office of Communications receive information and help disseminate information to the community. Critical pieces of information that come through this office include community events, news, fact sheets, and FAQs. Collaboration with this department is essential to effectively relay information on safety education, project news, community engagement, and other roadway safety initiatives. The Community Development Department plays an important role in elevating safety through community planning and development review and efforts. The Economic Development Office maintains strong relationships with local businesses and can facilitate conversations and information about safety goals, initiatives, and upcoming projects.

Alameda County Fire Department
The Alameda County Fire Department (ACFD) already provides guidance on safety improvement projects during the design review process. This invaluable partnership helps improve emergency response services and assessments of proposed safety countermeasures.

Dublin's Existing Safety Efforts

This 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 are included below, along with an explanation of how their goals, policies, programs, and recommendations informed this LRSP.

Dublin Traffic Safety Reports and Studies (2018)

Every three years, traffic safety performance reports have identified intersections and street segments with collision rates higher than the statewide average for similar locations and offer potential safety improvements. The most recent study was completed in 2018.

The intersections and segments identified in these reports helped the LRSP project team identify and vet key locations and safety improvements. This LRSP will replace these studies moving forward.

Complete Streets Policy (City Council Resolution 199-12) (2012)

Complete streets are designed to make space for all roadway users, including pedestrians, bicyclists, transit users, and motor vehicle drivers. The Complete Streets Policy identifies complete streets planning as an integral part of providing mobility needs for all users and furthering the health, safety, welfare, economic vitality, and environmental wellbeing of the community.

This LRSP includes multimodal safety recommendations intended to provide complete streets.

Bicycle and Pedestrian Plan (2022)

The updated 2014 Bicycle and Pedestrian Master Plan will include recommendations to guide Dublin's approach to bicycle and pedestrian safety. The update inventories existing conditions; analyzes existing barriers to walking and biking; provides program, policy, and infrastructure recommendations; and presents a prioritization framework to identify a tiered list of projects for implementation. The updated plan prioritizes safety in facility design and policy implementation. The updated plan also identifies local biking and walking high-injury networks, or HINs based on six years of collision data from 2014 to 2019. (To view the HINs in more detail, see Appendix E.)

The LRSP aligns its high-collision locations and countermeasures with the updated Bicycle and Pedestrian Plan's priorities and recommendations. This LRSP also incorporates community feedback collected as part of the updated plan's public outreach efforts.

Alameda County Countywide Active Transportation Plan (2019)

The Alameda County Transportation Commission (Alameda CTC) Countywide Active Transportation Plan (CATP) aims to improve pedestrian and bicyclist safety by prioritizing projects, policies, and programs that will address the greatest safety needs and by optimizing investments through corridor-level analyses and performance evaluations.

This CATP created profiles for each community in the county and includes local pedestrian and bicycle HINs based on collision data from 2012 to 2016. In total, eight miles of City roadways are part of a pedestrian or bicycle HIN.

This LRSP identifies projects along local HINs that would be prioritized for capital investment opportunities through the Alameda CTC.

Downtown Dublin Streetscape Plan (2020)

The recently updated Downtown Dublin Streetscape Plan aims to develop pedestrian-oriented environments on commercial throughways, downtown local streets, crosstown boulevards, and parkways.

LRSP goals and project recommendations align with this plan's emphasis on safe and comfortable facilities for people walking and biking.

Eastern Dublin Specific Plan (Updated 2022)

This plan establishes a planning framework for the future growth and development of approximately 3,300 acres of the largely unincorporated area east of Camp Parks. To reduce reliance on single-occupant vehicles, the plan features a comprehensive multimodal transportation and circulation system that will accommodate regional and local automobile traffic and encourage people to choose alternative modes of transportation, like walking, cycling, bus, ridesharing, light rail, or BART.

This LRSP coordinates its project recommendations with those identified in the Eastern Dublin Specific Plan. The LRSP also aligns its goals with the larger multimodal goals of the Eastern Dublin Specific Plan.

Downtown Dublin Specific Plan (2020)

The Downtown Dublin Specific Plan combines and replaces five existing specific plans: Downtown Core, Dublin Downtown, Village Parkway, West Dublin BART, and a portion of San Ramon Road. The plan sets a vision for a pedestrian-friendly downtown.

This LRSP aligns its downtown project recommendations with the Downtown Dublin Specific Plan's guiding principles. Both systemic and location-specific recommendations in this LRSP align with Dublin's vision of pedestrian-friendly streets and a roadway system traversable by foot or bike.

Dublin Village Historic Area Specific Plan (2014)

This plan ensures that future development in Dublin's historic core will remain sensitive to the area's historic past. The plan also formalizes the City's commitment to preserving and enhancing remaining historic, cultural, and archeological resources.

Safety project recommendations in this LRSP account for the identified safety, pedestrian-experience, and placemaking goals set out in the Dublin Village Historic Area Specific Plan.

Dublin Crossing Specific Plan (2013)

The Dublin Crossing Specific Plan outlines the development of 189 acres in the center of Dublin, north of Interstate 580 and Dublin Boulevard, on a portion of the former Camp Parks Reserve Forces Training Area. The project includes residential units, commercial uses, parks, open space, and a school. To create a well-connected and environmentally-conscious community for all users, the plan examines land use, development standards, design guidelines, and streetscape design.

Safety project recommendations in this LRSP incorporate streetscape and design guidelines identified in the Dublin Crossing Specific Plan area whenever possible.

Safe Routes to School

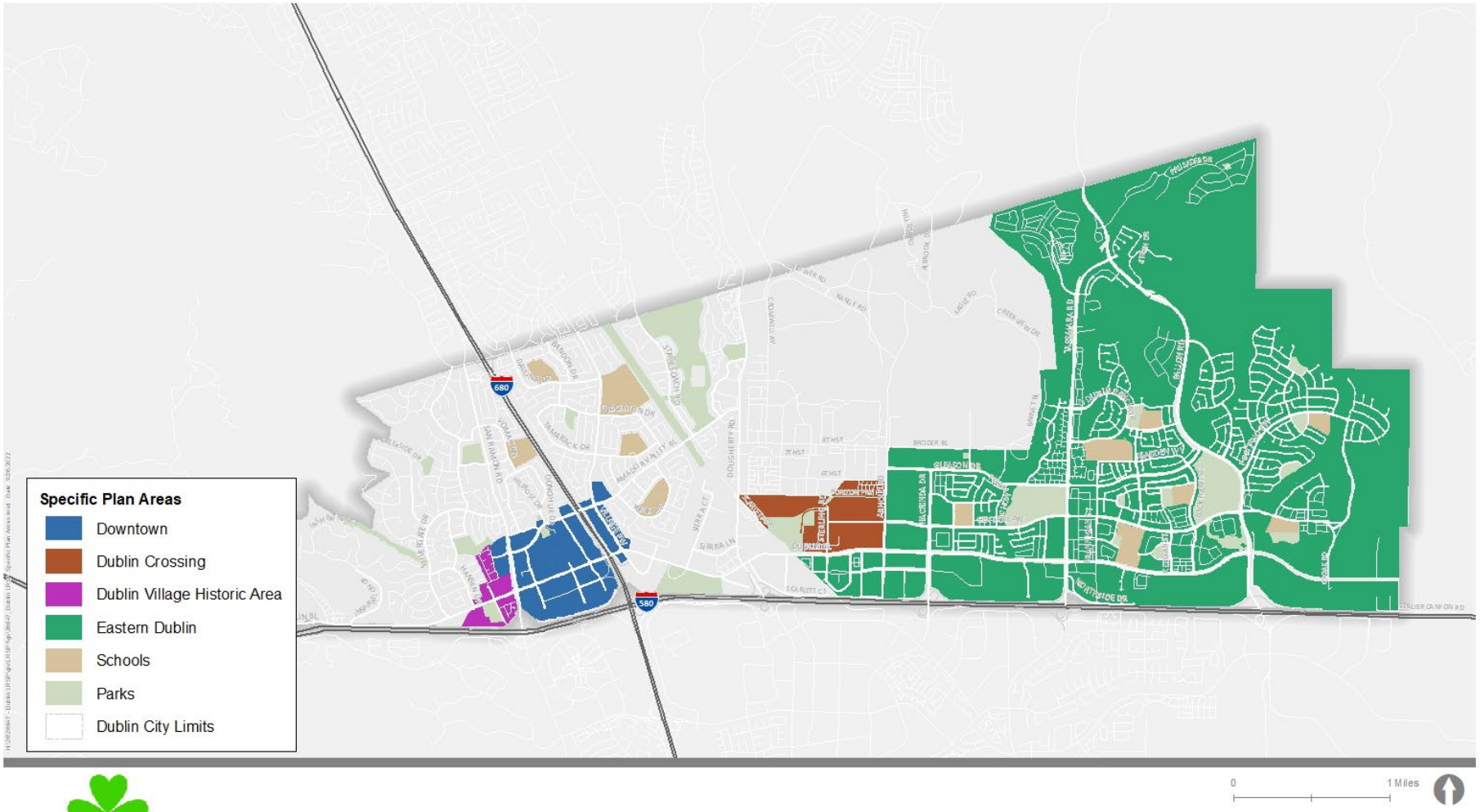
Alameda CTC manages the Alameda County Safe Routes to School (SR2S) Program. Through direct assistance and partnerships with local jurisdictions and school districts, SR2S promotes active transportation choices for parents and students traveling to school. School staff, parent volunteers, Dublin Police Services, and Dublin's Public Works staff continue to work together to create school safety assessments, which report street conditions and utilization around schools and make infrastructure and programmatic recommendations. Alameda CTC maintains a SR2S webpage with resources and school safety assessments at participating schools.

The LRSP project team used SR2S recommendations to develop engineering countermeasures for systemic solutions throughout Dublin and site-specific solutions near schools.

For more on the SR2S webpage and school safety assessments, visit https://alamedacountysr2s.org/our-program/school-safety-assessments/#dublin.

For Dublin SR2S maps, visit https://dublin.ca.gov/349/Safe-Routes-to-School.

Figure 2: Dublin Specific Plan Areas

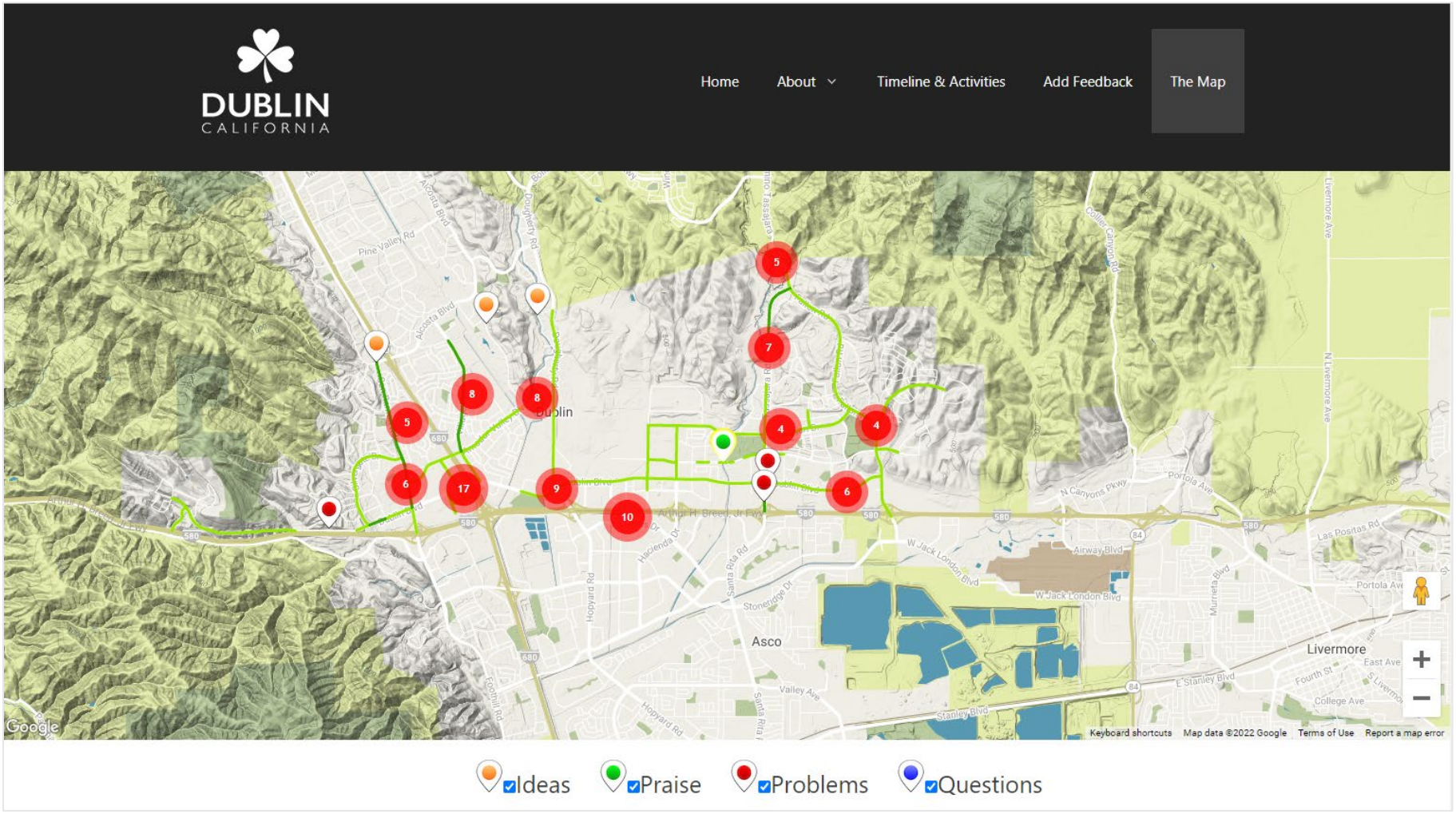


Engagement and Outreach

This LRSP was developed concurrently with the ongoing 2022 Bicycle and Pedestrian Plan update, which organized a series of public engagement events. Because safety is central to both plans' recommendations, those public activities and feedback inform locations, priorities, and input for this LRSP. The 2022 Bicycle and Pedestrian Plan project team conducted an extensive public survey, hosted two public workshops, and conducted a series of pop-up events at the Dublin Farmers' Market, the Alamo Creek trail head, and at a local St. Patrick's Day event. At these pop-ups, City staff and project team members received input on what infrastructure would best meet the needs of Dublin's residents, business owners, workers, and other visitors who walk and bike. Survey respondents indicated that safety and vehicle speeds were primary concerns when walking or biking. By incorporating the Bicycle and Pedestrian Plan's high-injury network findings and listening directly to community needs, this LRSP reflects community-driven desires to improve safety and encourage more multimodal transportation choices on Dublin's local roadway system.

Figure 3. Pop-up Community Engagement at a St. Patrick's Day Event

Figure 4. Webmap for the 2022 Bicycle and Pedestrian Plan



EXISTING CONDITIONS

EXISTING CONDITIONS

Dublin Safety Today

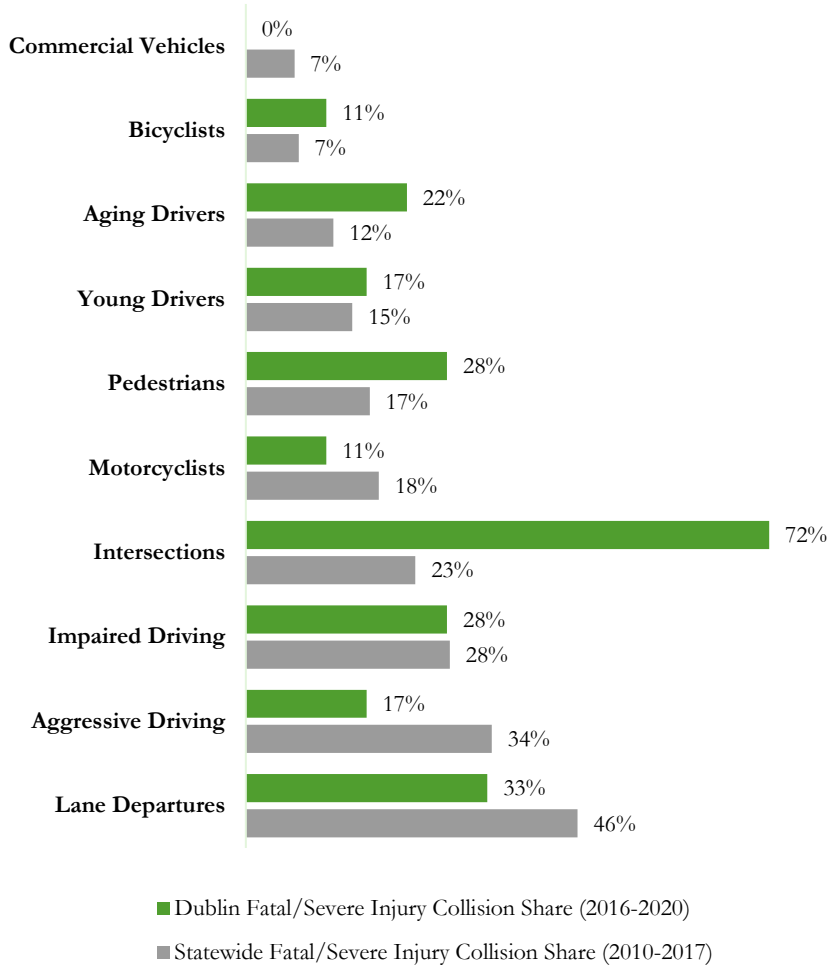
Traffic safety is a priority in Dublin, and collision data help identify where safety improvements are needed the most.

The California Office of Traffic Safety provides comparative crash rankings for cities statewide. For 2019, the most recent year comparisons are available, Dublin ranked in the best-performing 40th percentile (i.e., fewest injury/fatal collisions) of similarly sized California cities.[7] Because Dublin is a rapidly growing urban city, it shows some expected safety trends (pedestrian involvement and intersection collisions) when compared to the state as a whole. The city's fatal and severe injury collisions—18 reported from 2016 through 2020 –are trending at least 10 percent higher than the State average in three areas:

- Aging Drivers
- Pedestrians
- Intersections

The share of fatal and severe injury collisions that occur at intersections in Dublin is about three times higher than the statewide average (72 percent compared to 23 percent) (see Figure 5).

Figure 5. Dublin Collisions Compared to Statewide Average in Challenge Areas.



[7] California Office of Traffic Safety Crash Rankings are available online at https://www.ots.ca.gov/media-and-research/crash-rankings-results/.

These collisions predominately occur at intersections of arterial and minor roadways. Five of the SHSP high-priority areas align with this LRSP's emphasis areas and goals: intersections, pedestrians, bicyclists, impaired driving, and speed management/aggressive driving.

Some of the differences between the city's collisions and the statewide average simply come from Dublin being an urban area and much of California being rural. Because cities have more intersections and larger populations, they also have more potential for collision conflict and more people walking and biking.

(For a complete discussion of collisions in Dublin, see Appendix B.)

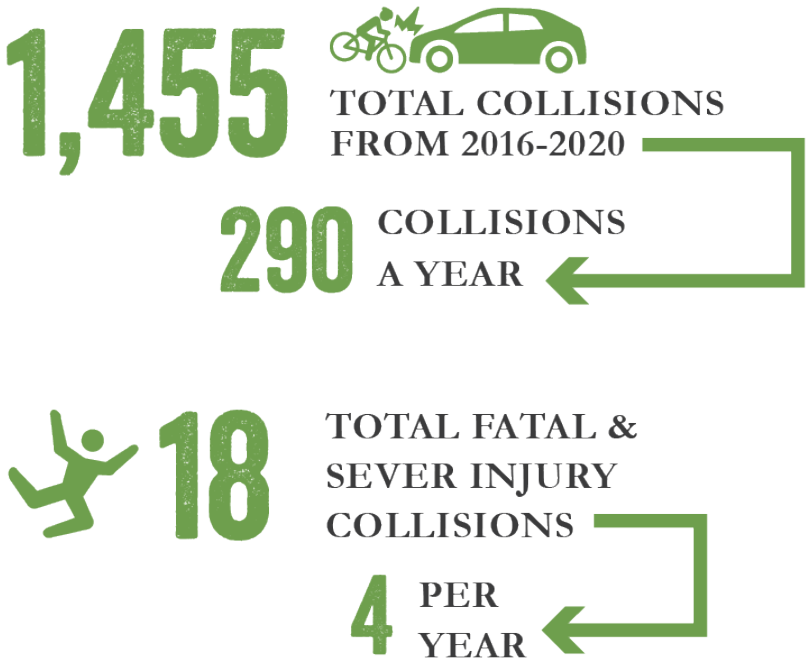
About the Data

To assess citywide safety performance, the project team analyzed collision patterns and identified priority intersections and roadways using a location-specific network screening. This analysis used reported collision data from 2016 through 2020. At the time of analysis, 2020 was the most recent year for which complete collision data were available.

Descriptive Trends Analysis

Analysis of reported collisions from the 2016 to 2020 Statewide Integrated Traffic Records System (SWITRS) dataset identified Dublin's high-priority emphasis areas for safety improvement.[8] The emphasis areas guide LRSP recommendations and project prioritization to maximize limited resources to improve safety.

Reported Collisions in Dublin, 2016–2020



[8] California Highway Patrol's SWITRS database collects and process data from collision scenes. Scene data includes information such as location, date, and collision type. For more, visit https://www.chp.ca.gov/programs-services/services-information/switrs-internet-statewide-integrated-traffic-records-system.

In this analysis, fatal and severe injury collisions are generally grouped together because the difference between death and a severe injury can depend on factors such as emergency response time or the victim's health rather than the collision type.

Understanding Collision Severity

Collision severity is coded according to the highest degree of injury experienced.

Fatal—A person dies due to injuries sustained in the collision.

Serious Injury—A person has major, visible injuries like broken bones, severe lacerations, or other injuries that go beyond the reporting officer's assessment of "other visible injuries."

Moderate Injury—A person has significant and visible injuries like bruises or minor lacerations. Moderate injury collisions are sometimes referred to as "other visible injury" collisions.

Minor Injury—A person has injuries that are not apparent from the outside. Examples include limps, neck pain, or confusion. Minor injury collisions are sometimes referred to as "compliant of pain" or "suspected injury" collisions.

Property Damage Only (PDO)—There were no injuries sustained.

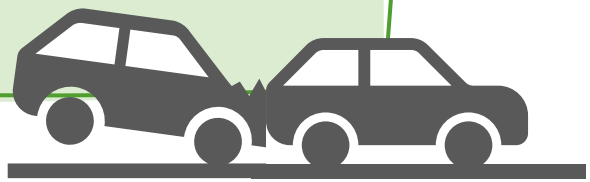
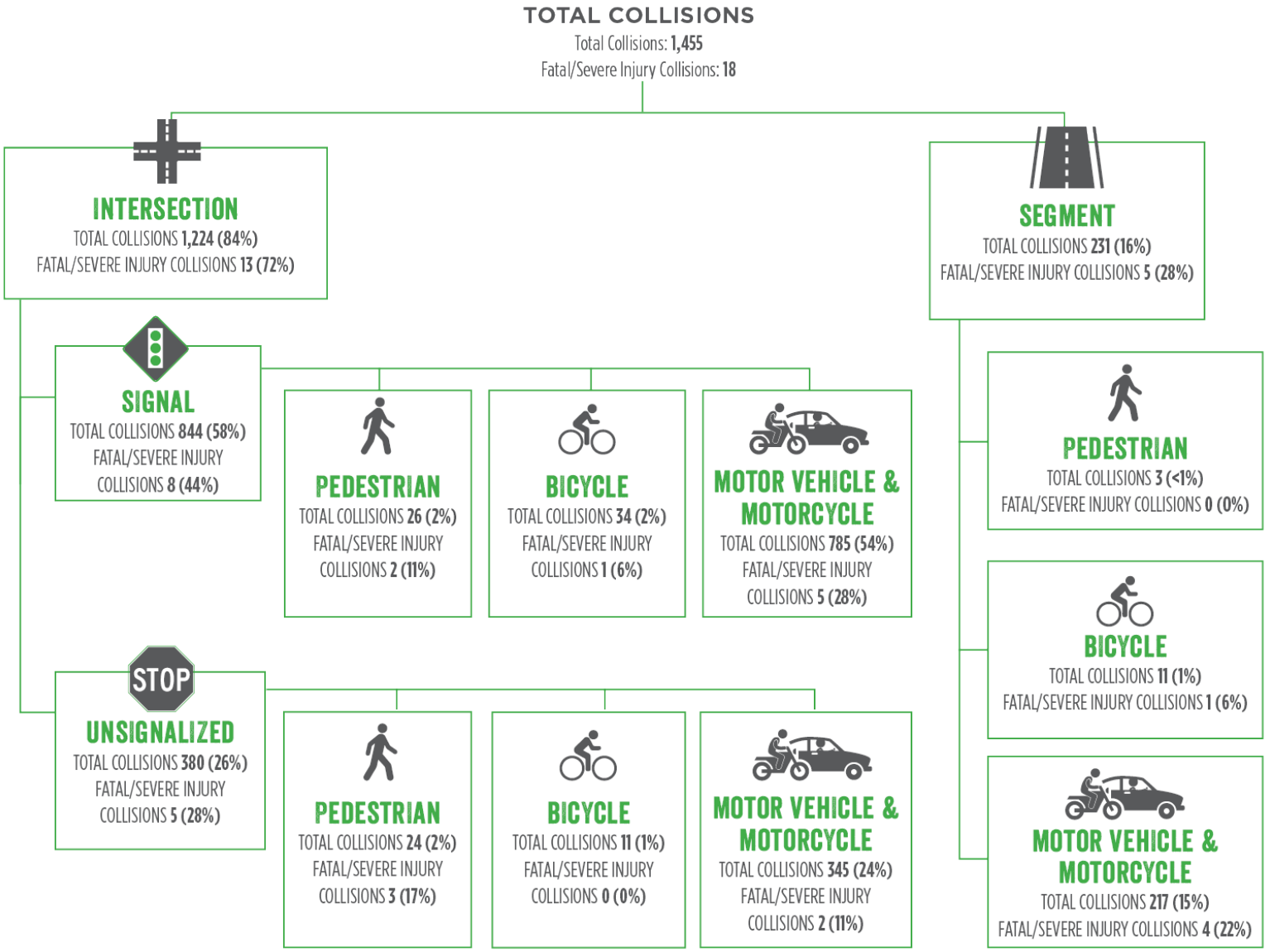


Figure 6. Collision Tree: Dublin Collisions by Location, Severity, and Mode



Reported collisions by location, City of Dublin, January 2016 - December 2020

KEY TAKEAWAYS

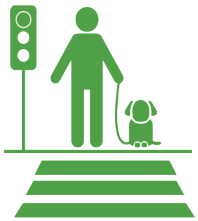
INTERSECTIONS ARE HIGHER RISK LOCATIONS

84% of reported collisions **& 72%** of fatal and severe injury collisions

OCCURRED AT AN INTERSECTION

MORE THAN 1/3

of fatal and severe injury collisions in Dublin occur at an intersection and involve a pedestrian or bicyclist.



MORE THAN 1/2

of Dublin's pedestrian collisions—and all of its fatal pedestrian collisions—occurred while the pedestrian was crossing in a crosswalk at an intersection.

Signalized intersections are the most common location for general collisions and fatal/severe injury collisions.

VULNERABLE ROAD USERS

53 COLLISIONS INVOLVED PEDESTRIANS

5 of which were fatal or severe injury collisions (4% of total collisions but 28% of fatal and severe injury citywide).

56 COLLISIONS INVOLVED BICYCLISTS

2 of which were severe injury collisions (4% of total reported but 11% of fatal and severe injury citywide).

TIME OF COLLISIONS

ALTHOUGH MOST COLLISIONS OCCUR IN DAYLIGHT CONDITIONS

MORE THAN 1/2

of fatal or severe injury collisions occur in dark or dusk conditions

A majority of **pedestrian fatal and severe injury collisions occur in dark or dusk conditions.**

PRIMARY COLLISION FACTORS

Reported primary collision factors (PCFs) convey the violation or underlying causal factor for a collision. Although there are often multiple causal factors, a reporting officer at the scene of a collision indicates a single relevant PCF related to a California Vehicle Code violation.

COLLISION TYPES AND FACTORS

MOST FREQUENT COLLISION TYPES

- Rear end
- Broadside
- hit object

RESULTING IN OF FATAL AND SEVERE INJURY

- Vehicle/Pedestrian
- Hit object

MOST COMMON REPORTED PRIMARY COLLISION

Unsafe Speed

Improper Turning

Automobile right of way violation

Together these account for more than 50% of all reported collisions.

NEARLY 20% of Dublin's fatal and severe injury collisions involved alcohol or drugs

75%

OF REAR END COLLISIONS

are most frequently associated with unsafe speed

68%

OF HIT OBJECT COLLISIONS

are caused by three PCFs: improper turning, unsafe speed, and driving/ bicycling under the influence.

OF BROADSIDE COLLISIONS

32%

are associated with automobile right of way

33%

are associated with traffic signals and signs

Broadside collisions are likely associated with driveway access or intersections.

51%

OF VEHICLE/PEDESTRIAN COLLISIONS

are attributed to either a pedestrian or a driver violating the other's right of way.

Figure 7: Collisions by Type and Severity

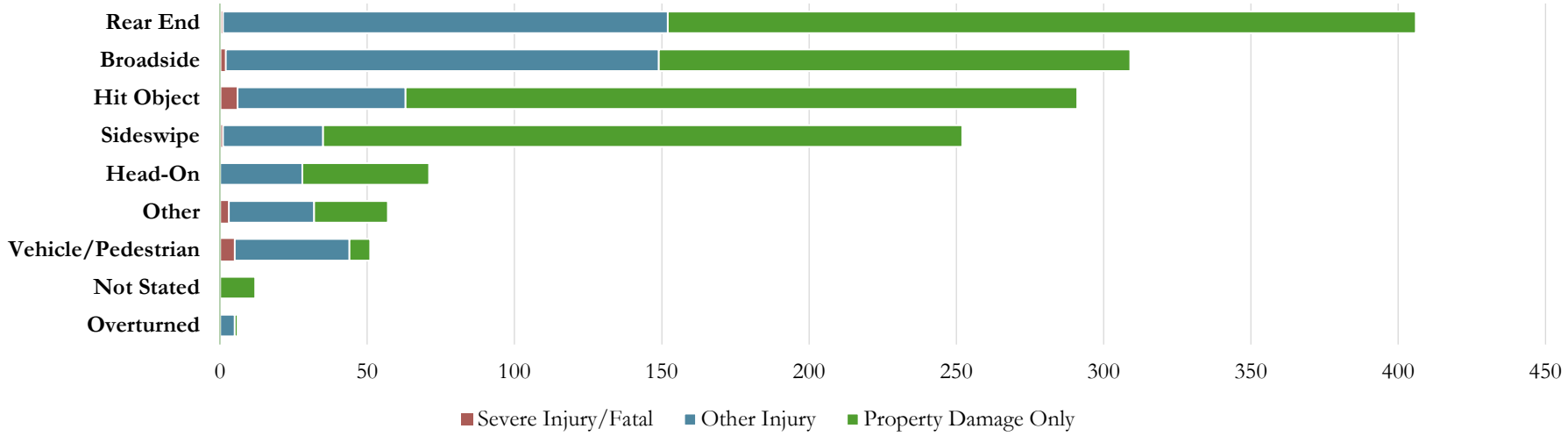
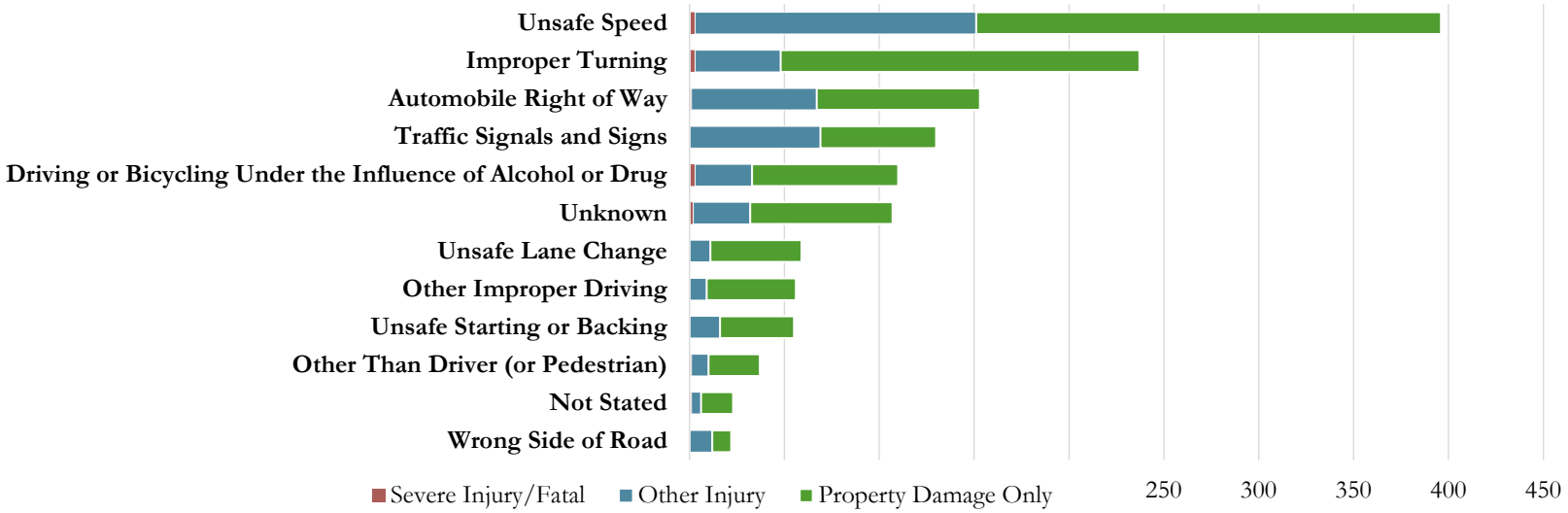


Figure 8: Collisions by Reported Primary Collision Factor



RECOMMENDED EMPHASIS AREAS

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

- **Pedestrian Collisions**
- **Nighttime Safety**
- **Aging Drivers (65 and Older)**
- **Signalized Arterial and Minor Roadway Intersections**
- **Aggressive and Impaired Driving**

Priority Intersections and Roadways

After mapping collision data, a network screening was conducted to identify intersections and roadway segments with the highest collision frequency and severity.

Priority locations were first based on the relative frequency and severity of collisions and then refined to emphasize locations with common characteristics associated with citywide emphasis areas. For example, the project team revised the list to prioritize signalized intersections on arterial roadways, locations with pedestrian collisions, and other emphasis areas with collision history.

Improvements have been identified for these 15 priority intersections and 5 priority roadway segments (shown in the table and map on the next pages).

Table 1: Top 20 Priority Locations

#	Location**	Location Type[1]	Annualized Collision Severity Score[2]	Total	Fatal and Severe Injury Crashes	Average Collision Rate[3]	Caltrans Average Collision Rate for Reference Population[4]
1	**Dublin Blvd & Arnold Rd**	SI	59.9	17	2	0.29	0.42
2	**Dublin Blvd & Village Pkwy**	SI	49.4	43	1	0.55	0.42
3	**Dublin Blvd & Donlon Way**	UI	42.1	6	1	0.21	0.24
4	**San Ramon Rd & Amador Valley Blvd**	SI	41.1	18	1	0.30	0.42
5	**Dublin Blvd & Dougherty Rd**	SI	37.2	65	0	0.48	0.42
6	**Dougherty Rd (north of Willow Creek Dr to south of 8th St), 0.75 mi**	R	36.2	8	1	0.17	1.34
7	**Fallon Rd (Signal Hill Dr to Gleason Dr) – 0.75 mi**	R	35.5	4	1	0.30	1.34
8	**Village Pkwy (northern city limits to north of Tamarack Dr), 0.69 mi**	R	35.3	8	1	0.55	1.34
9	**Amador Valley Blvd (Burton St to Dougherty Rd) – 0.75 mi**	R	34.1	3	1	0.18	1.27
10	**Regional St (Amador Valley Blvd to south of Saint Patrick Way), 0.40 mi**	R	33.9	6	1	1.20	1.27
11	**San Ramon Rd & Shannon Ave**	SI	29.3	8	1	0.21	0.42
12	**Dublin Blvd & Dublin Ct**	SI	27.3	13	1	0.18	0.42
13	**Dublin Blvd & Tassajara Rd**	SI	25.8	34	0	0.45	0.42

14	**Central Pkwy & Grafton St**	SI	24.3	3	1	0.32	0.42
15	**Hacienda Dr & Martinelli Way***	SI	18.5	28	0	0.44	0.42
16	**Dublin Blvd & Hacienda Dr**	SI	16.6	33	0	0.47	0.42
17	**Dougherty Rd & Sierra Ln**	SI	15.6	23	0	0.43	0.42
18	**Dublin Blvd & San Ramon Rd**	SI	14	35	0	0.33	0.42
19	**Village Pkwy & Amador Valley Blvd**	SI	13.3	17	0	0.32	0.42
20	**Dublin Blvd & Sierra Ct**	SI	13.2	21	0	0.27	0.42

[1] SI=signalized intersection; UI=unsignalized intersection; R=roadway

[2] Severity score is calculated based on Caltrans costs of collision outcomes and is normalized to be expressed in terms of equivalent property damage only collisions (PDOs). The relative severity values are as follows: fatal/severe injury collisions are 119.9 equivalent PDOs at signalized intersections, 190.8 at unsignalized intersections, and 165.2 along roadways; moderate injuries are 10.7; and minor injuries are 6.1. For example, a signalized intersection with an annualized crash severity score of 48, for example, could represents the equivalent of 48 PDO collisions per year, two fatal/severe injury collisions over 5 years (119.9*2/5 = 48), or some combination of severity levels resulting in the same score.

[3] Average Collision rate is presented for intersections as the number of collisions per million vehicles entering the intersections and for roadway segments as the number of collisions per million vehicle miles traveled along the roadway segment.

[4] References are based on statewide Caltrans state highway collision rates. For roadways, the comparison reference population is a three-year "Suburban roadways" average ending 2019; for intersections, the comparison reference population is a one-year (2019) collision rate for intersections by control type. The data used for comparison are available online at https://dot.ca.gov/programs/research-innovation-system-information/annual-collision-data.

Figure 9: Priority Locations Map

DUBLIN CALIFORNIA

KITTELSON & ASSOCIATES

Priority Locations
Dublin LRSP

TOOLBOX

TOOLBOX

Improving safety and addressing emphasis areas will take a coordinated effort and a combination of the available strategies presented in this section.

More information on countermeasures and strategies can be found in the Countermeasure Toolbox in Appendix C and the Strategy Toolbox in Appendix D.

Available Countermeasures

These engineering countermeasures are proven effective treatments to reduce collision risk. Selected countermeasures were tailored to reduce collisions and improve safety for issues specific to Dublin's signalized intersections, unsignalized intersections, and roadways.

Identifying opportunities to implement these countermeasures can help address safety issues on Dublin's local roadways. Combining these countermeasures with non-engineering strategies can also target roadway user characteristics and behaviors.

Proven Safety Countermeasures

Throughout this section, look for this icon:

This flag denotes that a recommendation is one of FHWA's **proven safety countermeasures**, a set of tools and strategies that are effective in reducing fatal and serious injuries on roadways. These tools address speed management, roadway departure collisions, intersections, and pedestrian and bicyclist safety. Some proven countermeasures—like local roadway safety plans—cut across categories.

For more, visit https://safety.fhwa.dot.gov/provencountermeasures/.

Countermeasures vs. Strategies

Countermeasures: These are engineering infrastructure improvements that can be implemented to reduce the risk of collisions.

Strategies: These are non-engineering recommendations that can help address the other portions of a Safe System and build a culture of safety in Dublin.

SIGNALIZED INTERSECTIONS

Table 2. Available Signalized Intersection Countermeasures

Countermeasure (CM) Name	CM ID*	Documented Collision Reduction Factor**	Cost Estimate*** $—under $50,000 $$—$50,000–$100,000 $$$—greater than $100,000	Applicable Emphasis Areas
MOTOR VEHICLE TREATMENTS				
Add intersection lighting	S01†	40%	$	● ● ● ●
Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	S02†	15%	$	● ● ●
Improve signal timing (coordination, phases, red, yellow, or operation)	S03‡	15%	$	● ● ●
Provide advanced dilemma-zone detection for high-speed approaches	N/A	N/A	$	● ● ●
Install left-turn lane and add turn phase	S06/S07†	55%	$–$$$[l]	●
Convert signal to mast arm (from pedestal-mounted)	S08	30%	$–$$[l]	● ●

Countermeasure (CM) Name	CM ID*	Documented Collision Reduction Factor**	Cost Estimate*** $—under $50,000 $$—$50,000–$100,000 $$$—greater than $100,000	Applicable Emphasis Areas 
Install raised median on approaches	S12†	25%	$[1]	● ●
Create directional median openings to allow (and restrict) left turns and U-turns (signalized intersection)	S14†	50%	$[1]	● ● ●
Install flashing beacons as advance warning	S10†	30%	$	● ● ●
Install raised pavement markers and striping (through intersection)	S09†	10%	$	● ● ● ●
No Right Turn on Red (RTOR)[1]	N/A	N/A	$	● ●
Centerline hardening[1]	N/A	N/A	N/A	● ● ● ●
Convert intersection to roundabout (from signal)	S16†	35–67%**	Varies	● ● ●
Install painted safety zone	N/A	N/A	$	● ● ●
PEDESTRIAN AND BICYCLIST TREATMENTS				
Install pedestrian countdown signal heads	S17PB†	25%	$	● ●

Countermeasure (CM) Name	CM ID*	Documented Collision Reduction Factor**	Cost Estimate*** $—under $50,000 $$—$50,000–$100,000 $$$—greater than $100,000	Applicable Emphasis Areas
Install pedestrian crossing	S18PB†	25%	$[II]	● ●
Install pedestrian scramble	S19PB†	40%	$	● ●
Install advance stop bar before crosswalk (bicycle box)	S20PB†	15%	$	● ●
Modify signal phasing to implement a leading pedestrian interval (LPI)	S21PB†	60%	$[III]	● ●

* CM ID refers to the Countermeasure ID from the Caltrans *Local Roadway Safety Manual* (April 2022, LRSM). If a CM ID is listed, the treatment is eligible for federal funding through HSIP and more information is available at Local Roadway Safety—A Manual for California's Local Road Owners. If a CM ID is not listed, the countermeasure is not funded through HSIP. Funding eligibility indicates the designated federal contribution level for approved HSIP projects in California associated with Caltrans HSIP Cycle 11. This is subject to change from one cycle to the next and should be confirmed with the State HSIP coordinator.

**Documented collision 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 collision reduction factor does not exist.

*** Cost estimates developed based on safety projects and bid prices from 2019-2021. Costs do not include any additional construction, right-of-way, or soft costs. Construction costs continue to fluctuate and should be checked against more recent data if possible.

† Countermeasure is 90% through federal funding in the current HSIP cycle (Cycle 11, 2022).

‡ Countermeasure is 50% reimbursable through federal funding in the current HSIP cycle.

[I] Cost per approach

[II] Cost per crossing

[III] Cost includes countdown timer, controller, signal head, and software

UNSIGNALIZED INTERSECTIONS

Table 3. Available Unsignalized Intersection Countermeasures

Countermeasure (CM) Name	CM ID*	Documented Collision Reduction Factor**	Cost Estimate*** $—under $50,000 $$—$50,000–$100,000 $$$—greater than $100,000	Applicable Emphasis Areas
MOTOR VEHICLE TREATMENTS				
Add intersection lighting	NS01†	40%	$	● ● ●
Create directional median openings to allow and restrict left-turns and U-turns	NS15†	50%	$[I]	● ● ●
Install painted safety zone	N/A	N/A	$	● ●
Install raised medians (refuge islands)	NS19PB†	45%	$[II]	● ● ●
Install or upgrade larger or additional stop signs or other intersection warning or regulatory signs	NS06†	15%	$	● ●
Upgrade intersection pavement markings	NS07†	25%	$	● ●
Install transverse rumble strips on approaches	NS10†	20%	$[I]	● ● ● ● ●

Countermeasure (CM) Name	CM ID*	Documented Collision Reduction Factor**	Cost Estimate*** $—under $50,000 $$—$50,000–$100,000 $$$—greater than $100,000	Applicable Emphasis Areas
Install splitter islands on the minor roadway approaches	NS13†	40%	$[I]	● ● ●
PEDESTRIAN TREATMENTS				
Install pedestrian crossing at uncontrolled locations (with enhanced safety features)	NS21PB†	35%	$	● ●
Install pedestrian signal or pedestrian hybrid beacon	NS23PB†	55%	$$$	● ● ●

* CM ID refers to the Countermeasure ID from the Caltrans *Local Roadway Safety Manual* (April 2022, LRSM). If a CM ID is listed, the treatment is eligible for federal funding through HSIP and more information is available at Local Roadway Safety - A Manual for California's Local Road Owners. If a CM ID is not listed, the countermeasure is not funded through HSIP. Funding eligibility indicates the designated federal contribution level for approved HSIP projects in California associated with Caltrans HSIP Cycle 11. This is subject to change from one cycle to the next and should be confirmed with the State HSIP coordinator.

**Documented collision 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 collision reduction factor does not exist.

*** Cost estimates cover the countermeasure only and do not include any additional construction, right-of-way, or civil costs.

† Indicates that the countermeasure is eligible for 90% reimbursement through federal funding in the current HSIP cycle (Cycle 11, 2022). This is subject to change from one cycle to the next and should be confirmed with the State HSIP coordinator.

[I] Cost per approach

[II] Cost per square foot

ROADWAYS

Table 4. Available Roadway Countermeasures

Countermeasure (CM) Name	CM ID*	Documented Collision Reduction Factor	Cost Estimate* $—under $50,000 $$—$50,000–$100,000 $$$—greater than $100,000	Applicable Emphasis Areas 
MOTOR VEHICLE TREATMENTS				
Add lighting	R01†	35%	$[I]	● ●
Use a roadway diet (reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)	R14†	30%	$[II]	● ● ● ●
Corridor access management	N/A	Varies	Varies	● ●
Install edgeline rumble strips or stripes	R31†	15%	$[II]	● ● ● ● ●
Install delineators, reflectors, and/or object marker	R27†	15%	$	● ● ●
Install/upgrade signs with new fluorescent sheeting (regulatory or warning)	R22†	15%	$	● ● ●

Countermeasure (CM) Name	CM ID*	Documented Collision Reduction Factor	Cost Estimate* $—under $50,000 $$—$50,000–$100,000 $$$—greater than $100,000	Applicable Emphasis Areas
Install speed feedback signs	R26†	30%	$	● ● ●
PEDESTRIAN AND BICYCLIST TREATMENTS				
Install or upgrade pedestrian crossing with enhanced safety features	R35PB†	35%	$	● ●
Install raised pedestrian crossing	R36PB†	35%	$$	● ●
Install separated bike lanes	R33PB†	45%	$$[III]	● ● ●

* CM ID refers to the Countermeasure ID from the Caltrans *Local Roadway Safety Manual* (April 2022, LRSM). If a CM ID is listed, the treatment is eligible for federal funding through HSIP and more information is available at Local Roadway Safety - A Manual for California's Local Road Owners. If a CM ID is not listed, the countermeasure is not funded through HSIP. Funding eligibility indicates the designated federal contribution level for approved HSIP projects in California associated with Caltrans HSIP Cycle 11. This is subject to change from one cycle to the next and should be confirmed with the State HSIP coordinator.

**Documented collision 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 collision reduction factor does not exist.

*** Cost estimates cover the countermeasure only and do not include any additional construction, right-of-way, or civil costs.

† Indicates that the countermeasure is eligible for 90% reimbursement through federal funding in the current HSIP cycle (Cycle 11, 2022).

[I] Cost per light

[II] Cost per mile

[III] Cost per foot

INNOVATIVE IDEA

QUICK BUILD AND DEMONSTRATION PROJECT GUIDANCE

Agencies around the country use quick build and demonstration projects to improve roadway user safety. Sometimes called tactical urbanism, quick builds and demonstration projects use easy-to-install materials like paint or posts that test flexible solutions to traffic or safety issues.[9]

Quick builds offer Dublin easy and cost-effective ways to prevent pedestrian collisions, improve nighttime safety, and improve signalized arterial and minor roadway intersections. PeopleForBikes' Quick Builds for Better Streets and the Street Plans Collaborative's Tactical Urbanist's Guide to Materials and Design provide excellent guidance for implementing quick builds.

Potential partners: Local Community Organizations (see Appendix A), Dublin Unified School District, and the Office of Communications

A quick-build parklet on Grand Avenue, Oakland, CA

[9] PeopleForBikes (2016). Quick Builds for Better Streets: A New Project Delivery Model for U.S. Cities, 2016PeoplefoBikes_Quick-Builds-for-Better-Streets.pdf (nacto.org)

Available Strategies

Identifying opportunities to implement these non-engineering strategies can help support countermeasures and build a safety culture in Dublin. For complete descriptions of these strategies and their partners, see Appendix D. The strategies are organized into four categories; each is described below.

EDUCATION

To build a culture of safety, the public should have access to traffic safety information. Public education and collaboration help bridge gaps in knowledge that influence roadway user behavior.

EQUITABLE 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, 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:

- Speed Monitoring Trailers
- Progressive Ticketing
- Speed Enforcement in School Zones
- High Visibility Saturation Patrols
- Collision vs. Citation Evaluation Programs

EMERGENCY SERVICES

In partnership with emergency medical services (EMS), the following strategies can improve regionwide response times and coordination by sharing real-time information:

- Local Hospital or Outreach Group Partnerships
- Emergency Services Coordination

EMERGING TECHNOLOGIES

New traffic safety technology can enhance the benefits of Dublin's other engineering, education, enforcement, and emergency services efforts. Some helpful technologies include artificial intelligence and deep learning software, crosswalk motion sensors, also called PUFFIN crossings.

RECOMMENDATIONS AND IMPLEMENTATION

RECOMMENDATIONS AND IMPLEMENTATION

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

Site Specific Treatments

This project matrix represents a list of high-priority, achievable improvements at priority locations. Locations were identified using the descriptive trends analysis. 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 Dublin.

Table 5: Site-Specific Projects

Location	Location Type*	Low-Cost, Short-Term Countermeasures[1]	Medium-Cost, Medium-Term Countermeasures[1]	Higher-Cost, Long-Term Countermeasures[1]
1. Dublin Blvd & Arnold Blvd	SI	› S21PB. Implement 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 (HVC) › S03. Improve signal timing (coordination, phases, or operation).	› S02. Improve signal hardware › Consider installing protected intersection elements	› Evaluate need for double left turn lane in eastbound direction and consider repurposing space. › Consider realigning curb ramps so all marked crosswalks are perpendicular to travel lanes

Location	Location Type*	Low-Cost, Short-Term Countermeasures[1]	Medium-Cost, Medium-Term Countermeasures[1]	Higher-Cost, Long-Term Countermeasures[1]
2. Dublin Blvd & Village Pkwy	SI	› S21PB. Implement LPI › Evaluate or consider implementing no RTOR where right turn conflicts with pedestrian crossing › S03. Improve signal timing (coordination, phases, or operation)	› S02. Improve signal hardware › Modify existing median for pedestrian refuge island › Align crosswalk to remove skew, shorten crossing, and reduce curb radii › Consider installing protected intersection elements	› Remove channelized right-turn lane in northbound direction.
3. Dublin Blvd & Donlon Way[2]	UI	› Install painted safety zone and centerline hardening.	› NS19PB: Install pedestrian refuge island › Consider change of traffic control (evaluate warrants and consider roundabout)	
4. San Ramon Rd & Amador Valley Blvd	SI	› S21PB. Implement LPI › Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing › Restripe as High Visibility Crosswalk (HVC) › S03. Improve signal timing (coordination, phases, or operation)	› Modify existing median for pedestrian refuge island and to reduce curb return radius › Consider installing protected intersection elements	› Remove channelized right-turn lane in southbound and westbound directions

Location	Location Type*	Low-Cost, Short-Term Countermeasures[1]	Medium-Cost, Medium-Term Countermeasures[1]	Higher-Cost, Long-Term Countermeasures[1]
5. Dublin Blvd & Dougherty Rd	SI	› S21PB. Implement LPI › Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing › Restripe as HVC › S03. Improve signal timing (coordination, phases, or operation)	› S09. Install raised pavement markers and striping within the intersection. › R33PB. Install separated bike lanes in eastbound direction › Consider installing protected intersection elements	› Corridor access management
6. Dougherty Rd (south of Willow Creek Dr and north of Camp Parks Blvd), 0.75 mi	R	› R26. Install speed feedback signs.		› Corridor access management › Evaluate need for double left-turn lane at Dougherty Road (northbound) and for U-turn lane at Dougherty Road (southbound); consider repurposing space
7. Fallon Rd (Signal Hill Dr to Gleason Dr), 0.75 mi	R	› R26. Install speed feedback signs		› Evaluate need for pedestrian crossing at Turnberry Dr.
8. Village Pkwy (northern city limits to north of Tamarack Dr), 0.69 mi	R	› R26. Install speed feedback signs	› R33PB. Install separated bike lanes in southbound and northbound directions	

Location	Location Type*	Low-Cost, Short-Term Countermeasures[1]	Medium-Cost, Medium-Term Countermeasures[1]	Higher-Cost, Long-Term Countermeasures[1]
9. Amador Valley Blvd (Burton St to Dougherty Rd), 0.75 mi	R	› R26. Install speed feedback signs › Evaluate or consider implementing no RTOR where right turn conflicts with pedestrian crossing › Restripe as HVC.	› R33PB. Install buffered bike lanes in eastbound and westbound directions › Consider installing protected intersection elements at signalized intersections › Centerline hardening at intersection roadways › Study need for marked crossing at Dublin Meadows Street;	
10. Regional St (Amador Valley Blvd to south of Saint Patrick Way), 0.40 mi	R		› R33PB. Install buffered bike lanes in southbound and northbound directions › Add midblock pedestrian crossing with enhanced safety features	› Corridor Access Management
11. San Ramon Rd & Shannon Ave	SI	› S21PB. Implement LPI › Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing	› Modify existing median for pedestrian refuge island › Consider installing protected intersection elements	› Reevaluate need for separate right-turn lanes on northbound and southbound approaches

Location	Location Type*	Low-Cost, Short-Term Countermeasures[1]	Medium-Cost, Medium-Term Countermeasures[1]	Higher-Cost, Long-Term Countermeasures[1]
12. Dublin Blvd & Dublin Ct[3]	SI	› S21PB. Implement LPI › Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing	› S02. Improve signal hardware › Consider installing protected intersection elements	
13. Dublin Blvd & Tassajara Rd	SI	› S21PB. Implement LPI across southbound, eastbound, and westbound legs › Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing › Restripe as HVC › S03. Improve signal timing (coordination, phases, or operation).	› S02. Improve Signal Hardware › S09. Install raised pavement markers and striping within the intersection › Consider installing protected intersection elements	
14. Central Pkwy & Grafton St	SI	› S21PB. Implement LPI › Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing	› S02. Improve Signal Hardware › Modify existing median for pedestrian refuge island › Consider installing protected intersection elements	

Location	Location Type*	Low-Cost, Short-Term Countermeasures[1]	Medium-Cost, Medium-Term Countermeasures[1]	Higher-Cost, Long-Term Countermeasures[1]
15. Martinelli Way & Hacienda Dr	SI	› S21PB: Implement LPI; Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing.	› S02. Improve signal hardware. › R33PB. Install separated bike lanes in southbound and northbound directions › Consider installing protected intersection elements	› Corridor access management
16. Dublin Blvd & Hacienda Dr	SI	› Evaluate or consider implementing no RTOR where right turn conflicts with pedestrian crossing › Restripe as HVC › S03. Improve signal timing (coordination, phases, or operation)	› S02. Improve signal hardware › S09. Install raised pavement markers and striping within the intersection	› Corridor access management
17. Dougherty Rd & Sierra Ln[4]	SI	› Evaluate or consider implementing no RTOR where right turn conflicts with pedestrian crossing › Restripe as HVC › Install painted safety zone. › S03. Improve signal timing (coordination, phases, or operation).	› Install concrete curb radii reductions.	
18. Dublin Blvd & San Ramon Rd	SI	› Evaluate or consider implementing no RTOR where right turn conflicts with pedestrian crossing › Restripe as HVC	› Consider installing protected intersection elements	

Location	Location Type*	Low-Cost, Short-Term Countermeasures[1]	Medium-Cost, Medium-Term Countermeasures[1]	Higher-Cost, Long-Term Countermeasures[1]
19. Amador Valley Blvd & Village Pkwy	SI	› S21PB. Implement LPI › Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing › Restripe as HVC › S03. Improve signal timing (coordination, phases, or operation)	› S02. Improve signal hardware › Consider installing protected intersection elements	› Remove channelized right turn lane in eastbound, southbound, and westbound directions
20. Dublin Blvd & Sierra Ct	SI	› Evaluate or consider implementing no RTOR with pedestrian signals where right turn conflicts with pedestrian crossing › S21PB: Implement LPI › S03 Improve signal timing (coordination, phases, or operation)	› S02. Improve signal hardware › Consider installing protected intersection elements	

* Signalized Intersection (SI); Unsignalized Intersection (UI); Roadway (R)

1: Where provided, treatment IDs (e.g., "S21PB") indicate countermeasure (CM) IDs, which refer to the Countermeasure ID from the Caltrans *Local Roadway Safety Manual* (*LRSM*) (April 2022). If a CM ID is listed, the treatment is eligible for federal funding through HSIP and more information is available at **Local Roadway Safety—A Manual for California's Local Road Owners**. If a CM ID is not listed, the countermeasure is not funded through HSIP. Funding eligibility indicates the designated federal contribution level for approved HSIP projects in California associated with Caltrans HSIP Cycle 11. This is subject to change from one cycle to the next and should be confirmed with the State HSIP coordinator.

2: Intersection improvements installed in 2018 (Rectangular Rapid Flashing Beacon)

3: Location includes at least one private roadway

4: Intersection improvements installed in 2019 (Class II bike lanes installed through along Dougherty Road and constructed median installed along north leg of intersection)

LEADING PEDESTRIAN INTERVALS & RIGHT-TURN-ON-RED RESTRICTIONS

Emphasis Areas Addressed

When paired, leading pedestrian intervals (LPIs), or variations on that treatment, and right-turn-on-red restrictions are a low-cost treatment that can be applied systemically to reduce the risk of pedestrian collisions, especially in areas with a high level of existing or anticipated pedestrian activity (see Figure 10). Research has shown that LPIs may lose their intended benefits when right turns on red that conflict with the crossing are not restricted.[10] When using an LPI, right turns on red should be restricted parallel and perpendicular to the treated crossings, since right-turning drivers from both streets would otherwise proceed and conflict with crossing pedestrians.

At some locations—particularly those near freeways with highly peaking traffic and with very high volumes of right turns (exceeding 200 vehicles per hour)—traffic operations and queueing may be a concern. *NCHRP Report 969: Traffic Control Strategies for Pedestrians and Bicyclists* explains some options for these locations:

- For LPIs providing a head-start along a minor street, adding an LPI typically has no effect on traffic operations.
- LPIs and right-turn-on-red restrictions can be implemented for certain times of day.
- At locations with very high volumes of right turns, full protection between vehicle and pedestrian movements may be preferred. *NCHRP Report 969* offers information on such options.[11]
- If the pedestrian phase is push-button actuated, then the additional LPI phase will only be triggered when a pedestrian is present.

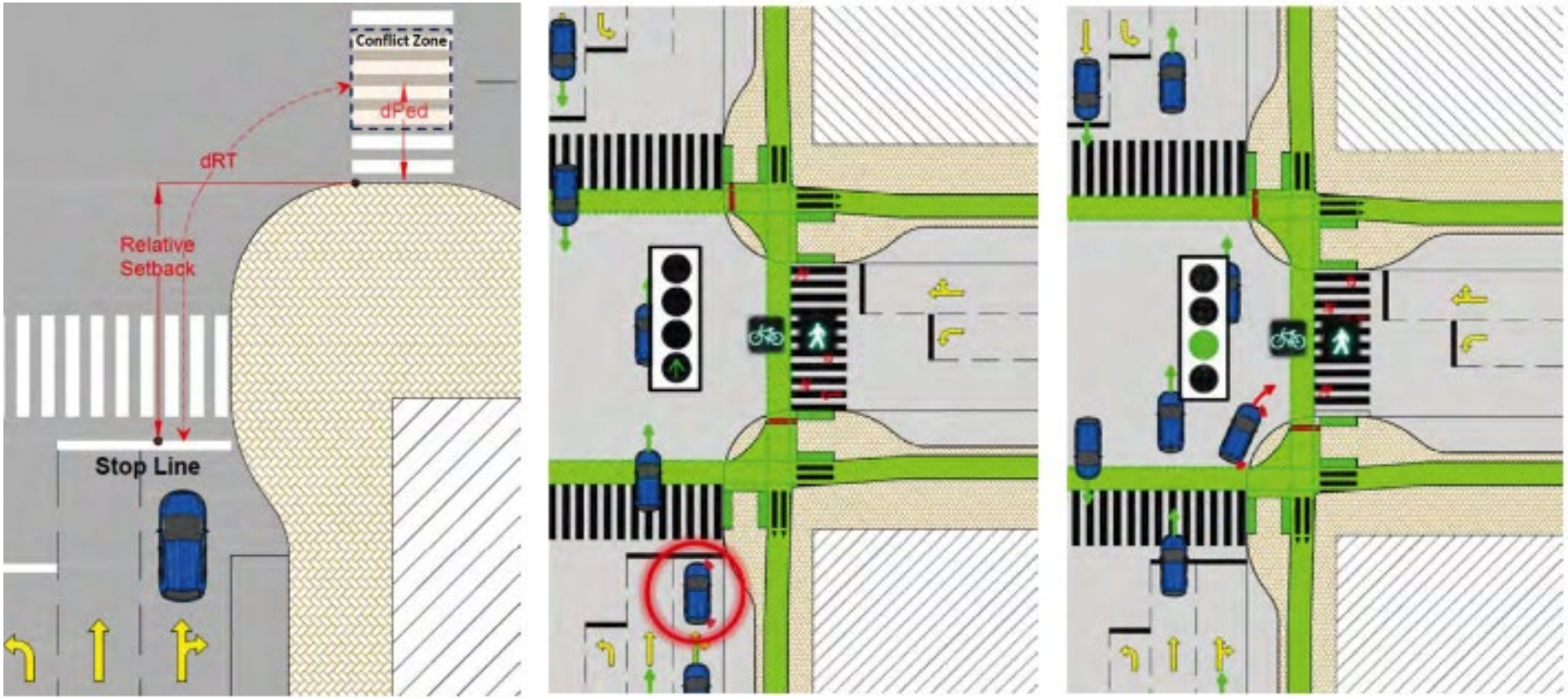
[10] Hubbard, Sarah ML, Darcy M. Bullock, and John H. Thai. "Trial implementation of a leading pedestrian interval: lessons learned." *ITE journal* 78.10 (2008): 32.

[11] The report is available online at https://www.trb.org/Main/Blurbs/182635.aspx

EXTENDING THE WAITING AREA

A typical LPI is anywhere from 3 to 7 seconds, but the length of an LPI may be determined by how long it takes a pedestrian to reach the conflict zone (see Figure 10). If a pedestrian waiting area is far enough ahead of the stop line, the LPI may be very short or unnecessary.

Figure 10: Geometric Requirements that Govern Leading Pedestrian Interval Timing (left); Leading Through Interval Application (center and right)



Note: dPed = the distance a pedestrian covers to reach the middle of the conflict zone

dRT = the distance a right-turning vehicle covers to reach the middle of the near edge of the conflict zone

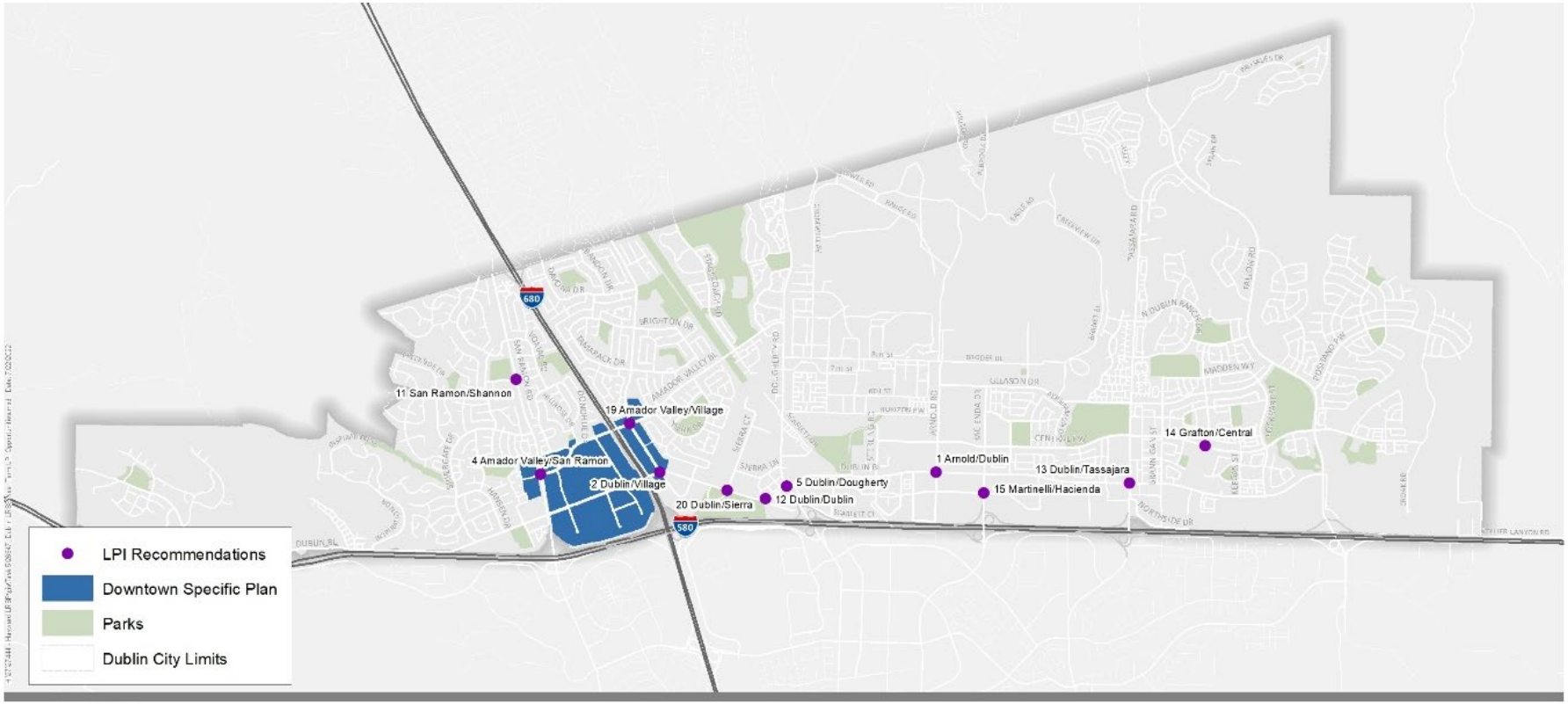
Source: NCHRP Report 969

LEADING THROUGH INTERVAL

Leading through intervals (LTIs) allow vehicle through movements, pedestrian movements, and bicycle movements to proceed while holding left and right turns long enough for pedestrians to have a partially protected crossing. The LTI can be implemented with or without exclusive right-turn lanes (see Figure 9). *NCHRP Report 969* also recommends other applications, including when full protection should be considered.

The locations shown in Figure 10 are initial candidates for implementing LPIs and right-turn-on-red restrictions. The City may choose to evaluate these locations to compare queueing impacts of implementing LPI or LTI at these locations against the safety benefits of providing the treatment. There may be other locations identified with a high level of existing or anticipated pedestrian activity as part of future plans or development review; this treatment may also be appropriate at such locations.

Figure 11. Near-Term Leading Pedestrian Interval Opportunities



DUBLIN CALIFORNIA

KITTELSON & ASSOCIATES

Near-Term Leading Pedestrian Interval Opportunities
Dublin LRSP

NIGHTTIME VISIBILITY

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

ROADWAY AND PEDESTRIAN-SCALE LIGHTING

Emphasis Areas Addressed

In general, Dublin has lighting along roadways, at intersections, and at crossings. Along roadways with four or more lanes, supplemental pedestrian-scale lighting may be required to adequately light the sidewalk and crossing locations.

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 primer includes a flowchart to help determine suitable pedestrian lighting applications (see Figure 12). 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 that are simply provided as examples.

Reviewing this guidance, considering amending or adopting local standards with respect to pedestrian lighting, and conducting a lighting review at locations identified in the Implementation section of this LRSP will help promote nighttime pedestrian safety throughout the city.

Figure 12: Example Pedestrian-Scale Lighting. Source: 2012 Seattle DOT *Pedestrian Lighting Citywide Plan*

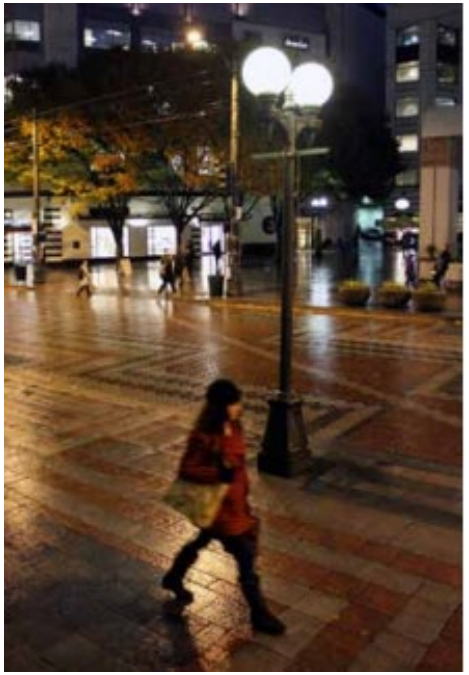
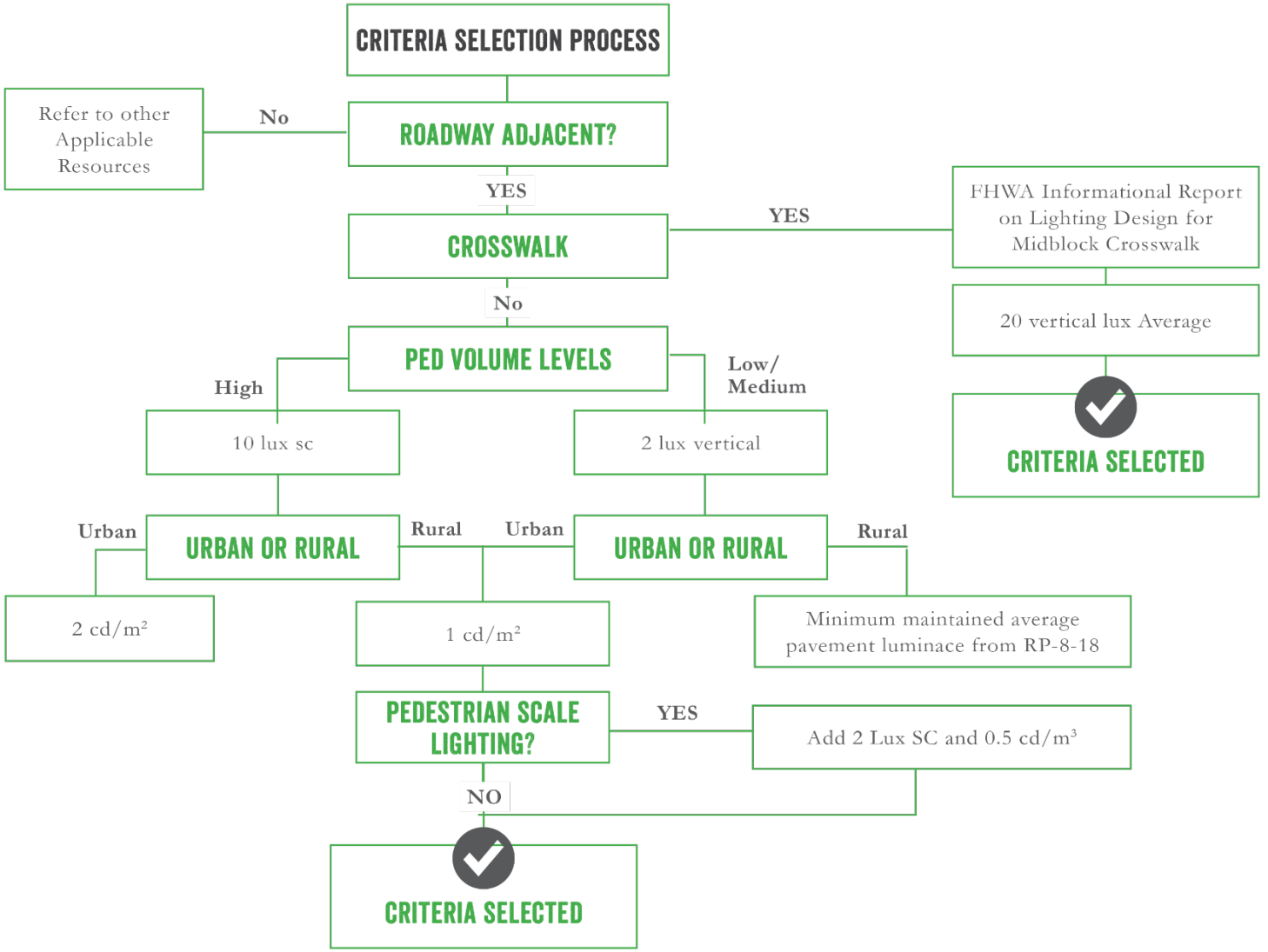


Figure 13 on the following page shows locations that meet the following criteria:

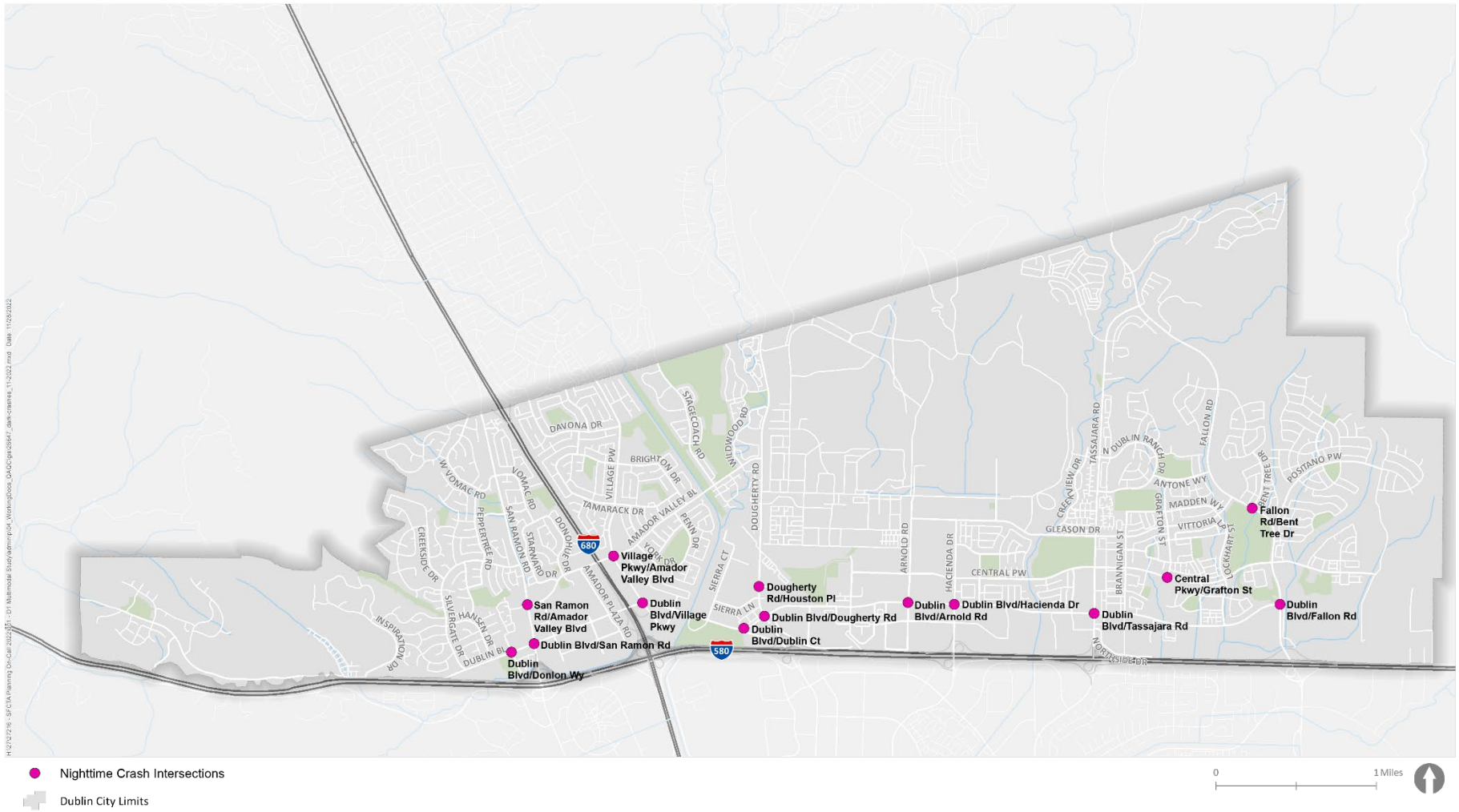
- Annualized collision severity score of at least 10 (an average of approximately 10 property-damage-only collisions per year, or one moderate injury collision per year); and at least
- One third of collisions occurring at night or one fatal/severe injury collision occurring at night

Figure 13: Recommended Pedestrian Lighting Criteria Selection Flowchart.



Source: 2022 FHWA *Pedestrian Lighting Primer*

Figure 14. Nighttime Collision Priority Intersections



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Nighttime Crash Priority Intersections
Dublin Local Roadway Safety Plan
Dublin, CA

SIGNAL VISIBILITY IMPROVEMENTS

Emphasis Areas Addressed

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

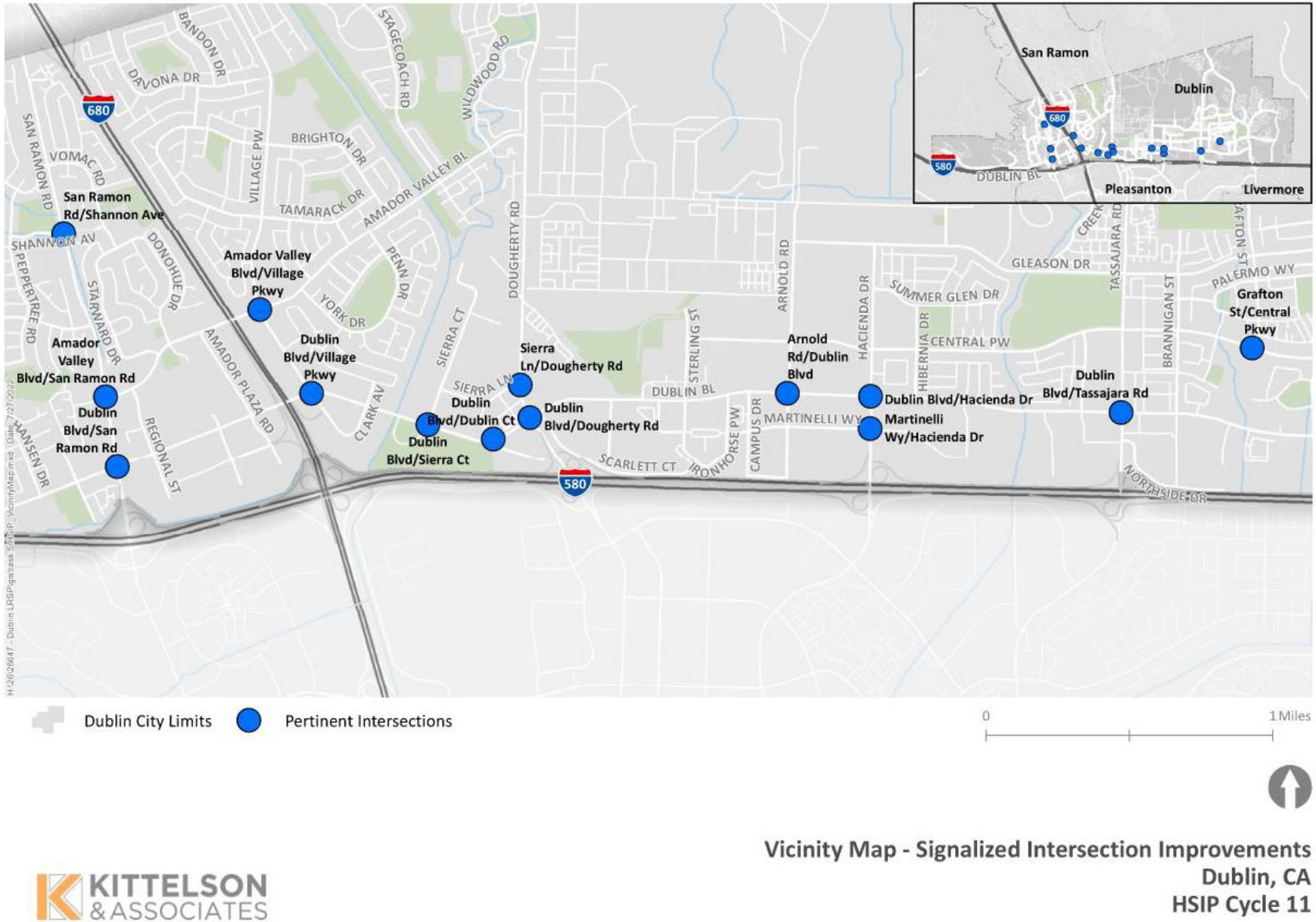
- **Lenses with LED lighting** increase traffic signal visibility.
- **Back-plates with retroreflective borders** improves signal head visibility during daytime and nighttime conditions.
- **Mounting** assemblies include mast arms, span wires, and side-mounted vehicular signals. Upgrading the mounting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

HSIP Cycle 11 funding was pursued in September 2022 to improve signal hardware at 14 signalized intersections, primarily along arterials and the HIN (see Figure 15). Locations where this treatment can be proactively applied should continue to be identified.

Figure 15: Retroreflective backplates improve signal visibility.

Source: Eliobed Suarez on Unsplash.

Figure 16: Signal Hardware Improvement Locations Identified for HSIP Cycle 11



Vicinity Map - Signalized Intersection Improvements
Dublin, CA
HSIP Cycle 11

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OTHER SYSTEMIC OPPORTUNITIES

CENTERLINE HARDENING

Emphasis Areas Addressed

Centerline hardening is an intersection treatment that reduces the speed of turning vehicles and improves pedestrian visibility. 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 17. Centerline Hardening Example in Oakland, California

Source: Kittelson and Associates, Inc.

Action Items and Performance Measures

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

Table 6. Goals, Action Items, and Performance Measures

Goal	Action Items	Performance Measures
IMPLEMENT SAFETY COUNTERMEASURES TO REDUCE RISK OF FUTURE COLLISIONS.	**Near Term and Ongoing** • Identify opportunities to implement short-term countermeasures at prioritized locations (see Site Specific Treatments). • Study the need for roadway and pedestrian-scale lighting at the prioritized locations with nighttime collision history (see Figure 13 on page 59) • Pursue HSIP and Safe Streets and Roads for All (SS4A) grant funding **Long Term** • Identify opportunities to implement low-cost, systemic application countermeasures identified in this plan as part of all projects (such as development review, repaving, and new projects) • Track future grant opportunities and pursue safety project grants with each available funding cycle (see Appendix F: Funding) • 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 Appendix F: Funding)	✓ Number of fatal and injury collisions (all levels) in identified emphasis areas ✓ Number of fatal and severe injury collisions citywide ✓ Grant money received for safety projects ✓ Annual expenditure on safety improvements

Goal	Action Items	Performance Measures
ANALYZE DATA TO IDENTIFY AND PRIORITIZE OPPORTUNITIES.	**Near Term and Ongoing** • Review collision data in subsequent plan updates to evaluate progress on emphasis areas and for fatal/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. • Continuously engage with the community to identify and document locations of concern, in recognition that collision data do not tell the whole story. **Long Term** • Update the LRSP goals and emphasis areas with subsequent plan updates. • Evaluate need for traffic control change or additional crossing improvements at locations with anticipated growth (e.g., as part of development review)	✓ Number of fatal and injury collisions (all levels) in identified emphasis areas ✓ Summary of feedback received (quantity, type, and location) regarding safety issues ✓ Number of safety improvements implemented at priority locations ✓ Number of systemic countermeasures applied to address emphasis areas

Goal	Action Items	Performance Measures
PROMOTE A CULTURE OF ROADWAY SAFETY IN DUBLIN'S AGENCIES AND RESIDENTS.	**Near Term and Ongoing** • Continue to engage with Dublin schools through existing venues like the Traffic Safety Committee to plan and promote school educational training and encouragement using school resource officers, bicycle rodeos, or other events at Dublin schools. • Establish educational programs to reduce driving under the influence and aggressive driving. • Work with the City Office of Communications to regularly communicate with the public on roadway, pedestrian, and bicycle safety. Use findings in this plan to align messaging priorities with emphasis areas. • Continue to coordinate with Dublin Police Services on location and emphasis areas and deploy speed trailers in mutually-agreed-upon HIN locations. **Long Term** • Continue to share best practices related to safety and coordinate with Alameda CTC and its member agencies. • Continue to identify opportunities to acquire grant funds or partner with local advocacy organizations for other educational opportunities. • Review City policies, standards, and guidelines, and identify updates that would promote evolving safety best practices.	✓ Number of events hosted, and summary of educational activities led by the City ✓ Frequency of communication with identified partners on safety initiatives ✓ Recency of guidelines and standard drawings (revisit for updates at least every five years) ✓ Number of safety improvements implemented at priority locations