

City of Huntington Beach

LOCAL ROADWAY SAFETY PLAN

DECEMBER 2022

Prepared for:

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1.0 EXECUTIVE SUMMARY

The California Department of Transportation (Caltrans) has established a program for cities to prepare a Local Roadway Safety Plan (LRSP) to identify safety needs and recommend projects to address these needs. LRSPs are intended to help local roadway owners contribute to the goals of Caltrans' statewide Strategic Highway Safety Plan (SHSP) by focusing on local-level concerns. An LRSP provides a framework for organizing stakeholders to identify, analyze, and prioritize roadway safety modifications on local roads. This document serves as the LRSP for the City of Huntington Beach.

1.1 OVERVIEW

An LRSP analyzes collision data, assesses infrastructure deficiencies through an inventory of roadway system elements, and identifies roadway safety solutions on a citywide basis. This document provides a basis for the continuation of ongoing efforts by the City to enhance roadway safety. The LRSP framework and process was created by the State to help local agencies develop safety projects that can be submitted for funding by the Highway Safety Improvement Program (HSIP). HSIP funding eligibility requires an LRSP or equivalent plans such as a Vision Zero Plan or Systemic Safety Analysis Report.

This report has been prepared per Caltrans LRSP guidelines and the *Caltrans Local Roadway Safety Manual* (LRSM) version 1.6 dated June 2022. The general content of this LRSP report follows this outline:

- Collision data source and analysis techniques
- Collision data analysis results and highest occurring collision types
- Traffic safety analysis based on Office of Traffic Safety (OTS) data
- Potential strategies to broadly address common collision types

The LRSP fulfills the following purposes:

- Identify the highest occurring collision types and the roadway characteristics contributing to the collisions.
- Identify corridors and intersections with high collision frequencies relative to all locations in a jurisdiction.
- Propose safety countermeasures to address the safety issues.

1.2 PROMINENT COLLISION PATTERNS

Five years of collision records were utilized from January 1, 2016 to December 31, 2020, adhering to the maximum period permitted by the HSIP for a safety infrastructure project application for federal funding. The collisions were categorized by severity, collision type, Primary Collision Factor (PCF), involved parties, lighting conditions, and facility type (signalized intersections, non-signalized intersections, and mid-block locations). A total of 7,195 collisions were recorded from 2016 to 2020. The following summarizes the collision patterns within the City:

- The most common collision types were identified in the SWITRS data as rear-end, broadside, and sideswipe.
- The most common Primary Collision Factors (PCFs) were identified in the SWITRS data as unsafe speed, automobile right-of-way violation, and improper turning.

- Unsafe speed is evaluated in both the context of posted speed limits and the speed that is considered acceptable for the conditions present. **Section 5.2** elaborates on this definition.
- Bicycle- and pedestrian-related collisions accounted for approximately 12.7% of total collisions, but about 46.9% of fatal and severe injury collisions as identified in SWITRS.

1.3 SAFETY MEASURES

The following transportation safety emphasis areas were identified based on the collision data analysis:

- Safe Spaces for People Walking & Riding
- Unsafe Speeds
- Intersection Safety
- Driving or Bicycling Under the Influence

The LRSP recommends engineering and non-engineering countermeasures which help to address the identified emphasis areas derived from the collision analysis. Concerns and recommended modifications were discussed with City staff including law enforcement, school districts, Huntington Beach Fire Department, Orange County Health Care Agency, and the Orange County Bicycle Coalition.

Some of the engineering countermeasures recommended include:

- Improving signal hardware to include back-plates with retroreflective borders, near-side signals and timing modifications
- Installing raised pavement markers and striping through intersections
- Implementing Leading Pedestrian Intervals (LPIs)
- Installing Rectangular Rapid Flashing Beacons (RRFBs) and Pedestrian Hybrid Beacons (HAWKs) at non-signalized pedestrian crossings

Additionally, engineering analysis recommended other safety countermeasures to address high collision locations throughout the City, listed by safety emphasis area. Funding for engineering countermeasures listed in the LRSP are available from the Highway Safety Improvement Program (HSIP).

In addition to the infrastructure modifications mentioned above, non-engineering safety measures address traffic safety concerns through education, encouragement, and enforcement. Several state and federal grant programs offer funds for non-engineering roadway safety projects, as shown below:

- USDOT Safe Streets and Roads for All
- Highway Safety Improvement Program
- Active Transportation Program
- Sustainable Communities Grant Program
- Office of Traffic Safety Grants
- OCTA Local Funding Programs

STATUTORY DISCLOSURE

Per the State’s guidance in preparing SSAR and LRSP reports, the following language from Section 148 of Title 23, Unites States Code [23 U.S.C. § 409: US Code - Section 409: Discovery and admission as evidence of certain reports and surveys

Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway- highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

By signing and stamping this Local Roadway Safety Plan, the engineer (Walter Okitsu, P.E., KOA Corporation) is attesting to this report's technical information and engineering data upon which local agency's recommendation, conclusions, and decisions are made.

Walter Okitsu



Dec 12, 2022

2.0 INTRODUCTION

In order to examine the breadth and scope of potential roadway safety enhancements, the City of Huntington Beach has developed this Local Roadway Safety Plan (LRSP). The purpose of the LRSP is to promote the goals of the California Statewide Strategic Highway Safety Plan (SHSP) through the context of local needs. The SHSP focuses on engineering and non-engineering solutions to roadway safety issues. The LRSP identifies the most common collision categories across a roadway network to target projects that address the factors associated with those categories. By focusing on causal factors rather than collisions, the LRSP allows agencies to assess risks before a collision occurs. Systemic approaches target a broader geography than the traditional spot location approaches. The systemic project selection favors the broad implementation of cost-effective countermeasures.

2.1 VISION, MISSION, AND GOALS

The vision of this LRSP is a roadway environment in Huntington Beach that maximizes safety and mobility for all users in all groups, using all modes. The LRSP's mission is to analyze existing safety patterns and identify a set of countermeasures and programs that will support delivery of the LRSP's vision and maintain enhanced safety when traveling in Huntington Beach. The goals of this LRSP are to reduce roadway injuries and fatalities in each identified safety emphasis area, as well as for all users of the City's roads and sidewalks.

2.2 LRSP PROCESS

The LRSP systematically identifies and analyzes safety problems and recommends safety improvements. Preparing the LRSP requires collaboration through the development of partnerships between the City and stakeholders; relevant stakeholders include Orange County Health Care Agency (OCHCA), Huntington Beach Police Department (HBPD), Huntington Beach Fire Department (HBFD), Huntington Beach City School District (HBCSD), Ocean View School District (OVSD), Fountain Valley School District (FVSD), Westminster School District (WSD), Huntington Beach Union High School District (HBUHSD), Coast Community College District (CCCD), Caltrans, Orange County Transportation Authority (OCTA), Orange County Bicycle Coalition, and Visit Huntington Beach. The results of the LRSP are summarized with a prioritized list of countermeasures. The LRSP offers a proactive approach to addressing roadway safety needs in Huntington Beach.

The LRSP not only focuses on engineering improvements to reduce the likelihood of collisions, but also addresses safety improvements in other areas such as enforcement, education, and emergency services. Making roadways safer requires the Four E's to be involved (Engineering, Enforcement, Education, and Emergency Services). Working together with the Four E's at the city level will help make city roads safer. Recently, Federal and State agencies have also considered Emerging Technologies and Equity as additional E's to improve traffic safety. For instance, considering the use of emerging technologies such as "smart" traffic signal equipment can serve to connect vehicles and traffic control systems to enhance traffic safety. Also, investing in safety projects in neighborhoods that have higher rates of fatal and severe collisions relative to the rest of the City will ensure that safety planning and implementation is equitably distributed across the agency's jurisdiction.

2.2.1 FREQUENTLY USED TERMS

The LRSP analysis is based largely on data from the Statewide Integrated Traffic Records System

(SWITRS). Collisions are entered into this database and classified by severity, Primary Collision Factor, and collision type.

Collision severity types, in order of least severe to most severe, are Property Damage Only, Complaint of Pain, Visible Injury, Severe Injury, and Fatality. Collision severity is classified by the most severe outcome of anyone involved in the collision; for example, if six people are involved in a collision, with five experiencing a complaint of pain but with one experiencing a severe injury, the collision would be classified as a Severe Injury collision.

Primary Collision Factor (PCF) is the factor deemed to be most responsible for the collision. Although collisions often have multiple contributing factors, a collision reported in SWITRS will only have one PCF. Examples of PCFs include unsafe speed, automobile right-of-way violation, and improper turning. A full glossary of PCF terms is included as **Appendix C**.

Collision type refers to the manner in which the vehicles collided. Examples include rear end, sideswipe, and broadside.

SWITRS data also includes other information such as movements preceding collision, time of day, lighting/weather conditions, and whether the collision was a hit-and-run.

2.3 CITY OF HUNTINGTON BEACH

Huntington Beach is an incorporated city in Orange County, California. According to the 2020 US Census, Huntington Beach had a population of 198,711. Based on the Statewide Integrated Traffic Records System (SWITRS) database, from January 1, 2016 to December 31, 2020, a total of 7,195 collisions occurred in the City of Huntington Beach, inclusive of both City streets and State highways within the City. Out of these collisions, 198 resulted in fatal or severe injuries. Collisions on Interstate 405 were excluded, which is grade-separated from City streets, and not part of the scope of this analysis or in the immediate jurisdiction of the City.

The City of Huntington Beach has made significant investments in recent years towards improving roadway safety for travelers within the City. In addition to regular maintenance and repaving of existing streets, a number of new projects have taken place, with more currently underway. These efforts include enhanced crosswalks with Rapid Rectangular Flashing Beacons (RRFBs), improved bicycle facilities, pedestrian gap closures, and traffic signal improvements. Additionally, the City has upgraded a significant number of signalized intersections to have left-turn protection.

2.4 LRSP DEVELOPMENT PROCESS

The following sections include a brief description of the tasks associated with the development of this LRSP, with a more detailed description of each task in subsequent sections of this document.

2.4.1 DATA COLLECTION

A comprehensive Geographic Information Systems (GIS) project database was developed by utilizing the following data:

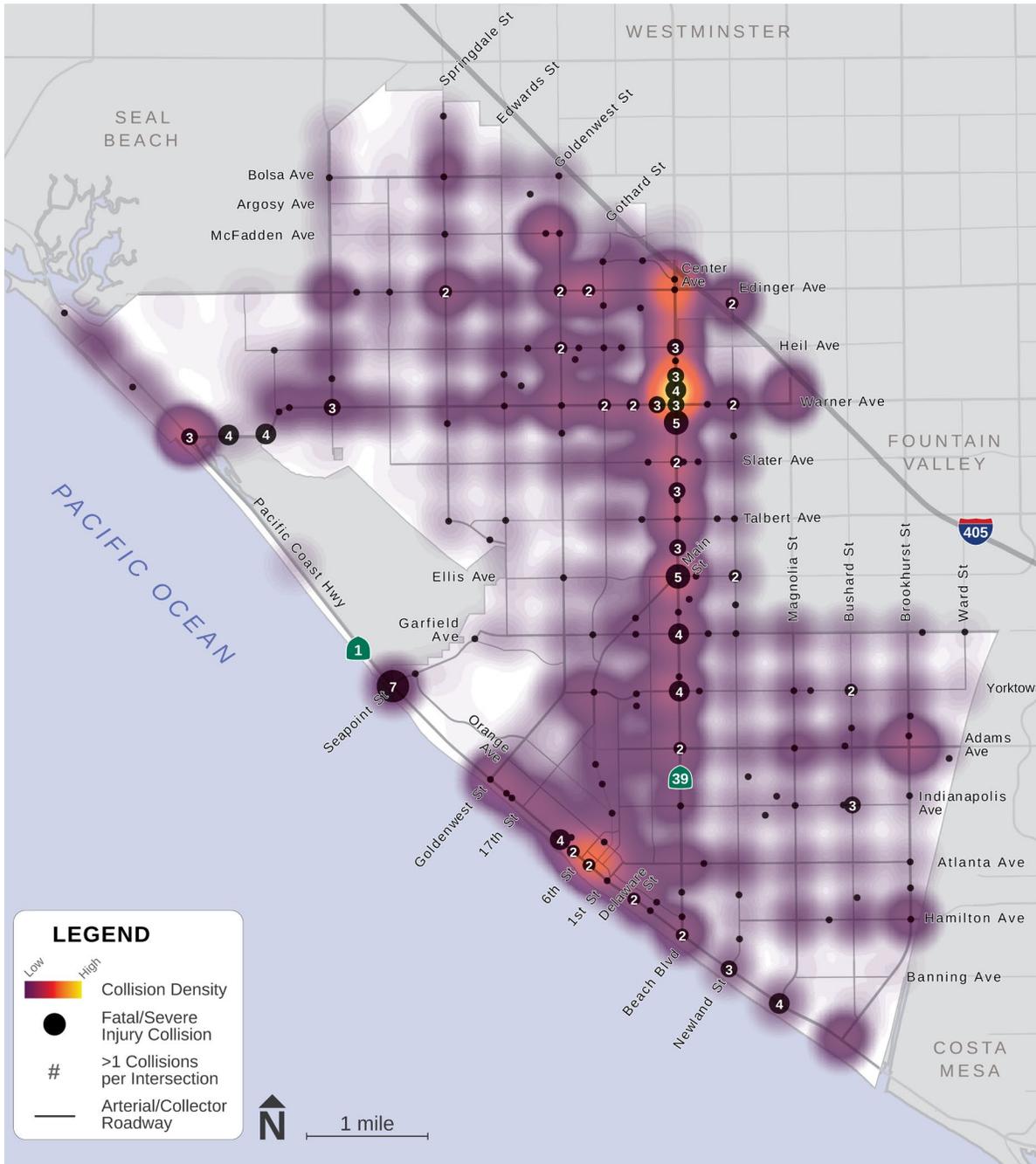
- Five-years (1/1/2016 to 12/31/2020) of collision data collected via the SWITRS collision database
- Traffic count information
- Administrative boundaries

- Base map with street centerlines, traffic signal locations, functional classification, and other contextual data

Additional data was collected to supplement the analysis around specific focus areas, provide contextual support, or develop countermeasures in later stages of the LRSP.

An overview of collision density within the City is shown in **Figure 2.1** below.

Figure 2.1: Huntington Beach Citywide Collision Heat Map (2016-2020)



2.4.2 SAFETY DATA ANALYSIS

Following collection of spatial and contextual data, the collision data was analyzed for Huntington Beach. Collisions were compared to the safety emphasis areas as defined in the California SHSP. The safety data analysis is summarized in **Section 4** of this document. The transportation emphasis areas are identified based on the collision data analysis and are discussed in Section 5 of this document.

2.4.3 IDENTIFY SAFETY MEASURES

In coordination with city staff, a list of engineering-related safety countermeasures and non-engineering safety measures were developed for use as recommendations in this LRSP. These countermeasures are discussed in **Section 6** and **Section 7** of this document.

2.4.4 CALCULATE BENEFIT/COST RATIOS

To better contextualize and prioritize the recommended countermeasures, potential collision reduction benefit totals were calculated for each countermeasure based on citywide collision data. This information would be used to help prioritize recommended countermeasures, as well as to support a Benefit/Cost Ratio component of a Highway Safety Improvement Program (HSIP) funding application.

2.5 EXISTING POLICIES AND PROGRAMS

As part of the preparation for this LRSP, existing planning documents for the City of Huntington Beach were evaluated to determine how existing City policy addresses roadway safety.

2.5.1 CITY OF HUNTINGTON BEACH GENERAL PLAN (2017)

The City of Huntington Beach General Plan clarifies and articulates the City's intentions with respect to the rights and expectations of the general public, property owners, community groups, developers, and businesses. The plan identifies how community amenities, services, and infrastructure will be provided to accommodate their planned growth, while maintaining community character and culture, conserving important resources, and adapting to changing economic and environmental conditions (p. 1-3). The Plan includes concerns and priorities related to roadway safety which may be addressed in this LRSP.

Circulation Element

The Circulation Element promotes Complete Streets within the City, which includes "Thoughtful design and accommodations for bicyclists and pedestrians reduces the incidence of collisions and improves safety for all transportation users." (p. 3-7). The Neighborhood Traffic Management section states:

Policies aimed at protecting neighborhoods from the negative effects of cut-through traffic and inappropriate parking include residential parking permits, site planning, and traffic-calming measures. Traffic-calming techniques are used to direct traffic elsewhere and slow traffic within neighborhoods." (p. 3-17).

The Element includes the City's Bikeway Plan, shown in **Figure 2.2**, which includes multi-use paths planned for rail corridors and river/creek corridors, with some Class II bike lanes proposed along major roads.

Figure 2.2: City of Huntington Beach Bikeway Plan



Source: City of Huntington Beach General Plan, Circulation Element, 2017

Land Use

The Land Use Element lists priority corridors within the City. It includes a description of each designated planning area and a summary of key issues. The following items can potentially be addressed as countermeasures for the implementation of this LRSP or for future projects:

- **Goldenwest Street and Warner Avenue:** Both are wide arterials, carrying large volumes of traffic through the intersection, but impeding pedestrian access from one corner of the site to another. The overlay area also currently lacks pedestrian connections to adjoining residential areas. (p. 2-19)

- Goldenwest Street and Edinger Avenue: The wide streets provide motorists with good access to the college and the retail uses, but limit pedestrian access, especially for students attempting to cross the streets to patronize businesses. (p. 2-19)

2.5.2 HUNTINGTON BEACH BICYCLE MASTER PLAN (2013)

The Huntington Beach Bicycle Master Plan seeks to promote a safe, convenient and efficient environment for bicycle travel to and across the City. Goals for the plan include physical, social and mental health improvements for those who choose to bicycle, reduced transportation costs, reduced traffic and parking congestion, transportation time savings, safer streets, improved air quality, and reduced greenhouse gas emissions (p. 1).

Educational Safety Programs

The Plan notes the following about bicycle safety educational programs in the City:

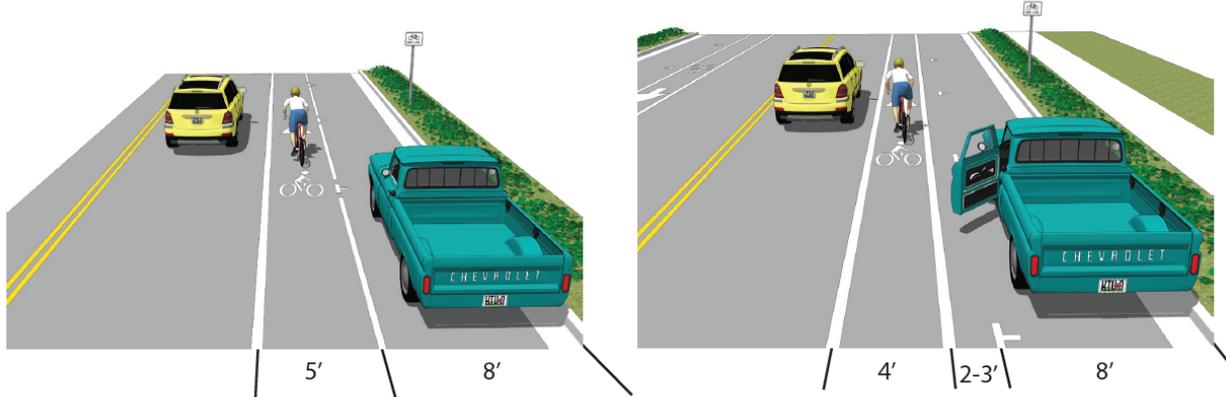
Since 1973, the City of Huntington Beach has conducted a nationally recognized bicycle diversion course for children who have been stopped by the Police Department for a safety violation (typically helmet violations). The individual has the option to attend a two hour safety course held by the Police Department or be directed to pay the full fine of the ticket. A parent or guardian's attendance is mandatory. The safety course is well attended on a monthly basis and can also be attended by the general public. (p. 26)

Improvements to Existing Facilities

The report found the following:

The minimum [bicycle and parking combined] width found was 12 feet, which corresponds to a four foot bicycle lane, which does not meet CA MUTCD recommendations of five feet adjacent to on-street parking. Bicycle lane width will vary if there is no striping separating it from the parking lane, and vehicles are parked at variable distances from the curb, making the functional lane dependent on the size and location of the parked vehicles. This type of striping is the most common in the City. (p. 69)

Figure 2.3: Bicycle Lane Marking Adjacent to On-Street Parking



Minimum standard width for bicycle lanes adjacent to on-street parking is five feet with eight foot parking stalls, for a total width of 13 feet. Lines on both sides of the bicycle lanes are recommended.

Where more than 13 feet is available, the extra space should be used for a buffer between the parking stalls and bicycle lanes. The bicycle lanes can be reduced to four feet minimum only when a buffer is provided between the bicycle lanes and parking stalls.

Source: City of Huntington Beach Bicycle Master Plan (2013)

Countermeasures

The Plan cites a number of potential solutions to the issues presented (p. 86). These include bike lanes, bike boxes, and 3' striped buffers between bicycle and parking facilities.

2.5.3 OC ACTIVE (OCTA ACTIVE TRANSPORTATION PLAN) (2018)

The OC Active Plan addresses bicycle and pedestrian networks across Orange County. The Plan seeks to reduce bicycle and pedestrian collisions, advance the walking and biking network, enhance walking and biking access to transit, improve high-need pedestrian areas, strengthen stakeholder partnerships, incorporate diverse community perspectives, and leverage funding opportunities.

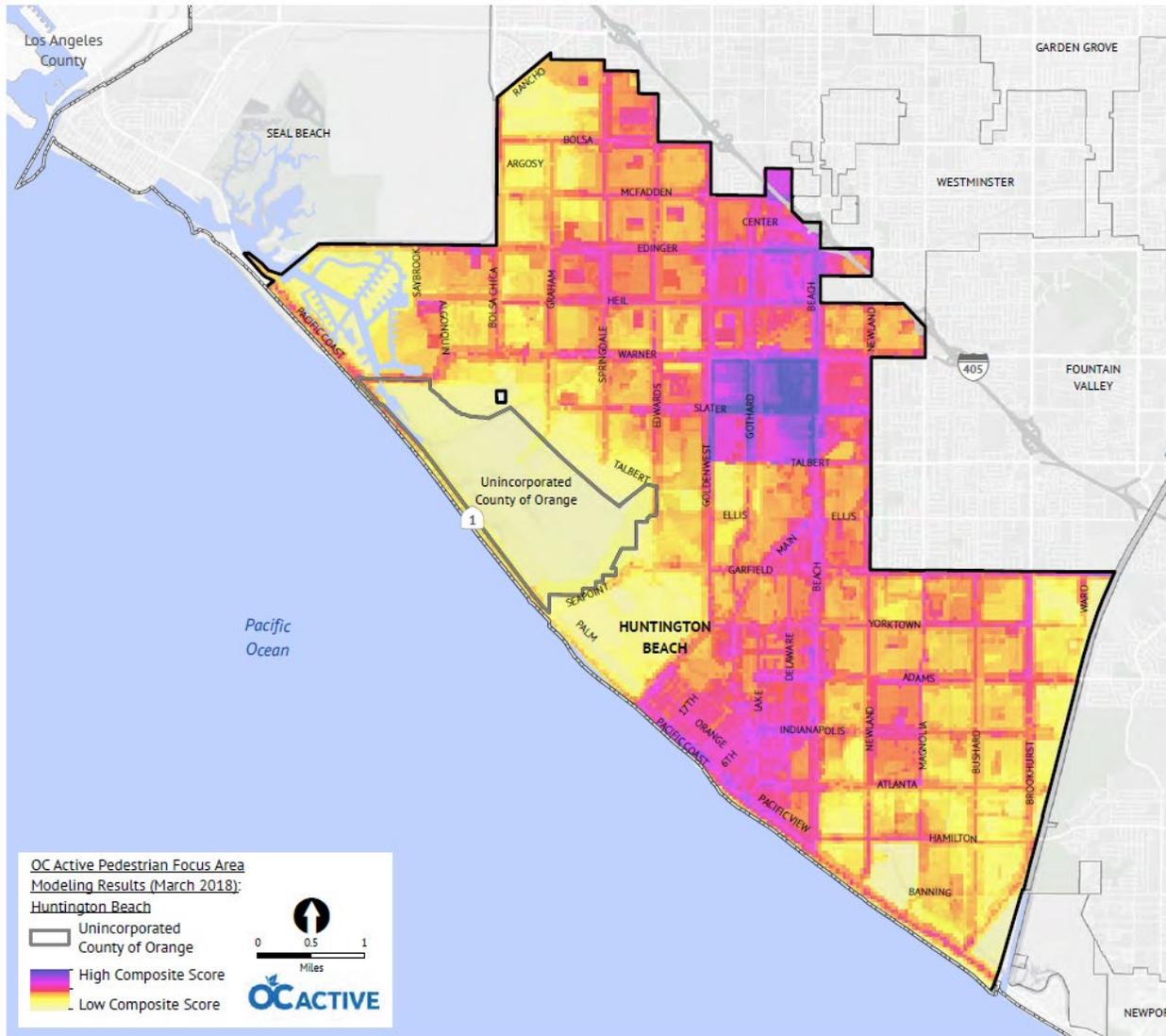
Design Treatments (Appendix Toolkit p. 24)

The Bicycle & Pedestrian Best Practices Toolkit lists several design treatments that can improve active transportation safety. The following design treatments on the list are also addressed as potential countermeasures in this LRSP:

- Traffic circles (related to mini roundabouts)
- Bike lanes
- Refuge islands
- Marked crosswalks
- High visibility crosswalks
- Pedestrian scrambles
- Pedestrian hybrid beacons (HAWK)
- Rectangular rapid flashing beacons (RRFB)

Figure 2.4 shows the Pedestrian Focus Area composite scores throughout Huntington Beach. The composite score is based on analysis of barriers, trip generators, and trip attractors. Higher composite scores indicate greater demand for pedestrian travel (p. 5). These findings align with a need for active transportation improvements, particularly Downtown and near Slater Avenue, Warner Avenue, Goldenwest Street, and Gothard Street.

Figure 2.4: Pedestrian Focus Areas



Source: Orange County Active Transportation Plan, 2018

2.5.4 OTHER PLANNING DOCUMENTS

Huntington Beach Downtown Specific Plan (2010)

The Downtown Specific Plan designates design guidelines for different roadway segments within the Downtown area.

For 5th Street between Walnut Avenue and Orange Avenue, and for Main Street between Pacific Coast Highway and Acacia Avenue, the Plan writes:

The midblock crossings will have in-pavement lights to improve safety. The crosswalks will highlight pedestrian areas within the street without creating interference for the crossing vehicle and will incorporate all required ADA standards. (p. 6-8, 6-14)

The most frequent comments received during community outreach include:

- *Make Walnut Avenue a pedestrian-oriented thoroughfare (p. C-2)*
- *Pedestrian and vehicle separation mechanism is needed at the intersections of Main Street with Orange Avenue, Olive Avenue, and Walnut Avenue (p. C-6)*
- *Main Street enhancements should provide better pedestrian experiences (p. C-6)*

Huntington Beach Bella Terra Specific Plan (2010)

Design requirements in the Bella Terra Specific Plan apply to both the internal circulation of the site, as well as circulation around the perimeter and at access points to the site for vehicle, bicycle, and pedestrian traffic. The Plan notes the following:

- *Policy 3.2.7: Pedestrian sidewalks shall be incorporated into the project as a component of the landscape plan. Sidewalks shall be installed throughout the development to facilitate pedestrian access from adjacent developments to the project site. The pedestrian walkway system shall include walkways around the perimeter of the site in the street right-of-way and through the parking lot to the project area.*
- *Policy 3.4.7.6: Pedestrian walkway systems shall be designed to unify the entire project area and provide pedestrian site access to buildings, parking, and site activity areas from the perimeter project area and from within the site. Pedestrian walkways shall be a minimum of five (5) feet clear in width with no vehicular overhang, risers, or utilities within the pathway.*
- *Policy 3.4.7.15: Pedestrian walkways shall include adequate night lighting for public safety and crime prevention purposes. (p. 75)*

3.0 METHODOLOGY

This section describes the methodology involved in collision analysis and countermeasure recommendation.

3.1 COLLISION DATA SOURCES

Collision data was collected for all citywide collision trends between January 1, 2016 and December 31, 2020 from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database. The California Office of Traffic Safety (OTS), which tracks safety trends statewide, contributed collision summaries for the years 2017 through 2019 for Huntington Beach and 59 cities in California with a similar population.

3.1.1 SWITRS

The California Highway Patrol's SWITRS collects and processes data on reported collisions throughout the State of California. The online SWITRS application provides geographically- and temporally-targeted collision reports in an electronic format. SWITRS was used to evaluate data on collisions in the City of Huntington Beach between January 1, 2016 and December 31, 2020, both in aggregate and classified by control type (signalized, non-signalized, and mid-block locations).

The SWITRS dataset is hierarchical, and is composed of three tables, Collision, Party, and Victim. The Collisions table contains information on each collision, with only one entry per collision. The Party tables contain information from all parties involved in the collision, one line per party. Parties are the major players in traffic collisions - drivers, pedestrians, bicyclists, and parked vehicles. The information includes personal descriptors and vehicle descriptors. The Victim table contains information about the persons associated with each party. For example, a collision where both a driver and their passenger were injured will have separate entries for each victim in the Victim table. Injury severity is included in the Collision and Victim tables.

Collision analysis for the LRSP includes information primarily from the Collision and Party tables. If there is a specific need, information from the Victim tables will be aggregated to the Party or Collision level as required.

3.1.2 OTS

The OTS Safety Rankings compare traffic safety statistics among cities in California with similar populations, with a focus on the number of collisions where people are killed or seriously injured (KSI). Cities can use these comparisons to see the areas in which they are improving traffic safety outcomes, and where they can make improvements. In the OTS Collision Ranking system, Huntington Beach belongs to Group B, which contains 59 cities with a population between 100,001 and 250,000. It is important to note that the OTS Safety Rankings use a count of collisions, not individual people, when creating their rankings. Unless specifically noted, this report will use the same approach, referring to the number of collisions that have occurred.

3.2 STAKEHOLDER OUTREACH

In addition to using analytical methods to identify locations for treatments and make recommendations, the LRSP also focuses on partnerships with the community to give input into this process and provide feedback on areas that the LRSP should focus on. Stakeholders were contacted after completing the

initial collision analysis but before selecting emphasis areas or specific infrastructure improvements or programs. Stakeholders were asked to provide feedback about traffic safety issues they have observed through their work and possible approaches to resolving these issues. For the Huntington Beach LRSP, feedback was provided by Orange County Health Care Agency (OCHCA), Huntington Beach Police Department (HBPD), Huntington Beach Fire Department (HBFD), Huntington Beach City School District (HBCSD), Ocean View School District (OVSD), Orange County Transportation Authority (OCTA), Orange County Bicycle Coalition, and Visit Huntington Beach. This outreach group served as an advisory committee to inform the LRSP team about other roadway safety issues they were aware of, but did not necessarily arise from collision data analysis alone.

3.2.1 ORANGE COUNTY HEALTH CARE AGENCY (OCHCA)

OCHCA expressed safety concerns for pedestrians crossing Edinger Avenue adjacent to the Bella Terra shopping center, suggesting scramble crosswalks as one potential countermeasure. They also expressed general concerns about the width, speed, and high traffic volumes of arterial roads in the City, suggesting traffic calming measures and lane reconfigurations that include bicycle lanes on several corridors (Warner Avenue, Heil Avenue, Goldenwest Street, Gothard Avenue near Goldenwest College).

3.2.2 HUNTINGTON BEACH POLICE DEPARTMENT (HBPD)

HBPD found that SR-1 (Pacific Coast Highway) and SR-39 (Beach Boulevard) are the most frequent locations for excessive speed violations. For SR-1 in particular, drivers are often cited for speeds in excess of 65 MPH, while the speed limit is 55 MPH or 60 MPH along the corridor. SR-39 at Adams Avenue is the most frequent location for failing to obey posted traffic signs. SR-39 at Slater Avenue is the most frequent location for hands-free cell phone violations. HBPD has also observed an uptick in reckless driving, loud exhaust, and car club gatherings, with Downtown and SR-1 being the most frequent areas. Additionally, HBPD has observed that pedestrians were at fault in most pedestrian-vehicle fatal collisions.

3.2.3 HUNTINGTON BEACH FIRE DEPARTMENT (HBFD)

HBFD cites the segment of Edinger Avenue between Gothard Street and Beach Boulevard to be a major impediment to emergency response access. The Department suggests the creation of an emergency lane in the center of the street through the removal of the median island and landscaping. HBFD also cites Gothard Street in front of HBFD Stations 1 and 2 and Heil Avenue in front of Station 8 as difficult areas for fire apparatus to navigate during traffic conditions.

HBFD expressed interest in the expansion of traffic signal pre-emption systems as well as the exploration of alternate means of operating these systems as they are improved and/or expanded, specifically upgrading the existing pre-emption system, which uses infrared light to trigger signals for oncoming fire engines or ambulances. The upgraded system would utilize full GPS-based and wireless communication systems to activate signal pre-emptions for all emergency vehicles.

3.2.4 HUNTINGTON BEACH CITY SCHOOL DISTRICT (HBCSD)

HBCSD cited three specific locations as areas of concern for roadway safety. Farnsworth Lane and Indianapolis Avenue was cited due to traffic speeds on Indianapolis Avenue. 17th Street and Agua Drive was cited due to its lack of a traffic stop directly across from Smith Elementary School. Neighbors and parents cited the intersection of 17th Street and Adams Avenue as a suggested location where a crossing guard could help control the intersection during school hours.

HBCSD currently has three projects underway in conjunction with the City: expanded parking and

additional pick-up/drop-off lanes at both Eader Elementary School and Peterson Elementary School, as well as the reconstruction of Sowers Middle School, which will impact surrounding streets.

3.2.5 OCEAN VIEW SCHOOL DISTRICT (OVSD)

OVSD expressed concerns about non-signalized crosswalks along major thoroughfares that include Edwards Street, Slater Avenue, and Heil Avenue. These crosswalks serve schools, parks, and playfields.

Specific crosswalks include locations at schools along Heil Avenue and Monroe Lane, which provides access to Westmont Elementary School, Edwards Street and Wrenfield Drive near Golden View Elementary School, and Slater Avenue and Cordoba Lane near Mesa View Middle School. All three cross multiple lanes of traffic that do not stop, and OVSD states that these crosswalks do not stand out well to drivers. They requested that a beacon or other traffic control devices/enhancements be implemented to create a safe walking environment for students and parents.

3.2.6 ORANGE COUNTY TRANSPORTATION AUTHORITY (OCTA)

OCTA responded that they will work with appropriate jurisdictions to amend the Master Plan of Arterial Highway (MPAH) facilities if it is determined that it must be amended due to a traffic safety issue.

OCTA is also currently in the process of developing e-bike safety videos to educate the public on safe e-bike operation on bicycle facilities in Orange County. OCTA has previously held distribution events for pedestrian and bicycle safety equipment, including front and rear LED lights, reflective arm bands or ankle straps, that makes walkers and cyclists more visible.

3.2.7 ORANGE COUNTY BICYCLE COALITION

The Orange County Bicycle Coalition cites Beach Boulevard (SR-39), Goldenwest Street, Magnolia Avenue, and Brookhurst Street as roads that pose the biggest risks to pedestrians and cyclists.

They recommend 20 mph speed limits at entrances to residential neighborhoods off primary arterials. They also recommend setback lines approximately 5 to 6 feet behind crosswalks in order to reduce instances of crosswalks being blocked by cars.

3.2.8 VISIT HUNTINGTON BEACH

Visit Huntington Beach named several intersections with traffic safety concerns: Pacific Coast Highway and Main Street, Pacific View Lane and 1st Street, Main Street and Orange Avenue, Pacific Coast Highway and Beach Boulevard (with bicycle considerations in mind), Main Street and Adams Avenue, and Lake Street and Adams Avenue. Locations with safety concerns include Downtown, the Huntington Beach Pier, Huntington Dog Beach, and the Pacific Coast Highway corridor between Main Street and Seapoint Street.

3.3 IDENTIFYING LOCATIONS FOR ENGINEERING COUNTERMEASURES

Collision data analysis for this LRSP was conducted using collision data from the SWITRS collision database. The collision records include a variety of information about each collision, including the location, date, time of the day, collision type, collision severity, primary violation category, transportation mode of the involved parties, and movement of the involved parties prior to the collision. Per California state law, motor vehicle collisions must be reported when vehicle or property damage exceeds \$1,000, or when any of the parties suffer an injury or fatality. Traffic collisions that had little or no property damage and no apparent injuries are often not reported; even though they do occur, they are not entered into SWITRS and are not reflected in the analysis.

Caltrans' *Local Roadway Safety, A Manual for California's Local Road Owners*, Version 1.6, April 2022 (LRSM) encourages a pro-active, rather than reactive, approach to safety issue identification. Traditionally, agencies using a reactive approach have located and implemented safety projects solely based on recent collisions, specific collision concentrations, or safety issues raised by stakeholders. A pro-active approach is preferred, according to the LRSM, because with traditional methods, "collision concentrations and collision trends may be missed if local agencies rely exclusively on these identifiers for their roadway safety effort." A pro-active approach would identify safety improvements by analyzing the safety of the entire roadway network. For this document, the process for identifying candidate locations for safety improvements considers any one of the following three factors:

- An extensive collision history at high-collision frequency locations providing insight into which roadway characteristics are associated with certain types of collisions
- Professional engineering judgment regarding the availability of feasible engineering countermeasures to address identified safety issues
- Applicability of the engineering countermeasures at other locations with roadway characteristics associated with similar types of collisions regardless of their collision history

Locations that conform to one or more of the three factors above can be considered "high-risk" for the purposes of the LRSP's analysis; "risk" is assessed within the context of all locations within Huntington Beach. This does not discount the fact that other individual behaviors of a roadway can also contribute to increased risk when driving, riding or walking. The LRSM guidelines require analyzing at least three to five years of the most recent collision data. Five years-worth of collision data from January 2016 to December 2020 was reviewed for the Huntington Beach LRSP. Five years of collision data usage adheres to the maximum threshold permitted by the Highway Safety Improvement Program (HSIP) for a safety infrastructure project application for federal funding.

3.3.1 RANKING FUNCTION

A candidate intersection or roadway segment for safety improvements does not necessarily need to demonstrate a history of high or severe collisions to be considered for further evaluation. However, locations with high numbers of collisions are often good starting points for safety analysis due to the rich information provided by the collision history. Three ranking methods were utilized to identify high collision frequency intersections and roadway segments: Average Collision Frequency, Collision Rate, and Equivalent Property Damage Only (EPDO) scores. A brief description of each of the methods is provided in the following sections.

3.3.2 AVERAGE COLLISION FREQUENCY

Average Collision Frequency is the most basic method for assessing collision incidence. The analysis tallies the numbers of collisions at each location in the roadway network, both in aggregate and by a category of interest (e.g. level of severity, collision type, and others). The analysis then ranks intersections or roadway segments based on the collisions' frequency.

3.3.3 COLLISION RATE

The Collision Rate method goes a step beyond average collision frequency, normalizing facilities' collision frequency by the amount of vehicle traffic or travel. This method divides the number of collisions (or collisions in a particular category) by the quantity of Million Entering Vehicles (for intersections) or 100 Million Vehicle Miles Traveled (for roadway segments). While the Collision Rate method accounts for

differences in facilities' length and traffic volume, it may instead unduly favor low-volume and low-collision roadways where countermeasures produce the lowest net benefit for the largest number of roadway users. Collision rates are typically normalized using automobile traffic volumes or VMT; bicycle and pedestrian volumes (or accurate estimates) are often not available across the majority of intersections in most cities.

3.3.4 EPDO SCORES

Equivalent Property Damage Only (EPDO) scores assign weighting factors to collisions by severity relative to property damage only (PDO) collisions. The weight generally reflects an order of magnitude difference between the cost of fatal/severe injury collisions and non-severe injury collisions. The weights by collision severity come from the 2022 Local Roadway Safety Manual.

Table 3.1: Collision Values and EPDO Score

Collision Severity	Location Type	Collision Cost	EPDO Score Value
Fatality (K) and Severe Injury (A)	Signalized Intersection	\$1,787,000	119.93
	Non-Signalized Intersection	\$2,843,000	190.81
Combined (KA)	Roadway	\$2,461,000	165.17
Evident Injury - Other Visible (B)		\$159,900	10.73
Possible Injury-Complaint of Pain (C)		\$90,900	6.10
Property Damage Only (O)		\$14,900	1.00

Source: Appendix D of the Caltrans LRSM, 2022

EPDO scores are useful for a benefit-to-cost analysis as collision costs can be translated into measurable benefits from installing improvements that reduce the collisions in question. However, EPDO scores may place undue weight on the injury outcomes of previous collisions rather than overall trends suggested by collision patterns regardless of injury outcome. Furthermore, a location's EPDO score could be inflated by a fatal or severe collision caused by DUI, which may not be related to the collision location's safety risk factors (i.e. high-speed arterial or blind curve), traffic safety infrastructure or other contributing factors in the collision.

3.4 PROPOSING ENGINEERING COUNTERMEASURES

After ranking the intersections and roadway segments, the following steps were used to propose engineering countermeasures:

- Make citywide collision maps for dominant collision types such as rear-end collisions, broadside collisions, bicycle and pedestrian collisions, and collisions due to unsafe speed. Identify locations with high collision frequency by collision type.
- Review collision details (party involved, movement before the collision, primary collision factor, violation code, time of the day, and others) at these locations. Obtain detailed police reports from the City and reviewed for all the fatal and severe injury collisions.
- Manually create collision diagrams for high-priority locations with high collision frequencies in preparation for funding applications. Review field conditions through physical site visits in the City. Assess the nature of prevalent collision types with respect to the intersection's control type, geometrical features, and signal phasing/timing.

- Review current conditions and recent historical conditions via Google Map Street View, whenever necessary, to check whether any geometry, signal, or signage changes have been made in the past few years.
- Evaluate and screen countermeasures from the LRSM or Collision Modification Factor (CMF) Clearinghouse, a searchable database that can be easily queried to identify CMFs and Collision Reduction Factors (CRFs).
- Identify intersections/roadway segments that do not have a higher than average collision rate but resemble other locations with a higher than average collision rate and risk factors. Once identified, these locations can be analyzed through the steps mentioned above.

4.0 SYSTEMIC SAFETY ANALYSIS – COLLISION TREND AND PATTERNS

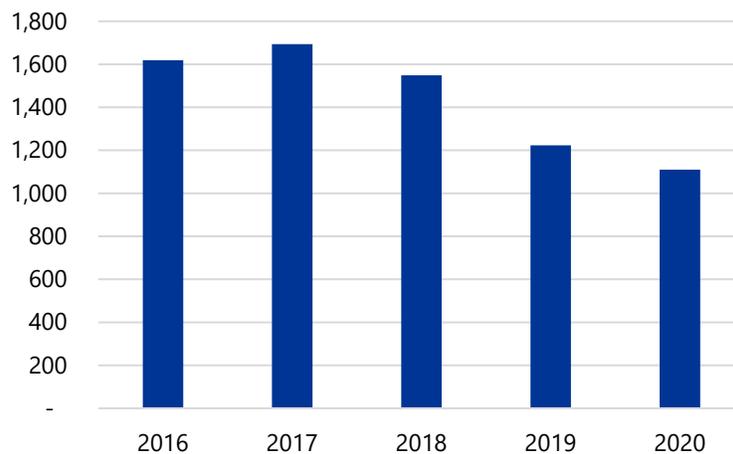
Collision data from the California Highway Patrol’s Statewide Integrated Traffic Records System (SWITRS) database was reviewed to evaluate the City of Huntington Beach’s collision trends for a five-year period between January 1, 2016, and December 31, 2020. Additionally, the California Office of Traffic Safety Rankings (OTS) data from 2017 to 2019 was reviewed.

4.1 TOTAL COLLISIONS AND KSI COLLISIONS

The collision trend analysis draws from the five years of data obtained from the SWITRS database. From January 1, 2016 to December 31, 2020, 7,195 collisions occurred in the City of Huntington Beach, inclusive of both City streets and state highways within the City. Out of these collisions, 198 resulted in fatal or severe injuries. **Figure 4.1** highlights the annual number of collisions per year over the five-year period from January 1, 2016 to December 31, 2020). Collisions on Interstate 405 were excluded, which is grade-separated from City streets, and not part of the scope of this analysis or in the immediate jurisdiction of the City. **Figure 4.2** highlights automobile collisions for the same period.

Overall, collision totals remained relatively consistent between 2016 and 2018. Starting in 2019, collisions declined to a larger degree, by 22% and again in 2020 by another 11%. Over this period, automobile collisions declined over a four-year period from 2017-2020, with a decrease of 8%, 23% and 15% in each of those years. Collision data for 2020 may have been affected by a dramatic decrease in activity due to the COVID-19 pandemic, which may have contributed to a lower collision total.

Figure 4.1: Total Collisions by Year



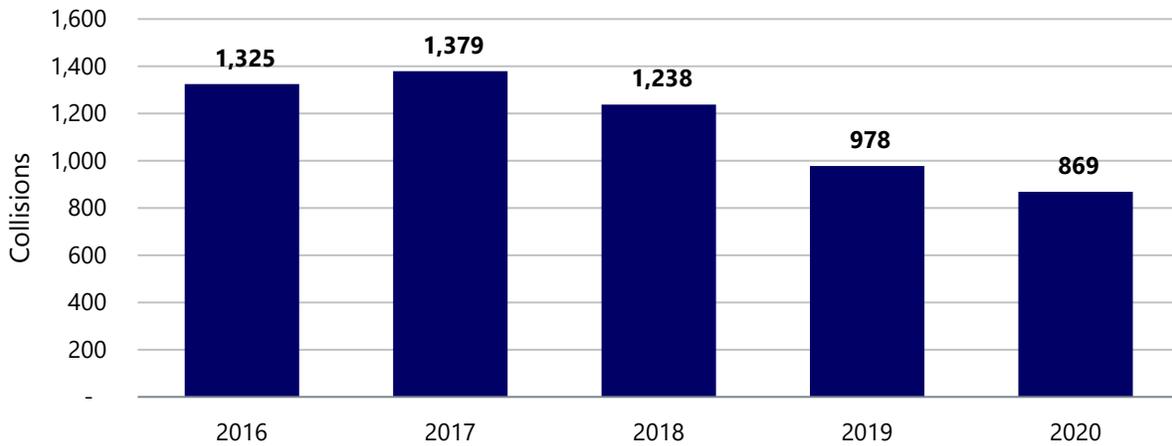
Source: SWITRS, 2016-2020

During the COVID-19 pandemic, between December 2019 and December 2020, travel in California dropped by nearly 66%.¹ Furthermore, collisions resulting in injury or fatality dropped 42% statewide

¹ U.S. Bureau of Transportation Statistics, *Mobility over Time: California*. <https://www.bts.gov/browse-statistical-products-and-data/covid-related/mobility-over-time-national-or-state>

when comparing March 2019 to March 2020 after restrictions were enacted.² Due to this, there is less emphasis placed on time-series analysis of the data, and a reduction in collisions should not be wholly attributed to recently implemented countermeasures alone, especially for 2020.

Figure 4.2: Automobile Collisions by Year

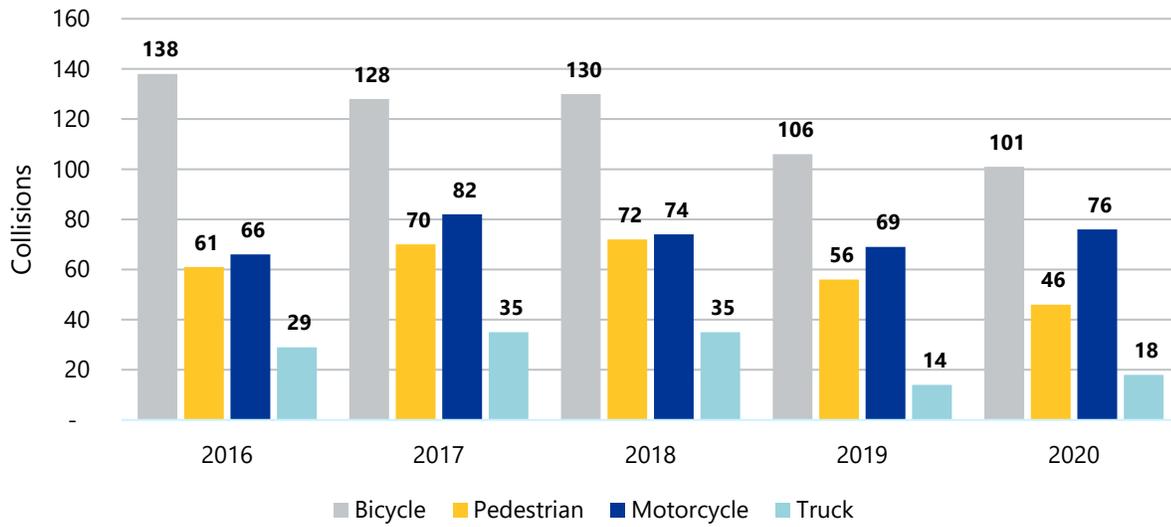


Source: SWITRS, 2016-2020

Figure 4.3 highlights pedestrian, bicycle, motorcycle, and truck-involved collisions per year. Pedestrian collisions also experienced a decline over the last two years (2019-2020). Truck, motorcycle, and bicycle collisions were more variable year to year. For truck collisions, the number of collisions increased every year with the exception of 2019. Motorcycle collisions, experienced an increase from 2016 to 2017, followed by a two-year decline, and then another year of higher collisions in 2020. Lastly, for bicycle collisions, the collision trend was a general decline, however, there was a slight increase of 3% in 2017 followed by larger declines in 2019 of 19%, and 2020 of 6% (a decline that could be attributable to the aforementioned effects of the COVID-19 pandemic on travel patterns).

² UC Davis Road Ecology Center. *Special Report: Impact of COVID-19 on California Traffic Accidents*. https://roadecology.ucdavis.edu/sites/g/files/dgvnsk8611/files/files/COVID_CHIPs_Impacts_updated.pdf

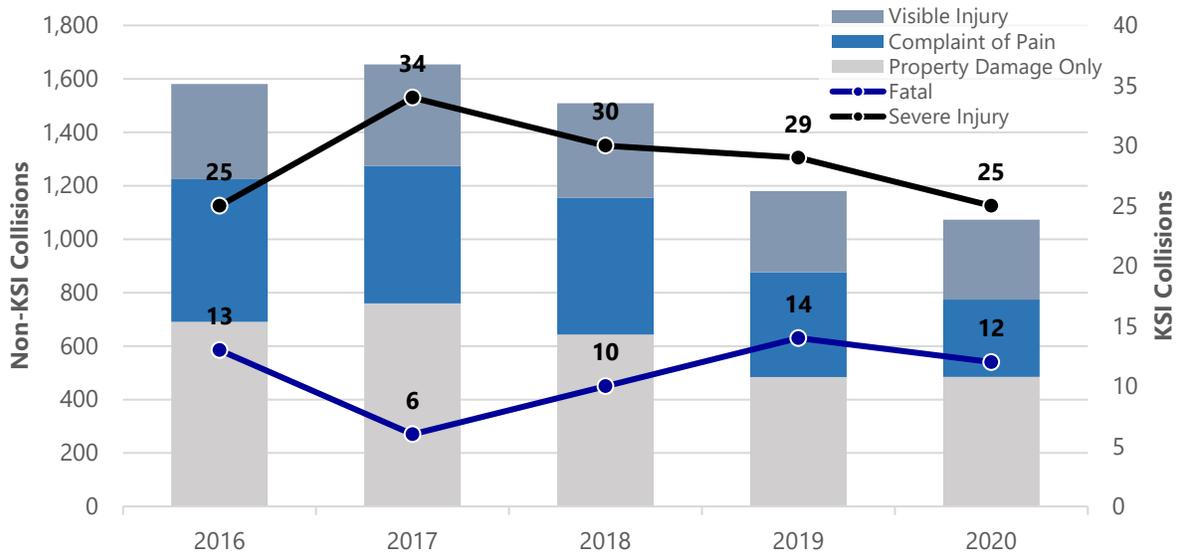
Figure 4.3: Pedestrian, Bicycle, and Truck Collisions by Year



Source: SWITRS, 2016-2020

Figure 4.4 illustrates the total number of traffic injuries and deaths over the five-year period. The number of injuries generally demonstrate a steady decline over time, with an approximate 35% decline in injuries from 2016-2020. In comparison, the number of deaths over the same period were unpredictable. There was a steep decline with half as many deaths in 2017 versus 2016 (15 deaths in 2016 versus seven deaths in 2017) followed by a doubling of deaths in 2018 versus 2017 (14 deaths in 2018), and small relative changes between 2019 and 2020 (15 deaths in 2019 and 13 deaths in 2020).

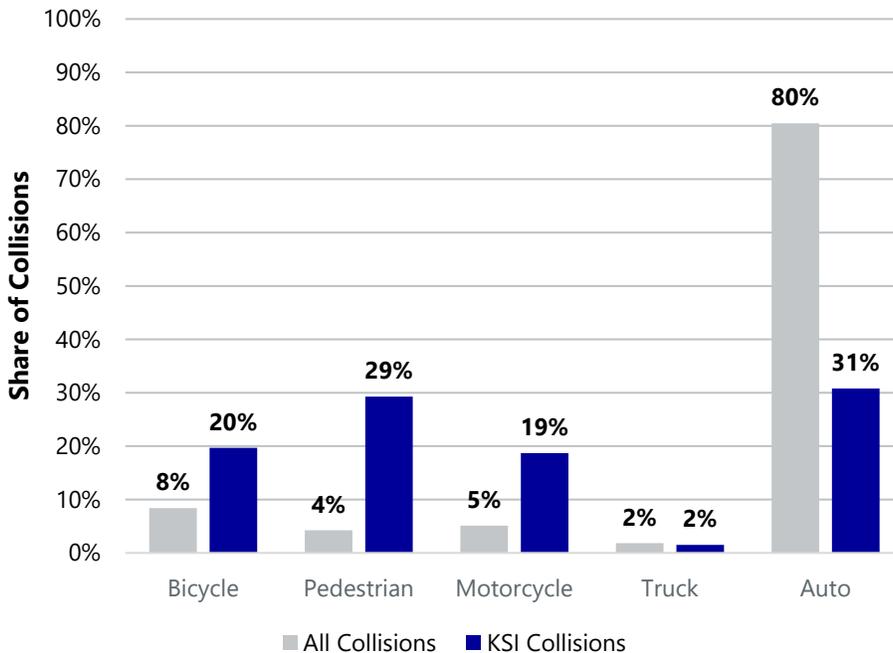
Figure 4.4: Annual Collisions by Severity



Source: SWITRS, 2016-2020

Figure 4.5 illustrates the collision percentages by mode relative to the share of fatal and severe injury (KSI) collisions. The difference between the two values demonstrates that these more vulnerable mobility groups (people walking, biking, or riding motorcycles) are likelier to have a disproportionately higher injury and fatality rate compared to drivers. The highest number of collisions by mode are automobile related at 80%, however, this mode made up a smaller share of fatalities (31%) when compared to pedestrian collisions that accounted for 4% of the collisions but 29% of the fatal collisions; bicycle collisions that were 8% of the total collisions and 20% of fatal collisions. Motorcycles collisions also accounted for nearly 20% of KSI collisions.

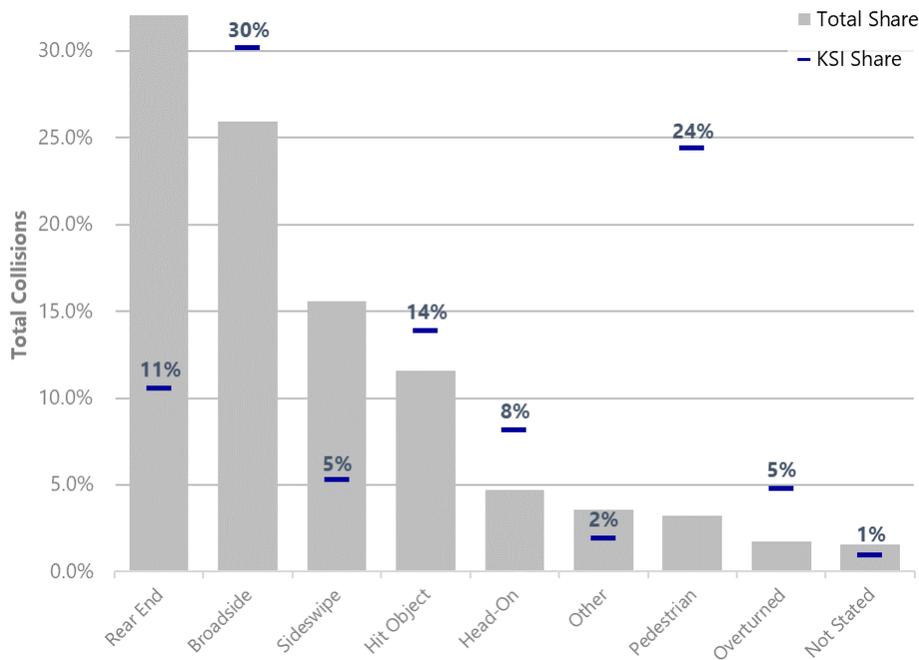
Figure 4.5: Collisions by Travel Mode, Total Collisions and KSI Collisions



Source: SWITRS, 2016-2020

Figure 4.6 summarizes all collisions by type, as well as each collision type’s share of KSI collisions. Even though rear end collisions are the most frequent collision type, accounting for approximately 35% of the total collisions, it represents only an 11% share of the KSI collisions. Collision types that cause higher KSI collisions include broadside (30% KSI), pedestrian (24% KSI), hit object (14% KSI), and head-on (8% KSI) collisions. The highest disparity between the number of total collisions and KSI collision share corresponds to pedestrian collisions. These only make up approximately 3% of the total collisions but 25% of the KSI collisions. Broadside collisions had a slightly higher frequency of KSI collisions versus overall collisions, which is in line with the relatively high frequency of improper turning and auto right-of-way violations.

Figure 4.6: Collisions Share by Type, Total Collisions and KSI Collisions



Source: SWITRS, 2016-2020

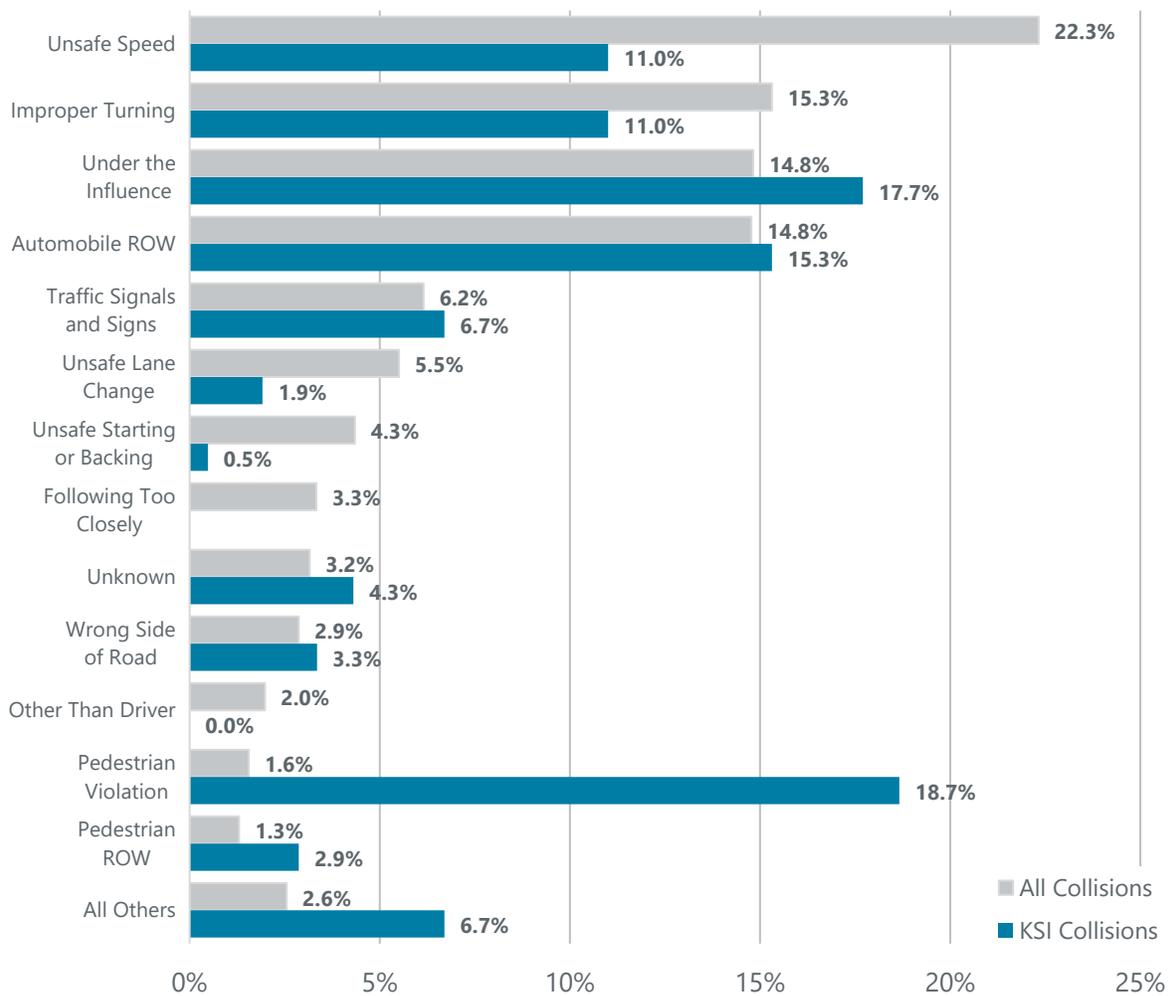
Figure 4.7 summarizes the Primary Collision Factor (PCF) for all collisions over the past five years based on 14 PCF categories. PCF is the one element or driving action that best describes the primary or main cause of the collision, based on the conclusion of the responding officer after completing the investigation and preparing the report. Among all collisions, unsafe speed (22%), improper turning (15%), driving under the influence (15%), and automobile right-of-way (15%) were the top four primary collision factors.

However, when comparing the share of total collisions to the share of collisions where a person was killed or severely injured (KSI), several concerns stand out. If the level of risk for all roadway users was equal, it would be expected that the share of KSI collisions would be equal for various PCFs, regardless of mode. However, since non-automotive roadway users are more vulnerable to injury and death than people in vehicles (due to the presence of multiple safety systems in most vehicles, including seatbelts, airbags, and the vehicle frame and body which absorb impact forces), some PCFs will carry a higher share of KSI collisions versus all collisions. Pedestrian violation collisions comprise only 2% of all collisions, but

are 19% of KSI collisions, indicating that there is a higher risk of injury or death for people walking. This is worth noting because pedestrian collisions only occur when they come into conflict with vehicles within the roadway, even though the majority of a pedestrian's travel path is on the sidewalk. Vehicle paths of travel are entirely within the roadway, where they primarily conflict with other automobiles, motorcycles, or bicycles. The typical pedestrian also has less physical protection when compared to these other modes (reinforced vehicle frame, air bags, seat belts, helmet, padded vest, etc.) so the degree of injury is almost always more severe for pedestrians.

Automobile right-of-way and driving under the influence (DUI) collisions also comprise a significant share of KSI collisions (18% and 15%, respectively) that are equal to or greater than their share of overall collisions.

Figure 4.7: Collisions by Primary Collision Factor

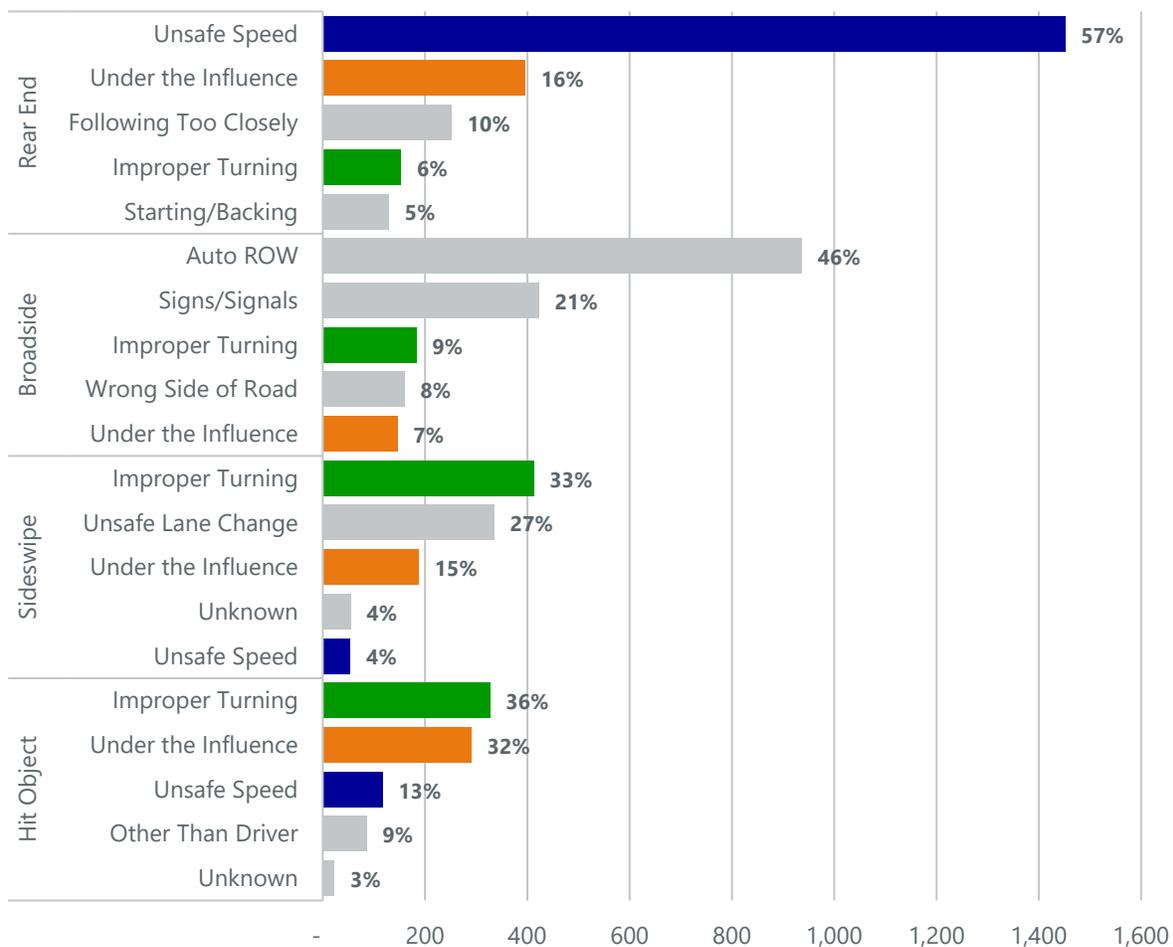


Source: SWITRS, 2016-2020

Of the top four collision types (rear end, broadside, sideswipe, and hit object, respectively), the main cause of these types of collisions are summarized in Figure 4.8. The top cause of rear end collisions are due to unsafe speed; broadside collisions main cause are automobile ROW related; both sideswipe and hit object collisions are due to improper turning. DUI collisions are consistently present in the PCF cause

for all four collision types, reinforcing the trend that DUIs play a persistent role in causing traffic collisions. Improper turning movements are also a smaller but consistent presence, indicating that clear signage, striping, or other infrastructure may be needed to help roadway users turn safely at intersections or driveways. In **Figure 4.8**, PCF categories highlighted in color are present across multiple collision types, indicating a common PCF across multiple types of collisions that may require countermeasure approaches that more specifically target driver behavior.

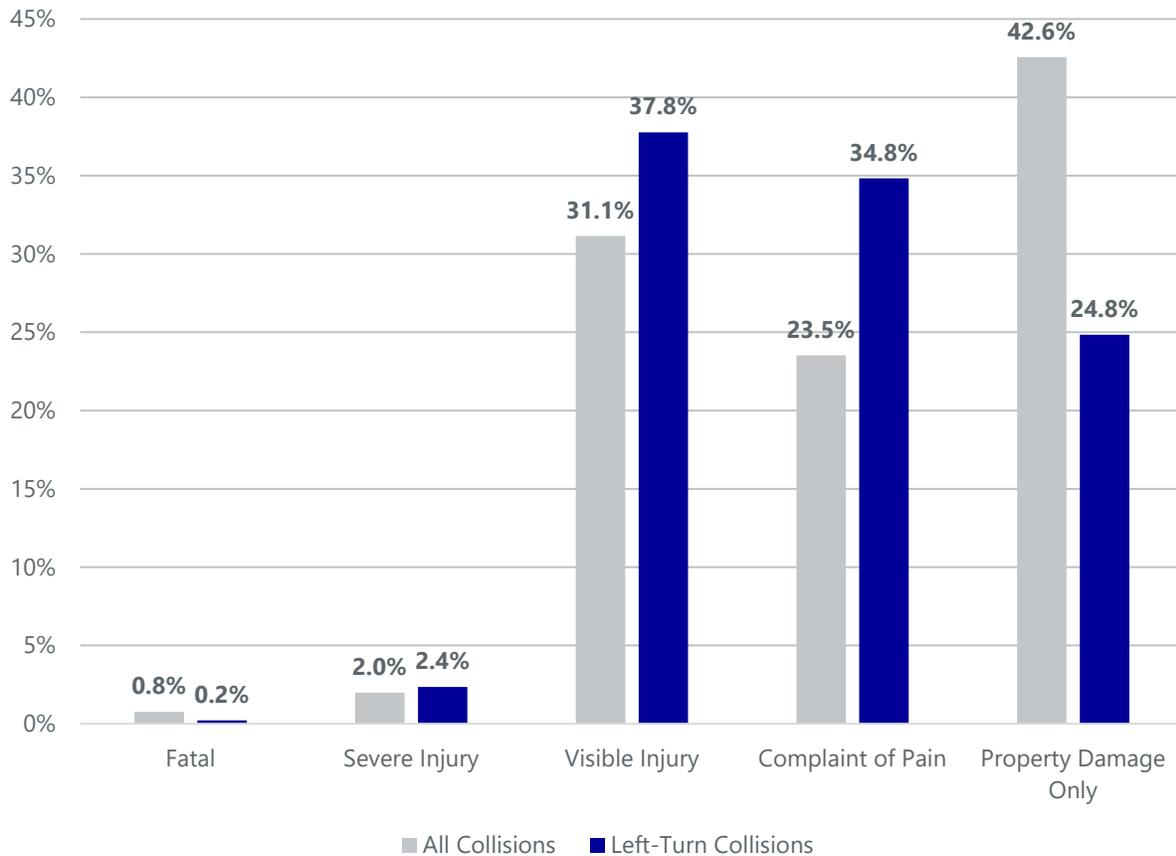
Figure 4.8: Top Collision Types and Primary Collision Factors



Source: SWITRS, 2016-2020

A review of the collision severity for all collisions versus left-turn collisions is shown in **Figure 4.9**. City staff were interested in understanding the level of collision severity associated with left-turn collisions across the city. Collisions where any involved party was making a left turn preceding the collision event were tabulated by collision severity. Property damage only (PDO) collisions were nearly half of all collisions, but for left-turn collisions, the PDO share of was only 25%. Injury collisions were 56% of all collisions, but were 73% of left-turning collisions. The fatal and severe injuries had a roughly equal share of left-turn versus all collisions (less than 1%); overall left-turn collisions were slightly more likely to result in an injury of some type, most likely a minor injury rather than a severe one.

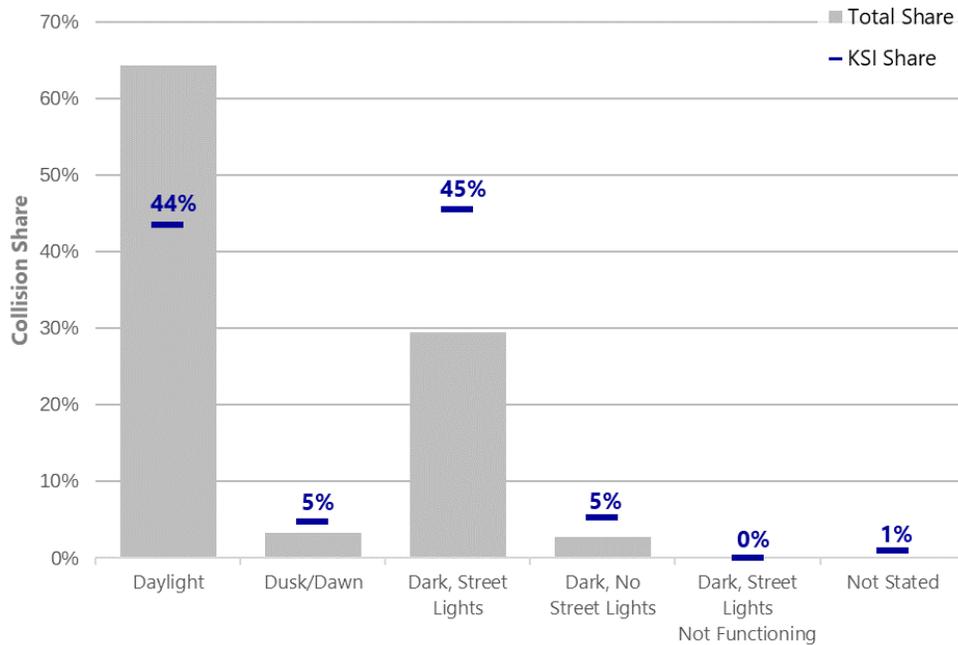
Figure 4.9: Collision Severity for All Collisions vs. Left-Turn Collisions



Source: SWITRS, 2016-2020

Figure 4.10 assesses lighting conditions for all collisions and KSI collisions. As presented, the majority of collisions and 44% of KSI collisions occur during the daytime. However, slightly higher share of KSI collisions occur at when it is dark (45%), even when street lights are present. This is to be expected, as visibility is generally poorer at night, even though the City’s street light provide illumination of the roadway and sidewalks. In addition to roadway lighting, the City also has installed pedestrian-scaled lighting in areas that have high pedestrian volumes, like around large commercial developments, the Downtown Huntington Beach area, and around school and college campuses.

Figure 4.10: Collisions by Lighting Conditions



Source: SWITRS, 2016-2020

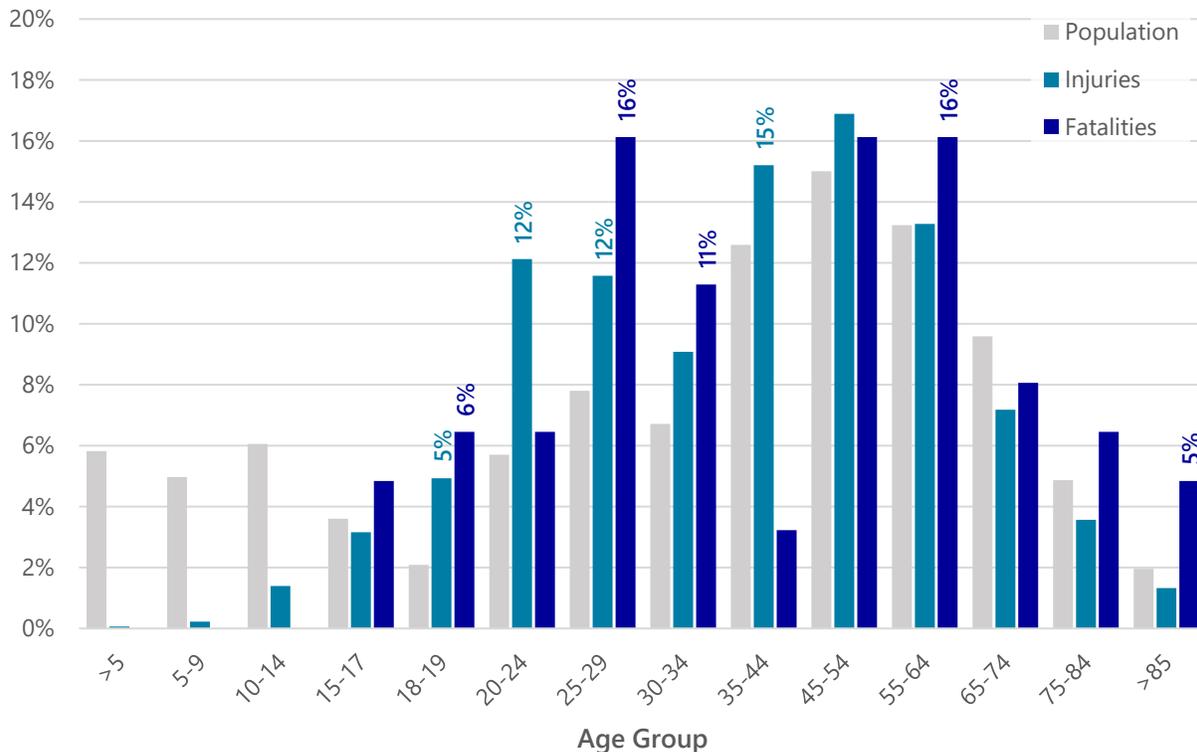
Figure 4.11 presents a summary of traffic injuries and fatalities by age groups. While there is a large variability in the total number of injuries versus deaths for each age group, the proportion of deaths to injuries remains consistent across all age ranges, with deaths making up approximately 0-1% of the combined death and injury cases over the five-year period. However, certain age groups experience a disproportionate share of fatalities compared to their share of injury injuries in traffic collisions.

In Figure 4.11, age groups where the share of injuries or fatalities was 2.5% or greater than their population share are labeled. The greatest difference is in the 18-19 age group, which is only 2% of the population, but the share of fatalities is nearly tripled, at 6%. Other age groups where the share of traffic fatalities is nearly double that of the population share are people aged 25-29 and over 85 years old. Injury rates are also double the population share for people aged 18-24, indicating that traffic safety risk is particularly high for this age group, and should be a key focus demographic for any messaging or education campaigns that the City undertakes.

It is important to note that the population estimates are for residential population of the City, which is used as a proxy for the overall traveling population, which may include people who reside in other cities, but were simply traveling through Huntington Beach when they were involved in a traffic collision. U.S.

Census data is the best available data for use in this analysis at this time, but more detailed travel surveys can be undertaken in the future for a more detailed understanding of the traveling population’s age distribution.

Figure 4.11: Traffic Injuries and Fatalities by Age



Source: SWITRS, 2016-2020; U.S. Census Bureau, 2020 Decennial Census

4.2 COLLISIONS BY FACILITY TYPE

Collision patterns by facility type (intersections vs. mid-block locations) were analyzed by using SWITRS data from January 1, 2016 to December 31, 2020. This analysis was used to determine the effect of access control and intersection geometry on collision frequency. Intersections are defined as crossing points involving streets, alleyways, or signalized commercial driveways. The analysis classifies collisions by facility type as follows:

- Collisions that occurred within 250 feet of signalized intersections are considered signalized intersection collisions;
- Collisions that occurred within 150 feet of non-signalized intersections are considered non-signalized intersection collisions; and
- Collisions that occur more than 250 feet away from any signalized intersection and more than 150 feet away from any non-signalized intersection are classified as mid-block collisions.

Table 4.1 shows the total number of collisions associated with each type of facility. 27% of all collisions occurred at signalized intersections, 47% occurred at non-signalized intersections, and 26% occurred at mid-block locations. It is unusual for such a low share of collisions to occur at signalized intersections, where there is often elevated risk where major streets cross. The high rate of non-signalized intersection

collisions could be reduced by systemic countermeasures across the city that slow speeds and clarify users’ right of way when proceeding through intersections. This is supported by the review of collision PCFs across the city, which indicated that unsafe speeds, unsafe turning, and right of way violations were the most common factors and could be countered by changes in roadway design or infrastructure.

Pedestrian-involved collisions followed a different pattern, with 37% of collisions occurring at signalized intersections, 47% occurring at non-signalized intersections, and only 17% occurring at mid-block locations. Over half of bicyclist-involved collisions (55%) occurred at non-signalized intersections, and 33% occurred along mid-block roadway segments. This may indicate that there is good visibility and protection for cyclists at signalized locations (such as pedestrian signals and push-buttons), but an evaluation of dedicated space and pedestrian protection at stop-controlled intersections may be needed to understand this further.

Table 4.1: Collisions by Facility Type

	Signalized Intersection		Non-Signalized Intersection		Mid-Block Location		Total
	Collisions	% of type	Collisions	% of type	Collisions	% of type	
All Collisions	1,929	27%	3,371	47%	1,895	26%	7,195
Bicycle Collisions	132	22%	303	50%	168	28%	603
Pedestrian Collisions	76	25%	168	55%	61	20%	305

Source: SWITRS, 2016-2020

Table 4.2 shows how the collision type share varies by location. Broadside collisions comprise the largest share of collisions at signalized and non-signalized intersections (32% and 28%, respectively). At mid-block locations, rear-end collisions (33%) are most prevalent, while sideswipe and broadside collisions comprise the second- and third-largest categories (19% and 18%, respectively). Sideswipe and rear-end collisions also amounted to the second-largest share of collisions at non-signalized intersections.

Table 4.2: Collision Types by Facility Type

Collision Type	Signalized		Non-Signalized		Mid-Block		Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	Share
Rear End	515	26.7%	925	27.4%	636	33.6%	2,076	28.9%
Broadside	733	38.0%	937	27.8%	373	19.7%	2,043	28.4%
Sideswipe	205	10.6%	545	16.2%	343	18.1%	1,093	15.2%
Hit Object	166	8.6%	401	11.9%	266	14.0%	833	11.6%
Head-On	148	7.7%	149	4.4%	71	3.7%	368	5.1%
Other	38	2.0%	164	4.9%	79	4.2%	281	3.9%
Vehicle/Pedestrian	62	3.2%	142	4.2%	48	2.5%	252	3.5%
Overtaken	23	1.2%	53	1.6%	49	2.6%	125	1.7%
Not Stated	39	2.0%	55	1.6%	30	1.6%	124	1.7%
Total	1,929	100%	3,371	100%	1,895	100%	7,195	100%

Source: SWITRS, 2016-2020

Table 4.3 tabulates the PCFs by facility type. At signalized and non-signalized intersections, unsafe speed,

automobile right-of-way, improper turning and DUI were the four most frequent PCF categories. At mid-block locations, unsafe speed, improper turning, and DUI comprised the three largest PCF categories. Regardless of location, DUI and unsafe speed are the most significant factors in the City’s collision data, followed by the combination of various intersection-related factors, which include automobile right of way, improper turning, and traffic signs and signals. Together, they account for 30% of all intersection-based collisions, with more than half (59%) occurring at non-signalized intersections.

Table 4.3: Primary Collision Factor by Facility Type

PCF Category	Signalized		Non-Signalized		Mid-Block		Total
	Collisions	%	Collisions	%	Collisions	%	
Unsafe Speed	320	16.6%	603	17.9%	387	20.4%	1,310
Automobile Right of Way	415	21.5%	536	15.9%	214	11.3%	1,165
Improper Turning	197	10.2%	562	16.7%	386	20.4%	1,145
Driving or Bicycling Under the Influence of Alcohol or Drug	277	14.4%	556	16.5%	301	15.9%	1,134
Traffic Signals and Signs	294	15.2%	182	5.4%	10	0.5%	486
Unsafe Starting or Backing	50	2.6%	201	6.0%	87	4.6%	338
Unsafe Lane Change	69	3.6%	139	4.1%	130	6.9%	338
Following Too Closely	58	3.0%	98	2.9%	103	5.4%	259
Unknown	68	3.5%	108	3.2%	65	3.4%	241
Wrong Side of Road	55	2.9%	101	3.0%	70	3.7%	226
Other Than Driver (or Pedestrian)	25	1.3%	66	2.0%	48	2.5%	139
Pedestrian Violation	23	1.2%	64	1.9%	35	1.8%	122
Pedestrian Right of Way	37	1.9%	57	1.7%	8	0.4%	102
Improper Passing	16	0.8%	20	0.6%	18	0.9%	54
Other Improper Driving	7	0.4%	28	0.8%	13	0.7%	48
Other Hazardous Violation	10	0.5%	24	0.7%	6	0.3%	40
Not Stated	7	0.4%	19	0.6%	10	0.5%	36
Hazardous Parking		0.0%	4	0.1%	2	0.1%	6
Impeding Traffic	1	0.1%		0.0%	2	0.1%	3
Other Equipment		0.0%	3	0.1%		0.0%	3
Total	1,929		3,371		1,895		7,195

Source: SWITRS, 2016-2020

Table 4.4 shows the relationship between street lighting conditions and facility type. At all location types, most collisions occurred in daylight (63% of all collisions). Most collisions that occurred in the dark were in the presence of functioning street lights, and at non-signalized intersections. 44% of all KSI collisions occurred at night where street lights were present, with the majority of those collisions (49 out of 92) occurring at non-signalized intersections. Because all signalized intersections in the City of Huntington Beach have lighting installed, collisions that are documented as taking place at signalized locations with no street lights, or street lights not functioning, may have occurred during power outages.

Table 4.4: Street Lighting and Facility Type

	Signalized		Non-Signalized		Mid-Block		Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Daylight	1,295	67.1%	2,078	61.6%	1,209	63.8%	4,582	63.7%
Dark - Street Lights	563	29.2%	1,113	33.0%	540	28.5%	2,216	30.8%
Dusk - Dawn	63	3.3%	112	3.3%	67	3.5%	242	3.4%
Dark - No Street Lights	6	0.3%	51	1.5%	74	3.9%	131	1.8%
Not Stated	0	0.0%	12	0.4%	4	0.2%	16	0.2%
Dark - Street Lights Not Functioning	2	0.1%	5	0.1%	1	0.1%	8	0.1%
Total	1,929	100.0%	3,371	100.0%	1,895	100.0%	7,195	100.0%

Source: SWITRS, 2016-2020

Rear-end collisions were the most prevalent collision type (32% of all collisions). Typically, rear-end collisions are a result of a motorists traveling at unsafe speeds as the primary collision factor, with additional secondary factors such as distracted driving or following too closely, which is supported by the collision data. **Table 4.5** tabulates rear-end collisions, and of those, collisions caused by drivers traveling at unsafe speeds. Rear-end collisions resulting from drivers traveling unsafe speeds ranged from 46% at mid-block locations to 51% at both signalized and non-signalized intersections. Second to unsafe speed was driving under the influence (18%), which is related to individual behavioral choices rather than roadway design or infrastructure.

Table 4.5: Rear-End Collisions by Facility Type

Facility	Rear End	Rear End + Unsafe Speed	% Unsafe Speed	Distracted Driver
Mid-Block	636	297	46.7%	12.1%
Signalized	515	266	51.7%	7.1%
Non-Signalized	925	474	51.2%	7.6%

Source: SWITRS, 2016-2020

Additionally, rear end, unsafe speed collisions where the at-fault party was distracted (cell phone use, children, music, etc.) contributed to 12% of all collisions on segments, and less than 8% of collisions at intersections. Compared to Orange County’s average rate of distracted driving for all rear end/unsafe speed collisions (9%), Huntington Beach’s rate is slightly higher at mid-block locations, and about the same for intersections. While not every incident report will capture the attention state of the driver, this summary indicates other factors, particularly unsafe speeds which are the highest PCF for rear-end collisions (see **Figure 4.8**), could be contributing to the rear-end collisions across the city.

As mentioned earlier, broadside collisions were the second most frequently-occurring collision types in Huntington Beach. Automobile right-of-way, signs/signals, and improper turning violations were the highest-occurring primary collision factor (PCF) in broadside collisions. **Table 4.6** provides a summary of broadside collisions with these “intersection factor” PCFs by facility type. 75% of broadside collisions resulted from intersection factors, with the highest share of those at signalized intersections (81%). Additionally, 38% of broadside collisions were left turn related, and 58% of those were also at signalized intersections.

Table 4.6: Broadside Collisions by Facility Type

Facility	Broadside Collision	Broadside Collision w/ Intersection Factor ³	% Intersection Factor	% Left-Turn Related
Mid-Block	373	241	64.6%	45.2%
Signalized	733	598	81.6%	52.8%
Non-Signalized	937	698	74.5%	51.3%

Source: SWITRS, 2016-2020

4.3 HUNTINGTON BEACH – ORANGE COUNTY COMPARISON

SWITRS data was extracted for all of Orange County using the same 5-year period from 2016 to 2020, to compare the characteristics of injury and fatality collisions for the City of Huntington Beach with those for all of Orange County. In order to make a meaningful comparison of the two datasets, collisions on all highways were excluded from the Orange County data, as they were for City data. Highway speeds and operating conditions are significantly different from those on local roadways, with fewer turning movements, bicycle and pedestrian prohibitions, and an overall higher design and travel speed. As shown in Table 4.7, between 2016 and 2020, Huntington Beach had a total of 7,195 collisions on City streets. With a 2020 population of 198,711, this amounts to 7,242 collisions per million residents per year over the five-year period. In all of Orange County during the same period, there were a total of 82,730 collisions, at a rate of 5,192 collisions per one million residents per year. Thus, Huntington Beach had a significantly higher collision rate than the county average.

Table 4.7: Total Collision Comparison, Huntington Beach vs. Orange County

Measure	Orange County	Huntington Beach
Population (2020 Census)	3,186,989	198,711
Total Collisions	91,035	7,195
Annual Collisions per Million Residents	5,713	7,242
KSI Collisions	3,099	209
KSI (% of Total)	3.4%	2.9%
Pedestrian Collisions	3,641	308
Pedestrian (% of Total)	4.0%	4.3%
Bicycle Collisions	4,052	607
Bicycle Collisions (% of Total)	4.5%	8.4%

Source: SWITRS, 2016-2020. U.S. Decennial Census

The County had a slightly higher percentage of KSI collisions (3.2% vs. 2.9%), but pedestrian-involved collision percentages were slightly lower in the County (4.1% vs. 4.3 %). However, the share of bicycle KSI collisions was appreciably higher in Huntington Beach than Countywide (8.4% and 4.6%, respectively); this may be due to the popularity of the regional Santa Ana River Trail and beachfront Huntington Beach Bike Path that run through the entire City, with both being a regional attraction for recreational and

³ Intersection Factors include the Auto ROW, Improper Turning, and Signs/Signals PCFs

commuter bicyclists.

Table 4.8 focuses on the KSI collision share in Huntington Beach and Orange County. Huntington Beach had a higher rate of KSI collisions per million residents per year than Orange County (210 vs. 166). Among KSI collisions, Huntington Beach had a slightly higher percentage of fatalities (28.2% vs. 20.1%) and a slightly lower percentage of severe injuries (71.8% vs. 79.9%) than the County as a whole. In addition, both pedestrian and bicycle KSI collision rates in Huntington Beach were higher than the County. This corresponds to the nearly equal rate of pedestrian collisions and higher rate of bicycle collisions in the City as an indicator that although the bicycle/pedestrian collision share is fairly low in the City or County, there is higher historical risk of a fatal or severe injury for people riding and walking in Huntington Beach versus the County overall (9% higher).

Table 4.8: KSI Collision Comparison, Huntington Beach vs. Orange County

Measure	Orange County	Huntington Beach
Population (2020 Census)	3,186,989	198,711
Fatal & Severe Collisions (KSI)	3,099	209
Annual KSI Collisions per Million Residents	194	210
Fatal Collisions	767	59
Fatal (% of KSI)	24.7%	28.2%
Severe Injury Collisions	2,332	150
Severe Injury (% of KSI)	75.3%	71.8%
Pedestrian KSI Collisions	748	59
Pedestrian (% of KSI)	24.1%	28.2%
Bicycle KSI Collisions	360	39
Bicycle KSI Collisions (% of KSI)	11.6%	18.7%

Source: SWITRS, 2016-2020

Table 4.9 summarizes the SWITRS data by collision type for Huntington Beach and Orange County. In both the City and County, broadside and rear-end collisions had the highest rate of occurrence. However, there was a much higher share of rear-end collisions in the City (6.3% greater), which being associated with the unsafe speed PCF, means that collision type could be mitigated by traffic calming and other vehicle speed reduction countermeasures. Overall, the remaining distribution of collisions types in the City is very similar to Countywide trends.

It is difficult to assess the significance of these differences based on a single year of data and a slight percentage difference, and small percent changes (<5%) are likely consistent with regular year over year changes.

Table 4.9: Collision Type Comparison, Huntington Beach vs. Orange County

Collision Type	Orange County	Huntington Beach	Difference
Broadside	28.3%	26.0%	-2.3%
Head-On	5.9%	4.7%	-1.2%
Hit Object	13.1%	11.6%	-1.5%
Not Stated	2.0%	1.6%	-0.4%
Other	2.9%	3.6%	0.7%
Overtaken	1.1%	1.7%	0.6%
Rear End	26.6%	32.1%	5.5%
Sideswipe	16.4%	15.6%	-0.8%
Vehicle/Pedestrian	3.6%	3.2%	-0.4%

Source: SWITRS, 2016-2020

Table 4.10 compares PCFs for the City and the County. As with collision type, the ranking of PCF categories in Huntington Beach is mostly aligned with that of Orange County. In both geographies, unsafe speed, automobile right-of-way, and improper turning comprise the top three PCF categories. Huntington Beach does have a slightly higher share of DUI collisions (3.3% difference), and a slightly lower rate of unsafe lane change-related collisions (-4.2% difference).

Table 4.10: PCF Comparison, Huntington Beach vs. Orange County

Primary Collision Factor	Orange County	Huntington Beach	Difference
Unsafe Speed	22.9%	22.3%	-0.6%
Improper Turning	18.0%	15.3%	-2.7%
Automobile ROW	16.4%	14.8%	-1.6%
Under the Influence	11.4%	14.8%	3.4%
Unsafe Lane Change	9.9%	5.5%	-4.4%
Traffic Signals and Signs	5.0%	6.2%	1.2%
Unknown	3.7%	3.2%	-0.6%
Unsafe Starting / Backing	3.6%	4.3%	0.7%
Other Than Driver / Ped	1.8%	2.0%	0.2%
Wrong Side of Road	1.4%	2.9%	1.4%
Pedestrian Right of Way	1.3%	1.3%	0.0%
Pedestrian Violation	1.3%	1.6%	0.3%
Other Hazardous Violation	0.8%	0.5%	-0.3%
Following Too Closely	0.8%	3.3%	2.6%
Improper Passing	0.7%	0.8%	0.1%
Other Improper Driving	0.6%	0.6%	0.0%
Hazardous Parking	0.1%	0.1%	0.0%
Impeding Traffic	0.1%	0.1%	0.0%
Other Equipment	0.1%	0.1%	0.0%
Lights	0.0%	0.0%	0.0%
Brakes	0.0%	0.0%	0.0%
Fell Asleep	0.0%	0.0%	0.0%

Source: SWITRS, 2016-2020

4.4 HUNTINGTON BEACH VS. CITIES OF SIMILAR SIZE

In the State of California's OTS Collision Ranking system, Huntington Beach is part of Group B. This group consists of 59 cities (58 in 2017) in the state of California with a population between 100,001 and 250,000. **Table 4.11** shows the City's 2019 collisions ranking among the cities in Group B (1 being the highest/worst and 59 being the lowest/best). The City's traffic safety indicators ranks higher than the County's in several areas based on the OTS rankings over time, when compared to the citywide collision analysis results.

- The City ranked 3rd for alcohol involved collisions that led to fatal or injured parties
- Of the alcohol involved collisions, the City ranked 9th for DUI drivers that were between the ages of 21-34 and 22nd for drivers under the age of 21
- The City ranked 2nd for motorcycle collisions (89% of all motorcycle collisions in the City) that resulted in death or injury
- The City ranked in the middle of Group B for pedestrian-involved collisions; however, the City ranked 20th for collisions involving pedestrians aged 65 and older
- The City ranked 2nd for bicycle collisions that resulted in injury or death
- The City ranked 59th in DUI arrests, the lowest of any Group B city
- The City ranked 11th for composite collisions (which aggregated the had been drinking 21-34, had been drinking under 21, alcohol involved, hit-and-run, nighttime and speed collision categories)

Table 4.11: 2017-19 OTS Rankings, Huntington Beach

Categories	2017		2018		2019	
	Collisions	Rank	Collisions	Rank	Collisions	Rank
Total Fatal and Injury	1,406	10/58	1,333	16/59	1,038	25/59
Alcohol Involved*	162	4/58	201	1/59	163	3/59
Had Been Drinking Driver < 21*	8	10/58	8	4/59	3	22/59
Had Been Drinking Driver 21 – 34*	46	10/58	56	5/59	29	9/59
Motorcycles	76	8/58	77	7/59	60	2/59
Pedestrians	79	14/58	85	13/59	54	35/59
Pedestrians < 15	5	37/58	12	5/59	3	53/59
Pedestrians 65+	7	24/58	7	28/59	10	20/59
Bicyclists	130	2/58	132	2/59	101	2/59
Bicyclists < 15	14	2/58	18	2/59	6	17/59
Composite	605	9/58	664	5/59	523	9/59
Other Collision Categories						
Speed Related*	188	18/58	191	20/59	152	29/59
Nighttime (9:00pm – 2:59am)*	100	26/58	117	20/59	100	21/59
Hit and Run*	101	10/58	91	16/59	76	26/59
Other Measures						
DUI Arrests	711	53/58	874	57/59	966	59/59
Daily VMT	2,392,357		2,421,010		2,076,450	
Fatal/Injury Collisions/1,000,000 VMT	588		551		500	

*OTS aggregates these indicators to produce the Composite collision total.

Source: OTS Crash Rankings 2017, 2018, 2019

5.0 TRANSPORTATION SAFETY EMPHASIS AREAS

Transportation safety emphasis areas provide a strategic framework for developing and implementing the Local Roadway Safety Plan (LRSP). The emphasis areas provide the City of Huntington Beach the areas to focus on when developing projects and programs based on the LRSP. The implementation of the emphasis areas should directly relate to the goals, policies, and strategies of the LRSP.

Based on the collision data analysis conducted for the City and trends in the OTS rankings, the following transportation safety emphasis areas were identified:

- Walking and Riding
- Unsafe Speed
- Intersection Safety
- Driving Under the Influence

The following section explains how each area was selected based on this memo's collision analysis.

5.1 SAFE SPACES FOR PEOPLE WALKING & RIDING

Pedestrians are among the most vulnerable roadway users. Pedestrian commuters in suburban communities are often too young or old to drive, or lack the means to purchase a car. Broad streets with narrow sidewalks, long crossing distances, and limited crossing opportunities can make walking not only uncomfortable, but especially concerning when people are crossing the street. High vehicle speeds can also increase the likelihood of death or serious injury if a cyclist or pedestrian is struck by a vehicle. A pedestrian or cyclist getting hit by a car traveling at 35+ mph is at a very high risk for fatal injury. Vehicles traveling at high rates of speed increase the energy of an impact, and also can result in a driver having less reaction time and ability to avoid a collision due to increased stopping distance and greater risk of losing control of the vehicle. While pedestrian-involved collisions comprised only 4% of total collisions in Huntington Beach, they accounted for 29% of KSI collisions. Huntington Beach also has several commercial districts with a high concentration of pedestrian activity; efforts to promote pedestrian safety should be targeted in those districts, and anywhere else where there are periods of high pedestrian demand, such as schools, parks, and other public facilities.

Figure 5.1: Risk of Pedestrian Fatality Based on Speed

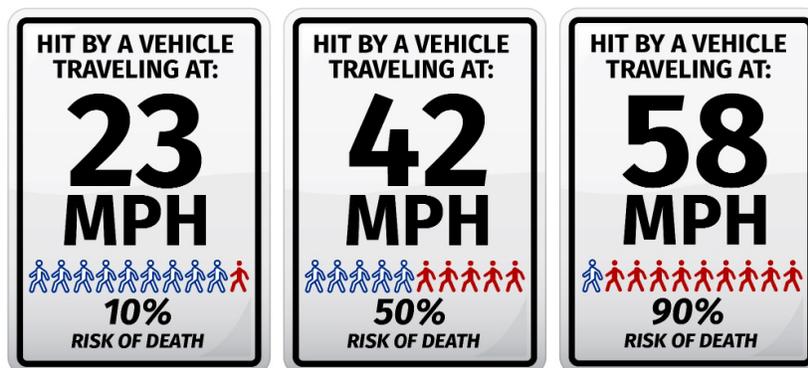
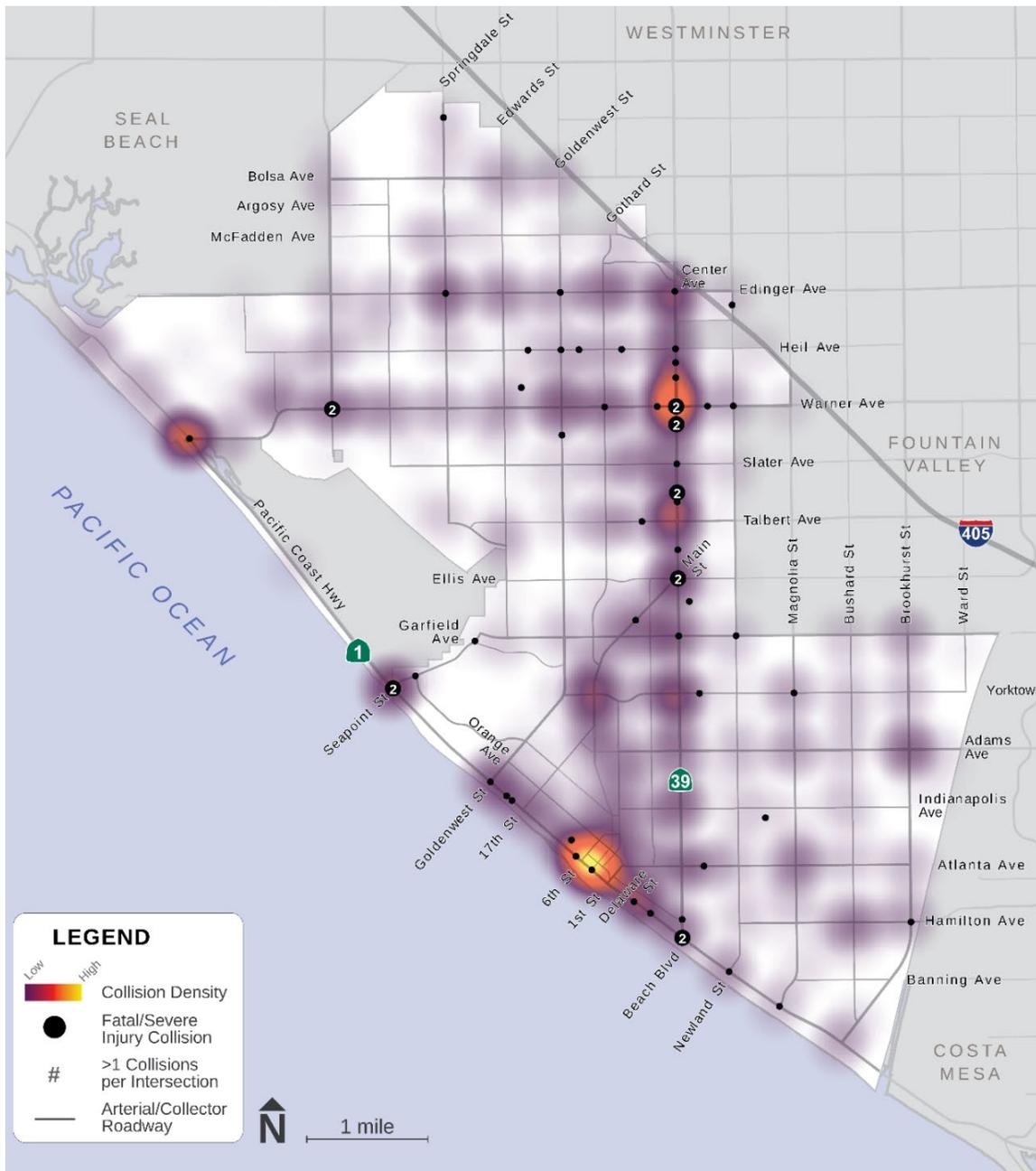


Figure 5.2: Bicycle and Pedestrian Collision Distribution



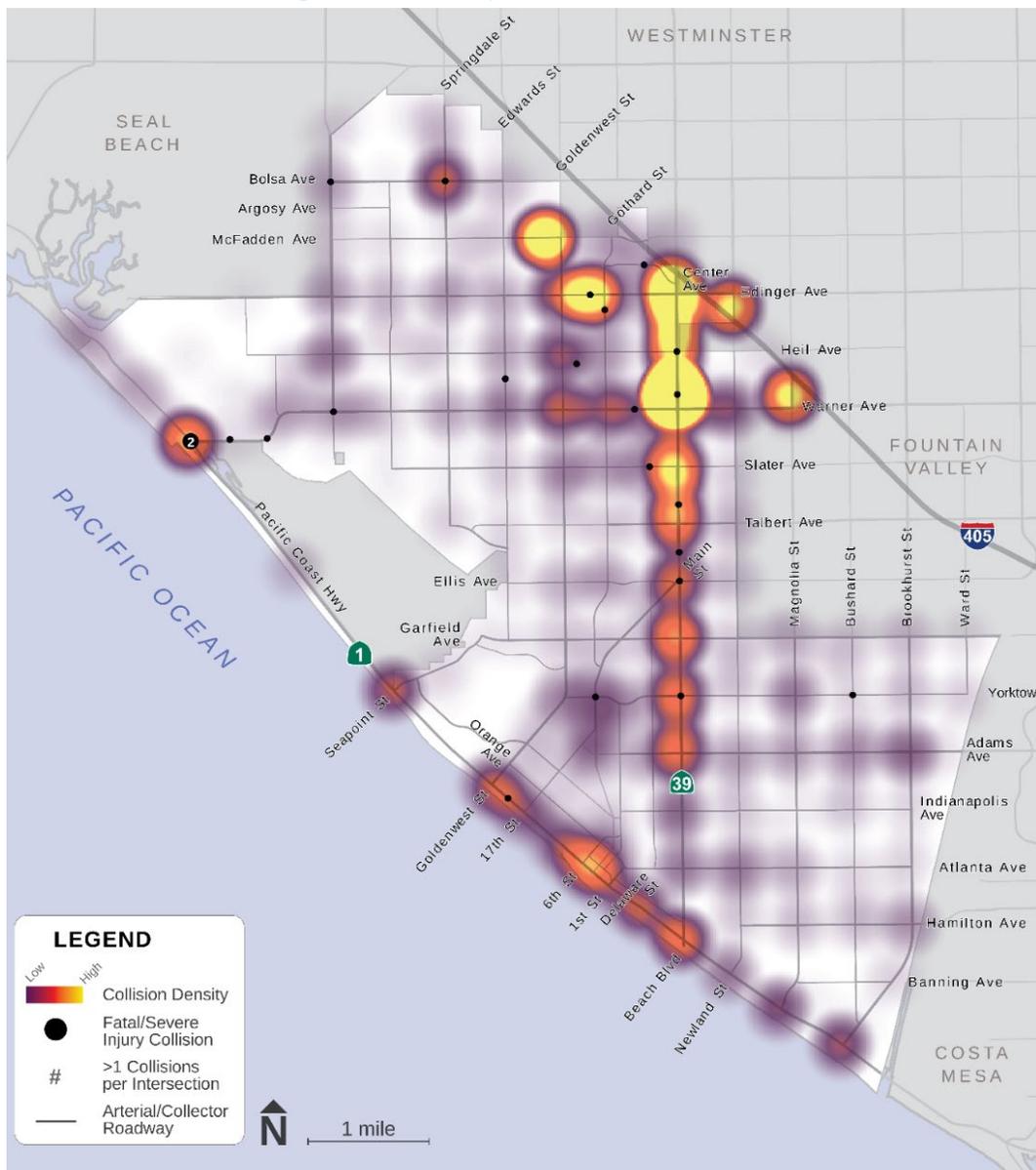
There are also several regional Class I bicycle paths and a network of Class II lanes throughout the City. Class II bicycle lanes do offer a dedicated space for cyclists in the roadway, but offer no physical barrier or protection from vehicles. Protected bicycle facilities on corridors and at intersections can demonstrably reduce (from 45% to 100%) the number of bicycle collisions if implemented. In the 2018 OTS Rankings, Huntington Beach ranked 2nd for killed or injured bicyclists, and 13th among peer cities for the number of killed or injured pedestrians.

5.2 UNSAFE SPEEDS

Unsafe speeds contribute significantly to collision frequency and severity. The level of risk for injury when

vehicles are traveling above 35 miles per hour increases dramatically, even with a “slight” increase in speed (5-10 MPH). A safe travel speed can vary relative to the conditions; wet road conditions, fog, construction, and traffic congestion can all require drivers to slow down to a speed below the posted speed limit. Additionally, there are other contributing factors that, when combined with higher speeds, can potentially lead to a traffic collision, and these may end up being reported as speed-related collisions in SWITRS data. Speed-related collision reductions could be achieved with a combination of traffic calming countermeasures, education or enforcement campaigns that focus on corridors with a high frequency of unsafe speeds (based on collision history, outreach and police citation data), and speed limit reductions where permitted under state and local guidance. Vehicles traveling at unsafe speeds create an elevated level of risk for all roadway users, but especially people walking or bicycling, whose safety is an overarching emphasis area for this entire LRSP.

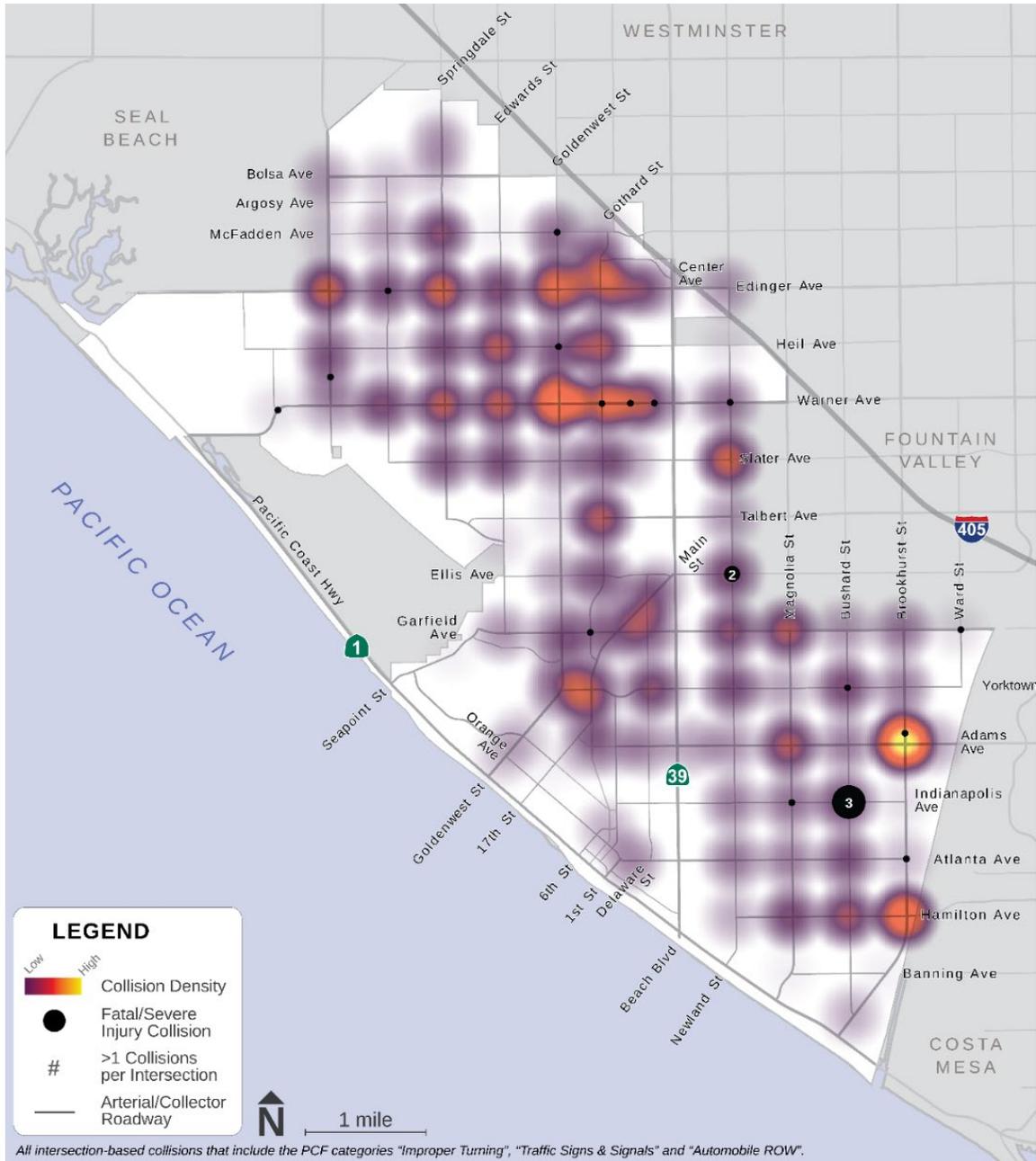
Figure 5.3: Unsafe Speed Collision Distribution



5.3 INTERSECTION SAFETY

The improper turning and automobile ROW collision factors are present across many of the collision types in the City, and carry a higher risk of injury or death if it results in head-on or broadside collision. Both a systemic review of all intersections, and a focused review of left turn collisions at signalized intersections will indicate where additional protected turning movements and warning signage can be added to improve safety for turning vehicles. Near-side signals, larger signal lenses, and a longer mast arm can increase signal visibility, which may address red light violations and rear-end collisions.

Figure 5.4: Intersection Safety Collision Distribution



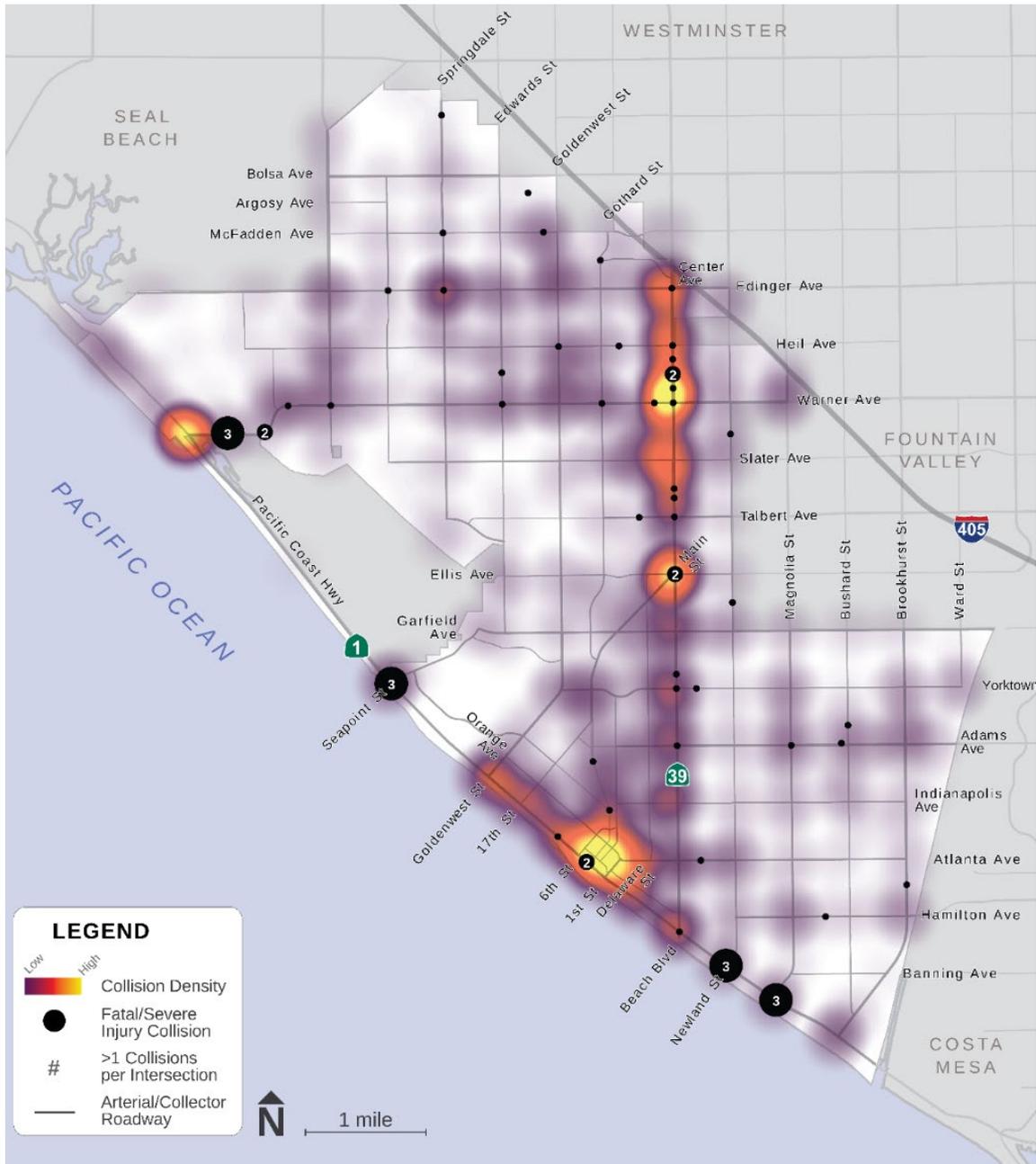
Where there are high frequencies of pedestrian or bicycle collisions, countermeasures include prohibiting

right-turn-on-red where intersection operation permits it and striping conflict zones at intersections and approaches to clearly indicate space for people walking or riding. Other design changes like stop bar set-backs, bicycle boxes, and two-stage turn queue boxes can also enhance bicycle safety at intersections. Countermeasures like these would complement the emphasis area focused on pedestrian and bicycle safety, and improving intersection safety for all modes and users.

5.4 DRIVING OR BICYCLING UNDER THE INFLUENCE

Driving under the influence (DUI) is the third most common PCF in Huntington Beach, responsible for 15% of all collisions over the 5-year analysis period. Additionally, DUI collisions accounted for the second-most frequent PCF for KSI collisions (18%). The 2018 OTS Rankings gave Huntington Beach some of the highest ranks for several DUI-related statistics, including 3rd for alcohol-related collisions, and 2nd for collisions where people aged 21-34 had been drinking. Huntington Beach has improved its ranking significantly for underage drinking collisions since 2018, moving from 2nd in its group to 22nd. The actions that led to this improvement should be continued, and even expanded to improve DUI collision outcomes even further. Reducing DUI collisions will require a long-term strategy to educate a broad spectrum of stakeholders. This could include education programs for drivers, funding “ride-home” programs in partnership with local businesses that serve alcohol, and DUI checkpoints on weekends and in the evenings, when these collisions most frequently occur.

Figure 5.5: DUI Collision Distribution



6.0 ENGINEERING COUNTERMEASURES

The City has taken a number of efforts in recent years to improve roadway safety, with particular emphasis on increasing pedestrian and bicycle safety. In addition, the City has funded the preparation of a Citywide Mobility Study to help identify additional needs and establish priorities for a variety of mobility improvements.

6.1 EXISTING PROJECTS AND CONTEXT

The City has installed Rapid Rectangular Flashing Beacons (RRFBs) at nine schools within the Ocean View School District (OVSD), Huntington Beach City School District (HBCSD), and the Fountain Valley School District (FVSD). Additionally, five more projects are currently in the design phase that include access to schools in Huntington Beach Unified High School District (HBUHSD), Westminster School District (WSD), OVSD, and HBCSD. The City also rebuilt a pedestrian bridge crossing Interstate 405, providing access to Westmond Elementary and Vista View Middle School.

In addition, the City has installed improved bicycle facilities at four locations, including two protected bike lane corridors along parts of Delaware Street and Springdale Street, with an additional protected/buffered bike lane along Banning Avenue currently undergoing design. In addition, the City recently implemented traffic signal improvements at three locations near OVSD and HBUHSD schools.

The recommended engineering countermeasures (physical or operational improvements made in the public right of way to enhance transportation safety) are intended to continue these efforts and make further improvements to roadway safety in the City. Based on the SWITRS collision analysis, these combinations represent the most common collisions that occurred in Huntington Beach from 2016 to 2020:

- Rear-end collisions due to unsafe speeds
- Broadside collisions due to automobile right-of-way violations
- Broadside collisions due to failure to obey traffic signals and signs
- Sideswipe collisions due to improper turning
- Rear-end collisions due to driving or bicycling under the influence

Countermeasure recommendations are organized by each Safety Emphasis Area as established in **Section 5**. Safety countermeasures for the identified candidate locations were selected based on the following collision patterns:

- Collision severity
- Lighting conditions
- Involved parties, especially bicyclists and pedestrians
- Type of collision
- Primary collision factor
- Movements of the involved parties preceding the occurrence of the collision

Each Safety Emphasis Area contains a table of recommended countermeasures related to that area. The table summarizes each countermeasure's applicable collision types, collision reduction factor (CRF), project life of the recommended improvement, maximum federal reimbursement percentage, and the opportunity for a systemic approach. The project life is used to estimate the number of collisions to

include in Benefit-Cost Ratio (e.g. a project life of 20 years would mean that the number of collisions estimated to occur in a 20-year time frame should be included in the benefit calculation).

The countermeasure numbers (far left column) in Table 6.1 represent the ID number for the types of improvements that are eligible for HSIP funding. Throughout this document, countermeasures eligible for HSIP funding will have the ID number, and those that are not eligible will not have an ID number.

Figure 6.1: Existing Projects in Huntington Beach



6.1 SAFE SPACES FOR PEOPLE WALKING & RIDING

6.1.1 COLLISION TRENDS AND PATTERNS

While pedestrian-involved collisions comprised only 4% of total collisions in Huntington Beach, they accounted for 29% of KSI collisions. In 41.8% of these collisions, it was deemed that the pedestrian committed a violation, while the other 58.2% of collisions had a driver or cyclist at-fault. Bicycle collision data is more comprehensive, as bicycles are considered vehicles by the California Vehicle Code and in SWITRS data; 51.2% of bicycle-involved collisions were broadsides, with sideswipes, overturning, or hit object being the next most common.

SWITRS data on pedestrian-involved collisions is limited by the fact that such collisions have their Primary Collision Factor and collision type categorized differently from other collisions. While all non-pedestrian-involved collisions will have a range of PCF (such as unsafe speeds, DUI, etc.) and collision type (such as broadside, head-on, etc.) options available, all pedestrian-involved collisions must either have a PCF of "pedestrian violation" (meaning the pedestrian committed a violation) or "pedestrian right-of-way violation" (meaning the driver violated the pedestrian's right-of-way), and all pedestrian-involved collisions will have a collision type of "vehicle-pedestrian". Thus, the typical suite of information regarding PCF and collision type is simplified, and secondary information that could provide context to the individual collision is not available.

6.1.2 COUNTERMEASURE RECOMMENDATIONS

Countermeasures to address pedestrian and bicycle safety should focus on increasing visibility for pedestrians and bicycles, increase driver awareness of their presence, create delineated spaces within roadways for pedestrians and bicycles, and make geometric changes to intersections when necessary to place pedestrians and bicycles in a safer position that reduces movement conflicts with vehicles. **Table 6.1** describes these countermeasures.

Table 6.1: Recommended Pedestrian and Bicycle Safety Countermeasures

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	Location Types
NS19PB	Install raised medians (refuge islands)	Create a protected space for pedestrians to wait in the center of the street, so they can cross each street direction one at a time rather than waiting for both directions to clear simultaneously.	Pedestrian & Bicycle	45%	20	Pedestrian crossings across major roadways at non-signalized locations
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Install or create a new marked crosswalk with features such as continental striping, set-back yield bars, and additional lane markings.	Pedestrian & Bicycle	35%	20	Pedestrian crossings across major roadways at non-signalized or mid-block locations
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)					

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	Location Types
NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Install signage with flashing lights that are activated by a pedestrian push button to warn drivers of pedestrians actively crossing.	Pedestrian & Bicycle	35%	20	Pedestrian crossings across major roadways at non-signalized or mid-block locations
R37PB						
NS23PB	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	Install an overhead flashing beacon activated by pedestrian push button to warn drivers of pedestrians actively crossing.	Pedestrian & Bicycle	55%	20	Pedestrian crossings across major roadways at non-signalized locations
S19	Pedestrian scramble	Create a signal phase where pedestrians can cross in all directions while all vehicle traffic is stopped; remove pedestrian walk phase when vehicles are moving.	Pedestrian & Bicycle	40%	20	Areas of high pedestrian activity (such as Downtown) at signalized intersections
R32PB	Install bike lanes	Create designated space for bicycles to protect against rear-end and sideswipe collisions.	Pedestrian & Bicycle	35%	20	Major roadways
R33PB	Install separated bike lanes	Install bike lanes with vertical separation, such as painted buffers, flexible delineators, bollards, etc. to minimize potential for drivers to encroach upon the space. Can include placing the lane to the outside of on-street parking to minimize conflict.	Pedestrian & Bicycle	45%	20	Major roadways
S20PB	Install advance stop bar before crosswalk (potential bicycle box)	Create a buffer of 5-10 feet between intersection approach's stop bar and striped crosswalk. This area can also be marked as a bicycle waiting area to improve the safety of bicycle left-turns and reduce conflicts when left-turning bicycles have to queue behind vehicles in the left turn lane.	Pedestrian & Bicycle	15%	10	Signalized intersections between major roadways
N/A*	Install two-stage bicycle left-turn box	Create a designated space for bicycles to wait while making a left turn through two separated intersection movements. This space is in front of vehicles waiting at the signal, which reduces conflict between bicycles and right-turning vehicles.		N/A		Signalized intersections between major roadways where Class II bicycle lanes intersect

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	Location Types
N/A*	Install curb bulb-outs	Extend the pedestrian waiting area into the crosswalk to shorten crossing distances and improve pedestrian sight lines/visibility while calming adjacent traffic.		N/A		Intersections with heavy pedestrian volumes

*Not an HSIP-eligible countermeasure.

Source: Caltrans Local Roadway Safety Manual, Version 1.6 April 2022

6.2 UNSAFE SPEEDS

6.2.1 COLLISION TRENDS AND PATTERNS

The most common combination of collision type and Primary Collision Factor (PCF) are rear-end collisions due to unsafe speeds, which can be related to other conditions like congestion, driver inattention or weather; 1,037 collisions of this combination occurred in Huntington Beach between 2016 and 2020, which is 14.4% of all collisions that took place during the time period. Among collisions with a PCF of unsafe speeds, hit object is the second-most common collision type, with 99 collisions of this combination. Other common collision types are sideswipe, broadside, and head-on.

6.2.2 COUNTERMEASURE RECOMMENDATIONS

Reduction in unsafe speed-related collisions can be achieved through countermeasures that calm traffic, increase driver reaction time, and create physical protections from objects and other vehicles. **Table 6.2** describes these countermeasures.

Table 6.2: Recommended Unsafe Speed Countermeasures

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	Location Types
S02	Improve signal hardware: back-plates with retroreflective borders	Increase driver attention by adding a retroreflective border to traffic signals, making the signal easier to see from a greater distance.	All	15%	10	Signalized intersections
S03	Improve signal timing (coordination, phases, red, yellow, or operation)	Reduce traffic congestion by re-timing signals so that traffic flow is improved and stops at signalized intersections are reduced along a corridor.	All	15%	10	Signalized intersections along major roadway segments
NS05mr	Convert intersection to mini-roundabout (from non-signalized)	Calm traffic speeds by installing mini-roundabouts at regular intervals along a residential street to require drivers to slow down.	All	30%	20	Minor intersections in residential neighborhoods
NS09	Install flashing beacons as advance warning	Improve driver reaction time by adding flashing beacons and signage to warn of an upcoming stop sign and make	All	30%	10	Stop-controlled intersections along major roadway

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	Location Types
		drivers aware of the stop sign from a greater distance.				segments
NS18	Install left-turn lane (where no left-turn lane exists)	Reduce potential for rear-end collisions by creating a designated space for vehicles awaiting a left-turn away from thru-traffic.	All	35%	20	Non-signalized, non-stop controlled intersections along major/high-speed roadway segments

Source: Caltrans Local Roadway Safety Manual, Version 1.6 April 2022

6.3 INTERSECTION SAFETY

6.3.1 COLLISION TRENDS AND PATTERNS

Broadside collisions are the most prevalent collision type among causes related to intersection safety; they are the most common type for collisions with a PCF of automobile right of way (934 collisions, or 80.2% of this PCF) and traffic signals and signs (422 collisions, or 86.8% of this PCF). Improper turning results in a broader range of collision types, with broadside, hit object, rear-end, and sideswipe being the most common. This safety emphasis area is primarily focused on collisions occurring within intersections rather than on the approaches to intersections.

6.3.2 COUNTERMEASURE RECOMMENDATIONS

Enhanced intersection safety countermeasures should work to minimize driver error, mitigate the impacts of driver error, and provide drivers with a greater sense of awareness about upcoming decisions they will need to make and hazards to look out for as they approach intersections. **Table 6.3** describes these countermeasures.

Table 6.3: Recommended Intersection Safety Countermeasures

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	Location Types
NS02	Convert to all-way STOP control (from two-way or yield control)	Implement stop controls for traffic in all directions to reduce driver right-of-way conflicts at intersections where some directions have stop controls and others do not.	All	50%	10	Non-signalized intersections without all-way stop controls
NS07	Upgrade intersection pavement markings	Increase driver awareness of non-signalized intersections and provide additional information as drivers approach (such as lane destinations, "Stop Ahead" markings).	All	25%	10	Non-signalized intersections

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	Location Types
S07	Provide protected left turn phase (left turn lane already exists)	Address head-on and broadside collisions during unprotected left turns across traffic by installing a protected left turn signal (note: requires warrant analysis)	All	30%	20	Signalized intersections with no protected left turn phase
NS14	Install raised median on approaches	Address broadside, rear-end, and sideswipe collisions by preventing left-turning movements (on or off the roadway) in close vicinity of major intersections.	All	25%	20	Major intersections
S12						
NS15	Create directional median openings to allow (and restrict) left-turns and U-turns	Address broadside, rear-end, and sideswipe collisions by separating thru-traffic from left-turning movements at intersections.	All	50%	20	Major and minor intersections, where appropriate
S14						

Source: Caltrans Local Roadway Safety Manual, Version 1.6 April 2022

7.0 NON-ENGINEERING SAFETY MEASURES

This section presents a list of potential non-infrastructure solutions to Huntington Beach’s roadway safety needs. The programs will promote safe behavior in each plan’s identified transportation safety emphasis areas through education, law enforcement, and encouragement.

7.1 SAFE SPACES FOR PEOPLE WALKING & RIDING

Pedestrians and cyclists are a highly vulnerable set of road users, particularly at night. Huntington Beach ranked 20th in nighttime collisions and 13th in pedestrian collisions among cities of similar size in 2018. While motorists have a responsibility to drive safely, pedestrians and cyclists can also take steps to enhance their own safety through increased awareness and measures to make themselves more visible.

The following safety (non-engineering) programs or program elements can be considered and/or continued to address pedestrian and bicycle collisions:

7.1.1 EDUCATION

- Implement a “See and Be Seen” campaign through signage, social media, and advertising.
- Support adult bicycle rider skills classes, such as those offered by the Orange County Bicycle Coalition.
- Promote and potentially expand Huntington Beach Police Department (HBPD) Bicycle Safety Class.
- Offer student pedestrian and bicycle traffic safety education in schools. Lessons related to walking can include the danger of walking with distractions, while bicycle lessons can include helmet and bicycle fit, hand signals, and riding safely with traffic.

7.1.2 ENFORCEMENT

- Continue to offer diversion to HBPD Bicycle Safety Class for bicycle riders who have been cited for traffic violations.

7.1.3 FUNDING SOURCES

Table 7.1: Pedestrian and Bicycle Program Funding Sources

Description	Responsible Agency	Funding Source
EDUCATION		
Implement a “See and Be Seen” campaign for pedestrians and cyclists	City of Huntington Beach	OTS Grants
Support adult bicycle rider skills classes.	Orange County Bicycle Coalition	OTS Grants
Promote and potentially expand Huntington Beach Police Department (HBPD) Bicycle Safety Class.	Huntington Beach Police Department	OTS Grants
Offer student pedestrian and bicycle traffic safety education in schools. Lessons related to walking can include the danger of walking with distractions, while bicycle lessons can include helmet and bicycle fit, hand signals, and riding safely with traffic.	Huntington Beach City School District, Ocean View School District, Huntington Beach Union High School District, Orange County Bicycle Coalition	OTS Grants

7.2 UNSAFE SPEEDS

Huntington Beach ranked 18th in speed-related collisions among cities of similar size in 2017. Unsafe speeds contribute significantly to collision frequency and severity. The following safety (non-engineering) programs or program elements can be considered to address unsafe speed-related collisions.

7.2.1 EDUCATION

- Create a social media campaign to help drivers become more aware of how their speed impacts the risk of death for vulnerable road users. This campaign could be led by the City of Huntington Beach Department of Community Services or the Huntington Beach Police Department.

7.2.2 ENFORCEMENT

- Deploy Huntington Beach Police Department officers equipped with radar or LIDAR technology at strategic locations to ticket speeding drivers.
- Deploy Huntington Beach Police Department officers at locations with frequent cell phone violations to ticket distracted drivers, as distracted driving can contribute to a speed-related collision.

7.2.3 FUNDING SOURCES

Table 7.2 presents potential funding sources for the programs addressing unsafe speeds.

Table 7.2: Unsafe Speed Program Funding Sources

Description	Responsible Agency	Funding Source
EDUCATION		
Create a social media campaign across multiple platforms that targets messaging towards drivers to drive at or below the speed limit, with emphasis on the consequences of not doing so.	City of Huntington Beach Department of Community Services, Huntington Beach Police Department	OTS Grants
ENFORCEMENT		
Deploy police officers equipped with radar or LIDAR technology at strategic locations to ticket speeding drivers.	Huntington Beach Police Department	OTS Grants

7.3 INTERSECTION SAFETY

While intersection safety is primarily a consideration of infrastructure, non-engineering measures can be integral to the successful implementation of intersection upgrades. Through outreach programs, members of the public can be made aware of changes, offer their input, and learn more about the benefits of upgraded amenities at intersections.

7.3.1 EDUCATION

- Create a pop-up demonstration using SCAG's *Go Human* Kit of Parts, which is a set of physical materials that demonstrate potential street design elements in a temporary manner. These are made of portable, light-weight materials that are easy to transport and assemble.

- Create educational materials to teach drivers how to use unfamiliar intersection features, such as mini-roundabouts.

7.3.2 ENFORCEMENT

- Deploy special enforcement around newly upgraded intersections to ensure that features are being used properly, e.g. ensuring bicycle lanes remain unobstructed, limit lines are obeyed, and roundabouts are used correctly.

7.3.3 FUNDING SOURCES

Table 7.3 presents potential funding sources for the programs addressing intersection safety.

Table 7.3: Intersection Safety Program Funding Sources

Description	Responsible Agency	Funding Source(s)
EDUCATION		
Create a pop-up demonstration using SCAG’s <i>Go Human</i> Kit of Parts, which is a set of physical materials that demonstrate potential street design elements in a temporary manner. These are made of portable, light-weight materials that are easy to transport and assemble.	Huntington Beach Public Works Department, Southern California Association of Governments (SCAG)	SCAG <i>Go Human</i> Mini-Grants, OTS Grants, ATP NI Funds
Create a social media campaign focused on reducing distracted driving or cell phone use while driving.	Huntington Beach Department of Community Services, Huntington Beach Police Department	Caltrans ATP NI Funds, OTS Grants
ENFORCEMENT		
Deploy special enforcement to ensure that features are being used properly, e.g. ensuring bicycle lanes remain unobstructed, and roundabouts are used correctly.	Huntington Beach Police Department, Huntington Beach Public Works	OTS Grants

7.4 DRIVING OR BICYCLING UNDER THE INFLUENCE

Driving Under the Influence (DUI) remains a major issue in the City of Huntington Beach, ranking in the top 4 every year from 2017-2019 in alcohol-involved collisions among cities of similar size, and ranking 1st in 2018. While underage drinking is often an issue in other locations, Huntington Beach has high instances of alcohol-involved collisions among drivers both above and below age 21. Despite this, Huntington Beach consistently ranks among the lowest of cities of similar size for DUI arrests, always ranking within the bottom top 10, and ranking 59th out of 59 in 2019. This indicates that additional education and enforcement efforts are needed in this area to prevent DUI collisions, and that creative approaches should be considered to complement traditional methods of reducing drinking and driving.

7.4.1 EDUCATION

- Schools in Huntington Beach can consider incorporating Every 15 Minutes⁴ into the curriculum. The Every 15 Minutes program is a two-day program focusing on high school juniors and seniors. The program challenges them to think about drinking, driving, personal safety, the responsibility

⁴ California Highway Patrol. *Every 15 Minutes*. <https://www.chp.ca.gov/programs-services/programs/youth-programs/every-15-minutes>

of making decisions, and the impact their decisions have on their family, friends, and community. The program is funded through OTS grants and California Highway Patrol mini-grants.

- The California Department of Alcoholic Beverage Control (ABC) operates the Licensee Education on Alcohol and Drugs (LEAD) training program for store managers and employees on how to sell alcohol safely, responsibly, and legally, with an emphasis on preventing sales to minors and clearly intoxicated customers⁵. This program is voluntary and free through OTS grants.

7.4.2 ENFORCEMENT

- Set up police checkpoints at night to enforce DUIs.
- Provide training to Huntington Beach Police Department for finding DUIs and other driving behaviors.

7.4.3 FUNDING SOURCES

Table 7.4 presents potential funding sources for the programs addressing Driving or Bicycling Under the Influence.

Table 7.4: DUI Program Funding Sources

Description	Responsible Agency	Funding Source(s)
EDUCATION		
Establish and stage an Interactive Simulation program for high school students – Every 15 Minutes. The Interactive Simulation program aims to challenge high school juniors and seniors about drinking, driving, and mature decision-making.	Huntington Beach City School District, Ocean View School District, Huntington Beach Union High School District	OTS Grants
Promote Licensee Education on Alcohol and Drugs (LEAD) certification for store managers and employees on how to sell alcohol safely, responsibly, and legally.	City of Huntington Beach Department of Community Services, Huntington Beach Chamber of Commerce	OTS Grants
ENFORCEMENT		
Monitor local liquor stores and bars suspected of selling alcohol to minors.	Huntington Beach Police Department	OTS Grants
Set up police checkpoints at night to enforce driving under the influence.	Huntington Beach Police Department	OTS Grants

⁵ California Department of Alcoholic Beverage Control. *LEAD Training*. <https://www.abc.ca.gov/education/lead-training/>

7.5 EMERGENCY VEHICLES

A total of 133 collisions were related to an emergency vehicle in Huntington Beach from 2016 to 2020, eight of which involved fire trucks. The City of Huntington Beach has its own Fire Department, with eight fire stations within the City.

Emergency Vehicle Preemption (EVP) allows emergency vehicles to interrupt a normal signal cycle to proceed through the intersection more quickly and under safer conditions. An EVP system may assist emergency vehicles traveling through traffic prone areas when responding to an emergency call. The City of Huntington Beach has deployed EVP at major intersections, but these are based on direct communication between vehicles and signals; more advanced systems, like those using GPS, can anticipate oncoming emergency vehicles, with greater notice.

It was also noted during stakeholder meetings that when the Fire Department vehicles are responding to emergencies, their siren and lights will often clear an intersection faster than the current EVP system can respond. Any development of a new EVP implementation should include additional analysis of the impact of signal delay on response times, and discussion with operations and emergency staff what the critical elements of an EVP system would be required for emergency responders.

8.0 SAFETY PROJECTS

This section provides the project scope, collision reduction benefits calculation, cost estimation, and Benefit to Cost (B/C) ratio analysis. This section also discusses and summarizes the project prioritization for the HSIP application.

8.1 PROJECT SCOPES AND BENEFIT CALCULATIONS

The development of project scopes involves identifying one or more specific countermeasures at potential locations for safety improvements. Expected benefits are derived by applying the proposed countermeasures and corresponding Collision Reduction Factors (CRFs) to the expected collisions. This involves:

- Identifying the current number of collisions without treatment
- Applying CRFs by type and severity
- Applying a benefit value by collision severity
- Calculating the annual collision reduction benefits and multiplying by the project life in years

Caltrans has established some key requirements and procedures for its calls-for-projects to allow agencies maximum flexibility in combining countermeasures and locations into a single project while ensuring all projects can be consistently ranked on a statewide basis. These include:

- Only a maximum of three individual countermeasures can be utilized in the B/C ratio for a project.
- For a countermeasure to be utilized in the B/C ratio calculations, it must represent a minimum of 15 percent of the project's total construction cost. This is intended to ensure that minor and insignificant project elements are not misrepresented to the agency's major safety effort.

An engineer determining the benefits of newly installed infrastructure first determines the number of collisions with the potential to be prevented by the improvement. The engineer then applies the CRF, which gives the rough percentage of collisions that would be prevented. The next step in estimating the overall benefit of a proposed improvement project is multiplying the expected reduction in collisions by a generally accepted value for the "cost" of collisions. The expected "benefit" value for a project is the expected "reduction in costs" value from reducing future collisions. The collision severity weighting comes from the 2022 Local Roadway Safety Manual.

Table 8.1: Collision Values and EPDO Score

Collision Severity	Location Type	Collision Cost	EPDO Score Value
Fatality (K) and Severe Injury (A)	Signalized Intersection	\$1,787,000	119.93
	Non-Signalized Intersection	\$2,843,000	190.81
Combined (KA)	Roadway	\$2,461,000	165.17
Evident Injury - Other Visible (B)		\$159,900	10.73
Possible Injury–Complaint of Pain (C)		\$90,900	6.10
Property Damage Only (O)		\$14,900	1.00

Source: Appendix D of the Caltrans LRSM, 2022

The final step in calculating the total safety project benefits is to divide the benefits by the number of years the collision data was collected (five years for this project) and multiply this value by the project life in years.

8.2 BENEFIT/COST RATIO

A Benefit/Cost Ratio (BCR) is the ratio of a project's benefits relative to its costs, and both are expressed in monetary terms. The BCR is calculated by taking a project's overall benefit and dividing it by the overall project cost. Projects with a higher BCR mean greater benefits relative to costs, while a lower BCR means fewer benefits than costs. Once a project is selected for further development, a detailed design concept and cost estimate should be created, including costs for all project phases from planning to construction completion.

Based on Caltrans's need for a fair, data-driven, statewide project selection process for HSIP call-for-projects, the benefit and cost calculations should be completed using the same process shown in the HSIP Analyzer to calculate the B/C ratio of the project. The calculated B/C ratio can then be refined by expanding or reducing the project scope elements, to deliver the most safety benefit with a project that is highly competitive in future HSIP cycles.

8.3 COUNTERMEASURE PRIORITIZATION

There are many viable approaches to project prioritization. Collision history, proximity to trip generators and attractors, corridor connection, equity, and stakeholder input are all among the various inputs that can factor into project prioritization. Most, if not all, state and federal funding programs will require a prioritization process to be involved in the selection of candidate projects. Some programs are more rigid than others with respect to how this process is conducted.

As mentioned previously, the HSIP uses the Benefit/Cost Ratio measure as the primary method of project selection. Although developing the required project concepts and cost estimates would require location selection and further refinement, **Tables 8.2, 8.3, and 8.4** combine the results of citywide collision analysis with Collision Reduction Factors (CRFs) for each countermeasure. Note that these amounts represent a *maximum potential benefit* from citywide implementation by considering all potential locations. Only HSIP-eligible countermeasures for which citywide data was available were included; non-HSIP eligible countermeasures and countermeasures that require specific contextual application were excluded. A more detailed breakdown of collision counts that were used to calculate these figures can be found in **Appendix A**.

8.3.1 SAFE SPACES FOR PEOPLE WALKING & RIDING

Table 8.2: Pedestrian and Bicycle Countermeasure Benefits

CM #	Countermeasure Names	Collision Type	CRF	Project Life (Yr.)	Location Types	Eligible Collisions	Total Collision Reduction Benefits
NS19PB	Install raised medians (refuge islands)	Pedestrian & Bicycle	45%	20	Pedestrian crossings across major roadways at non-signalized locations	257	\$197,371,980
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Pedestrian & Bicycle	35%	20	Pedestrian crossings across major roadways at non-signalized locations	257	\$153,511,540
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)					137	\$49,590,940
NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Pedestrian & Bicycle	35%	20	Pedestrian crossings across major roadways at non-signalized locations	257	\$153,511,540
R37PB						137	\$49,590,940
NS23PB	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	Pedestrian & Bicycle	55%	20	Pedestrian crossings across major roadways at non-signalized locations	257	\$241,232,420
R32PB	Install bike lanes	Pedestrian & Bicycle	35%	20	Major roadways	137	\$49,590,940
R33PB	Install separated bike lanes	Pedestrian & Bicycle	45%	20	Major roadways	137	\$63,759,780
S20PB	Install advance stop bar before crosswalk (potential Bicycle Box)	Pedestrian & Bicycle	15%	10	Signalized intersections where major roadways cross	204	\$15,073,200
S19	Pedestrian scramble	Pedestrian & Bicycle	40%	20	Areas with high pedestrian activity (such as Downtown) at signalized intersections	6 (Downtown)	\$1,314,240
						16 (Goldenwest College, Bella Terra)	\$20,734,000

Source: Caltrans Local Roadway Safety Manual, Version 1.6 April 2022

8.3.2 UNSAFE SPEEDS

Table 8.3: Unsafe Speed Countermeasure Benefits

CM #	Countermeasure Names	Collision Type	CRF	Project Life (Yr.)	Location Types	Eligible Collisions	Total Collision Reduction Benefits
S02	Improve signal hardware: back-plates with retroreflective borders	All	15%	10	Signalized intersections along major and minor arterials	1,929	\$70,905,720
S03	Improve signal timing (coordination, phases, red, yellow, or operation)	All	15%	10	Signalized intersections along major roadway segments	1,886	\$69,404,880
NS05mr	Convert non-signalized intersection to mini-roundabout with two way stop or yield control only	All	30%	20	Minor intersections along local or collector streets that parallel high volume arterial corridors	846	\$103,425,480

Source: Caltrans Local Roadway Safety Manual, Version 1.6 April 2022

8.3.3 INTERSECTION SAFETY

Table 8.4: Intersection Safety Countermeasure Benefits

CM #	Countermeasure Names	Collision Type	CRF	Project Life (Yr.)	Location Types	Eligible Collisions	Total Collision Reduction Benefits
NS07	Upgrade intersection pavement markings	All	25%	10	Non-signalized intersections	1,804	\$125,274,650
S07	Provide protected left turn signal phasing (left turn lane already exists)	All	30%	20	Signalized intersections with no protected left turn phase	1,333	\$206,103,480
NS14	Install raised median on approaches	All	25%	20	Major arterial intersections	2,525	\$413,481,500
S12						1,886	\$231,349,600

Source: Caltrans Local Roadway Safety Manual, Version 1.6 April 2022

9.0 EVALUATION AND IMPLEMENTATION

This section describes the process that will be used to evaluate the success of the plan, ensure implementation, and establish when an update is needed.

9.1 EVALUATION AND UPDATE TIMEFRAME

The LRSP should be evaluated annually to ensure that objectives are being met. The LRSP collision analysis and recommendations should be revised and/or updated, at a minimum, every five years, per Caltrans requirements for maintaining a valid LRSP. The safety emphasis areas may be adapted or revised as safety priorities in the City evolve over time and as additional safety infrastructure or programs are implemented.

In developing and evaluating any performance measures for traffic safety improvement, it is important that measures are established within the context of the safety emphasis areas, and that the data needed to measure them is readily available. For example, if the City wants to use fatal collisions per million vehicle miles traveled (VMT) in the City, both the collision data and accurate VMT estimates will need to utilize a consistent methodology over each year that is measured. It is also important to note that longer term safety infrastructure projects and education campaigns can take several years to show clear improvements over time. Year-to-year safety trends may even show short term increases but measuring outcomes over the long term will also help the City determine if it is making steady progress towards increased traffic safety.

9.2 OVERSIGHT COMMITTEE

Oversight of LRSP implementation and evaluation should be overseen by a Technical Advisory Committee. This committee will include stakeholders within the City, which may include the Department of Public Works, the Huntington Beach Police Department, the Huntington Beach Fire Department, school districts within the City, other City departments with overlapping policy or planning objectives, related external agencies, and community groups within the City or County.

The Technical Advisory Committee should utilize data-informed evaluation methods and measures to ensure that the goals of the LRSP are continually met. Data from SWITRS and the California Office of Traffic Safety (OTS) is released annually, and the City can supplement that with data from its Crossroads database or other information that Public Works maintains. NHTSA also releases annual data on fatal collisions through the Fatality Analysis Reporting System (FARS). As other related documents like General Plan elements, specific plans, Safe Routes to School programs, or other transportation studies are completed, they should be added to the list of references that are supported by, and support, the LRSP. Where possible, the LRSP's goals should be incorporated into other planning documents for consistency across City policies and procedures.

9.3 FUNDING SOURCES

Several state and federal grant programs offer to fund engineering and non-engineering roadway safety projects. The California Department of Transportation's (Caltrans) Active Transportation Program (ATP) encourages bicycle and pedestrian use in the state by funding programs that increase bike or pedestrian mode share or improve bicycle or pedestrian safety. Caltrans also administers the Sustainable Communities Grant Program, which awards grants to municipal projects that reduce greenhouse gas

emissions and support multi-modal transportation. The Sustainable Communities Program prioritizes projects that solicit stakeholder and community engagement and support state policies like the 2040 California Transportation Plan. The California Office of Traffic Safety awards grants for projects addressing any one or more of ten priority areas, including Alcohol-Impaired Driving, Drug-Impaired Driving, Motorcycle Safety, Police Traffic Services, Roadway Safety and Traffic Records, Distracted Driving, Emergency Medical Services, Occupant Protection, Pedestrian and Bicycle Safety, and Public Relations.

At the federal level, the Advanced Transportation and Congestion Management Technologies Deployment Program funds technology to promote safety and efficiency in the transportation system. The Highway Safety Improvement Program (HSIP) funds roadway safety improvements on any public roadway, but the funds are distributed by Caltrans through a state discretionary program. USDOT has also recently created the Safe Streets and Roads for All Program (SS4A), which can fund a broad variety of roadway safety project and studies. USDOT and FHWA are in the process of revising the guidance and priorities of many funding programs, which may open new opportunities for safety funding that were not considered a good fit for projects in the past, but may be strong candidates based on the revised guidance.

Table 9.1 provides a list of eligible programs and the funding sources for related to transportation safety. In addition to these programs, the 2021 Infrastructure Investment and Jobs Act (IIJA) has begun to program additional discretionary grant and formula funding programs focused on roadway safety, active transportation, and mobility technology improvements. These programs, and others that stem from new revenue sources in the State of California, should be considered as they are programmed and incorporated into the City's infrastructure funding strategies.

Table 9.1: Transportation Safety Funding Sources Summary

Oversight Agency	Source	Eligible Programs	Areas Addressed
Federal Highway Administration (FHWA)	Highway Safety Improvement Program (HSIP)	Any work on public roads, bikeways and pedestrian paths/trails “that improves the safety for its users”. For the most part, only engineering projects are eligible, but the FAST act also permits funding for data collection by law enforcement ^{1, 2} . Funding awards are administered by the State through a bi-annual funding call for projects.	Data Collection, Countermeasure Implementation
Federal Highway Administration (FHWA)	Advanced Transportation Technologies & Innovative Mobility Deployment (ATTIMD)	Funds advanced transportation and congestion management technologies to improve safety, efficiency and performance. Examples of funded project types include advanced traveler information systems and data collection and analysis efforts ³ . The City can partner with the County or SCAG on innovation projects.	Digital Enforcement; Technology Partnerships
Federal Highway Administration (FHWA)	Surface Transportation Block Grant Program (STBG)	Provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals ⁴ .	Active Transportation
US Department of Transportation	Safe Streets and Roads for All (SS4A)	The purpose of SS4A grants is to improve roadway safety by significantly reducing or eliminating roadway fatalities and serious injuries through safety action plan development and implementation focused on all users, including pedestrians, bicyclists, public transportation users, motorists, personal conveyance and micromobility users, and commercial vehicle operators.	Roadway Safety, Active Transportation, Planning & Design, Education and Enforcement, Data Collection
California Department of Transportation (Caltrans)	Active Transportation Program (ATP)	Local government projects that improve the safety or increase the mode share of bicycling and walking. Additional program objectives include reducing emissions and enhancing public health ⁵ .	Bicycle and Pedestrian Education and Enforcement
Orange County Transportation Authority	Local Fair Share Program	The Local Fair Share Program provides flexible funding to help cities and the County of Orange pay for the escalating cost of restoring the aging street system. In addition, cities can use these funds for other local transportation needs such as residential street projects, traffic and pedestrian safety near schools, signal priority for emergency vehicles, etc. This program is intended to augment, rather than replace, existing transportation expenditures	Roadway Safety, Active Transportation, Emergency Services

Oversight Agency	Source	Eligible Programs	Areas Addressed
Orange County Transportation Authority	Bicycle Corridor Improvement Program (BCIP)	The Bicycle Corridor Improvement Program (BCIP) makes funding available to local Orange County agencies for bicycle and pedestrian projects that reduce traffic congestion and improve air quality. The goals of the BCIP are to increase the number of biking and walking trips, provide regional linkages to key destinations, close bikeways corridor gaps, promote mobility options by increasing safety, implement projects with community support, and improve air quality across Orange County.	Planning & Design, Countermeasure Implementation, Active Transportation
California Department of Transportation (Caltrans)	Sustainable Communities Grant Program	The program awards "Competitive Grants" to local governments. These grants prioritize projects that reduce Greenhouse Gas Emissions, support multi-modal transportation, involve stakeholder/ community engagement and support related plans like the California Transportation Plan and California Complete Streets Framework ⁶ .	Active Transportation, Speed, Education
California Office of Traffic Safety	Office of Traffic Safety (OTS) Grants	Programs should address one of ten priority areas (eight are listed to the right). Grant recipients should expect to wait up to 90 days before being reimbursed/funded, and should be able to provide traffic safety data to justify funded programs ⁷ .	Alcohol-Impaired Driving, Drug-Impaired Driving, Police Traffic Services, Roadway Safety and Traffic Records, Emergency Medical Services, Occupant Protection, Pedestrian and Bicycle Safety, Public Relations/Advertising/ Marketing
California Air Resources Board	Sustainable Transportation Equity Program (STEP)	Aims to address community residents' transportation needs, increase access to key destinations, and reduce greenhouse gas emissions by funding planning, clean transportation, and supporting projects particularly in disadvantaged and low-income communities via two types of grants: Planning and Capacity Building Grants and Implementation Grants.	Countermeasure Implementation

Sources:

1. Highway Safety Improvement Program Guidelines, September 2021
2. Highway Safety Improvement Program, Pub. L. No. 148, 23 US Code (2015). <https://www.law.cornell.edu/uscode/text/23/148>.
3. Federal Highway Administration. Advanced Transportation and Congestion Management Technologies Deployment. February 2016. <https://www.fhwa.dot.gov/fastact/factsheets/advtranscongmgtmfs.cfm>.
4. Federal Highway Administration. Surface Transportation Block Grant Program (STBG). <https://www.fhwa.dot.gov/specialfunding/stp/>
5. California Transportation Commission. 2023 Active Transportation Program Guidelines. March 16, 2022. Resolution G-22-30.
6. California Department of Transportation. Sustainable Transportation Planning Grant Program 2022-23 Grant Application Guide. September 2021.
7. California Office of Traffic Safety Grant Manual for Federal Fiscal Year 2022. October 2021.